VISIONS OF GLOBALIZATION:
INEQUALITY AND POLITICAL STABILITY

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Dedicated to lost memories and new ones to come

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To my friends, family, professors, random email correspondence, and everyone else that was around me on this journey. Thank you.

Abstract

Beginning with a literature review of globalization, economic inequality, and political stability, a series of quantitative models are presented to identify interweaving relationships. Using the knowledge gained from these models, combined with events extracted from science fiction, several scenarios of the United States are constructed. These scenarios are useful to anticipate future consequences of emerging issues, and to influence the policy making process by providing a structured environment to examine assumptions regarding the future.

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List of Abbreviations

AT Index: A.T. Kearney Index of Globalization
CAD: Computer Aided Design
CAR: Central African Republic
Clark C-P: Core-Periphery measure taken from Clark, 2011.
DRM: Digital Rights Management
EFA: Exploratory Factor Analysis
FDI: Foreign Direct Investment
GDP: Gross Domestic Product
IDM: Internal Development Model
IPR: Instability of the Political Regime
KC: Kuznets Curve
MCP: Mass Civil Protests
NL: Natural Log
OLS: Ordinary Least Squares
PCA: Principal Components Analysis
PMV: Politically Motivated Violence
PostTax: Post-Tax Redistribution Inequality
Prew W-S: Prew measure of World System Position taken from Prew, 2010.
PreTax: Pre-Tax Redistribution Inequality
SAS: Scarcity, abundance, and sufficiency.
SNA: Social Network Analysis
SWIID: Standardized World Income Inequality Database
Sym C-P: Symmetrical Construction of Clark Core-Periphery Measure.
TIA: Trend Impact Analysis
UNU-Wider: The U.N. University World Income Inequality Database
UTIP: University of Texas Inequality Project
WR: Instability Within a Government Regime

Introduction: The Spirit of the Futures

“But this globalization had a dark side—a large and growing chasm between rich and poor. While trade globalization is associated with lower inequality, financial globalization—the big story of recent years—increased it,” IMF Managing Director Dominique Strauss-Kahn.¹

"Sooner or later, inequality undermines political stability and erodes the consensus on which development strategies are based," ECLAC Executive Secretary Alicia Barcena.²

IMF Managing Director Dominique Strauss-Kahn and ECLAC Executive Secretary Alicia Barcena together identify a powerful force shaping the world system. Globalization, networks of interrelated transactions such as movements of trade or finance, is constantly impacting the world. One of globalization's possible impacts is an increase in the rise of inequality. Unfair inequality can increase social discontent, cause a reduction in economic growth, and may even be an important factor in affecting political stability.³

During the last thirty years, a debate has risen regarding whether or not the world is increasingly tied together through overlapping, intensive networks of inter-state connections, i.e., the globalization debate.⁴ Subsequently, a parallel debate has evolved regarding the implications of globalization on inequality.⁵ Throughout, a third debate has raged regarding whether or not inequality leads to political instability.⁶ While the literature has explored many of the relationships between any two of these variables, none has attempted to explore more complicated relationship between all three. What relationship, if any, exists between globalization, inequality, and political stability? If indeed connections can be identified, what implications exist for the future?

¹ “IMF Chief Calls for New Approach to Globalization,” *IMF Survey Online*, April 5, 2011. Accessed July 30, 2013 at <http://www.imf.org/external/pubs/ft/survey/so/2011/NEW040511A.htm>.

² “Inequality Undermines Political Stability and Erodes Consensus.” *States News Service, HighBeam Research*. April 18, 2011. Accessed July 30, 2013 at <http://www.highbeam.com/doc/1G1-239730842.html>. ECLAC stands for the Economic Commission for Latin America and the Caribbean, and is a part of the United Nations.

³ Antonio Savoia et al, “Inequality, Democracy, and Institutions: A Critical Review of Recent Research,” *World Development* 38 no. 2 (2010): 142-154.

⁴ For a review of globalization theories and perspectives, see Luke Martell, “The Third Wave in Globalization Theory,” *International Studies Review* 9 no. 2 (2007): 173-196.

⁵ A review of the globalization-inequality relationship, see Melinda Mills, “Globalization and Inequality,” *European Sociological Review* 25 no. 1 (2009): 1-8.

⁶ See Antonio Savoia et al, 2009.

Recent developments in the study of globalization demonstrate a lack of clarity in the intersection between globalization, inequality, and political stability. In a recent survey of globalization- inequality research, the authors note divergent findings within the literature; depending on the definition of globalization and methodology used, there is either a positive or negative relationship.⁷

Where the relationship between globalization and inequality is clouded, there is a similar amount of confusion relating inequality with political stability. The problem stems largely from differing definitions, measurements, and methodologies to specify the relationship.⁸ On one hand are arguments where inequality impedes investment and economic growth, resulting in political instability as the economy falters.⁹ Other authors have argued that the relationship between inequality, investment, and political stability is weak at best, and lacks robustness.¹⁰ Another strand of research uses ideas of relative deprivation, and ‘within group inequality’ to positively demonstrate that inequality encourages civil war.¹¹

Throughout much of the literature on globalization, inequality, and political stability, an important strand of research involving network analysis has largely been ignored. Social Network Analysis (SNA) was developed in the 1960s, and uses dyadic data on transactions and relationships (such as international trade) to identify the structure of a network. SNA argues that the position of an actor within a network reveals important information. Breaking up the world system into a core of advanced, developed

⁷ Melinda Mills, 2009.

⁸ The analysis in this dissertation follows in the empiricist tradition. However, one could equally argue that problems in understanding the relationship of globalization, inequality, and political stability are historicist in nature, and that a focus on definitions, measurement, and methodology misses the larger environmental milieu in which these forces operate. Some recent examples of this alternative analytical perspective include: Robert C. Young, “New Historicism and the Counter Culture,” in Robert C. Young, Torn Halves: Political Conflict in Literary and Cultural Theory (Manchester: Manchester University Press, 1996): 163-183, and Marjorie Levinson, “Reflections on the New Historicism,” *European Romantic Review* 23 no. 3 (2012): 355-362.

⁹ Mark J. Roe and Jordan Siegel, “Political Instability: Effects of Financial Development, Roots in the Severity of Economic Inequality,” *Journal of Comparative Economics* 39 no. 3 (2011): 279-309. Also see the original landmark study, Alberto Alesina, and Roberto Perotti, “Income distribution, Political Instability, and Investment,” *European Economic Review* 40 (1996): 1203-1228.

¹⁰ For research showing there is no relationship between inequality and political stability, see Philip Nel, “Income Inequality, Economic Growth, and Political Instability in Sub-Saharan Africa,” *The Journal of Modern African Studies* 4 (2003): 611-639.

¹¹ Gudrun ØStby et al., “Regional Inequalities and Civil Conflict in Sub-Saharan Africa,” *International Studies Quarterly* 53 no. 2 (2009): 301-324.

nations, a semi-periphery of intermediate developing nations, and a periphery of developing nations, the core has significant advantages vis-à-vis the rest. In analyzing global trade networks, structural inequality has been shown to reduce economic growth and equality, benefitting the core at the expense of the rest.¹² Applying the insights from SNA provides an additional perspective that may provide clearer insights into the effects of globalization on income inequality and political instability.

This dissertation fits within, and extends the research on globalization, economic inequality, and political stability. Unlike other traditional research programs, this dissertation includes alternative network based indices to measure globalization for data on trade.¹³ These network indices provide an additional perspective to other composite indicators of globalization, such as the KOF Globalization index. Furthermore, the advance of a massive income inequality database called the Standardized World Income Inequality Database creates the potential to further study the globalization – inequality relationship.¹⁴ Finally, an established research program using composite measures of political instability is extended to questions of globalization and inequality.¹⁵

Importantly, one element completely missing from current debates regarding globalization, inequality, and political stability is attempts to take into account the design of futures possibilities. While quantitative regressions are useful in understanding how variables have interacted in the past, additional methods are required to project relationships into the future. To further a future-focused analytical paradigm, several qualitative methods are introduced. The Mānoa School of Futures Studies introduces a four futures framework, constructing of continued growth, collapse, discipline, and

¹² Matthew C. Mahutga, “The Persistence of Structural Inequality? A Network Analysis of International Trade, 1965 – 2000.” *Social Forces* 84 no. 4 (2006) 1863-1889. See also the review article of network analysis and world systems research Paulette Lloyd et al, “Looking Back and Forging Ahead: Thirty Years of Social Network Research on the World System” *Journal of World Systems Research* 15 no. 1 (2009): 48-85.

¹³ Bilateral trade statistics is from the IMF Direction of Trade statistics.

¹⁴ Data on wage inequality is found at the University of Texas Inequality Project, <http://utip.gov.utexas.edu/>. Frederick Solt, “The Standardized World Income Inequality Database,” *Social Science Quarterly* 90 no. 2 (2009): 231-242. Current database accessible at <http://dvn.iq.harvard.edu/dvn/dv/fsolt/faces/study/StudyPage.xhtml?globalId=hdl:1902.1/11992>.

¹⁵ A foundational usage of factor analysis to create an indicator of political instability is R. Perotti, “Growth, Income Distribution, and Democracy: What the Data Say,” *Journal of Economic Growth* 1 (1996): 149-187. This strand of political instability analysis was most recently extended and refined in Richard Jong-A-Pin, “On the Measurement of Political Instability and its Impact on Economic Growth,” *European Journal of Political Economy* 25 (2009): 15-29.

transformative futures, helping organize thoughts into useful paradigms. In addition, emerging issues analysis identifies crucial recent technological developments that may dramatically affect the evolution of globalization, inequality, and political stability. The emerging issues discussed are 3D printing, automation, and digitization.

Analyzing the potential impact of emerging issues is difficult in a purely quantitative environment. Not enough data exists regarding their influence on society to generate useful quantitative models. An alternative method is found in aesthetic analysis of science fiction, where the potential consequences of emerging issues are hypothesized and imagined in Chapter five. Science fiction stories can be analyzed to discuss the conditions of possibility creating the opportunities for the emerging issues to have their potential impacts. Science fiction provides an overarching theme, where underlying events that are consistent with that theme can be generated.

Trend Impact Analysis is used to combine the insights from the quantitative and qualitative methods in the formation of four futures scenarios in Chapter six. Trend Impact Analysis uses a probabilistic framework postulating the likely time to impact and anticipated influence of an event in a scenario. For each of the four scenarios of the Mānoa School, numerous events are constructed from the quantitative analysis of chapters two and three, and the qualitative analysis of chapter five. These events are forecasted using Monte Carlo simulations, where numerous possible events are calculated and aggregate into several scenarios.¹⁶ The objective of this research is to use the ideas and conclusions generated from qualitative and quantitative research from the social sciences towards constructing futures scenarios. The novel feature of this research program is its ability to include the conclusions from qualitative and quantitative analysis in a format that facilitates focused speculations about the future, but open enough to include many types of social data. Figure .1 visually reflects how each part of the dissertation fits within the futures focused research methodology.

Chapter one begins with a literature review assessing definitions of globalization, inequality, and political stability, and addressing potential relationships. Chapter 1 is not located in Figure .1 because it serves as background, defining the major variables and

¹⁶ A detailed description of Trend Impact Analysis is in Theodore J. Gordon, "Trend Impact Analysis," in Jerome C. Glenn and Theodore J. Gordon eds., Futures Research Methodology Version 3.0 (Washington, DC: The Millennium Project, 2009): 1 – 19.

reviewing relevant literature in attempting to understand what globalization, economic inequality, and political stability mean.

Chapter two explains the quantitative methodology, describes the data, and tests relationships. As the upper left section in Figure .1, chapter two attempts to reflect modern ‘best-practices’ in using statistical modeling to attempt to understand how variables affect each other in the real world. Also in the quantitative circle of Figure .1, chapter three uses a network-based analysis of globalization to assess the meaning and implications of network based indices in the context of globalization relationships. The relationships modeled in chapters two and three provide quantitative results that help constrain and focus the construction of possible alternative futures.

Chapter four introduces the four alternative futures images of the Mānoa School, and significant emerging issues. Inhabiting the circle of “qualitative futures research” in Figure .1, chapter 4 parses possible futures into four distinct archetypes, providing a useful framework to encourage imagining alternative possible relationships between the emerging issues and the quantitative models.

Chapter five discusses numerous science fiction worlds where emerging issues affect change in globalization, economic inequality, and political stability. Occupying the qualitative analysis circle of Figure .1, chapter five seeks to describe specific events that give direction to the four futures of the Mānoa School, leading to a theory of social change that anticipates how the emerging issues could affect the quantitative relationships explored in chapters two and three.

Where chapter five describes imagined worlds from science fiction and identifies how emerging issues shape human society, chapter six quantifies those qualitative events through a probabilistic method of scenario construction known as Trend Impact Analysis. Beginning with a literature review of scenario construction schools, chapter six first extrapolates trend lines for globalization, economic inequality, and political stability using line fitting software. Subsequently, events extracted from science fiction are dissected to anticipate how emerging issues may affect trend lines within the four futures paradigm. The chapter concludes by running the probabilistic relationships through a Monte Carlo simulation, constructing quantitative graphs showing potential futures consistent with each trend line, as well as a brief qualitative synopsis. As reflected in the

center of Figure .1, chapter six attempts to construct an intersection ($\cap$) of qualitative and quantitative methodologies, using quantitative results and qualitative insights, in the creation of possible futures scenarios to create a playground for analysts' assumptions.

The potential for integrative scenarios, as seen in Figure .1, transcends that available to mixed methods research. While several definitions for mixed-methods research exist, a useful summary is as follows:

A mixed method study is one that juxtaposes or combines methods of different types (qualitative and quantitative) to provide a more elaborated understanding of the phenomenon of interest (including its context) and, as well, to gain greater confidence in the conclusions generated by the evaluation study.¹⁷

Mixed methods research attempts to use quantitative and qualitative methods in order to explore relationships for the present and the past, but avoids discussion of possible futures. The futures focused research framework, through the creation of 'Integrated Scenarios,' seeks to incorporate quantitative and qualitative methods in order to construct and analyze future possibilities.

Chapter seven concludes by applying Charles Peirce's pragmatism in order to elucidate what is meant when people talk about "the futures." Using this dissertation as a proof-of-concept, chapter seven illustrates how theory generation, data analysis, and social culture merge together in futures thinking: envisioning enigmatic possibilities, reflecting those possibilities on the world as now known, to facilitate the constant creation of tomorrow.

¹⁷ R. Burke Johnson, Anthony J. Onwuegbuzie, and Lisa A. Turner, "Towards a Definition of Mixed Methods Research," *Journal of Mixed Methods Research* 1 no. 2 (2007): 119.

**Figure .1: Merging Quantitative and Qualitative Perspectives in Scenario Construction:
Location of Chapters in Overarching Dissertation Research Framework**

Chapter 1: Theories of Social Change in a World of Constant Change

The increasingly rapid rate of change in the development of new technologies that facilitate social organization stands in stark contrast to the relatively slow rate of change in social institutions. Compare, for example, the apparent prescience of Moore's law, stating that transistors within microprocessors will double every two years that causes a dramatic increase in computing power, with the lack of growth in the United States Senate, stuck at two senators per state since its inception. Technology allows individuals increasing capabilities to communicate, organize, and effect social change, often avoiding the use of traditional social institutions. With technology advancing at such a rapid rate, how can social institutions, especially government, stay relevant? Alternatively, with the lack of transparency often seen in governing institutions, what balance can society have against government?

One possible path is to create and test theories of social change, allowing both government institutions and individuals to perceive trends in society that are affecting the social environment. An interested citizenry, coupled with the organizational power of technology, is now just as capable as government in using modern social science to obtain some control over the future of society. The question then arises, what is affecting social change, and which types of social change are the most relevant in forming future societies?

Understanding the underlying causes of social change may allow everyone within society a greater capability in creating the environment they wish to live in. Raymond Boudon has identified four different types of theories of social change.¹⁸ These include the identification of trends, conditional laws or if-then statements, the form of social change, such as linear or cyclical, and the causes of change. Following from this archetype, this dissertation first identifies several sources of social change: globalization, economic inequality, and political stability. Subsequently, econometric models are constructed in order to explain as much variance in each dependent variable as possible. These models allow an understanding of how globalization, inequality, and political

¹⁸ Raymond Boudon, Theories of Social Change: A Critical Appraisal (Berkeley: University of California Press, 1986): 21.

stability relate to a host of other characteristics of states. Using quantitative models, as best as possible given current data, creates the potential for a detailed understanding of the interrelationship between important variables to understand certain processes that affect social change. These relationships become a foundation for anticipating future trends, assessing the impact of potential events, and constructing future images of society.

Throughout this exercise in anticipating social change, a critical eye must be placed towards the limits of quantification and extrapolation. While the best available data is used and placed within models consistent with current literature, the generation of knowledge is at best a frail project. The hope is that relationships within data can be identified, other qualitative assumptions can be clearly laid out, and their potential combined impact on future social scenarios be examined.

The first three sections of this chapter discuss how globalization, inequality, and political stability have been defined, as well as reviewing different ways they have been measured. After this introduction, the relationships between these concepts are discussed.

Section 1: Globalization

The study of globalization has become increasingly prominent in the late 1980s and 1990s, continuing to today. Arguments have arisen as to the definition, the process, and the extent to which globalization affects the world. This section initially discusses various definitions of globalization, resting finally on a multi-dimensional interpretation. The section continues by discussing various attempts to measure globalization. The section concludes by summarizing primary causes of globalization.

The analysis of globalization is often mired in definitional quarrels. What ties many of the definitions of globalization together is an understanding of the increasing connectivity and interdependence of states within the international system. While some definitions focus increasing connectivity of economic markets,¹⁹ others on the growth of

¹⁹ Thomas L. Friedman, The Lexus and the Olive Tree (New York: Anchor Books, 1999).

technological advancements to facilitate human communication,²⁰ to even more that focus on the meshing of political and cultural phenomenon,²¹ the guiding theme remains an increasingly tightly connected world through various processes affecting different areas of society.

Globalization studies have been focused on a three way debate between hyperglobalists, skeptics, and transformationalists, focusing primarily on how globalization is defined and what impact it is having on the nation-state.²² Hyperglobalists see globalization as creating a new era in world politics defined by global governance, declining power of the nation-state, and the driving power of capitalism and technology. As a result, old hierarchies are demolished, and a new “framework of human action” is left in its place.²³

Alternatively, skeptics question anything new regarding globalization. Arguing that modern levels of economic interconnection are nothing new, relative to the Golden Age of Capitalism of the late 1800s and early 1900s, skeptics see the power of states being reinforced. For skeptics, states are the driving forces of globalization, pursuing trade agreements that open up markets for the movement of goods and services, for the purpose of expanding the national interest. Skeptics see globalization as culminating in the formation of regional trading blocs that are likely to lead to new forms of competition and a reduced relevance of global institutions.

Where hyperglobalists perceive a global age marked by international institutions and skeptics perceive a world cut up into competing blocs, transformationists perceive globalization as causing a level of interdependence never before seen. What separates the modern age from the Golden Age of Capitalism is the sheer intensity of global interaction; never before has finance, trade, and people been able to move about the world in such large numbers and in such little time. States, rather than declining or increasing in power, are instead changing in response to new forms of organization from

²⁰ Martin Albrow, The Global Age: State and Society Beyond Modernity (Stanford, California: Stanford University Press, 1996).

²¹ James H. Mittelman, The Globalization Syndrome: Transformation and Resistance (Princeton, New Jersey: Princeton University Press, 2000).

²² This review builds off Luke Martell, “The Third Wave in Globalization Theory,” *International Studies Review* 9 no. 2 (2007): 173-196, and Held et al, Global Transformations: Politics, Economics, Culture (Stanford: Stanford University Press, 1999): 3 – 11.

²³ Held, 1999, 5.

below (local citizen organization) and challenges from above (the free flow of finance). The future for the transformationalist is indeterminate; parts of the world are increasingly connected, whereas others are becoming fragmented.

Moving beyond whether or not globalization is a “new” or “transformative” force in the world today, exemplified by the previous debate, numerous additional perspectives of globalization exist.²⁴ Of primary importance for this dissertation’s understanding of globalization is pursuing definitions that allow for measurement. Measurement is important because it helps provide a ballpark, approximate estimate as to the impact globalization has on the world, in substantive and testable terms. In this vein, two particular perspectives on globalization are appealing: world-system theory, and the network society.

World Systems theory was developed by Immanuel Wallerstein, and is often seen as a theoretical counterpart to social network analysis.²⁵ World-Systems theory focuses on the relationships *between* states, not simply characteristics *of* states. This shift in perspective is important because the consequences of globalization do not exist in an individualistic vacuum, but are instead the product of interactions between actors.

World systems theory argues that the international system is characterized by three major features. First, the world economy is becoming increasingly interconnected. Second, sovereign states increasingly are the major actors that interact and are affected by the world economy. Finally, the world economy is marked by a stark division of labor, where powerful states in the ‘core’ of the world economy, use their economic and military might to extract resources from the periphery, creating “an unequal global division of labor.”²⁶

²⁴ For a review of all relevant theories, see William I. Robinson, “Theories of Globalization,” in George Ritzer ed., The Blackwell Companion to globalization (Malden, MA: Blackwell Publishing, 2007): 125-143

²⁵ For an in-depth theoretical review of world systems theory and how it relates to social network analysis, see Matthew Mahutga, “The Persistence of Structural Inequality? A Network Analysis of International Trade, 1965-2000,” *Social Forces* 84 no. 4 (2006): 1863-1889. Wallerstein’s three volume set regarding world systems theory consists of The Modern World System I: Capitalist Agriculture and the Origins of the European World-Economy in the Sixteenth Century (New York: Academic Press, 1974), The Modern World System, II: Mercantilism and the Consolidation of the European World-Economy, 1600-1750 (New York: Academic Press, 1980), and The Modern World System, III: The Second Era of Great Expansion of the Capitalist World-Economy, 1730-1840 (Orlando, FL: Academic Press, 1988).

²⁶ Knoke, 183.

By using dyadic data, such as in trade, a structure of relationships can be discerned for the world system. This structure is then separated into several different sections, a core, a periphery, and a semi-periphery, with important implications for the process of inter-state interactions. States location within these structures assists analysts in understanding how states interact with each other.

Core states are highly developed, with strong economies and highly evolved militaries. Core countries are powerful due to the structural advantages provided by being part of the global core, and are characterized by diverse economies and capable of autonomous political action. Using their privileged positions, core nations extract natural resources, goods, and other desired material objects from a periphery of weaker nations who are unable to stop intrusions into their societies by the core. Where the core is dominant, the periphery is weak, with specialized economies in order to service the needs of the core, while concurrently being unable to restrict intrusions by the core into their domestic politics. The periphery is also unable to release itself from the bonds of global servitude, as structural elements in the world system halt a country in the periphery from climbing to the core.²⁷

While the core exploited the periphery, the semi-periphery acts as a buffer to protect the global structural division. Including industrializing nations such as Brazil or the East Asian tigers of South Korea, Taiwan, Singapore, and Hong Kong, the semi-periphery was at one time exploited by the core and exploiter of other lesser developed nations.²⁸ The semi-periphery is important largely because it acts as a stabilizing feature of the world system. The semi-periphery and periphery are competitors in the world economy, and consequently are unable to unite in order to restructure the world system in their favor against the core, even though both the periphery and semi-periphery are exploited and dependent on the core. If the semi-periphery ever revolts against the power of the core, system stability disappears, and the “world system disintegrates.”²⁹

²⁷ David Knoke, Political Networks: The Structural Perspective (New York: Cambridge University Press, 1990): 184.

²⁸ Knoke, 185.

²⁹ Wallerstein, “The Rise and Future Demise of the World Capitalist System: Concepts for Comparative Analysis,” in Hamza Alavi and Todor Shanin, eds., Introduction to the Sociology of ‘Developing Societies’ (New York: Monthly Review Press): 29-53, quoted in Knoke, 185.

However, World Systems theorists never operationalized the concepts of core, semi-periphery, and periphery, into a quantitative, testable form. Measurement modeling was instead pursued by sociologists working in the social network analysis tradition, and used numerous methods to identify unequal relationships between the core, semi-periphery, and periphery. Combining world systems theory and network analysis together, Snyder and Kick were able to demonstrate that a state's structural position in the world system was highly correlated with economic growth, and states within the periphery did not experience significant economic growth.³⁰

World-system theories explicit focus on inter-state positional relationships allows it to dovetail with the more encompassing theoretical perspective of the network society.³¹ Through the lens of World Systems theory, globalization is quantified by using network indices to locate states within a network of relationships; a state's position in that network, according to the literature, determines numerous aspects of a state's behavior with other states as well as its potential for future evolution. The cross section of methods connecting world-systems and social network analysis will be clearly extrapolated in chapter 3.

While world-systems theory has an explicitly master-slave perspective of globalization, other network perspectives primarily focus just on exchange between states, and the factors that catalyze exchange-based relationships. Clearly expressed in 1996 by Manuel Castells, the networked society is primarily driven by technological change.³² Three features identify the growing influence of technology in changing global relationships: quick transfers of knowledge, global production networks, and numerous opportunities for global networks of interaction.³³

³⁰ David Snyder and Edward Kick, "Structural Position in the World System and Economic Growth, 1955-1970: A Multiple-Network Analysis of Transnational Interactions," *The American Journal of Sociology* 84, no. 5 (1979): 1096-1126.

³¹ William Robertson, "Theories of Globalization," in George Ritzer ed., *The Blackwell Companion to Globalization* (Malden, MA: Blackwell Publishing, 2007): 127, where world-systems theory is explicitly identified as a theory of interdependencies and interconnections of states.

³² Manuel Castells, *The Rise of the Network Society* (Malden, MA: Blackwell Publishing, 2000).

³³ Robertson, 2007, 132.

The networked society is quantified and extended by a pluralistic approach constructed by Alex Dreher and others.³⁴ Focusing on the impact of connectivity between nations, the integrative effects of globalization can be seen in five distinct sections of society: politics, culture, environment, economics, and technology. The boundaries between each domain are interconnected, so while analysts can differentiate between roughly separate sections, the impacts of each section spills over into any other.

Dreher's "Pluralistic Model" of globalization identifies the intersection of politics, cultures, environments, economics, and technology. Political globalization is most clearly seen in treaties and other arrangements that tie state-policy together. Participation in United Nations treaties, international trade agreements, and the like identify the extent to which a state's policy is tied to international organization. Cultural globalization identifies the extent to which cultural ideas and traditions spill over throughout the globe. One element of cultural globalization is the rise of media institutions, informing people throughout the world of the lives and conditions of others. Another facet is the transformation of homogenous societies into multicultural societies through immigration. Economic globalization discusses the extent to which financial transactions, such as trade and foreign direct investment, affect societies. Key to economic globalization is the rise of capitalism, where the acquisition of surplus capital and private ownership has been important to the formation of multinational corporations that act throughout numerous areas of the globe. Environmental globalization identifies the extent to which the actions of states affect the global environment. For example, carbon dioxide emissions become an issue that affects all states if global climate change begins to affect the quality of the environment. While environmental effects are often the consequences of other forms of globalization, if environmental issues begin to affect greater states, environmental issues become driving forces in the future affecting other forms of globalization. Finally, technological globalization identifies how people are increasingly able to connect with others through newly arising technologies. In this sense, technology acts as a connector between other elements of globalization. Through the combined effect of all segments of

³⁴ The following presentation of a pluralistic approach to globalization is taken from Axel Dreher, Noel Gaston, and Pim Martens, Measuring Globalization: Gauging its Consequences (New York: Springer: 2008): 5-23.

globalization, the lives of all humans become increasingly interconnected and intertwined. The pluralistic model of globalization is graphically modeled in Figure 1.1.

Several methods measuring globalization that can be placed within the network society worldview exist. Numerous composite indices have been created that take into account the multiple dimensions associated with globalization. The indexes range from primarily economic based measurements of the A.T Kearney/Foreign Policy Magazine Globalization Index, to multi-dimensional indexes such as the KOF index.

The A.T. Kearney (AT Index) provides a measure of globalization using measurements on politics, technology, personal contact, and economic integration.³⁵ The index heavily weights economic factors, which are weighted six times more important than political factors. While useful for some areas of research, one major methodological problem with the index is a lack of countries, including only 62, which reduces its potential for cross national comparison. In addition, its focus is on primarily Western nations, lacking information on third world nations. With its focus on economic factors, and lack of data on many nations, the AT Index is not a first choice for time series panel

³⁵ A.T. Kearney, Inc., "The Globalization Index," *Foreign Policy* November/December 2007, 69-76.

analysis to understand the relationship between globalization and many other phenomena.

An alternative is found in the KOF index of globalization.³⁶ The KOF index includes four separate indices, one each for political, economic, and social globalization, and overall globalization, a weighted average of the previous three. The development of the KOF index has facilitated new research on globalization by providing a multidimensional approach to globalization that avoids simplification, identifying how various global elements can work with, or against each other, in affecting any global phenomenon. In its most recent iteration, the KOF index includes data on 208 countries from 1970 to 2009.³⁷ Furthermore, in generating its overall index of globalization, the KOF index provides a greater representation of political and cultural factors, where economic connectivity accounts for 35%, political factors account for 28%, and social connections account for 38% of the overall index. As a result, its usefulness in cross country, time series comparison is greater than many alternative indices.

To summarize, the perspective of globalization used throughout this dissertation fall within the classifications of world-system theory and the network society. From the world-systems standpoint, the primary catalyst extending globalization is a capitalist based system of exploitation and domination through control of production channels. This control allows a smaller cluster of centrally located states to obtain most of the surplus value created through the sale of goods and services within the global economy. The world-systems perspective on globalization will be modeled and examined through quantitative models expressed in chapter three. Alternatively, the network society perspective identifies the primary catalyst of globalization as the accelerating pace of technological change, and is the primary perspective on globalization used in chapter 2.

Section 2: Economic Inequality

The study of inequality analyzes the growing divergence within societies on various issues regarding economics and politics. One of the most studied types of

³⁶ Dreher, 2008. Index originally formulated in Axel Dreher, "Does Globalization Affect Growth? Evidence from a new Index of Globalization," *Applied Economics* 38 no. 10 (2006): 1091-1110.

³⁷ The most recent data for the KOF index can be found at <http://globalization.kof.ethz.ch/>.

inequality is income inequality, effectively trying to measure the gap between the rich and the poor. Debate over its causes and consequences has been extensively debated. This section begins by discussing the meaning of income inequality and various attempts at measurement, and ends by discussing some causes of inequality.

When discussing income inequality, the primary measurement is the Gini coefficient.³⁸ The Gini coefficient is a measure of income inequality for a whole society that ranges from a score of zero, where everyone makes the same income, and a score of one, where a single individual makes 100% of the society's income. The Gini coefficient is calculated by identifying the difference between perfect equality in a society and the actual distribution of income, which is known as the Lorenz Curve. The difference between perfect equality and actual equality is then divided by total income. As a result, the Gini coefficient is a proportional measurement that is especially useful for cross-national comparisons. Unfortunately, because the Gini coefficient is about the relative difference in income distributions, it does not take into account differences from absolute variance in income distribution. The Gini's primary benefit is in ease of interpretation.

Unfortunately, one of the major problems in analyzing economic inequality is the lack of broadly comparable data. The major datasets that have been used in previous analysis are simply not useful for time series, macro analysis. The first database, published by Deininger and Squire in 1996, and updated by the World Bank, has Gini coefficient data that measures income inequality for many countries from 1950, but data is scattered, some countries having many data points, while others are sparsely populated.³⁹ In addition, the inequality data that is collected for each country is often different, some using gross household incomes, while others use net income. These two types of inequality are not directly comparable. Another, more detailed dataset, the

³⁸ An extremely up to date and detailed analysis of how to measure economic inequality is in James K. Galbraith, *Inequality and Instability: A Study of the World Economy Just Before the Great Crisis* (New York: Oxford University Press, 2012): 1-46.

³⁹ Klaus Deininger, and Lyn Squire, "A New Data Set Measuring Income Inequality," *The World Bank Economic Review*, 10 no. 3 (1996): 565-591. The World Bank updated webpage for this database is <http://go.worldbank.org/UVPO9KSJJ0>.

Luxembourg Income Studies, is also deficient in that it covers only a handful of wealthy nations.⁴⁰

To address previous data difficulties, several datasets have been created to provide greater coverage. An important database on inequality, focusing on differences in wages, comes from the University of Texas Inequality Project (UTIP), a database on inequality that includes a total of 3554 observations for many countries from 1963 to 2003.⁴¹ Whereas previous inequality analysis has been usually limited to members within the Organization for Economic Cooperation and Development (OECD) due to the ease of access to Gini coefficient data, the UTIP data has dramatically increased the time and geographic areas of analysis. However, unlike other inequality databases, the UTIP data is *NOT* a Gini coefficient. Rather, they calculate a Theil index.⁴² Instead of looking at individual averages of income like the Gini would use, the Theil index instead uses economic data aggregated by economic, industrial, or geographic groupings. These data depict average incomes of many people, and are useful estimates for shifts in a society's inequality. The major benefit of the Theil index is that it is additive, a total country's inequality score is just the sum of the scores of the underlying parts. However, interpretation of the Theil index is more difficult than the Gini; where a score of zero still means everyone has the same income, there is no upper bound, but higher scores are associated with greater inequality. The UTIP database is an important tool in understanding long-term trends in inequality, but an even larger inequality database exists.

The culmination of all data on economic inequality has been organized into the Standardized World Income Inequality Database (SWIID).⁴³ Using data from the Luxembourg Income Study, the World Bank Deininger and Squire database, The U.N. University World Income Inequality Database (UNU-WIDER), the UTIP dataset, and

⁴⁰ James K. Galbraith and Hyunsub Kum, "Inequality and Economic Growth: Data Comparisons and Econometric Tests," *UTIP Working Paper* 21. Accessed on July 30, 2013 at http://utip.gov.utexas.edu/papers/utip_21rv.pdf.

⁴¹ Accessed August 7, 2013 at <http://utip.gov.utexas.edu/>.

⁴² For a more detailed breakdown of the Theil index and its benefits/costs versus the Gini, see Galbraith, 2012, 29-32.

⁴³ Frederick Solt, "The Standardized World Income Inequality Database," *Social Science Quarterly* 90 no. 2 (2009): 231-242. Current database accessible at <http://dvn.iq.harvard.edu/dvn/dv/fsolt/faces/study/StudyPage.xhtml?globalId=hdl:1902.1/11992>.

finally the Standardized Income Distribution Database (SIDD), the SWIID provides Gini coefficient data for 171 countries from 1960 to 2008, and is frequently used for time series panel research to explain the causes and effects of income inequality.

Most explanations of income inequality begin with the Kuznets curve (KC). The KC shows that inequality was linked with GDP growth, where inequality grew during early stages of development while tapering off after the economy had matured.⁴⁴ Kuznets outlined several important areas where economic development affected inequality, first being the changing size of agricultural production. During early stages of development, economies are primarily focused on agriculture, but as the economy develops, a gap grows between agricultural incomes and newly created industrial jobs, causing an increase in inequality. Second, changes in demographics can often lead to an increase in inequality, as growing populations have an influx of young and less skilled labor that create gaps in income. Finally, as access to education increases within a society, inequality is likely to decrease as more people can use education as a path towards higher skilled and higher paying jobs.⁴⁵ Overall, the relationships Kuznets analyzed has come to be known as the internal development model, identifying domestic shifts within a country that are important in explaining changes in income inequality.⁴⁶

Recent research has also identified government regime type as an important indicator of levels of inequality.⁴⁷ Whether or not a government has a stated purpose of distributing wealth has been shown to affect levels of inequality. The UTIP categorized nations as to whether or not the government was a dictatorship, a communist regime, an Islamic republic, a social democracy, a pseudo-democracy, or a recent democracy.⁴⁸ A pooled regression was run with the UTIP Theil inequality score as the dependent variable

⁴⁴ Simone Borghesi, "Inequality and Poverty in the Globalized World," in Popeo Della Posta, et al. eds., Globalization, Development and Integration: A European Perspective (New York: Palgrave Macmillan, 2009): 70.

⁴⁵ Matthew C. Mahutga et al, "Within-Country Inequality and the Modern World-System: A Theoretical Reprise and Empirical First Step," *Journal of World-systems Research* 17 no. 2 (2011): 298. See also Matthew C. Mahutga and Nina Bandelj, "Foreign Investment and Income Inequality: The Natural Experiment of Central and Eastern Europe," *International Journal of Comparative Sociology* 48 (2008): 436 – 437.

⁴⁶ The first usage of the term "internal development model" is in F. Nielsen, "Income Inequality and Development: Dualism Revisited," *American Sociological Review* 59 (1994): 654-77.

⁴⁷ Galbraith, 2012, 100-123.

⁴⁸ Most of these labels are self-explanatory. Pseudo democracies are "a condition of democratic formalism but in which opposition parties are effectively prohibited from winning elections," Galbraith, 2012, 107.

with robust standard errors and including control variables of Log GDP Per Capita, Degree of Trade Openness, and dummy variables for geographic location and time. Most regimes were highly significant at a p score of .000. Reducing inequality, in order of largest to least, was communist regimes, Islamic Republics, and social democracies. Increasing inequality, starting with largest impact, was recent democracies and dictatorships. The overall r^2 was 45.71%, meaning not only did the model identify clear relationships between inequality and regime type, but the overall variance accounted for was almost half. These findings indicate that when political regimes are determined to spread the wealth, either through social welfare programs or other policies, they can have a small, though influential effect. Unfortunately, while policies directed at reducing inequality are effective, they take effect slowly, while policies and actions that directly or indirectly increase inequality can occur quite suddenly and have a great impact.⁴⁹

Finally, several additional variables will be included to analyze economic inequality. These include variables that are a part of what is often labeled as the internal development model (IDM). These include sector dualism, which identifies how separated an economy is between agricultural and non-agricultural economic endeavors. Other variables include the level of secondary education, population growth, and the percent of the population involved in agricultural work.⁵⁰ The purpose of the IDM is to capture the major sources of economic inequality that were identified by Kuznets.

The last variable used to investigate inequality is the effect of Foreign Direct Investment (FDI). Recent research has shown that there is a positive relationship between FDI and economic inequality.⁵¹ Recently, the analysis of FDI and economic inequality has focused on increased dependence on inward FDI, leading to economic inequality as a highly paid elite manages a large group of “tertiary workers.”⁵² The

⁴⁹ Galbraith, 2012, 113.

⁵⁰ Used in Mahutga et al., 2011.

⁵¹ Changkyu Choi, “Does Foreign Direct Investment affect Domestic Income Inequality?” *Applied Economics Letters* 13 (2006): 811-814. This author did not explain why inward FDI (used in the current analysis) would lead to inequality, but the paper does argue that outward FDI is associated with increasing inequality as it represents an outsourcing of labor.

⁵² Arthur S. Alderson and Francois Nielsen, “Income Inequality, Development, and Dependence: A Reconsideration,” *American Sociological Review* 64, no. 4 (1999): 606-631. 612. A more modern article that highlights many of the same arguments, as well as identifying additional ones in the same vein is Matthew C. Mahutga et al., 2008.

growing importance of FDI in the modern economic system, by linking corporations and nations, ensures it needs to be studied to continue to assess its impact.

In chapter two, both the UTIP and SWIID will be used to measure economic inequality, acting as a robustness check. In addition, regime type, and the internal development model are useful control variables to identify whether or not globalization or political stability have a substantive affect in explaining variation in income inequality.

Section 3: Political Stability

Political stability reflects a perception of the possibilities for violence to destabilize governments. This section begins by discussing evolving definitions of political stability. First, the meaning of political stability within the relevant literature is discussed, focusing on how definitions of political stability have changed. Second, various different perspectives on generating a quantitative measure of political stability are assessed. Third, major factors affecting political instability indexes are addressed.

Definitions of political stability can be broken down into several types. The first separates political stability into different categories which can each be studied separately.⁵³ In assessing political stability, several attributes are separately analyzed and are presented in Table 1.1:⁵⁴

Table 1.1: Principal Approaches to Political Stability
The absence of violence
The duration of government
The existence of a legitimate constitutional regime
The absence of structural change
A multifaceted social attribute

This perspective on political stability reflects an assessment of political institutions and their continuity, separated out into distinct aspects that can be studied without the use of an overarching perspective. Analysts could focus, for example on the handing over of power from one governance administration to the next, and whether or not that transfer is

⁵³ Claude Ake, "A Definition of Political Stability," *Comparative Politics* 7 no. 2 (1975): 273.

⁵⁴ Leon Hurwitz, "Contemporary Approaches to Political Stability," *Comparative Politics* 5 no. 4 (1973):449-463, in Simona Milio, "How Political Stability Shapes Administrative Performance: The Italian Case," *West European Politics* 31 no. 5 (2008): 922.

violent, studied in a vacuum separate from say the legitimacy of the government or underlying pressures for change.

After the 1970s, this position was rejected, and political stability was perceived as an interconnected, multidimensional phenomenon, reflecting numerous underlying conditions that together affected the political system.⁵⁵ Political stability could not be studied as the separation of underlying factors, but was rather an overarching concept that needed to be studied holistically. From this transition came a growing focus on the relevance of composite indicators of political stability, including numerous underlying factors to create a single overall perception.⁵⁶

By 2002, indicators of political stability had separated into two camps. On one hand were “upper bound” forms of political instability, including violent overthrows of government power, including assassinations, coups, and revolutions. Phrased another way, “upper bound” political instability identifies the transformation of political regimes between dictatorial and democratic/pseudo democratic regimes.⁵⁷ On the other hand are “lower bound” types of instability, identifying transfers of government power that are regulated and relatively nonviolent, focusing on regulations built within political systems, such as restrictions on who can have executive authority, or the regulation of political participation.⁵⁸

Unsatisfied with the bi-dimensional perspective, Jong-A-Pin compiled a database of 25 indicators related to political instability, the largest yet assembled.⁵⁹ Previous composite indicators used principal components analysis to identify all the variance among a set of variables, and reduce the data to one index. Instead, Jong-A-Pin used exploratory factor analysis (EFA). The difference is that while principal components analysis (PCA) takes into account all the variance embedded within the underlying

⁵⁵ Richard Jong-A-Pin, 2009, 15-17.

⁵⁶ A detailed discussion of the evolution of indicators to measure political instability is in Richard Jong-A-Pin, “Essays on Political Instability: Measurement, Causes and Consequences,” *P.h.D Dissertation* University of Groningen, 2008, 1-4.

⁵⁷ A recent attempt to create a political instability measurement focusing on changes between dictatorship to democracy and vice versa, is Pushan Dutt and Devashish Mitra, “Inequality and the Instability of Polity and Policy,” *The Economic Journal* 111 (2008): 1285-1314.

⁵⁸ This paragraph is a brief summary of Nauro F. Campos and Jeffrey B. Nugent, “Who is Afraid of Political Instability,” *Journal of Development Economics* 67 (2002): 157-172. Upper bound political instability is a composite indicator from measures from the Banks Time Series Cross National Dataset. Lower Bound political instability is a composite indicator from the Polity IV dataset.

⁵⁹ Jong-A-Pin, 2009.

variables purely for data reduction, (EFA) only takes into account the variance held *in common* between all the variables.⁶⁰ Jong-A-Pin had a preexisting theory that the covariance of the variables was more directly related to the latent variable of political instability, and EFA allows the usage of a simple model in order to clearly test that theory, where PCA is unable to follow a similar strategy. Also, oblimin factor rotation is used, which allows the individual factor components to be correlated with each other, and each component will be highly related with one factor. Previous component indicators for political stability were constructed with varimax rotation, which is the most common rotation due to its ease of interpretation; each component indicator will have a high or low correlation with the resulting factors allowing for easy identification of components *with factors*. However, oblimin is better situated for constructing a political stability index because the underlying indicators share considerable variance and to force them to be uncorrelated might work against the structural relationships within the data.⁶¹

Through an EFA of 21 different measurements, Jong-A-Pin identifies four factors of political instability.⁶² The first is “politically motivated violence,” (PMV) which includes assassinations, revolutions, and civil war. Second is “mass civil protests,” (MCP) and identifies the amount of civil protests and politically motivated strikes. The third element of political instability is “instability within the region,” (WR) identifying not seismic institutional shifts, but rather polarization and disagreement among political actors within government. The final factor of political instability identifies “instability of the political regime,” (IPR) identifying shifts in the structure of political institution, such as movements from democracy to dictatorships, to coups, and other major government crises.⁶³ Jong-A-Pin’s study was important because it included the largest number of components of political instability that clearly identified four different aspects of political instability. Clarifying the currently available data on political stability, future research programs can be constructed to understand how each dimension of political instability is affected by a host of other events.

⁶⁰ Jong-A-Pin, 2008, 17. For a much more detailed explanation of the differences between factor analysis and principal components, see T. Wansbeek and E. Meijer, Measurement Error and Latent Variables in Econometrics, Volume 37, (The Netherlands: North Hollander, 2000): chapter 7.

⁶¹ B. G. Tabachnick and L. S. Fidell, Using Multivariate Statistics 5th ed, (New Jersey: Pearson Allyn and Bacon, 2007).

⁶² Jong-A-Pin, 2008, 18.

⁶³ Jong-A-Pin, 2008, 19.

As composite indicators began to become more popular, studies were initiated to find the most important underlying factors that could explain episodes of political instability. The belief underlying these studies was the recognition that political stability was a multifaceted concept, but that while one could spend time accumulating data on numerous factors related to political stability, perhaps some factors were simply more important and useful in predicting periods of instability.

Recently, a massive study of political instability, including events such as civil wars, quick regime changes, and genocides reported on the primary explanatory variables for political instability.⁶⁴ The research concluded that four variables explained over 80% of all political instability events from 1955 to 2003. These variables, identified here as the Goldstone Model, includes regime type, ranging from fully autocratic to a full democracy, infant mortality, conflict-ridden neighborhood, which identified whether or not a state was surrounded by other states prone to violence, and whether or not states pursued discrimination against minorities. Importantly, when explaining periods of political stability, the model required a two year lag time from a political stability to instability.

When focusing on near term instability (hence the two year lead in time), by far the most powerful explanatory variable was regime type. A full autocracy, ruling by fear, and a full democracy, with respect for minority rights and civil society, were both highly resilient to instability. Both partial autocracies and partial democracies without factions were significantly more unstable than their full counterparts. However, partial autocracies were more likely to experience civil wars and adverse regime change, whereas partial democracies were only more prone to experience adverse quick regime change; i.e., from a democratic style of government to an overnight coup.

But of all the types of governments studied, the most unstable was a partial democracy with factionalism. These governments were unstable because they allowed fringe elements of society an equal voice in the participation of government, creating a polarizing political environment heavy with ideologues without the commensurate protections given to minorities.

⁶⁴ Jack Goldstone, et al., "A Global Model for Forecasting Political Instability," *American Journal of Political Science* 54 no. 1 (2010): 190-208.

Interestingly, autocracies, while appearing stable within the constraints of the quantitative model, face an extra danger not seen by fully democratic systems. While the rulers of dictatorships are young and healthy, and unafraid of using violence to instill fear in their populaces, they remain remarkably stable. As time goes by, and their populations either acquire wealth or attempt to pursue a loosening of political restrictions, autocracies often begin to slowly open up, allowing new political freedoms. This beginning transition stage is prone to forces of instability, as if the transition to a more open political system is not legitimately pursued, and instead only half measures are implemented, factional and radical consequences can be unleashed. In other words, while autocracies can appear stable for many years, desires for freedom, or the pursuit of political power can unleash a torrent of radical change that can bring down any autocracy.⁶⁵

Importantly, in addition to building a model of political instability, the authors also identify a series of policies to ensure stable political systems, focusing on the importance of regime type. To create long term stability, the authors identify a high level of income, a geographic location among friendly neighbors, low levels of discrimination, and a political regime that is unified.⁶⁶

This literature review identifies important concepts that will be used as control variables in the regressions for Chapter Two. Now that the control variables that will be employed in separate models for globalization, economic inequality, and political instability have been identified, the next section focuses on the possible pathways in which these three variables may affect each other.

Section 4: Connecting Globalization, Income Inequality, and Political Instability

The nexus of globalization, income inequality, and political stability has never been studied. However, partial relationships between them have. This section will in turn place each variable in the position of the dependent variable, identifying several pathways evident within the social science literature where the other variables could act as important independent variables.

⁶⁵ Goldstone, et al., 2010.

⁶⁶ Goldstone et al., 2010. 205.

First, globalization is placed as the dependent variable. Very few studies have contextualized globalization in this manner, and none have used the KOF index of globalization like this. Furthermore, every study analyzing a relationship between income inequality and globalization places income inequality as the dependent variable. The lack of previous research in this field allows room for creative new hypotheses regarding the impact income inequality may have on globalization.

The first series of relationships are not directly between inequality and globalization, but instead have an intermediary. The link between political stability and inequality has been studied frequently, so to the extent that inequality can be shown to have an effect on political stability, some of that effect may pass through and impact globalization. Unfortunately, based merely on this relationship, the actual relationship between inequality and globalization is likely to be insignificant and extremely small.

Alternatively, inequality may affect globalization more directly by changing the purchase behaviors of consumers. If economic inequality is increasing, consumers are likely to consume less imported luxury or unessential goods, reducing the economic connections between nations. Again, unfortunately, this is not a directly link between inequality and globalization, as the relationship is facilitated by consumer behavior. Altogether, a significant relationship between inequality and globalization, with globalization as the dependent variable, is unlikely to be significant.

Another relationship absent from the literature is between political stability and globalization, where globalization is the dependent variable. However, unlike for inequality, if there is a relationship between political stability and globalization, the explanations are likely similar to those between political stability and economic growth.⁶⁷ In many ways, the drivers of globalization and economic growth are similar in that they are both affected by technological change. A positive relationship may exist because a stable political system creates a sense of safety; people are more likely to increase their connectivity, in all forms, when they are in an environment that reinforces a feeling of

⁶⁷ There is a vast literature relating political instability with economic growth. For a recent discussion, see Ari Aisen and Francisco Jose Veiga, "How Does Political Instability Affect Economic Growth," *IMF Working Paper* (2010). Accessed on July 30, 2013, at <http://www.imf.org/external/pubs/ft/wp/2011/wp1112.pdf>.

safety.⁶⁸ Similarly, political instability creates uncertainty, causing people to reduce their interactions, retract their investments, and hunker down while waiting for better times.⁶⁹ These potential relationships would insinuate that the globalization ~ political stability nexus would be statistically significant and positive, but its strength and importance is unlikely to be overwhelming, because while important in creating a powerful environment for the original conditions of connectivity, political stability does not contribute to the actual mechanics of globalization.

Based on the literature review of globalization, important explanatory variables are likely to be technological factors and economic growth as measured by GDP per capita. Political stability may be statistically significant, but its coefficient is likely to be small. Inequality is theorized to have no impact on globalization.

If economic inequality becomes the dependent variable several new relationships occur. Numerous studies exist using both political stability and globalization to explain changes in inequality. In one analytical perspective, the literature on the globalization ~ inequality relationship identifies increases in trade, investment, and migration as significant causes of rising inequality.⁷⁰ Trade increases inequality as it reduces average wages within industrialized countries and causes a stark contrast in wages between skilled and unskilled labor. Investment flows can also increase inequality as domestic firms invest elsewhere seeking better production conditions, such as cheaper labor or better tax systems. This leads to a reduction in the bargaining position of labor in the home country, causing rising inequality between labor and investment classes. Furthermore, the outsourcing of production through investment flows leads to a loss of higher paying jobs in manufacturing, replaced instead by jobs in worse-paying service sectors, contributing to rising inequality. Finally, migration may contribute to rising inequality by causing an influx of low skilled labor that increases the amount of low paying jobs within a society. All these transactions are elements of globalization tying nations together through cross-national flows, leading to increases in economic

⁶⁸ While not using globalization as the term has grown to being used today, a similar relationship is explored in Karl Deutsch et al., Political Community and the North Atlantic Area: International Organization in the Light of Historical Experience (Princeton, Princeton University Press, 1957).

⁶⁹ Alberto Alesina and Roberto Perotti, "Income Distribution, Political Instability, and Investment," *European Economic Review* 40 (1996): 1203-1228.

⁷⁰ Melinda Mills, "Globalization and Inequality," *European Sociological Review* 25 no. 1 (2009): 1-8. The subsequent discussion is based on Mills, 2009.

inequality. The KOF measurements for economic and social globalization are able to stand for trade/investment, and migration, respectively.

However, while trade and immigration may have at one time affected inequality, the primary culprit since 1980 appears to be growing dependence on foreign investment facilitated by the removal of restrictions on flows of global finance.⁷¹ Foreign capital dependence leads to several processes that increase inequality. First, the presence of large sums of foreign finance leads to the expansion of an elite class to manage foreign investments. Second, profits from foreign investments are often not re-invested in the host economy. Third, land ownership becomes concentrated. Finally, host countries create artificial conditions to attract foreign investments that are not extended to domestic industries. In measuring the relationship between globalization and inequality, the influence of financial flows should be accounted for in models attempting to understand the globalization-inequality nexus. These relationships are somewhat reproduced in the KOF Index of globalization by using the economic component of the index, which uses data on financial flows.

A recent study using both the UTIP data on wage inequality and the KOF Globalization index has demonstrated that globalization indeed has increased wage and income inequality, but only slightly.⁷² Using country fixed effects, time dummies, a lagged value of inequality, and the system Generalized Method of Moments (GMM) estimator, the overall KOF index of globalization was significant at the 10% level for wage inequality, and significant at the 5% level for income inequality. However, the coefficients were fairly small. Also, democracy was found to have a positive impact on both wage and income inequality, which the authors attributed to democracies pursuing more “market-oriented policies” rather than pursuing redistribution of wealth. When the overall globalization index was replaced with the individual component measurements for economic, social, and political globalization, only social globalization was significant

⁷¹ Sadullah Celik and Ulkem Basdas, “How Does Globalization Affect Income Inequality? A Panel Data Analysis,” *International Advances in Economic Analysis* 16 no. 4 (2010): 358-370. See also Jeffrey Kentor, “The Long Term Effects of Globalization on Income Inequality, Population Growth, and Economic Development,” *Social Problems* 48 no. 4 (2001): 438.

⁷² Dreher et al., 2008, 149-158.

and positive, which the authors attributed to social globalization increasing processes of deunionisation, reducing the abilities of workers to organize and increase their wages.⁷³

The previous study only used the UTIP wage inequality data. Similar regressions are run in chapter two using the Gini coefficient data from the SWIID to assess the robustness of these findings. Based on previous research, however, globalization is unlikely to be a huge factor in explaining or causing inequality. Numerous intervening processes cloud the relationship, making a clear understanding of the globalization-economic inequality connection difficult.

Political instability as a cause of inequality is not studied throughout any element of the social science literature. Typically, the argument is framed in the reverse. Yet, prolonged periods of political instability, especially if extreme violence results, may lead to increased economic inequality within a nation, as one part of the country has its wealth destroyed through violent acts.

Alternatively, periods of continued political stability could also lead to increased economic inequality, as financial and social elites can have uninterrupted access to the levers of political power, facilitating the passage of laws that fleece the countryside. The problem with this argument is that political stability is a necessary, but not sufficient requirement. Corruption, and the type and purpose of the government regime are likely to be at least, if not more important than stability. As a result, one would expect there to be very little relationship between political instability and economic inequality when inequality is the dependent variable.

When political stability becomes the dependent variable, a massive amount of literature connects globalization or economic inequality with stability. Globalization has numerous theorized relationships with political stability. Recent research has shown that globalization may have a negative impact on a society's trust of their government.⁷⁴ As people lose faith in government, for example due to government's inability to manage the strains globalization may cause on society due to reduced employment from outsourcing, an increasing likelihood for violent social change exists. The coefficient is unlikely to be extremely large because there are intermediary factors at work here; globalization is not

⁷³ Dreher et al, 2008, 158.

⁷⁴ Justina Fischer, "Globalization and Political Trust," *Unpublished Manuscript* (2012). Accessed on July 30, 2013, at <http://mpra.ub.uni-muenchen.de/36327/>.

directly affecting political stability, and instead is working through perceptions of public trust.

Another positive affect globalization may have on political instability is by encouraging reformation of the political system to cope with increasing stress caused by international forces, such as flows of finance, or immigration. These global pressures on state governments can lead to a reorganization of domestic coalitions and an increase in political instability as these coalitions compete for power.⁷⁵ If the globalization~political stability relationship conforms to this hypothesis, the coefficient may be rather large, as globalization is directly threatening the government by flooding government institutions with difficult to monitor flows of people and goods.

Recent events in Egypt and Tunisia, and the usage of Facebook, Twitter, and YouTube, is giving rise to a third way that globalization can affect political stability, revolving around the rising importance of communication technologies. Conflicts between states and opposition groups are of an unequal character – states have greater capabilities of violence at their disposal. However, the rise of the internet and communication technologies has facilitated increased flexibility in resistance to state domination.⁷⁶ As oppositional groups become increasingly networked through technology, potential effective resistance against state power increases. Furthermore, increasing global interconnectivity makes people more aware of the freedoms enjoyed by others throughout the world.⁷⁷ Globalization, from this perspective, entails three threats to political stability. The first is the increasing awareness of political situations throughout the world that allows people to recognize whether or not they are starved from perceived freedoms. The second is that global interconnectivity allows protestors in one region of the world to share their strategies with protestors and anti-government movements elsewhere, creating a pool of knowledge to increase the anti-government

⁷⁵ This inference is deduced from the impact of economic growth on political instability, but the inference may also concur with the effects of globalization. See M. Olson, "Rapid Growth as a Destabilizing Force," *Journal of Economic History* 23 (1963): 529-552, and D. North, *Structure and Change in Economic History* (New York: W. W. Norton, 1981), as cited in Campos and Nugent, 2002.

⁷⁶ Joshua D. Atkinson, *Alternative Media and Politics of Resistance* (New York: Peter Lang Publishing, Inc., 2010).

⁷⁷ Jeremy Kinsman, "Democracy Rising: Tunisia and Egypt, When Idealists Got it Right," *Policy Options* (2011): 37-43. Accessed on July 30, 2013, at <http://www.irpp.org/en/po/budget/democracy-rising-tunisia-and-egypt-when-idealists-got-it-right/>.

effectiveness. The third is the increased capability to organize domestic opposition through communication technologies. Altogether, globalization of communication networks can have a positive impact on political instability, by providing new opportunities for people to organize in ways outside of state control. Since global communication networks have only recently become common enough throughout the developing world to threaten governments, this relationship may not appear very strong in the regressions, or significant. However, if quantitative tests are insignificant, there may be a strong case for discounting their findings given the light of recent historical experience.

Surveying the literature on inequality and political stability, several major relationships arise. The first argues that social discontent is caused by relative deprivation, which leads to unmet expectations of groups that consequently agitate for social change. Relative deprivation identifies a condition where a person within society sees someone else with a material good, and as a result desires the same material good. In this way, the person is ‘relatively deprived’ in comparison to the other in his want for the material advantage.⁷⁸ Deprivation, by itself, is not enough to cause social unrest. Deprivation must also be accompanied by a perceived lack of social justice. Not only must there be differences in material possessions between individuals, but those gaps are caused by an unjust social system that chains some to the benefit of others.⁷⁹ Relative deprivation theories have been exceedingly difficult to test or measure because of the difficulties in quantifying relative deprivation.⁸⁰ However, recent forays into this literature have used results from “happiness studies,” and global surveys on perception of corruption and personal happy from the World Values Surveys.⁸¹ These data have not been applied to an analysis of political stability.

⁷⁸W. G. Runciman, Relative Deprivation and Social Justice (Berkeley: University of California Press, 1966): 10-11.

⁷⁹ Runciman, 1966, 283-284.

⁸⁰ Erik Thorbeck and Chutatong Charumilind, “Economic Inequality and Its Socioeconomic Impact,” *World Development* 30 no. 9 (2002): 1486. However, the World Values survey does have some data that may be helpful. Including data for about 80 countries from 1981 to 2008, questions such as “feeling of happiness,” “how satisfied are you with your life,” “satisfaction with the financial situation of the household,” and a belief of whether or not “incomes should be more equal.”

⁸¹ For a treatment of relative deprivation to economic growth see Volker Grossmann, Inequality, Economic Growth, and Technological Change: New Aspects in an Old Debate (Germany: Physica-Verlag, 2001). In this literature, relative deprivation is similar to what is labeled as “status concerns.”

The second explanation is the “resource mobilization hypothesis,” where persistent inequalities in resources distributions, such as land in rural areas, create an incentive for many to organize cohesively and agitate for social change.⁸² Maldistribution in land creates societies where people live in poverty, are suffering, and have a powerful incentive to organize and revolt.⁸³ Societies with unequal distributions of land are susceptible to mass revolutions as poorer classes fight to acquire a greater share of society.

The relative deprivation and resource mobilization hypotheses were merged, with a major focus on the importance of income inequality instead of land inequality.⁸⁴ Income inequality, unlike land inequality, was more likely to draw dissent from easily agitated urban areas. Furthermore, inequalities in wealth were more visible in urban areas, so the agitating effect of relative deprivation was more acute. Inequality has also been found to damage perceptions of trust for governance institutions, increasing difficulties for the state to tax the population to create programs that reduce poverty and inequality.⁸⁵ This creates a cycle of inequality and mistrust that reduces the overall capability of government to govern.

A third relationship between inequality and political instability is the economic growth hypothesis.⁸⁶ Inequality can lead to a reduction in investment opportunities within a society. A lack of investment can lead to economic stagnation, resulting in rising discontent as people are unable obtain jobs, food, and basic welfare. Hence, inequality does not directly affect political stability, but rather requires an indirect channel through a reduction in economic growth to create the negative social conditions that catalyze political change.

Recent research has disagreed with many of the previous arguments relating income inequality to political instability. Collier and Hoeffler found that grievances

⁸² Thorbeck and Charumilind, 2002, 1477-1495.

⁸³ Samuel P. Huntington, Political Order in Changing Societies (New Haven: Yale University Press, 1968): 375.

⁸⁴ Edward N. Muller and Mitchell A. Seligson, “Inequality and Insurgency,” *The American Political Science Review* 81 no 2 (1987): 425-452.

⁸⁵ Bo Rothstein and Eric M. Uslaner, “All for All: Equality, Corruption, and Social Trust,” *World Politics* 58 (2005): 71. See also Sanjeev Gupta et al., “Does Corruption Affect Income Inequality and Poverty,” *Economics of Governance* 3 (2002): 23-45.

⁸⁶ Alesina, and Perotti, 1996, 1203-1228. Alesina and Perotti’s previous work was updated in Kentor, 2001.

caused by income inequality were insignificant in causing civil wars.⁸⁷ A similar finding was also found by Fearon and Laitin, where income inequality, was also insignificant for instigating civil wars.⁸⁸ The preceding two studies were important in removing inequality as a cause of civil war, but they did not remove alternative possibilities for inequality to affect overall political stability.

The causal relationship between economic inequality and political stability is under continued furious debate. For present purposes, a clear relationship is difficult to infer. However, none of the previous studies have used the definitional separations of political stability encouraged by Jong-A-Pin. From this perspective, economic inequality may be important in increasing the likelihood of rioting, or what Jong-A-Pin identifies as “mass civil riots.” Instigated by mass rioting within France throughout the last decade, recent research has reinforced this connection; where economic inequality is prevalent, people begin to riot and act out violently to force change.⁸⁹ Based on this previous research, inequality is anticipated to be strongly associated with political instability indicators based on “mass civil riots.”

When political stability is measured as movements back and forth between dictatorship and democracy, significant relationships with inequality have been identified.⁹⁰ Building off research on government institutions by Acemoglu and Robinson, the authors demonstrate that the more unequal a society is, the more likely it is to transition between democratic and dictatorial regimes.⁹¹ If a democracy has high inequality, the government is faced with pressure from masses of voters to transfer wealth from the rich to the poor. This phenomenon provides a significant incentive for rich elites to stage a coup and install a regime that eschews redistribution. Alternatively, when dictatorships have high inequality, there is significant incentive for the masses to instigate revolutions because the government is unlikely to pursue redistributive policies

⁸⁷ P. Collier, and A. Hoeffler, "Greed and Grievance in Civil War." *Oxford Economic Papers-New Series* 56 no. 4 (2004): 563-95.

⁸⁸ James D. Fearon and David D. Laitin, "Ethnicity, Insurgency, and Civil War," *The American Political Science Review* 97 no. 1 (2003): 85.

⁸⁹ A. Abbink, D. Masclet, and D. Mirza, "Inequality and Riots – Experimental Evidence," *French Experimental Economics Association Working Paper No.2010-13*. Accessed on July 30, 2013 at http://perso.univ-tours.fr/mirza/research/Abbink_Masclet_Mirza.pdf.

⁹⁰ Dutt and Mitra, 2008, 1285-1314.

⁹¹ D. Acemoglu and J. Robinson, "A Theory of Political Transitions," *American Economic Review*, 90 no 4 (2001): 938-63.

to reduce revolutionary fervor. As a result, high levels of inequality encourage societies to move back and forth between these two regime types as masses and elites fight over the distribution of resources.

Based on the previous research, economic inequality is likely to be significant in explaining political instability of political regimes and of mass civil riots, whereas inequality is likely to be insignificant in explaining other forms of political instability.

Section 5: What's next?

The previous chapter provided a description of globalization, economic inequality, and political instability. Definitions, causes, and interweaving relationships were discussed. The variables and relationships discussed here serve as the foundation for several quantitative models constructed in chapter two.

Chapter 2: Methodology and Theory Testing

Examining the relationship between globalization, inequality, and political stability builds on previous work within the literature. First, quantitative modeling will be identified as a useful tool in order to identify possibly significant relationships in explaining global trends in globalization, inequality and political stability. In doing so, a distinction is made between factor-centric and outcome centric research, and how quantitative modeling can be used to facilitate forecasting of trends. Second, the dangers and benefits of panel data quantitative models are discussed. Major models for time series panel data are discussed, identifying which are appropriate, and applying them to the research questions being studied. Third, overall parameters of the study are identified, introducing which countries are in the study, the types of data used, and the time periods being analyzed. Fourth, the models are run and the results are discussed.

In political science research, a distinction has been made between factor-centric and outcome-centric research designs.⁹² In a factor-centric design, the purpose is to identify causality; how much change in variable y is caused by changes in variable x. Control variables are included in this design in order to measure precisely the exact relationship between x and y. Alternatively, outcome-centric designs focus more on explaining *all* the variation in a variable. The purpose here is not causality, but rather explaining as much variation as possible by including as many relevant, theory-guided variables as possible. In outcome-centric designs, there are no control variables used to “hold constant” the influence of variables; all variables are included that are capable in explaining variance. Where factor-centric designs are primarily seen in field experiments or where statistical control is desired, outcome-centric designs are useful for forecasting.⁹³

The quantitative modeling pursued here is focused on an outcome-centric design. Numerous explanatory variables are regressed to account for as much variance as possible in the primary variables of globalization, inequality, and political stability. The

⁹² Thomas Gschwend and Frank Schimmelfennig, “Introduction: Designing Research in Political Science – A Dialogue between Theory and Data,” in Thomas Gschwend and Frank Schimmelfennig, eds., Research Design in Political Science: How to Practice What They Preach (Great Britain: Palgrave Macmillan, 2007): 8-9.

⁹³ Gschwend and Schimmerlfennig, 2007, 14.

purpose of this exercise is to facilitate forecasting; if variables that explain a significant portion of variance in the primary variables can be identified, these concepts can be used in the subsequent section on Trend Impact Analysis, to construct events that impact global trends in globalization, inequality, and political stability.

Panel data analysis has become increasingly popular in quantitative modeling of global phenomena. By using measurements for many countries over several years, the potential exists to reduce bias and recognize important relationships not seen in a simple cross-section or time-series analysis. Unfortunately, the benefits of panel data must be carefully weighed against many new problems that arise from panel data.

First, panel data analysis is considered to be a non-experimental design.⁹⁴ Countries are not randomly selected, and there are no control groups. As a result panel data often has significant sources of bias, including heteroscedasticity, serial correlation, and omitted variable bias, also known as unobserved heterogeneity. Each of these biases can affect estimated coefficients and levels of significance in regressions.

One of the primary assumptions in econometric analysis is that the error terms are homoscedastic, meaning the error terms in a regression model have roughly equal standard errors throughout the range of the dependent variable. If the variance of the error terms is not constant, then the bias of heteroscedasticity occurs. Not controlling for heteroscedasticity leads to the standard errors being biased, though in what way is a priori unknown. On the positive side, heteroscedasticity does not lead to bias in the coefficients of the independent variables.⁹⁵

Another problem with panel data is serial correlation. Serial correlation occurs when an observation is highly related with a previous observation. This is often a problem with time series data because trends are often related with themselves – this year’s measurement of globalization is likely highly correlated with the previous year’s measure.⁹⁶ Dealing with serial correlation in panel data is an extremely difficult problem

⁹⁴ Paul D. Allison, Fixed Effects Regression Methods for Longitudinal Data Using SAS (Cary, NC: SAS Institute Inc., 2005): 1.

⁹⁵ A. Colin Cameron, Microeconomics using Stata (College Station, Texas: Stata Press, 2010): 152. Peter Kennedy, A Guide to Econometrics: 4th ed. (Cambridge, Massachusetts, The MIT Press, 1998): 119-121.

⁹⁶ Joshua Angrist and Jorn-Steffen Pischke, Mostly Harmless Econometrics: An Empiricist’s Companion (Princeton: Princeton University Press, 2009): 236.

with no consensus solution.⁹⁷ Fortunately, a solution for both heteroscedasticity and serial correlation is to use cluster robust standard errors, which are easily implemented in most statistical programs, although they are an imperfect solution.

The final problem to be discussed here with panel data is omitted variable bias. This occurs when an important explanatory variable is omitted from a model, either because data has not been collected for it, or data collection is impossible. The most common solution to omitted variable bias is called a fixed effects regression.⁹⁸ In a controlled experiment, randomization allows treatment groups to be reasonably assumed to be approximately identical, allowing for strong inferences to be made between cause and effect.⁹⁹ Unfortunately, in a non-experimental design, randomization becomes impossible, so researchers use various statistical techniques to “control” for certain variables in an attempt to recreate randomized groups in a research setting. However, the numerous characteristics that exist in groups, especially states, make controlling for all possible causal variables to be practically impossible. The fixed-effects model is able to control for all time –invariant characteristics by giving each state a separate starting point (x-intercept), identifying any changes that occur over time within each state, and then taking an average of all the in-state changes that transpire among all the states in the analysis.¹⁰⁰ Also, a common practice with fixed-effects regressions to help control for omitted variables is to use a time dummy. Time dummies are able to control for any maturation trends specific to each state that could affect the regression. Combining fixed effect models with time dummies allows for a significant source of unobserved variance to be accounted for.

Unfortunately, the primary problem of fixed-effects models is they are not very useful in addressing variation that occurs between countries, or when variables change slowly over time.¹⁰¹ In order to control for unobserved variables, the fixed effects model tosses away between-country variation. So if the analyst is concerned with understanding how relationships *between* countries affect an individual country’s evolution, the fixed-

⁹⁷ Angrist and Pischke, 237.

⁹⁸ Allison, 2009, 2-3.

⁹⁹ Allison, 2009, 1.

¹⁰⁰ Allison, 2009, 1.

¹⁰¹ Thomas Plumper and Vera E. Troeger, “Efficient Estimation of Time-Invariant and Rarely Changing Variables in Finite Sample Panel Analyses with Unit Fixed Effects,” *Political Analysis* 15 (2007): 124-139.

effects model is likely to provide little insight. Between-state variation is removed because there are likely highly important, unobservable characteristics that make changes in one state different from another, and are extremely difficult to control for in a statistical environment; in effect, the “contaminated” between-state variation is discarded in favor of the more reliable within-state variation.¹⁰² Finally, the fixed-effects model does not control for characteristics within a country that change over time; important, time-variant characteristics need to be included in the model to understand their significance. Overall, the fixed-effects model is a strong tool to remove much bias from unobserved variables, but it is not a complete solution; theory must always remain a guide in determining what variables need to be included in models.

Section 1: The Data

Numerous data sources are used to pursue the quantitative analysis in this chapter. The indexes for inequality and globalization were created by other institutions. However, the measures for political stability need be crafted in the space that follows. The section will begin by constructing two measurements of political stability. The section will conclude by describing other relevant measures.

Several major datasets are used in the following analysis. They include the KOF index of globalization (KOF Index), the Standardized World Income Inequality Database (SWIID), the World Governance Indicators (WGI) database, the Polity IV database, and the Banks Times Series Cross National database. Trade data is acquired from the IMF direction of trade statistics. Finally, an assortment of additional variables is taken from the World Bank World Development Indicators (WDI) Database.

The first measure of political stability uses factor analysis, and is based off the work of Jong-A-Pin.¹⁰³ This measure is chosen because it uses a significant number of measurements, and has a clear theoretical basis. Previous measurements in this vein of literature identify several components, such as assassinations, revolutions, and coups, and take the first unrotated component from a factor analysis and create a single

¹⁰² Allison, 2009, 3.

¹⁰³ Richard Jong-A-Pin, “On the Measurement of Political Instability and its Impact on Economic Growth,” *European Journal of Political Economy* 25 (2009): 15-29.

measurement.¹⁰⁴ The defining feature of these methods is that they construct a single measure of political instability through factor analysis. Campos and Nugent expand this notion by identifying a “high” and “low” political instability, but leave significant opportunity to define additional aspects.¹⁰⁵

In 2009, building on much of the work of Rummel¹⁰⁶ and other quantitative analysts of the international system from the 1950s and 1960s, Jong-A-Pin identifies 21 measures of political stability and identifies four principal characteristics of political stability. According to Jong-A-Pin, the major types of political instability are “politically motivated violence,” mass civil protest,” “within regime instability,” and “instability of the political regime.”¹⁰⁷ Jong-A-Pin used maximum likelihood factor analysis, which uses each variable’s multiple r^2 in the diagonal of the correlation matrix, and oblimin rotation, allowing for the resulting factors to be correlated with each other. However, maximum likelihood factor analysis, while identifying the variance shared in common with the underlying measurements, is prone to significant problems, not least of which is a Hayward case, which can result in inconsistent analysis. Instead, principal components factor analysis is used, which places unities (1) in the diagonal of the correlation matrix. This method creates factors that depend on *all* the variance of the underlying variables, not just their shared variance, and eliminates potential for Hayward cases.¹⁰⁸ In practice, however, the difference between alternative methods of factor analysis is frequently overstated; the relationships between the underlying variables and the constructed factors are frequently very similar regardless of method used. The primary difference is how high the factor loadings are, where principal component analysis has higher factor loadings due to the fact that it includes all the variance among all the variables. But the variables are often correlated with the same factors regardless of method.¹⁰⁹

¹⁰⁴ See Alberto Alesina et al., “Political Instability and Economic Growth,” *Journal of Economic Growth* 1 (1996): 189-211. See also Alesina and Perotti, “Income Distribution, Political Instability, and Investment,” *European Economic Review* 40 (1996): 1203-1228. Finally, see Nauro F. Campos and Jeffrey B. Nugent, “Who is Afraid of Political Instability,” *Journal of Development Economics* 67 (2002): 157-172.

¹⁰⁵ Campos and Nugent, 2002.

¹⁰⁶ Rudolph. J. Rummel, *The Dimensions of Nations* (Beverly Hills, California: Sage, 1972).

¹⁰⁷ Jong-A-Pin, 2009, 19.

¹⁰⁸ Discussions with Richard Chadwick.

¹⁰⁹ See James Dean Brown, “Principal Components Analysis and Exploratory Factor Analysis – Definitions, Differences, and Choices,” *Shiken: JALT Testing & Evaluation SIG Newsletter* 13 no. 1 (2009):26-30.

To determine whether or not the dataset is acceptable for factor analysis, two tests are used. The first is the Kaiser-Meyer-Olkin (KMO) test, which measures for sampling adequacy, and Bartlett's Test of Sphericity.¹¹⁰ The Bartlett test was successful, with a score of 6808.333, and a p-value of .000, indicating that the correlation matrix is not an identity matrix. The KMO test identifies whether or not there are high enough correlations among the variables to make factor analysis worthwhile; the test returned a result of .69, indicating that the dataset is about average for factor analysis. A score below .5 indicates the dataset is unacceptable for analysis. The dataset is deemed acceptable to pursue a factor analysis and identify several structural components of political stability.

Table 2.1 shows the correlation matrix for the 21 variables included in the factor analysis. The variables are all the same ones used in Jong-A-Pin.¹¹¹ Figure 2.1 shows a scree plot of the factors extracted through the principal component factor analysis with oblimin rotation. Four factors are clearly identified and need to be analyzed to understand their significance.

Several methods are used to identify many how factors should be extracted. The first test used is the Scree Plot (Figure 2.1). When analyzing a scree plot, the focus is on identifying factors with an eigenvalue greater than 1 but before the factors appear to be capturing random covariance as indicated by similar eigenvalues. Based on the scree plot, four factors are required. Second, a likelihood ratio (LR) test is used to compare the four factor model with a fully saturated 21 factor model. The test is significant and encourages the usage of 4 factors, because four factors have eigenvalues greater than 1.¹¹² Unfortunately, principal component factor analysis, unlike maximum likelihood, cannot be subject to as many tests, so the scree plot and LR tests are the only tests used to determine the legitimacy of four factors.

¹¹⁰ A Yakuba et al., "Varimax Rotated Principal Component Factor Analysis of the Zoometrical Traits of UDA Sheep," *Arch Zootec* 60 no. 231 (2011): 813-816. Tests were conducted using the STATA user created program factortest, which can be found by using the command findit factortest.

¹¹¹ Jong-a-Pin divided his database into two sets, one with 21 variables and the other with 25. The 25 variable dataset only goes to 1980, whereas the 21 variable analysis includes older years. In order to include as many years as possible, the 21 variable set is used. For descriptions and sources of these variables, see Appendix A and B.

¹¹² The Likelihood ratio test score is 6816.53, and has a p-value of .000

Figure 2.1: Scree Plot of Eigenvalues for Political Stability Variables

Table 2.1: Correlation Matrix for Factor Analysis of Political Stability Variables																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Assassinations	1																				
Strikes	.23	1																			
Guerrilla War	.35	.19	1																		
Crises	.23	.36	.38	1																	
Purges	.07	.13	.37	.32	1																
Riots	.19	.38	.23	.26	.2	1															
Revolutions	.33	.09	.49	.3	.21	.08	1														
Demonstrations	.24	.34	.16	.23	.1	.74	.11	1													
Coups	.09	.09	.15	.24	.19	.04	.41	0	1												
Constitutional Chg.	.06	.03	.08	.12	.09	.03	.28	0	.39	1											
Cabinet Changes	.13	.15	.14	.44	.11	.11	.29	.1	.33	.34	1										
Chief Exec. Chg.	.11	.18	.07	.39	.09	.09	.16	.1	.37	.25	.48	1									
Number of Elections	.02	.06	-.05	.07	0	.05	-.12	.1	-.1	.03	.12	.19	1								
Regime Changes	.16	.07	.26	.25	.15	.07	.4	.1	.3	.52	.29	.24	0	1							
Years Largest Party in Government	-.06	-.08	-.09	-.09	.12	.05	-0.1	.1	-.1	0	-.2	-.2	-.1	-.1	1						
Fractionalism	.1	.14	0	.19	-.2	.02	0	0	-.1	-.1	.15	.24	.2	0	-.45	1					
Polarization	0	.1	-.09	.11	-.1	0	-.11	0	-.1	-.2	.01	.2	.2	-.2	-.23	.51	1				
Veto Players	.16	.19	.11	.31	.04	.08	.17	.1	.28	.19	.31	.54	.1	.25	-.19	.2	.12	1			
Minor Conflict	.26	.13	.25	.12	.03	.17	.34	.1	.08	.03	.08	.01	0	.05	-.08	.03	-.1	.08	1		
Medium Conflict	.28	.08	.36	.1	.02	.12	.47	.1	.06	.04	.07	0	-.1	.07	-.09	.02	-.1	.08	.69	1	
Civil War	.2	.05	.36	.09	.05	.07	.43	.1	.1	.08	.06	.01	-.1	.11	-.06	0	-.1	.04	.13	.68	1

The four factors are rotated using oblimin rotation, creating the following correlations between the underlying variables and the individual factors in Table 2.2:

Table 2.2: Principal Component Factor Loadings after Oblimin Rotation Highly Significant Loadings are Bolded in Blue					
Variable	Factor 1	Factor 2	Factor 3	Factor 4	Uniqueness
	Violence	Regime	Within	Protest	
Guerrilla War	0.8328	0.0409	0.0217	0.1275	0.2552
Revolutions	0.7652	0.3079	-0.0049	-0.0573	0.2945
Assassinations	0.4693	0.002	0.1991	0.224	0.6017
Civil War	0.7099	0.0163	-0.0411	-0.0054	0.4939
Minor Conflict	0.6234	0.0884	0.007	0.2123	0.5185
Medium Conflict	0.8752	-0.0026	0.0009	0.0772	0.2115
Fractionalization	0.0324	-0.088	0.7944	0.0616	0.317
Polarization	-0.0872	-0.2634	0.6859	-0.0326	0.4499
Years Largest Party in Gov.	-0.1742	-0.0569	-0.5857	0.1396	0.5079
Number of Elections	-0.199	-0.0163	0.4223	0.067	0.7334
Purges	0.112	0.0195	-0.1747	0.0669	0.3353
Riots	0.1155	0.017	-0.0556	0.8714	0.223
Demonstrations	0.1012	0.0416	0.0073	0.8588	0.2335
Strikes	0.0425	0.0814	0.2371	0.6925	0.4495
Changes in Chief Executive	-0.0507	0.4808	0.5803	0.1142	0.368
Cabinet Changes	0.0737	0.5975	0.3373	0.1435	0.501
Constitutional Changes	0.071	0.7848	-0.1515	0.059	0.3504
Coups	0.165	0.6931	-0.0169	-0.1102	0.4771
Veto Players	0.0421	0.4313	0.4968	0.1031	0.5227
Regime Changes	0.1901	0.697	-0.0952	0.0796	0.4597
Government Crises	0.1835	0.3351	0.3771	0.358	0.5357

The results from this factor analysis closely mimic the results from Jong-A-Pin, even though the current analysis uses more recent data.¹¹³ Table 2.2 shows the correlation coefficients for the 21 variables of political stability and the four factors. Cells that are highlighted in blue have a high enough correlation where they provide strong insights regarding the aspects of political stability that are identified. There are, however, some slight differences. In Jong-A-Pin's analysis, "Crises" is most highly associated with the Regime factor, but the factor loading has a higher correlation coefficient of .42, although even in his analysis crises is fairly evenly spread throughout

¹¹³ Jong-A-Pin's factor loadings are in his 2009 paper on page 18.

the same three factors. Still, even though different factor analysis methods were used, maximum-likelihood vs. principal component factor, the results are extremely similar, supporting the notion that these factors actually reflect latent characteristics of political stability and are not a product of random chance.

An alternative measure of political stability that has had a strong correlation with economic inequality is a residual based measure.¹¹⁴ The authors use the Polity2 measure from the Polity IV Annual Time-Series Data.¹¹⁵ The Polity2 ranges from a complete dictatorship, scored as a -10, to a complete democracy, scored as +10. Combining the Polity2 score with various other control variables, the authors create a model of political stability where:

$$\begin{aligned} \text{Polity2}_{it} = & \text{Polity2}_{it-1} + \text{Polity2}_{it-2} + \text{Polity2}_{it-3} + \\ & \text{LN(GDP Per Capita)}_{it} + \\ & \text{Primary School Rate}_{it} + \\ & \text{Gap Between Male and Female Primary Schooling}_{it}^{116} + \\ & \text{Urbanization Rate}_{it} + \\ & \text{LN(Population)}_{it} + \\ & \text{Oil exporting Dummy}_{it} + \\ & \text{Major Civil War Dummy}_{it} + \\ & \text{Minor Internal War Dummy}_{it}^{117} + \\ & \varepsilon_{it} \text{ (Eq. 1.1)} \end{aligned}$$

where i = the country, and t = time. To measure political stability, the authors measure the standard deviation of the residual. While the authors use several different ways to model the equation, personal correspondence with the authors has encouraged a country-by-country Ordinary Least Squares (OLS) model. Each country is modeled separately,

¹¹⁴ Pushan Dutt and Devashish Mitra, "Inequality and the Instability of Polity and Policy," *The Economic Journal* 118 (2008): 1285-1314.

¹¹⁵ Data available at <http://www.systemicpeace.org/inscr/inscr.htm>.

¹¹⁶ Measures for Primary School Rate and the Gap Between Male and Female Schooling is from R. Barro and J. W. Lee, "International Data on Educational Attainment: Updates and Implications," *CID Working Paper no. 42* (2000). The most recent data is available at <http://www.barrolee.com/>.

¹¹⁷ In the original equation, there are no dummies for Major and Minor War. The authors use inter-state and extra-state wars from the Armed Conflict Dataset NRIO, http://www.pcr.uu.se/research/ucdp/datasets/ucdp_prio_armed_conflict_dataset/. However, the authors do not state in their paper how inter and extra-state wars are operationalized, and the dataset itself makes the process quite complicated. In addition, post-WW2 the primary threat to political stability more frequently comes from domestic conflict rather than international. The same NRIO dataset provides a much more accessible measure for domestic major and minor wars that are used here instead. This author believes that the use of domestic conflict data as opposed to international conflict data is at least as good in identifying war-related threats to political stability. Unfortunately, repeated attempts to address this issue with the authors have not been met with success.

and residuals calculated individually. In addition, a fixed effects model is also used for additional support.¹¹⁸ These two residual-based measures, the OLS and fixed-effects, are titled PS_{ols} and PS_{fi} . Unfortunately, because the authors used the standard deviation of the residual, each country only has one datapoint, and it is not suitable for time-series analysis. This particular measure will be used in a cross-section model to highlight particular relationships between inequality and political stability.

In addition to measures for political stability, measurements for globalization and economic inequality are used. The first discussed is the KOF index of Globalization.¹¹⁹ The KOF Index compiles several measurements of economic, social, and political exchange. These measurements are then weighted and compiled in a single measurement, Overall Globalization. The Overall Globalization index is a weighted average of underlying indexes for economic, social, and political connections between states, and ranges from 1 to 100, where 100 is high levels of globalization. The variables used to create the Overall Globalization index are in Table 2.3.

¹¹⁸ The authors measure the residual in 5 different ways. I reproduce the Fixed effects and OLS versions for two reasons. First, the authors identified the OLS version as superior to all the others. 2. The fixed effects version is also reproduced here in order to reflect a systemic measure of political stability; also, compared to all the other types the authors used, the fixed effects model is easy to replicate. Correspondence with the authors encouraged using the fixed effects approach.

¹¹⁹ See <http://globalization.kof.ethz.ch/>.

Table 2.3: Variables and Weights Included in the KOF Index of Globalization (Source: http://globalization.kof.ethz.ch/static/pdf/variables_2011.pdf)	
Variable	Weight
1. Economic Globalization	36%
A. Actual Flows	50%
<ul style="list-style-type: none"> - Trade (percent of GDP) (22%) - Foreign Direct Investment, stocks (percent of GDP) (29%) - Portfolio Investment (percent of GDP) (22%) - Income Payments to Foreign Nationals (percent of GDP) (27%) 	
B. Restrictions	50%
<ul style="list-style-type: none"> - Hidden Import Barriers (22%) - Mean Tariff Rate (28%) - Taxes on International Trade (percent of current revenue) (27%) - Capital Account Restrictions (23%) 	
2. Social Globalization	38%
A. Personal Contacts	33%
<ul style="list-style-type: none"> - Telephone Traffic (26%) - Transfers (percent of GDP) (2%) - International Tourism (26%) - Foreign Population (percent of total population) (20%) - International Letters (per capita) (25%) 	
B. Data on Information Flows	36%
<ul style="list-style-type: none"> - Internet Users (per 1000 people) (36%) - Television (per 1000 people) (37%) - Trade in Newspapers (percent of GDP) (28%) 	
C. Data on Cultural Proximity	31%
<ul style="list-style-type: none"> - Number of McDonald's Restaurants (per capita) (43%) - Number of Ikea (per capita) (44%) - Trade in Books (percent of GDP) (13%) 	
3. Political Globalization	26%
<ul style="list-style-type: none"> - Embassies in Country (25%) - Membership in International Organizations (28%) - Participation in U.N. Security Council Missions (22%) - International Treaties (25%) 	

Measurements for income inequality are from two sources, the Standardized World Income Inequality Database (SWIID), and the University of Texas Inequality Project(UTIP).¹²⁰ Using data from the Luxembourg Income Study (LIS), the World Bank Deininger and Squire database, The U.N. University World Income Inequality

¹²⁰ Frederick Solt, "The Standardized World Income Inequality Database," *Social Science Quarterly* 90 no. 2 (2009): 231-242. SWIID database accessible at <http://dvn.iq.harvard.edu/dvn/dv/fsolt/faces/study/StudyPage.xhtml?globalId=hdl:1902.1/11992>. UTIP dataset is available at <http://utip.gov.utexas.edu/>.

Database (UNU-WIDER), the UTIP dataset, and finally the Standardized Income Distribution Database (SIDD), the SWIID provides Gini coefficient data for 171 countries from 1960 to 2008, and is frequently used for panel research to explain the causes and effects of income inequality. Gini measurements range from 0 of complete equality, where everyone has the same income, to 1 where 1 individual has all the income.

The SWIID identifies overall income inequality, including all sources of income within an economy. An alternative measure of inequality is the UTIP measure for wage inequality, which identifies the wage difference between people who earn an income through labor. The UTIP measure only includes wages from manufacturing payrolls, not all wages.. This measure specifically does not include income generated from stocks, investments, or other non-wage income.¹²¹ The data coverage for the UTIP measure is from 1963-2003 for most countries.¹²²

Measuring technological development is a difficult task. First, many of the more simple measures of technological development, such as the number of land-line telephones or internet users, are incorporated in the measure for globalization; as a result, they are inappropriate as independent variables because they are already a part of the dependent variable. The remaining measures that are readily available in the World Bank's development indicators include the number of scientific and technical journal articles¹²³, high-technology exports, and trademark applications. High technology exports have an extremely small number of observations, and are not very suitable for time-series analysis. The remaining technology indices have almost as many observations as the political stability measures, and are used.

Following standard practice in modeling, economic development is measured using the natural log of GDP per capita. This data is acquired from the Penn World Tables.¹²⁴

¹²¹ James Galbraith, Inequality and Instability: A Study of the World Economy Just Before the Great Crisis (New York: Oxford University Press, 2012): 51.

¹²² <http://utip.gov.utexas.edu/>.

¹²³ Arnold Verbeek, "Measuring Progress and Evolution in Science and Technology – I: The Multiple Uses of Bibliometric Indicators," *International Journal of Management Reviews* 4 no. 2 (2002): 179-211.

¹²⁴ Alan Heston, Robert Summers and Bettina Aten, Penn World Table Version 7.1, Center for International Comparisons of Production, Income and Prices at the University of Pennsylvania, July 2012.

In creating a model to explain change in inequality, several variables are used to construct an internal development model. The internal development model uses the percent of labor force in agriculture, sector dualism, population increase, and the amount of people enrolled in secondary education.¹²⁵ Data for labor force in agriculture is taken from the Food and Agricultural Organization of the United Nations.¹²⁶ All the other variables are calculated using data from the World Bank.¹²⁷

All data have been averaged over 5 years in order to focus on long term trends rather than short term blips. All models use standard errors that are robust against heteroscedasticity and are clustered at the country level. These regressions are not meant to be the final word on the relationships analyzed. Rather, consistent with the “outcomes” approach discussed earlier, the purpose is to provide “raw” inferences to be used to generate events in the Trend Impact Analysis in chapter six. These models are at best inspired by current best practice in quantitative modeling. The hope is that these models are a solid first start, but that in the future better and more data, combined with improved model specification will lead to improvements in the structural model over that articulated here.

Section 2: Regressions

Based on theories outlined in the literature review, several regressions are run to understand the relationships of globalization, inequality, and political stability. First, globalization is explained through a model focusing on the role of the state, technology and economic development. Second, inequality is explained by using an internal development model combined with other state functions. Finally, political stability is modeled using numerous variables for globalization, communication, and technology.

¹²⁵ For an application of the internal development model to explain inequality, see Matthew C. Mahutga and Nina Bandelj, “Foreign Investment and Income Inequality: The Natural Experiment of Central and Eastern Europe,” *International Journal of Comparative Sociology* 49 (2008): 429-454.

¹²⁶ Statistical database located at <http://faostat.fao.org/default.aspx>.

¹²⁷ Matthew C. Mahutga et al, “Within-Country Inequality and the Modern World-System: A Theoretical Reprise and Empirical First Step,” *Journal of World-Systems Research* 27 no. 2 (2011): 298. World Bank data is from World Bank, *World Development Indicators* (Washington, Dc: World Bank, 2013).

Globalization

Measurements of globalization have often been used to explain other concepts, such as economic growth and inequality.¹²⁸ However, a model has not previously been constructed to explain how globalization is affected by the state. The KOF globalization index identifies the connections that tie states together, including trade, information transfers, and treaties. All of these forms of interaction are affected by state policies. Additionally, the technological development of a state should increase the amount of globalization between states, as more opportunities for interaction arise. As a result, the following model of globalization is analyzed:

$$\begin{aligned} \text{Globalization}_{it} = & \beta \text{Globalization}_{it-1} \\ & + \beta \text{Violence Factor}_{it-1} + \\ & + \beta \text{Regime Stability Factor}_{it-1} \\ & + \beta \text{Within Regime Factor}_{it-1} \\ & + \beta \text{Protest Factor}_{it-1} \\ & + \beta \text{Technological Development}_{it-1} + \\ & + \beta \text{Economic Development}_{it-1} (\text{LN GDP}) + \\ & + \beta \text{ctrycode}_{it} + \\ & + \beta \text{year}_{it} + \\ & + \varepsilon_{it} \text{ (Eq. 1.2)}^{129} \end{aligned}$$

where i identifies country and t identifies year. This model is based off the technique demonstrated by Acemoglu.¹³⁰ The lagged value of globalization is included in order to portray persistence of globalization; a country's level of globalization is likely to be

¹²⁸ For economic growth, see Axel Dreher, "Does Globalization Affect Growth? Evidence from a New Index of Globalization," *Applied Economics* 38 no. 10 (2006): 1091-1110. For inequality, see Axel Dreher and Noel Gaston, "Has Globalization Increased Inequality," *Review of International Economics* 16 no. 3 (2008): 516-536.

¹²⁹ It has been brought to my attention that the models with lagged dependent variables discussed in this chapter all suffer from Nickel Bias, which occurs when a lagged dependent variable is included in a fixed effect OLS regression, see Stephen Nickell, "Biases in Dynamic Models with Fixed Effects," *Econometrica* 49 no. 6 (1981): 1417-1426. A dynamic model is any model with a lagged dependent variable. This chapter currently uses fixed effects OLS, whereas it should use system or difference GMM. Sadly, the short number of observations per country (roughly 8 due to averaging), indicate that the nickell bias may potentially be huge. Through direct correspondence with a leading STATA academic, Christopher Baum, I have learned how to correctly implement system GMM for these regressions. However, a couple hanging questions means I will address this issue in later revisions. Early testing so far has confirmed the results I report here, but I would appreciate some assistance.

¹³⁰ Daron Acemoglu et al., "Reevaluating the Modernization Hypothesis," *Journal of Monetary Economics* 56 (2009): 1047.

associated with its previous level of globalization. Treaties, economic contracts, and other “tethers” to the international system are difficult to remove, so once in place they are likely to stay around. The other independent variables are lagged to identify whether or not they have an impact on globalization. Changes in the independent variables lead to effects on globalization; globalization and the independent variables do not vary contemporaneously.

Before continuing with the analysis, several notes are worth mentioning regarding the model chosen. The benefit of including a lagged dependent variable, along with time and country specific dummies, is that these “controls” increase the likelihood that statistically significant findings are actually real. However, the inclusion of these controls may explain most of the possible variance in the dependent variable, creating a possibility where independent variables that are actually significant in the real world become irrelevant within the model.¹³¹

Of the controls included, the lagged dependent variable is frequently argued as being highly suspect.¹³² Including this as a control frequently increases the fit of the model to the data, and often reduces the significance of other, theoretically interesting variables, as well as reducing the size of the coefficients. Before including a lagged dependent variable, some justification should be identified to ensure theoretically significant variables are not suppressed.¹³³

To reiterate, lagged dependent variables, as well as time and country specific effects are often theoretically uninteresting and absorb much of the variance in the dependent model, leaving very little variance left for theoretically interesting variables.¹³⁴ However, the lagged dependent variable in the globalization model is justifiable because previous levels of globalization are highly likely to influence future levels of

¹³¹ Thomas Plumper et al, “Panel Data Analysis in Comparative Politics: Linking Method to Theory,” *European Journal of Political Research* 44 (2005): 327-354.

¹³² Christopher H. Achen, “Why Lagged Dependent Variables Can Suppress the Explanatory Power of Other Independent Variables,” presented at the Annual Meeting of the Political Methodology Section of the American Political Science Association, UCLA, July 20-22, 2000. Available online at <http://www.princeton.edu/csdp/events/Achen121201/achen.pdf>.

¹³³ Theoretically, including the lagged dependent variable should either A: be theoretically relevant and act as a meaningful control, or B: even if unnecessary, should not bias the other coefficients. Yet, evidence from applied research shows that the lagged dependent variable can indeed bias other coefficients in a model if the model is incorrectly specified. See Achen, 2000, 3.

¹³⁴ Thomas Plumper et al., “Panel Data Analysis in Comparative Politics: Linking Method to Theory,” *European Journal of Political Research* 44 (2005): 338.

globalization. A country's current level of globalization is likely to be associated with the number of relationships and connections a country has in the global system; more access to the global system by itself is likely to be a strong factor in increasing future growth in globalization. The time and country parameters are presumed to control for unobserved variables that tend to be time and place specific, and which in their effects can bias the overall model. As a result, these controls are used because results that are statistically significant are likely to remain robust in further analysis.

The four factors of political stability are likely to affect globalization in different ways. The violence factor identifies the amount of revolutions, civil wars, and other sources of domestic aggression that seek to destabilize a government. This should be negatively related with globalization, as the more violent a domestic environment is, the more difficult it is to make connections with the international system. Similarly, the protest factor should also have a negative relationship with globalization. Few companies want to invest in a country that is enveloped by strikes and social discontent; the same goes for tourists as well. The regime factor identifies political coups, regime changes, and constitutional changes, all of which are major threats to political stability. As a result, this factor should be negatively related with globalization. Alternatively, the within factor is more difficult to assess a-priori its impact on globalization. The within factor identifies how fractionalized and polarized the political system is; i.e., the likelihood that members of the legislature are from different political parties, or that the executive is from a different political party from the legislature. These types of schisms, while identifying internal divides within a political system, may actually be healthy for the political process. Alternative voices are present in the political system, giving opportunities for robust debate and discussion.

The nonpolitical stability related measures are most likely going to have a positive effect on globalization. Technological development is likely to increase globalization, as it not only provides new opportunities and venues for individual people to communicate, increasing social globalization, but it also creates new opportunities for states and businesses to cooperate as well, facilitating economic and political globalization. Economic development is likely to increase globalization as it reflects more abilities for

states to financially interact, through either trade, or funding international institutions, or other forms of economic interaction.

Table 2.4 shows the results from the globalization model. Three regressions were calculated, using economic, social, and political globalization each as the dependent variable. The results generally support theoretical and common sense understandings of the relationships between globalization, political stability, economic development, and technology. In equation 1.2, economic globalization identifies flows, such as trade and FDI, as well as restrictions like tariffs, to international economic integration. Regime factors, protest factors, economic development, and technology were all significant. The regime and protest factors both identify either significant threats to the stability of the political regime, such as coups, or social demonstrations against the government, such as strikes and protests. The sign is negative, meaning as threats to the stability of the state increase, economic globalization decreases. Economic development, measured by GDP per capita, is also significant, but the measure is negative, indicating there may be some multicollinearity or other problem.¹³⁵ Theoretically, one would expect globalization and GDP per capita to be positively related because increases in GDP per capita indicate more resources for a state to interact with the international system, including more trade, more FDI, etc. Finally, the number of trademark applications, used as a proxy for technological development, is also significant. Unfortunately, this is not a very clear indicator of technological development; it could represent either the availability of government institutions for maintaining trademarks, as well as the interests of domestic and foreign interests to protect their intellectual and technological property. Regardless, its high level of significance and positive coefficient reinforce the belief that higher technological development leads to greater economic globalization.

¹³⁵ The negative sign of GDP per capita is most likely due to multicollinearity. When only economic globalization and GDP per capita are included in the model, the results are significant at the .000 level at highly positive. As the political stability variables are included, the significance of GDP per capita is reduced, and its sign changes. The most likely implication of this result is that the relationship between GDP per capita and economic globalization is spurious. Alternatively, the effects of political stability on economic globalization outweigh the effects of GDP per capita. In other words, direct and indirect effects are being scurried.

Table 2.4: Globalization Model Results			
VARIABLES	(1) Economic Globalization	(2) Social Globalization	(3) Political Globalization
Violence Factor _{<i>t-1</i>}	-0.362 (0.309)	-0.406* (0.221)	-1.502*** (0.563)
Regime Factor _{<i>t-1</i>}	-0.504** (0.220)	-0.00901 (0.175)	-0.501** (0.241)
Within Factor _{<i>t-1</i>}	0.200 (0.389)	0.277 (0.357)	0.971** (0.456)
Protest Factor _{<i>t-1</i>}	-0.550*** (0.167)	0.0572 (0.214)	-0.283 (0.477)
GDP Per Capita _{<i>t-1</i>}	-2.781** (1.347)	1.603 (1.375)	-0.641 (1.985)
Trademark Apps (NL) _{<i>t-1</i>}	1.970*** (0.493)	1.179** (0.462)	0.848 (0.617)
Economic Globalization _{<i>t-1</i>}	0.566*** (0.0454)		
Social Globalization _{<i>t-1</i>}		0.592*** (0.0453)	
Political Globalization _{<i>t-1</i>}			0.609*** (0.0479)
Constant	29.40** (12.07)	-6.257 (11.42)	22.98 (16.86)
Fixed Effects and Time Dummies	Yes	Yes	Yes
Number of Observations	479	504	505
Number of Countries	111	120	121
R-squared	0.848	0.828	0.784

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

For social globalization, none of the variables were significant except for the proxy of technological development, and a very slight significance for violence. Approximately 33% of the social globalization variable is the amount of telephone traffic, and the number of internet users and televisions. All of these would be related to the country's level of technological development, providing encouraging support to the legitimacy of the results. Regardless of the stability of the political regime or level of economic development, people are going to try to communicate with people outside of their country. The low level of significance for the violence factor reinforces the belief that if a country is mired in domestic conflicts, the population is more likely to fear for their lives than attempt to communicate with foreign entities; however, the low level of significance shows that regardless of the amount of violence people will still try to communicate with the outside world, if anything to let the world know of the violence taking place and to plea for aid.

Political globalization also had results that reinforce theoretical likelihoods. Violence, regime instability, and within instability were all significant in the model. Countries embroiled in violence are less likely to have embassies in foreign countries or participate in international treaties or governance. This is logical, as countries embroiled in domestic violence are likely concentrating on finding political solutions or exterminating the opposition. A similar explanation exists for regime instability, as regimes involved in coups, or major regime changes are more focused on domestic political concerns. An interesting result is the significance of the within factor, and its positive coefficient. This result is saying that when governments are polarized, and have 2 or more political parties vying for control, they are *more* likely to participate in international forms of governance. While there is not enough information to specifically understand why this phenomenon is occurring, one possibility is that political parties attempt to use international interests as bargaining chips in achieving domestic political desires.

Economic and technological development, and the protest factor were not significant in the political globalization regression. Economic development could have possibly been significant because wealthy nations have more ability to fund international institutions; however, the insignificant result encourages a belief that mere participation

in international institutions and treaty making does not require a significant amount of financial resources. Similarly, technological development is not required to politic internationally. The insignificant result for protests shows that the desires of the masses, shown through political motivated demonstrations and strikes, is not much of a factor in affecting a state's international political objectives.

The political stability indicators, although statistically significant, had a very small actual impact on globalization. Political stability likely plays a role in the early stages of globalization, perhaps even in the pre-planning stages as reflected by the need for a lagged political stability score to be statistically significant. Political stability changes slowly over time, even though when it does change it is likely to be severe and drastic. The slow change in political stability indicates that when foreign actors seek to pursue relationships with a state, they will survey the history and likely future of a state's stability. Assuming the foreign actor considers the state to be stable enough to pursue either economic, political, or cultural arrangements, their interests turn to more pressing concerns, such as legislation that is being passed that is favorable or unfavorable, and the amount of economic and technological growth.

Economic Inequality

Numerous studies have attempted to explain the relationship between inequality, globalization, the state, and other factors.¹³⁶ These models share in common a reliance on the Standard World Income Inequality dataset in order to measure inequality, and the usage of the Internal Development model. The section begins by addressing some unique aspects of the data, and then attempts to reproduce and expand the inequality analysis in Galbraith (2012). The analysis continues by explaining the details of the internal development model, which acts as a set of control variables in a wider model of inequality. The section concludes by using a lagged dependent variable model, with time

¹³⁶ Particularly relevant to the analysis pursued here are Matthew C. Mahutga and Nina Bandelj, "Foreign Investment and Income Inequality: The Natural Experiment of Central and Eastern Europe," *International Journal of Comparative Sociology* 49 (2008): 429-454, Andreas Bergh and Therese Nilsson, "Do Liberalization and Globalization Increase Income Inequality," *European Journal of Political Economy* 26 (2010) 488-505, and Cheol-Sung Lee, Francois Nielse, and Arthur S. Alderson, "Income Inequality, Global Economy and the State," *Social Forces* 86 no. 1 (2007): 77-112.

and country specific controls, to identify significant sources of variance in economic inequality.

One element of this study that is very interesting is the usage of both the UTIP data on Wage inequality, as well as the SWIID data on overall income inequality. The UTIP data (Wage Ineq.) is interesting because it only includes data on wages; other sources of income, such as stock returns and other investments are not included. Alternatively, the SWIID data uses all sources of income, including wages and investments, which are broken down into pre-tax income inequality (Pre-Tax Ineq.), and post-tax redistribution income inequality (Post-Tax Ineq.).

First, the relationship between wage inequality and overall income inequality is investigated. Table 2.5 shows the relationship between the three types of inequality measures, wage inequality, income inequality before taxes, and income inequality after tax redistribution. In all regressions, the coefficients were significant, but the primary purpose is to demonstrate the amount of variance explained. The overall income Inequality measures, both net and market, explain a decent amount of variance in wage inequality with r^2 scores of .23 and .24 respectively. Alternatively, wage inequality does not explain much variance in either of the overall income inequality scores, with r^2 of .09 and .12 respectively. The major point here is that wage inequality does not reflect a large source of inequality within an economy; rather, non-wage sources, such as capital gains, stock options, and income raised from venture capital, represent likely areas where economic inequality accrues.

Table 2.5: Exploring the Relationship Between Inequality Measures (5 Year Averages)¹³⁷				
VARIABLES	(1) Wage Ineq.	(2) Wage Ineq.	(3) Post-Tax Ineq.	(4) Pre-Tax Ineq.
Pre-Tax Ineq.	0.00722** (0.00357)			
Post-Tax Ineq.		0.0134*** (0.00467)		
Wage Ineq.			4.016*** (1.335)	4.188** (1.863)
Constant	-1.860*** (0.180)	-2.036*** (0.187)	44.15*** (2.112)	53.44*** (2.929)
Fixed Effects and Time Dummies	Yes	Yes	Yes	Yes
Observations	653	664	664	653
R-squared	0.232	0.248	0.097	0.122
Number of Countries	120	120	120	120
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1				

Table 2.6 begins with a series of fixed effects regression models using cluster robust standard errors to identify the relationship between economic inequality and economic development. These regressions generally have statistically insignificant results and low R^2 , except for the case of after tax overall income inequality. The chart generally tells a story of wage inequality increasing while economic development increases, and overall income inequality decreasing while economic development increases. However, based on the research of Galbraith, there is a very high chance that serial correlation is interfering with the results.¹³⁸ The same regressions are re-run using an autoregressive (AR1) model. The important statistic to look at is RHO, where a score closer to 1 indicates significant serial correlation, which in all the models is high, from .79 to .93.¹³⁹ These results indicate that the AR1 model is likely the correct specification to correct for the serial correlation in the inequality statistics.

¹³⁷ Single year measures were not used in these models because the results are very similar.

¹³⁸ Galbraith, 2012, 67.

¹³⁹ In comparison, Galbraith had RHO scores of .8, indicating the AR1 model is likely correct.

When the AR1 model is used, the results are completely opposite from the previous models, with high levels of significance. In the AR1 models, now wage inequality decreases as economic development increases, and overall income inequality increases when economic development increases. The same reversal of coefficient scores between the two types of models are also seen when 5 year averages are used, though the RHO scores are lower. Lower RHO scores should be expected given the 5 year averaging.

Table 2.6: Inequality and Economic Growth: Standard and AR1 Models (No Average of Data)						
	Fixed Effects Models with Clustered SE			Fixed Effect AR1 Models		
VARIABLES	(1) Wage Ineq.	(2) Post-Tax In.	(3) Pre-Tax Ineq.	(4) Wage Ineq.	(5) Post-Tax In.	(6) Pre-Tax In.
LN(GDP Per Capita)	0.433 (0.363)	-4.889 (5.075)	-18.47** (7.168)	-0.302*** (0.0314)	10.76*** (0.491)	10.79*** (0.683)
LN(GDP Per Capita) ²	-0.0327 (0.0212)	0.297 (0.285)	1.266*** (0.408)	0.0188*** (0.00340)	-0.677*** (0.0496)	-0.609*** (0.0675)
Constant	-2.801* (1.581)	59.18** (22.73)	117.0*** (31.74)	-0.234*** (0.0164)	-2.832*** (0.108)	-2.688*** (0.136)
Time Effects	Yes	Yes	Yes	No	No	No
Observations	3,135	4,106	4,038	2,991	3,943	3,875
Number of Countries	144	163	163	137	155	155
R-squared	0.136	0.031	0.126	.0835	.2138	.1404
RHO				.7959	.9241	.9343

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 2.7: Inequality and Economic Growth: Standard and AR1 Models (5 Year Averages)						
	Fixed Effects Models with Clustered SE			Fixed Effect AR1 Models		
VARIABLES	(1) Wage Ineq.	(2) Post-Tax In.	(3) Post-Tax Ineq.	(4) Wage Ineq.	(5) Post-Tax In.	(6) Post-Tax Ineq.
LN(GDP Per Capita)	0.330 (0.377)	-4.617 (5.162)	-19.59*** (6.778)	-0.374*** (0.0737)	9.820*** (0.926)	9.150*** (1.356)
LN(GDP Per Capita) ²	-0.0268 (0.0213)	0.292 (0.290)	1.351*** (0.380)	0.0245*** (0.00640)	-0.597*** (0.0847)	-0.494*** (0.124)
Constant	-2.362 (1.677)	57.67** (22.94)	119.3*** (30.43)	0.00498 (0.110)	-0.499 (1.406)	3.300** (1.555)
Time Effects	Yes	Yes	Yes	No	No	No
Observations	801	997	986	656	834	823
Number of Countries	145	163	163	132	151	151
R-squared	0.187	0.021	0.177			
RHO				.5977	.5632	.6707

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

From the AR1 models, it is possible to infer that globally, people who earn wages are slowly being compressed into similar levels of income (lower wage inequality). Alternatively, overall income inequality is increasing, which may be caused by wealth being accrued in non-wage sources such as stock markets and other investment income. In table 2.5, wage income inequality only had an R^2 of .09 or .12 in overall income inequality (pre-tax and post-tax, respectively), indicating that increases in income inequality mostly come from non-wage sources. These non-wage sources of income are most likely acquired by social and political elites and identify the primary source of income gap between wage-earners and elites.

The statistical analysis here, where wage inequality decreases and overall income inequality increases due to a redistribution of wealth into financial and non-wage areas of the economy is supported by numerous other sources. Galbraith argues that these increases in overall income inequality are due to large gains in financial sectors, information technology, the military, and mortgage booms, ultimately redistributing wealth into fewer and fewer hands.¹⁴⁰ A highly controversial report by the Congressional Research Office argued that the rise of economic inequality in the United States was caused by tax cuts for the rich, especially cuts on capital gains, which make up a significant portion of the overall economy and yet are held by a small minority of the population.¹⁴¹ A recent book by respected economist Joseph Stiglitz also discusses a similar story, a process of rent-seeking and lobbying by social elites to have tax codes and other economic benefits placed in the laps of elites that ultimately lead to increasing economic inequality.¹⁴²

While the previous reports and analysis are primarily directed at the United States economy, the regressions in Table 2.6 and 2.7 indicate that the process of wealth

¹⁴⁰ Galbraith, 2012, 148-149.

¹⁴¹ Thomas L. Hungerford, “Taxes and the Economy: An Economic Analysis of the Top Tax Rates Since 1945,” *Congressional Research Service* 7-5700 R42729, September 14, 2012. Accessed on August 2, 2013 at http://online.wsj.com/public/resources/documents/r42729_0917.pdf. On the controversial nature of the report and Senate Republicans attempt to muzzle it, see Jonathan Weisman, “Nonpartisan Tax Report Withdrawn After G.O.P Protest,” *New York Times*, November 1, 2012, Accessed on August 2, 2013 at http://www.nytimes.com/2012/11/02/business/questions-raised-on-withdrawal-of-congressional-research-services-report-on-tax-rates.html?hp&_r=0. See also Timothy Noah, “Why the GOP Muzzled the Library of Congress’s Research Agency,” November 1, 2012. Accessed on August 2, 2013, at <http://www.tnr.com/blog/plank/109509/gop-crs-drop-dead#>.

¹⁴² Joseph Stiglitz, *The Price of Inequality* (New York: W.W. Norton & Company, 2012).

extraction from wage earners and the masses of society into the hands of the elite is a global phenomenon. The next series of regressions seeks to identify other concepts that increase or decrease inequality.

First, the political stability variables are analyzed to see if there are any relationships with inequality.¹⁴³ Table 2.8 shows the results from averaged and year by year data for several fixed effect regressions. Cluster robust standard errors are used, as well as time dummies. In addition, following Acemoglu (2009), the independent variables are lagged 5 years in order to reflect the 5 year average data.¹⁴⁴ Most of the models encourage a reading where inequality and political stability do not have a strong relationship. While in model 1 regime and within stability have a minor level of statistical significance, those findings are not supported by the models run with all years. Similarly, model 6 shows that political violence has a positive effect on after-tax distribution income inequality, at a high level of significance (below $p=.05$), but that finding was not corroborated by the 5 year average data.

¹⁴³ Following Dreher et al, 2008, the lagged dependent variable of inequality is included because “inequality tends to change slowly over time,” page 153.

¹⁴⁴ Acemoglu et al, 2009, 1049. Single year lags would create significant serial correlation, and the 5 year average data encourages a view that 5 year lags in inequality predict changes in inequality. Also, due to the lag structure of these models, serial correlation was not a problem and an AR1 model was unnecessary.

Table 2.8: Inequality and Political Stability 5 Year Avg and All Years
(Fixed Effects w/Cluster Robust SE)

	5 Year Avg Data			All Years (Ind. Vars. Lagged 5 Yrs)		
VARIABLES	(1) Wage Ineq.	(2) Pre-Tax In.	(3) Post-Tax In.	(4) Wage Ineq.	(5) Pre-Tax In.	(6) Post-Tax In.
Wage Ineq. $t-1$	0.255*** (0.0878)			0.199* (0.107)		
Pre-Tax Ineq. $t-1$		0.587*** (0.0596)			0.416*** (0.0698)	
Post-Tax Ineq. $t-1$			0.448*** (0.0490)			0.222*** (0.0517)
Violence Factor $t-1$	0.0205 (0.0209)	0.276 (0.323)	0.358 (0.276)	-0.00800 (0.00853)	0.343 (0.248)	0.294** (0.137)
Regime Factor $t-1$	0.0250*(p=.052) (0.0127)	-0.159 (0.281)	-0.0806 (0.265)	0.00847 (0.00539)	0.125 (0.111)	0.0757 (0.0911)
Within Factor $t-1$	0.0492*(p=0.056) (0.0254)	-0.151 (0.269)	-0.149 (0.206)	0.00986 (0.0169)	0.0333 (0.225)	0.0707 (0.189)
Protest Factor $t-1$	0.0247 (0.0163)	-0.0864 (0.259)	-0.0608 (0.241)	0.0156* (0.00846)	0.117 (0.211)	0.0528 (0.203)
Constant	-1.179*** (0.140)	17.85*** (2.622)	21.32*** (1.949)	-1.291*** (0.159)	25.03*** (3.364)	29.52*** (2.111)
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	348	516	519	1,072	1,915	1,921
R-squared	0.427	0.369	0.251	0.211	0.221	0.093
Number of Countries	114	127	127	102	124	124

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 2.9: Inequality and Globalization (5 Year Average) Fixed Effects Regressions with Cluster Robust SE Independent Variables Lagged 1 Time Period						
VARIABLES	(2) Wage Ineq.	(5) Pre-Tax Ineq	(6) Pre-Tax Ineq	(7) Pre-Tax Ineq	(8) Pre-Tax Ineq	(10) Post-Tax In
Wage Ineq. $t-1$	0.328*** (0.0733)					
Pre-Tax Ineq. $t-1$		0.555*** (0.0391)	0.528*** (0.0431)	0.571*** (0.0459)	0.551*** (0.0400)	
Post-Tax Ineq. $t-1$						0.425*** (0.0432)
Economic Globalization $t-1$		0.118** (0.0494)				
Social Globalization $t-1$	-0.00432* (0.00260)		0.164*** (0.0492)			0.0953*** (0.0297)
Political Globalization $t-1$				-0.0518* (0.0309)		
Constant	-0.887*** (0.112)	15.50*** (2.918)	16.24*** (2.268)	21.79*** (2.749)	14.94*** (3.289)	19.11*** (2.017)
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	512	655	679	679	679	684
R-squared	0.354	0.387	0.394	0.374	0.378	0.265
Number of Countries	130	135	147	147	147	147

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 2.10: Inequality and Globalization (All Years of Data) Fixed Effects with Cluster Robust Standard Errors (Independent Variables Lagged 5 Years)					
VARIABLES	(5) Pre-Tax In.	(6) Pre-Tax In.	(7) Pre-Tax In.	(8) Pre-Tax In.	(10) Post-Tax Ineq.
Wage Ineq. $t-5$					
Pre-Tax Ineq. $t-5$	0.400*** (0.0419)	0.372*** (0.0431)	0.408*** (0.0473)	0.396*** (0.0427)	
Post-Tax Ineq. $t-5$					0.260*** (0.0437)
Economic Globalization $t-5$	0.0993** (0.0476)				
Social Globalization $t-5$		0.162*** (0.0472)			0.0877*** (0.0281)
Political Globalization $t-5$			-0.0594** (0.0265)		
Constant	22.68*** (3.003)	22.65*** (2.478)	28.86*** (2.743)	22.74*** (3.395)	25.26*** (1.993)
Year Dummies	Yes	Yes	Yes	Yes	Yes
Observations	2,817	2,883	2,883	2,883	2,912
R-squared	0.220	0.229	0.211	0.209	0.124
Number of Countries	132	142	142	142	142

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

With political stability likely insignificant, the analysis next turns to globalization and inequality. The next series of regressions use KOF globalization measures as independent variables to see if there is any relationship with inequality. Also, due to significant multicollinearity, the different types of KOF globalization cannot be included in the same regressions.¹⁴⁵ Finally, due to space, only regressions where the independent variables are statistically significant are shown.

For wage inequality, only social globalization was significant, and only at the .1 level. When the yearly data is analyzed, none of the globalization indicators are significant for wage inequality. However, the analysis becomes very intriguing when looking at pre and post-tax redistribution income inequality data.¹⁴⁶ All of the globalization indicators are significant with the pre-tax income inequality data, for 5 year averages as well as for yearly data. However, almost all these relationships, except for social globalization, disappear when after-tax redistribution income inequality is looked at. In both sets of data, economic and social globalization has a positive effect on inequality, whereas political globalization has a negative, though almost statistically insignificant relationship. Since the relationships disappear in the after-tax redistribution regressions, the role of the state appears very important in understanding how globalization affects inequality. Tax redistribution schemes are often able to reduce much of the brunt of economic and social interactions, such that their significant ability to increase economic inequality is removed.

Combining the regressions with economic inequality and globalization supports the importance of institutional factors in affecting inequality. Broadly, there are two different schools of thought as to the intersection of politics, globalization, and inequality.¹⁴⁷ On the one hand, globalization, often in the form of capital mobility, reduces the ability of the state to collect taxes and reduces the ability of the state to

¹⁴⁵ When economic, social, and political globalization are included in the same regression, the VIF scores are over 25, which means the multicollinearity is large enough to severely bias the coefficients. The general rule of thumb is to not have a VIF score of over 10.

¹⁴⁶ For additional research on the importance of tax redistribution in reducing inequality, see Fabrizio Carmignani, "The Distributive Effects of Institutional Quality when Government Stability is Endogenous," *European Journal of Political Economy* 25 (2009): 409-421. Through quantitative analysis of institutional strength and inequality data, the author demonstrates how redistribution is a successful mechanism to reduce economic inequality.

¹⁴⁷ From Dreher et al, 2008, 151.

redistribute wealth and reduce inequality.¹⁴⁸ Alternatively, policies passed by the state in response to negative aspects of globalization can reduce the impact of globalization to affect labor and the poor, reducing the likelihood that possible losers from globalizations would continually fight against policies that may facilitate increased globalization.¹⁴⁹ The results from tables 10 and 11 generally support the second theory; through tax redistribution schemes, states are often able to ameliorate the negative aspects of globalization to such an extent that globalization is not a significant force increasing inequality after tax-redistribution is taken into account.

The stark contrast between pre and post-tax redistribution encourages an analysis of economic inequality that takes into account the type and quality of political regimes. Recently, the University of Texas Inequality Project released a dataset classifying nations according to their type of government. Using dummy variables, governments are classified as dictatorships, communist, Islamic republics, social democracies, one party democracies, and recent democracies.¹⁵⁰

Unfortunately, while the dataset provides a clear breakdown of regime type that is not represented in any other type of data, the use of dummy variables means fixed effect regressions are not well suited for the data. First, for most of the countries, regime type is fairly constant, meaning in a fixed effect regression that data will drop out of the model. Second, even if there is a slight change in some of the data, for example due to a coup or some form of regime change, and the variable would not drop out, the coefficients are likely biased and inconsistent because there is very little variation in the data except for those infrequent periods of regime change; otherwise, the variable does not change. As a result, instead of using a fixed effect model, pooled regressions, which take all the available data and ignores the panel structure of the data, are used instead. Year dummies and cluster robust standard errors are still used to provide some robustness.

¹⁴⁸ See for example V. Tanzi, Taxation in an Integrating World (Washington, D.C: Brookings Institution, 1995).

¹⁴⁹ See G. Garrett, Partisan Politics in the Global Economy (Cambridge: Cambridge University Press, 1998), and D. Swank, Global Capital, Political Institutions and Policy Changes in Developed Welfare States (Cambridge: Cambridge University Press, 2002), both cited in Dreher et al, 2008.

¹⁵⁰ Database located at <http://utip.gov.utexas.edu/data.html/>. One Party Democracies are classified as countries where elections take place, but citizens can only vote for one political party or leader, such as Egypt under Mubarak. Recent Democracies are governments that became democracies within the last X years. The other classifications are self-explanatory.

Table 2.11 provides several regressions for inequality and regime type. Several unique relationships are evident in the data. First, for wage inequality, both social democracies and communist nations have a significant ability to reduce income inequality, with communist governments being slightly more effective. Dictatorships have a marginally significant positive affect to increase inequality. The other types of government are insignificant, though they slightly reduce inequality.

More relevant relationships are discernible when analyzing the pre and post-tax redistribution income inequality data. Democracies without social safety nets generally have a significant and positive affect increasing economic inequality. Communist nations have a powerful, negative affect on economic inequality, regardless of tax redistribution. However, social democracies are where the most interesting relationships occur. Before tax redistribution, social democracies are insignificant in affecting inequality, though the coefficient is negative. However, *after* tax redistribution, social democracies have a highly significant large affect in reducing economic inequality. Through the taxing and redistribution powers of the social democracy, economic inequality is greatly reduced.

In addition, a cautionary tale is presented by the one party democracies and recent democracies. Both have a significant affect in increasing inequality, most prominently prior to tax redistribution. One party democracies also have a significant, positive affect on economic inequality when after tax redistribution inequality is analyzed, whereas recent democracies are insignificant in affecting inequality after tax redistribution. Several lessons can be extracted from this model. First, One Party democracies, by effectively being a dictatorship in actuality while providing citizens an opportunity of “choice,” do not use the powers of the state to reduce inequality. These types of democracies likely have one major purpose – to maintain their grip on power, and they do not view reducing economic inequality as an important task. Second, recent democracies, perhaps due to their recent creation, likely lack the institutional depth and strength to use the powers of the state to reduce inequality. Unlike one party democracies, which have a significant and positive affect on inequality after tax redistribution, implying they use the powers of the state to enrich their partners, recent democracies have no significant effect on inequality, implying the institutions required to

affect inequality have not matured enough to the point where they can impact inequality through the tax code, either positively or negatively.

The last series of regressions for economic inequality involve what is frequently identified as the internal development model (IDM).¹⁵¹ The IDM explains inequality changes within nations through five factors. The first is sector dualism, which identifies the differences in income between agriculture and non-agricultural parts of a state's economy. This is calculated by taking the absolute value of the percentage of the labor force involved in agriculture minus the percentage of GDP involved in agriculture.¹⁵² As the income between agricultural and non-agricultural sectors increases, overall inequality is seen to increase as there is an increasing separation between these two parts of an economy.

Second in the model is the percentage of the labor force involved in agriculture. Again, as this percentage increases, inequality is also expected to increase as the greater the percentage of population in agriculture, the less people are involved in higher earning industrial wages, indicating an increased divergence between agriculture and non-agricultural sections of an economy. One problem in the current analysis is that of all the variables in the IDM, both sector dualism and the percent labor force in agriculture have a significantly less number of observations, approximately ¼ compared to the others. As a result of this discrepancy, regressions will be run with and without these variables to see if there is any significant difference.

¹⁵¹ This explanation of the IDM draws primarily from Cheol-Sung Lee et al, 2007, but is similarly explained in Mahutga and Bandelj, 2008.

¹⁵² The percentage of labor force in agriculture is acquired from the Food and Agricultural Organization of the United Nations at <http://faostat.fao.org/site/550/default.aspx#ancor>. Percentage of GDP involved in agriculture is taken from the World Bank's World Development Indicators.

Table 2.11: Inequality and Regime Type (Pooled Regression with Cluster Robust SE)						
VARIABLES	5 Year Averages			All Years		
	(1) Wage Ineq.	(2) Pre-Tax In.	(3) Post-Tax In.	(4) Wage Ineq.	(5) Pre-Tax In.	(6) Post-Tax In.
Dictatorship	0.105* (0.0617)	2.339 (2.060)	2.962 (1.985)	0.100 (0.0617)	2.647 (1.988)	2.755 (2.028)
Communist	-0.627*** (0.144)	-15.12*** (2.871)	-13.78*** (2.978)	-0.634*** (0.143)	-14.68*** (2.765)	-14.59*** (2.952)
Islamic Republic	-0.172 (0.145)	-3.449 (2.628)	-4.344 (3.588)	-0.223 (0.152)	-2.261 (2.530)	-3.834 (3.687)
Social Democracies	-0.520*** (0.0786)	-2.581 (1.797)	-11.84*** (1.845)	-0.503*** (0.0769)	-2.304 (1.738)	-12.12*** (1.916)
One Party Democracies	-0.0439 (0.0888)	7.285** (2.967)	7.873** (3.785)	-0.0285 (0.0833)	7.765** (3.018)	8.157** (3.835)
Recent Democracies	-0.0296 (0.0651)	3.602** (1.768)	2.129 (1.979)	-0.00306 (0.0633)	3.817** (1.699)	2.076 (2.034)
Constant	-1.347*** (0.0566)	49.27*** (1.905)	41.39*** (1.928)	-1.353*** (0.0556)	52.20*** (2.841)	43.21*** (2.797)
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	850	932	943	3,309	3,592	3,660
Number of Countries	152	142	142	152	142	142
R-squared	0.402	0.238	0.359	0.404	0.230	0.377

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

The third element of the IDM is the rate of population growth, calculated by taking the crude death rate and subtracting it from the crude birth rate. These statistics are gathered from the World Bank's World Development Indicators. Population growth is expected to increase inequality for various reasons, including greater population growth rates in poor areas, as well as the increased pressure population growth places on the need for job growth.¹⁵³

The next part of the internal development model is enrollment in secondary schools. This factor identifies the spread of education throughout a country. An increased enrollment is expected to lead to lower inequality, as higher amounts of education increase the likelihood people are able to find jobs and increase their income. This is calculated by taking enrollment in secondary education as a percentage of the total secondary school age population.¹⁵⁴

The final element of the IDM is GDP per capita. This reflects the level of economic development. Higher GDP per capita is expected to have a lower level of economic inequality, because a higher level of GDP per capita indicates that each individual has a greater access to wealth.

While not typically included as an element of the IDM, this model will also include the net inflow of Foreign Direct Investment (FDI). The relationship between FDI and inequality has been extremely tumultuous, and a review of the current literature is found in Mahutga and Brandelj. Current scholarship indicates that FDI, by increasing the amount of domestic industries owned by foreign actors, increases inequality for possibly many reasons, but particularly because host countries become embroiled in a "race to the bottom" where governments attract foreign capital by providing many enticements, such

¹⁵³ For additional explanations of this relationship, see Francois Nielsen and Arthur S. Alderson, "Income Inequality, Development, and Dualism: Results from an Unbalanced Cross-National Panel." *American Sociological Review* 60 no. 5 (1995): 674-701.

¹⁵⁴ These statistics are acquired from the United Nations Educational, Scientific, and Cultural Organization (UNESCO) Institute for Statistics, located online at http://stats.uis.unesco.org/unesco/TableViewer/document.aspx?ReportId=136&IF_Language=eng&BR_ToPic=0. World Bank data was also used. It should be noted that certain countries, especially highly developed ones such as Australia, have greater than 100% enrollment in secondary schools, due to over-aged or under-aged students that are either repeating grades or entered school late/early. See <http://data.worldbank.org/indicator/SE.SEC.ENRR>.

as reducing the ability of domestic labor to bargain for higher wages, and other restrictions that could increase income inequality.¹⁵⁵

As feared, though some variables were significant, there is a significant reduction in observations due to the inclusion of employment share in agriculture and sector dualism. Moreover, neither employment share in agriculture nor sector dualism were ever significant. As a result, the models are re-run dropping these variables and the results shown in Table 2.14.

In these final set of regressions for income inequality, the IDM variables with a significant number of observations still remained insignificant. The most intriguing development of this model is the reinforcement of other's analysis that FDI has significant and positive affect on increasing overall income inequality, although it had no significant effect on wage inequality.¹⁵⁶ Inward FDI can increase economic inequality for several reasons, including the creation of an elite management class along with lower paid workers, as well as the creation of state policies to attract FDI at the expense of domestic investment.¹⁵⁷

¹⁵⁵ Mahutga and Brandelj, 2008, 430.

¹⁵⁶ See for example Changkyu Choi, "Does Foreign Direct Investment Affect Domestic Income Inequality," *Applied Economics Letters* 13 (2006): 811-814, and Mahutga and Brandelj, 2008.

¹⁵⁷ Mahutga and Brandelj 2008. See also Jeffrey Kentor, "The Long Term Effects of Globalization on Income Inequality, Population Growth, and Economic Development," *Social Problems* 48 no. 4 (2001): 435-455.

Table 2.12: Inequality, the IDM, and FDI
(Fixed Effects with Cluster Robust SE)

VARIABLES	5 Year Averages			All Years (Lagged 5 Years)		
	(1) Wage Ineq.	(2) Pre-Tax In.	(3) Post-Tax In.	(4) Wage Ineq.	(5) Pre-Tax In.	(6) Post-Tax In.
Wage Ineq. _{<i>t-1</i>}	0.135 (0.102)			0.0623 (0.0636)		
Pre-Tax Ineq. _{<i>t-1</i>}		0.291*** (0.0861)			0.206*** (0.0763)	
Post-Tax Ineq. _{<i>t-1</i>}			0.270*** (0.0800)			0.107* (0.0646)
Sector Dualism _{<i>t-1</i>}	-0.00902 (0.0108)	-0.0600 (0.158)	-0.0116 (0.118)	-0.000209 (0.00733)	-0.0694 (0.126)	0.0302 (0.0721)
Employment Agric _{<i>t-1</i>}	0.0122 (0.0116)	0.0602 (0.174)	-0.0135 (0.133)	0.00293 (0.00796)	0.0742 (0.151)	-0.0655 (0.0846)
School Enrollment _{<i>t-1</i>}	-0.000723 (0.00112)	0.0414 (0.0311)	-0.00484 (0.0177)	0.000557 (0.00117)	0.0227 (0.0215)	-0.00306 (0.0152)
Rate Pop Growth _{<i>t-1</i>}	-0.0218*** (0.00776)	0.194 (0.139)	0.0519 (0.0954)	-0.0210*** (0.00729)	0.170 (0.124)	0.0298 (0.0773)
GDP Per Capita _{<i>t-1</i>}	0.191* (0.108)	3.328* (1.974)	1.551 (1.406)	0.0959 (0.110)	3.432* (1.795)	0.451 (1.088)
FDI Inward(% GDP) _{<i>t-1</i>}	-0.000508 (0.000406)	0.0109*** (0.00354)	0.00706*** (0.00255)	-0.00177 (0.00146)	0.00768** (0.00344)	0.00659*** (0.00177)
Constant	-2.771*** (0.973)	-4.548 (18.07)	13.42 (13.90)	-2.140** (0.944)	-0.906 (18.10)	28.13*** (10.65)
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	196	332	332	515	1,101	1,101
R-squared	0.254	0.182	0.132	0.142	0.116	0.045
Number of Countries	80	115	115	68	102	102

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 2.13: Inequality and Selected Variables (Fixed Effects with Cluster Robust SE)						
VARIABLES	5 Year Averages			All Years (Lagged 5 Years)		
	(1) Wage Ineq.	(2) Pre-Tax In.	(3) Post-Tax In.	(4) Wage Ineq.	(5) Pre-Tax In.	(6) Post-Tax In.
Wage Ineq. _{<i>t-1</i>}	0.185*** (0.0628)			0.0595 (0.0377)		
Pre-Tax Ineq. _{<i>t-1</i>}		0.498*** (0.0603)			0.309*** (0.0611)	
Post-Tax Ineq. _{<i>t-1</i>}			0.389*** (0.0530)			0.205*** (0.0464)
School Enrollment _{<i>t-1</i>}	-0.00104 (0.00140)	0.0268 (0.0233)	0.00157 (0.0169)	-0.00156 (0.00137)	0.0138 (0.0227)	-0.0166 (0.0172)
Pop Growth _{<i>t-1</i>}	-0.00819 (0.00555)	0.0693 (0.0972)	0.0427 (0.0735)	-0.0136** (0.00607)	0.118 (0.0972)	0.0485 (0.0760)
GDP Per Capita _{<i>t-1</i>}	-0.197*** (0.0650)	2.473 (1.759)	2.032* (1.100)	-0.180** (0.0689)	2.495 (1.768)	1.433 (1.199)
FDI _{<i>t-1</i>}	-0.000437 (0.000486)	0.0106*** (0.00335)	0.00722** (0.00294)	-0.00271 (0.00268)	0.00661** (0.00292)	0.00458** (0.00190)
Constant	0.638 (0.545)	0.424 (14.71)	6.321 (9.504)	0.434 (0.577)	6.326 (15.68)	14.93 (10.62)
Year Dummies	Yes	Yes	Yes	Yes	No ^a	Yes
Observations	433	577	582	1,351	2,002	2,022
R-squared	0.314	0.363	0.230	0.186	0.143	0.108
Number of Countries	124	141	141	112	135	135

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

^a An F-test for the significance of the year dummies was insignificant in this model, i.e., the p scores for the year dummies are all insignificant.

Overall, several factors were found to be significant in explaining economic inequality. The most important and powerful variable was regime type and the types of policies passed by governments. The primary sector of economies that contributes to increased inequality is mostly non-wage factors, such as investment income. As a result, the ways that a government taxes non-wage income becomes very important to understand levels of inequality. Also, government policies, specifically tax redistribution, were strong enough to remove entirely the increase in inequality caused by globalization. One of the central tenets of international economic theory is that people who are affected negatively from globalization are much more vocal than the winners. As a result, to the extent that globalization increases inequality, that rising inequality becomes a threat to further levels of globalization. The data demonstrates that tax redistribution schemes “massage” the negative inequality effects of globalization so that continued economic integration is not threatened by people harmed by pro-globalization policies.¹⁵⁸

An important component of globalization, specifically FDI, was also found to have a positive and significant effect leading to increased inequality. This affect remained even when looking at the post-tax redistribution inequality data. This presents two hypotheses. First, tax redistribution schemes likely require either more financing or more experimentation to nullify some of the negative effects of economic integration. Second, if policies are not found to assist those harmed by global integrative processes, some aspects of globalization could threaten continued economic integration.

Intriguingly, one of the major models used to understand inequality, the IDM, was overall insignificant. Also, political stability had no significant effect on inequality. These disappointing results encourage a view that the causes of economic inequality are extremely difficult to separate out from the overall social system in which inequality occurs. Further research is encouraged in order to further understandings of the relationship between society and inequality.

¹⁵⁸ This finding is a significant addition to current studies on the relationship between globalization and inequality. Previous work showing a positive relationship between globalization and inequality includes Sifat Sharmin and Md. Israt Rayhan, “Does Globalization Always Increase Inequality? An Econometric Analysis in Bangladesh Perspective,” *Journal of Globalization Studies* 2 no. 2 (2011): 160-172. A study arguing that globalization strengthens social inequality is Sandra Bucholz et al., “Life Courses in the Globalization Process: The Development of Social Inequalities in Modern Societies,” *European Sociological Review* 25 no. 1 (2009): 53-71.

Political Stability

Political stability has been the subject of numerous quantitative analyses. This section will analyze three separate views on political stability that are prevalent in the literature. The first, as discussed in the literature review in chapter 1, focuses on globalization as an important factors explaining political stability. The second model explains political stability as being related to perceptions of repression and social justice.¹⁵⁹ The next model is a famous model for forecasting political instability that focuses on 4 primary factors, and will be called the Goldstone model.¹⁶⁰ The last model seeks to identify a relationship between inequality and political stability.

One prominent interpretation identifying causes of political instability is globalization. Globalization, by leading to increased inflows of FDI, leads to increasing economic inequality. As inequality becomes more prevalent and society becomes more aware, people become disgruntled and agitate for social change, especially if they feel that inequality is the result of corruption or an unjust political system. Alternatively, increased globalization leads to a greater recognition of the interdependence of society through greater access to communication technologies. Depending on whether or not a state's population perceives society as being just or unjust, communication technologies are commandeered to facilitate social change, which may increase the likelihood of political instability.

The first set of regressions analyzes the relationship between political stability and globalization, including communications technology. Table 2.14 reports the results where violence and regime types of political instability are used as dependent variables. None of the globalization measures are ever significant in affecting violence types of political stability. Globalization has a constant and significant affect in reducing protest types of instability, with social globalization (representing many types of communication) having the greatest negative impact. Globalization had a positive, significant effect on instability within the regime, whereas a negative significant impact on instability of the regime. However, for all these regressions, the r^2 is very small,

¹⁵⁹ Richard Chadwick, "Political Stability, Repression, and Social Justice," *Unpublished Research Note*. Accessed on August 8, 2013, at <http://www.hawaii.edu/intlrel/pols315/Text/Theory/ps-sj-r.htm>.

¹⁶⁰ Jack A. Goldstone, et al., "A Global Model for Forecasting Political Instability," *American Journal of Political Science* 54 no. 1 (2010): 190-208.

indicating that while globalization may have these impacts, whatever impact it has is very small.

Table 2.14: Globalization and Political Stability 5 Year Averages with Cluster Robust Standard Errors						
VARIABLES	(1) Violence	(2) Violence	(3) Violence	(4) Protest	(5) Protest	(6) Protest
Economic Glob.	-0.00602 (0.00414)			-0.012** (0.00532)		
Social Glob.		-0.00625 (0.00410)			-0.026*** (0.00857)	
Political. Glob.			-0.00441 (0.00268)			-0.0105* (0.00550)
Constant	0.287 (0.209)	0.239 (0.159)	0.258 (0.158)	0.617** (0.268)	0.994*** (0.332)	0.612* (0.324)
Time Dummies ^a	No	No	No	No	No	No
Observations	732	805	815	732	805	815
R-squared	0.009	0.006	0.006	0.018	0.060	0.021
Number of Countries	128	143	145	128	143	145

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

a: Time dummies were insignificant.

Table 2.14 Cont'd: Globalization and Political Stability						
VARIABLES	(7) Within	(8) Within	(9) Within	(4) Regime	(5) Regime	(6) Regime
Economic Glob.	0.0174*** (0.00386)			-0.0169*** (0.00329)		
Social Glob.		0.0161*** (0.00577)			-0.0167*** (0.00403)	
Political. Glob.			0.0158*** (0.00310)			-0.0103*** (0.00287)
Constant	-0.777*** (0.194)	-0.583** (0.224)	-0.912*** (0.183)	0.831*** (0.165)	0.653*** (0.156)	0.612*** (0.169)
Time Dummies	No	No	No	No	No	No
Observations	732	805	815	732	805	815
R-squared	0.070	0.038	0.076	0.033	0.021	0.017
Number of Countries	128	143	145	128	143	145
Robust standard errors in parentheses						
*** p<0.01, ** p<0.05, * p<0.1						

Recent events in Egypt and Tunisia, and the usage of Facebook, Twitter, and Youtube, is giving rise to a third way that globalization can affect political stability, revolving around the rising importance of communication technologies. Conflicts between states and opposition groups are of an unequal character – states have greater capabilities of violence at their disposal. However, the rise of the internet and communication technologies has facilitated increased flexibility in resistance to state domination.¹⁶¹ As oppositional groups become increasingly networked through technology, the potential for effective resistance to states increase. Furthermore, increasing global interconnectivity makes people more aware of the freedoms enjoyed by others throughout the world.¹⁶² Globalization, from this perspective, entails three threats to political stability. The first is the increasing awareness of political situations throughout the world that allows people to recognize whether or not they are starved from perceived freedoms. The second is that global interconnectivity allows protestors in one region of the world to share their strategies with protestors and anti-government movements elsewhere, creating a pool of knowledge to increase the anti-government effectiveness. The third is the increased capability to organize domestic opposition through communication technologies. Altogether, globalization, through communication networks, can have a direct, negative impact on political stability, by providing new opportunities for people to organize in ways outside of state control.

The results from Table 2.15 dispute the potential of social globalization and communications technologies to increase political instability. Remarkably, communications technology, reflected in the measure of social globalization, had a significant affect in reducing the likelihood of protests. This result could possibly be caused by the fairly recent development and widespread access to Mobile Communications technologies. Furthermore, the social globalization index does *not* include mobile communication, but rather internet access, landlines, and letters.

To delve further into this relationship, per capita mobile cellphones data from the World Bank is regressed on violence and protest forms of political instability. The

¹⁶¹ Joshua D. Atkinson, Alternative Media and Politics of Resistance (New York: Peter Lang Publishing, Inc 2010).

¹⁶² Jeremy Kinsman, “Democracy Rising: Tunisia and Egypt, When Idealists Got it Right,” *Policy Options* (2011): 37-43. Accessed August 8, 2013 at <http://www.irpp.org/po/archive/apr11/kinsman.pdf>.

natural log of the cellphone is taken due to the massive skew in the data. While insignificant for violence, cellphones are significant in reducing the amount of protests. Again, the negative coefficient is seen. The picture becomes clearer in regressions 3 and 4, which include only democracies and dictatorships, respectively. Under democracies, cell phones have a significant, negative effect in reducing protests, with a respectable R^2 of .112. Alternatively, under dictatorships, cell phones are insignificant, though with a positive coefficient.

Table 2.15 generates several hypotheses regarding communications technology and political stability. First, in democracies, cell phone access reduces political instability. This is likely due to the ability of cell phones and communications technology to act as a check on potential abuses of power by political actors. Alternatively, dictatorships likely have a lower concentration of cellphones, and political actors are resilient to the beliefs and actions of the “mob,” reducing the effectiveness of cellphones in the current dataset. However, this data is before the recent revolutions in the Middle East, where communications technology played a prominent role, so these results should not be seen as an attack on the relevance of communication to political stability. Rather, data should be updated, and the phenomenon continually studied.

Table 2.15: Political Stability and Cell Phones				
Fixed Effects with Cluster Robust Standard Errors				
VARIABLES	(1) Violence	(2) Protest- All	(3) Protest Democracies	(4) Protest Dictatorships
Cell Phones Per Capita (Natural Log)	-0.0161 (0.0107)	-0.0482** (0.0204)	-0.0748*** (0.0249)	0.0378 (0.0244)
Constant	-0.0581*** (0.00847)	-0.00484 (0.0163)	0.0145 (0.0278)	-0.0247 (0.0167)
Observations	497	497	411	116
R-squared	0.010	0.053	0.112	0.058
Number of Countries	139	139	119	48

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Political stability can also be explained through fear and social justice. The relationship is described in Figure 2.2:

Chadwick's model of political stability identifies two paths leading to increased political stability. The first is the Machiavellian cycle, where repression, or the use of state violence to intimidate society, leads to greater levels of fear, specifically fear of further repression. As fear increases within society, political stability also increases as nobody is willing to either participate in politics or rebel due to the likelihood of violent reprisal by the state. Alternatively, the democratic cycle identifies increasing political stability being caused by greater levels of social justice. In this perspective, social justice is identified as the amount of stress people in society are willing to accept. As social justice increases, or as people are willing to accept more amounts of stress, political stability likewise increases. As stability increases, repression decreases as the state is less fearful of rebellion because society is viewed as just. As repression decreases, social justice increases, continuing to reinforce political stability.

The next set of regressions attempts to quantify the Chadwick model of political stability. Political stability in these models is represented by the violence score of political instability as constructed through factor analysis. This score is a composite of the number of guerrilla wars, civil wars, revolutions, assassinations, and medium/minor

conflicts. Following the violence type of political instability, the subsequent models will use the regime instability scores.

Social justice is represented by the Economic Freedom of the World measure for Legal System and Property Rights and covers 1970 to 2009.¹⁶³ A higher score identifies a more robust legal system. This measure at least partly reflects Chadwick's perception of social justice because a solid legal system, reflected by independent courts, protection of individual rights, and a lack of military interference in the rule of law, encourages citizens to believe their well-being is supported by the state and the environment they live in is just.

Repression is measured by using the Amnesty International's Political Terror Scale.¹⁶⁴ Scoring nations from 1 to 5, the purpose is to identify the levels of violence and repression governments direct towards their population. A score of one identifies a government that does not repress its society, whereas a score of five identifies a government that believes there are no limits to their use of repression.

Unfortunately, there is no measure that identifies a population's fear of its government. As an emotional concept, fear proves to be more difficult to measure, as it cannot simply be a tally or index of the number of times a government abuses the society. Conceivably, survey data would be able to provide some understanding of this concept, but such data is currently not available. However, as will be demonstrated below, the impact of fear towards a government may be discernible through several scatter plots.

Table 2.16 shows the relationship between the violence measure of political stability, and the Economic Freedom Index's Rule of Law and Amnesty International's political terror scale. The theoretical model anticipates two cycles, a Machiavellian and Democratic. As a result, scores are shown for all countries, dictatorships, and democracies, in an attempt to see if differences are discernible. Unlike globalization and inequality, lagged values of the dependent variable are not included as independent

¹⁶³ James Gwartney, Robert Lawson, and Joshua Hall, Economic Freedom of the World: 2012 Annual Report (Vancouver: Fraser Institute, 2012): 4-6. Accessed August 2, 2013 at <http://www.freetheworld.com/2012/EFW2012-complete.pdf>.

¹⁶⁴ <http://www.politicalterroryscale.org/>. Two version of the scale exist. One by Amnesty, and the other by the United States State department. Several problems exist with the State department's version, notably that the United States has no rating. As a result, Amnesty's version is used. See also Reed M. Wood and Mark Gibney, "The Political Terror Scale (PTS): A Re-Introduction and a Comparison to CIRI," *Human Rights Quarterly* 32 no. 2 (2010): 367-400.

variables. This is because theoretically, political violence, such as a civil war, assassinations, and the other variables in the political violence measure do not have the types of persistence seen in globalization and inequality. Political violence is often sudden and erupts from the populace. In addition, the independent variables are not lagged to reflect a similar proposition; instances of political violence likely reflect present levels of repression and social justice.¹⁶⁵

Table 2.16: Political Violence and the Chadwick Model

with Cluster Robust Standard Errors

VARIABLES	(1) Pol. Violence All Regimes	(2) Pol. Violence Democracies	(3) Pol. Violence Dictatorships
Legal System	-0.0810** (0.0316)	-0.0511 (0.0362)	-0.0311 (0.0342)
Political Repression	0.432*** (0.0913)	0.334*** (0.103)	0.305** (0.116)
Constant	-0.665** (0.269)	-0.556* (0.305)	-0.757* (0.387)
Time Dummies ¹⁶⁶	No	No	No
Observations	529	405	139
R-squared	0.171	0.087	0.175
Number of Countries ¹⁶⁷	107	92	46

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Model one provides support for Chadwick's democratic cycle when all regime types are included. As a country's legal system becomes more robust, indicating higher levels of social justice, the levels of political violence decrease. Similarly, as a government is more repressive towards its citizens, levels of political violence increase. Intriguingly,

¹⁶⁵ A literature review was conducted to find support for this proposition, but I did not find anything to support an argument either way. Models were run where a lagged version of the dependent variable was included, and although it was significant, it was only at the .05 level when it would be expected at the .001 level, indicating political violence may not be persistent. Theoretically, if political violence were persistent, then societies that are currently involved in a civil war or similar would likely remain in one in the future, yet eventually there is a victor and the violence ends.

¹⁶⁶ Time dummies were insignificant in all models.

¹⁶⁷ The number of countries in models 2 and 3 do not equal the number in in model 1 due to an averaging process. As a result, a country is included in both models if sometime during the 5 year period they switched between a democracy and a dictatorship.

this relationship holds for democracies and dictatorships, though the statistical significance for the legal system drops out.

Focusing on the r^2 indicates that the variables used to measure social justice (legal system variable) and repression are not comprehensive indicators taking into account the whole range of possibilities inherent in social justice and repression. A R^2 of .17 encourages a reading where the phenomenon being analyzed, political violence as a source of instability, is much larger of a concept than the underlying quantified concepts being used as measurements. At best, all the measurements for political stability, repression, and social justice are ballpark estimates that require refinement.

Based on these models, it is clear that levels of repression are extremely important in identifying political violence. To delve further into the data, a scatter plot of the relationship between violence and repression is displayed to see if there is any evidence of fear, or some other factor, that may allow highly repressive governments to have low levels of violence.

The scatter plot shows a clear linear relationship between political violence and repression. Except for the United Kingdom's conflict with the IRA, scores on the political repression scale from 1 to 3 exhibit very low levels of violence. Once levels of repression reach 3 or above, levels of violence begin to increase significantly. However, there are several countries that have high levels of political repression, but also maintain low levels of violence.

The next scatter plot seeks to identify countries with high levels of repression, but low violence, and only includes countries with a repression score of 4 or greater, and a violence score of 1 or less.¹⁶⁸ Countries with a repression score of 3 are not included because the graph becomes unreadable, and the focus here is on countries that have highly repressive regimes.

¹⁶⁸ As with the previous scatter plot, all regime types are included, not just dictatorships.

The scatter plot shows mixed support for Machiavellian cycle of political stability. Though slightly difficult to read, clear relationships emerge. The most extreme case, Uruguay during 1975 to 1979 reinforces the importance of fear in reinforcing state power with a lack of violence directed at the state.¹⁶⁹ During this period, Uruguay was a military dictatorship, where torture and detention were used to reshape society to such an extent that public activities with any hint of political importance were avoided by the population. These social changes were successful in reshaping society to “inhibit collective action, diminish support networks, and depoliticize social interactions” all to reinforce the supremacy of the military regime.¹⁷⁰ Certainly in Uruguay, repression led to fear, which created a population that at least publically did not resist authoritarian rule.

In addition, the cases of China, Syria, Iraq, North Korea, and others during the years identified are commonly known as areas where repression and fear of the government were common. That these countries had low scores for political violence is not shocking. Generally, this scatter seems to provide support that fear of the government can allow repressive regimes, at least for a time, to exist without political violence. However, while fear is important in many of these cases, neither the scatter plot, nor the previous regressions, rule out other alternative sources that could also explain stable repressive political regimes. The r^2 for all types of governments was .17, indicating that numerous other sources exist to cause violence. More specifically, the case of Brazil seems out of place; while it has a high score for political repression, Brazil after 1990 has been associated with peaceful, democratic transfers of power, obfuscating otherwise fairly clear relationships.

Where political instability was first measured by violence scores, the models now identify political instability as the regime score from the factor analysis. Here, political instability is a factor analysis score of changes in the chief executive, cabinet changes, constitutional changes, coup d'états, regime changes and government crises. The primary difference in this measure is its focus on actual changes in the regime itself, whereas

¹⁶⁹ The following analysis is from Patricia Weiss Fagen, “Repression and State Security,” in Juan E. Corradi et al., *Fear At the Edge: State Terror and Resistance in Latin America* (Berkeley: University of California Press, 1992): 59-62.

¹⁷⁰ Corradi et al., 1992, 62.

previously political stability was more associated with episodes of violence, even violence that does not lead to a change in regime.

Table 2.17: Regime Change and the Chadwick Model with Fixed Effects and Cluster Robust Standard Errors			
VARIABLES	(1) Regime Chg.	(2) Regime Chg. Democracies	(3) Regime Chg. Dictatorships
Legal System	-0.119*** (0.0347)	-0.110*** (0.0338)	-0.132* (0.0755)
Political Repression	0.267** (0.109)	0.178 (0.134)	0.494*** (0.176)
Constant	-0.132 (0.299)	0.0617 (0.340)	-0.600 (0.635)
Year Dummies ¹⁷¹	No	No	No
Observations	529	405	139
R-squared	0.063	0.040	0.124
Number of Countries ¹⁷²	107	92	46
Robust standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

Table 2.17 provides the results from a series of regressions to for regime change types of political stability. For the overall sample, both the legal system and political repression have coefficients in the expected directions, though legal system is more statistically significant. As a legal system becomes more just, the likelihood for regime change decreases. As political repression increases, the likelihood of regime change also increases.

The picture begins to change however, when democracies and dictatorships are analyzed separately. For democracies, the legal system is much more important in warding off regime change, and repression is completely insignificant. Most of the democracies analyzed in this study have very low scores for repression, so this is not surprising. In addition, the r^2 for democracies is extremely low, indicating that neither the legal system nor repression is very important in determining regime changes.

¹⁷¹ Year dummies were never significant

¹⁷² Number of Countries in Model 2 and 3 do not equal the number of countries in Model 1 due to a rounding process.

Dictatorships tell a different story. While the coefficients are similar, the significance tests are juxtaposed. The legal system is now barely significant at the .1 level, whereas repression is highly significant at the .001 level. As with violence types of political instability, dictatorships penchant for resorting to repression increases the likelihood for instability. In addition, the r^2 scores are much higher than the total sample and for just the democracies, at .124, indicating that political repression is an important source for understanding regime changes, though certainly other sources exist as well.

Unfortunately, as with the violence scores, the regime change scores of political instability did not switch the signs of the repression scores when looking at dictatorships. The Machiavellian cycle of political stability indicates that repression should have a *negative* effect on the level of violence and regime changes. Repression, by instilling fear throughout the population, should reinforce a regime's durability. This was not found to be the case when looking at all dictatorships. Again, by looking at scatter plots, countries with high repression and low regime are investigated to see if fear is a possible explanation for regime durability.

First, for a baseline, a scatter plot between regime change and repression for only dictatorships is presented in graph 2.3. For a repression score from 1 to 4, a fairly clear linear relationship can be identified. However, when repression goes from 4 to 5, a dramatic reduction in regime change occurs. Extremely repressive regimes appear to dissuade attempts at regime change.

Graph 2.3: Regime Change and Repression: Dictators Only

Graph 2.4: High Repression and Low Regime Change

Year	6 = 1975-79	9 = 1990-94
Legend:	7 = 1980-84	10 = 1995-99
	8 = 1985-89	11 = 2000-04
	12 = 2005-09	

To investigate further, another scatter plot is presented in Graph 2.4 identifying repression scores of four or greater and regime changes scores of 2 or less. The scatter plot identifies some of the most resilient and repressive regimes in the post-World War II era. Indonesia under Suharto, Iraq under Hussein, Syria under Hafez al-Assad, and North Korea under Kim Jong-Il are just a few of the nations that are famous for repressive regimes while maintaining a long reign. While the scatter plot does not guarantee that society's fear of the government ensured regime change did not occur, a compelling picture is surely painted.

However, since the data ends in 2009, it is unable to reflect on the recent tumult in Syria, nor the overthrow of Hussein in Iraq. Hence, while repression and fear certainly can reinforce the durability of a regime for some time, resentment, foreign intervention, or other factors can lead to regime changes nonetheless.¹⁷³

Juxtaposing the sources of instability of violence or regime changes, several observations are salient. Highly repressive regimes do not end due to coups or internal forms of regime change. Except for the specific cases highlighted previously, the major sources of instability for a repressive regime often comes from massive violence, often militarized conflicts sprouted internally such as civil wars or externally from revolutions or other conflicts. Again, the recent violence in Syria, which is most likely categorized as a civil war, or the American overthrow of Hussein in Iraq provide some support for this argument. For countries with intermediate levels of repression, sources of instability are numerous, creating a "no man's land" where the most stable governing regimes are either those that are not repressive and provide the rule of law, or are extremely repressive, creating a culture of fear that transforms society into a prison. The democratic and Machiavellian cycles of political stability are salient representations of political stability.

The Goldstone et al. model of political instability is highly successful in forecasting political stability using historical data.¹⁷⁴ The model uses four independent variables. The first, and most important, is a measure of regime type, assessing how open political systems are to participation and how executive officers are brought into office. Second is a measure of infant mortality. The third identifies whether or not a country's

¹⁷³ This scatter plot and cases of Iraq and Syria provide additional support as to why lagged values of regime change should not be included in the regression models.

¹⁷⁴ Goldstone et al., 194.

neighbors are prone to conflict; i.e., if one state's neighbor recently had a coup, then the state is also likely to have a coup. Finally, the model identifies whether or not the state discriminates against minorities. Altogether, these variables were able to forecast 80.3% of all political instability events in their dataset.¹⁷⁵

The novel aspect of the goldstone model is how regime type was measured. Previous measures of regime type used either a 3 point scale from the Polity IV series of statistics, identifying autocracies, and democracies, or a binary scale differentiating between democracies and autocracies.¹⁷⁶ Instead, Goldstone et al., inspired by Dahl,¹⁷⁷ envision regime type being characterized along two axes: a government's openness in allowing people to be elected to executive positions, and the competitiveness of political participation. To construct this regime type variable, the Goldstone model combines the EXREC and PARCOMP variables from the Polity IV dataset, which reflect openness in executive elections and competitiveness in political participation, respectively.¹⁷⁸ By combining these concepts, 5 separate types of regimes are envisioned: full autocracy, partial autocracy, partial democracy, partial democracy with factionalism, and full democracy.¹⁷⁹

Intriguingly, in the Goldstone model, regime type is not linearly related to political stability. In Goldstone et al's results, full autocracies and democracies were both related with political instability, likely because, for different reasons, both regimes represent unified political systems, on one hand instituted by autocratic centrality, and on the other on popular representation.¹⁸⁰ The regime type that had the greatest potential to forecast political instability was partial democracies with factionalism. Partial democracies with factionalism reflect a transition regime, moving from a full autocracy to something more open. However, during this transition, if factions of competing organizations begin to dominate politics, leading to a "polarized politics of exclusive identities or ideologies," the transition in essence becomes hijacked, and movement to a more open political system creates opportunities for social divisions to be unleashed,

¹⁷⁵ Goldstone et al., 195.

¹⁷⁶ Goldstone et al., 194.

¹⁷⁷ Robert Dahl, *Polyarchy* (New Haven, CT: Yale University Press, 1971).

¹⁷⁸ Polity IV dataset available online at <http://www.systemicpeace.org/inscr/inscr.htm>.

¹⁷⁹ A full explanation and graphical description of this variable is in Goldstone et al., 196.

¹⁸⁰ Goldstone et al., 197, 205.

thrusting government into chaos.¹⁸¹ With autocracies and democracies being most stable, and transitional regimes the most unstable, the regime type function in the Goldstone model can be inferred to be a quadratic specification.

To achieve its high level of accuracy, the Goldstone model uses actual event data. Unlike Jong-A-Pin, who created factor analyzed measures of political stability, Goldstone documented every conflict where countries having at least 500,000 citizens were stable for at least seven years, including 2 years prior to the conflict and up to 4 years after the conflict.¹⁸² These rigorous controls indicate that just taking the variables from the Goldstone model, and seeing if they are related with the Jong-A-Pin variables in a fixed effects model is likely to provide inconclusive results. However, just in case relationships appear, the analysis will proceed regardless. By using a fixed effect model framework with the Goldstone variables, an alternative test of the model can occur, potentially providing new insights into political stability.

The model specification is:

$$\begin{aligned} \text{Political Stability(Jong-A-Pin)}_{it} = & \beta \text{Regime Type}_{it-1} + \\ & \beta \text{Regime Type Squared}_{it-1} + \\ & \beta \text{Mortality Rate(NL)}_{it-1} + \\ & \beta \text{Conflict Ridden Neighborhood}_{it-1} \\ & \beta \text{State Discrimination}_{it-1} \\ & \beta \text{trycode}_{it} + \\ & \varepsilon_{it} \text{ (Eq. 1.3)} \end{aligned}$$

where i is country, $t-1$ is a 1 period time lag, and ε_{it} is an error term. The results of the Goldstone model are in Table 2.18. The results do not need to be gone through in much detail. Unlike every model presented so far, the F-test scores for the entire models are insignificant for every model except where instability within the regime occurs. This means that the results are fairly meaningless. Based on the previous models ran, regime type is an important factor in understanding political instability, and the insights from the Goldstone model on regime type should be included in future analysis. Unfortunately, the other ancillary variables appear less important.

¹⁸¹ Goldstone et al., 198.

¹⁸² Goldstone et al, 193.

Table 2.18: The Goldstone Model and Political Stability				
VARIABLES	(1) Violence	(2) Protest	(3) Within	(4) Regime
Regime Type $t-1$	0.0807 (0.398)	1.030*** (0.302)	0.814** (0.376)	0.0240 (0.386)
Regime Type Squared $t-1$	-0.0390 (0.0730)	-0.236*** (0.0665)	-0.100 (0.0686)	-0.0307 (0.0672)
Infant Mortality (NL) $t-1$	-0.121 (0.0781)	-0.0142 (0.0988)	-0.200** (0.0919)	-0.00748 (0.145)
Conflict Ridden Neighborhood $t-1$	-1.357** (0.542)	-0.196 (0.538)	0.773 (0.702)	0.528 (0.392)
State Discrimination $t-1$	0.140 (0.189)	-0.0791 (0.131)	-0.161 (0.141)	0.253 (0.193)
Constant	0.708 (0.618)	-0.406 (0.552)	-0.388 (0.613)	0.0557 (0.833)
Observations	281	281	281	281
R-squared	0.063	0.123	0.145	0.042
Number of ccode	87	87	87	87
F-Test Score ^a	2.15	2.92	5.01	2.40
Prob > F	.0670	.0175	.0004	.0437

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

^a This is the first time that the F test score and its significance (Prob >F) have been shown because every model so far was significant at the .000 level. The low levels for these models means the models themselves are insignificant.

Exploring the Political Instability ~ Economic Inequality Nexus

The relationship between economic inequality and political instability has been studied since the time of Plato.¹⁸³ Studies measuring analyzing the inequality ~ political instability nexus have drawn the entire gamut of possibilities. Some analysts argue that economic inequality increases political instability,¹⁸⁴ while others argue there is no relationship.¹⁸⁵ The major reason for the differing consequences lies in different measures of economic inequality, different measures for political stability, and different quantitative models.¹⁸⁶

For example, in Alesina and Perotti's 1996 analysis they use a cross-section of 71 states, averaging their scores from 1960 to 1985, having 69 to 71 observations per model. Inequality had a substantial impact on political instability, a one standard deviation increase in inequality led to a 48% increase of a standard deviation for political instability.¹⁸⁷ However, the loss of the time dimension, though understandable given the type of data used, indicates that the validity of the results outside of the Alesina and Perotti's sample may be lacking.

Using the SWIID inequality data, the UTIP wage inequality data, and the violence and regime factor analysis scores, a cross section of 141 countries was analyzed. The data coverage was from 1965 to 2009. The dependent variable ranges from the violence and regime factor analysis scores, as well as a measure of political stability created through the Polity2 score based on Dutt and Mitra (2008). Independent variables are secondary school education, GDP per capita, state repression, and different measures for

¹⁸³ For a concise review of the entire literature, see Gunhild Gram Giskemo, "Exploring the Relationship Between Socio-Economic Inequality, Political Instability and Economic Growth: Why Do We Know So Little?" *CMi Working Paper* (2012): 2. Accessed August 2, 2013 at <http://www.cmi.no/publications/file/4379-exploring-the-relationship-between-socio-economic.pdf>.

¹⁸⁴ See is Alesina and Perotti, 1996. See also Dutt and Mitra, 2008, and Mark Irving Lichbach, "An Evaluation of 'Does Economic Inequality Breed Political Conflict?' Studies," *World Politics* 41 no. 4 (1989): 431-470, and Thorbeck and Charumilind, "Economic Inequality and Its Socioeconomic Impact," *World Development* 30 no. 9 (2002): 1477-1495.

¹⁸⁵ For a recent review see P. Collier and A. Hoeffler, "Greed and Grievance in Civil War," *Oxford Economic Papers – New Series* 56 no. 4 (2004): 563-595.

¹⁸⁶ R. MacCulloch, "Income Inequality and the Taste for Revolution," *Journal of Law & Economics* 48 no. 1 (2005): 93-123.

¹⁸⁷ Alesina and Perotti, 1996, 1218.

economic inequality. The purpose of this model is to attempt to update the methods of Alesina and Perotti with modern data while still using a comparable model.¹⁸⁸

$$\begin{aligned} \text{Political Stability (Various Measures)} = & \\ & \beta \text{Economic Inequality (Various Measures)}_{it} + \\ & \beta \text{Secondary Education}_{it} + \\ & \beta \text{GDP Per Capita}_{it} + \\ & \beta \text{Repression}_{it} + \\ & \varepsilon_{it} \text{ (Eq. 1.4)} \end{aligned}$$

The results of the models are presented in table 2.19. For both the violence and regime factor analysis measures of political stability, economic inequality was never significant. Rather, repression was highly significant in explaining variance in violence, whereas GDP Per capita was significant in explaining regime changes. Not even the political transitions variable from Dutt and Mitra (2008) showed any statistically significant results.¹⁸⁹

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¹⁸⁸ When the same model was run while keeping the panel structure intact and using cluster robust standard errors, economic inequality was never significant in explaining variance in political stability. The fixed effects, panel style regression is much more rigorous and robust measure of the underlying relationships, but it also has difficulty in detecting small changes in the independent variables. Since inequality generally changes very little over time, the cross-section model may be more suitable in understanding the relationship between political stability and economic inequality. Dutt and Mitra, as well as Alesina and Perrot both use a cross section type model.

¹⁸⁹ Political transition is defined how frequently a government transitions between dictatorial and democratic regimes based on the polity2 score from Marshall and Jaggers,

Table 2.19: Political Stability and Economic Inequality: Cross Section

VARIABLES	(1) Violence	(2) Violence	(3) Violence	(4) Regime	(5) Regime	(6) Regime	(7) Political Transitions	(8) Political Transitions	(9) Political Transitions
Inequality Measures									
Pre-Tax In.	-0.00411 (0.00658)			-0.00902 (0.00672)			0.0355 (0.0261)		
Post-Tax In.		0.00586 (0.00671)			-0.0110 (0.00684)			0.0293 (0.0265)	
Wage Ineq.			0.00450 (0.173)			0.130 (0.156)			0.272 (0.581)
Political Stability Model									
Education	-0.00190 (0.00315)	-3.66e-05 (0.00306)	-0.00044 (0.00356)	-0.00381 (0.00321)	-0.00383 (0.00312)	0.000717 (0.00322)	-0.00745 (0.0125)	-0.00965 (0.0123)	0.00585 (0.0123)
GDP PC	0.142* (0.0816)	0.114 (0.0837)	0.119 (0.101)	-0.24*** (0.0833)	-0.22*** (0.0853)	-0.28*** (0.0910)	-0.370 (0.325)	-0.408 (0.335)	-0.826*** (0.309)
Repression	0.693*** (0.0726)	0.683*** (0.0713)	0.697*** (0.0782)	-0.0970 (0.0741)	-0.112 (0.0727)	-0.0776 (0.0706)	0.454 (0.289)	0.511* (0.286)	0.525* (0.294)
Constant	-2.69*** (0.655)	-2.97*** (0.647)	-2.75*** (0.743)	2.900*** (0.668)	2.915*** (0.660)	2.636*** (0.671)	4.346 (2.642)	4.713* (2.607)	8.851*** (2.587)
Observations	137	137	121	137	137	121	145	145	132
R-squared	0.461	0.463	0.466	0.234	0.238	0.235	0.192	0.189	0.212

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

The inequality-political stability thesis dates back to Aristotle, and remains popular.¹⁹⁰ Yet, finding the relationship in statistical data has provided mixed results. The results from the current series of analyses discourage the relationship. In a cross sectional average of data from 1965 to 2009, inequality was never significant with any of the political stability variables. The models used are similar to Alesina and Perotti (1996), but with significantly more years of data. When the relationship was tested using panel construction of data (not shown for space), there was no significant results either.

Why does the data not support a historically anticipated result? The data analyzed occurs in a unique time period of history, a post-colonial environment where cultures are still greatly affected by the repercussions from colonialism. In addition, inequality generally changes slowly, whereas political instability events occur sporadically.

A major test of the inequality-political stability thesis is currently playing itself out in China. Since the beginning of economic reforms in 1978, economic inequality has skyrocketed.¹⁹¹ The Chinese government, certainly concerned of the potential of economic inequality to cause instability, regardless has been stable. Graph 2.5 shows a time series of regime and violence forms of instability, as well as pre-tax Gini scores.¹⁹² As the previous research has shown, inequality has increased steadily since the economic reforms of the late 1970s. Since that same period, political stability, in starts and fits, has slowly decreased, though the overall change is minimal, from -.2 to -.8 for regime instability, and from -.5 to -.7 for violence. Clearly, there is no relationship between inequality and stability in the historical data for China.

¹⁹⁰ Edward N. Muller, "Income Inequality, Regime Repressiveness, and Political Violence," *American Sociological Review* 50 no. 1 (1985): 47-61.

¹⁹¹ Martin King Whyte, "China's Post-Socialist Inequality," *Current History* September 2012): 229-234. See also Qinglan Long, "Thought's on China's Inequality," *Pacific Rim Law & Policy Journal Currents* June (2011): 1-27.

¹⁹² Post-tax gini scores are not shown because they have a similar pattern as Pre-tax, but about 10 points lower. Graph is calculated by the author using published statistics. Wage Inequality scores not shown because they were not enough measurements to create a useful time-series trend line.

Analysts looking at the importance of inequality within China by using survey methods have discovered that both absolute and relative inequality are important in the pursuit of happiness, and that economic inequality is a possible source of political instability.¹⁹³ Both rural and urban Chinese dislike economic inequality if it occurs as a result of corruption or cheating, whereas inequality that occurs due to hard work and dedication is seen as beneficial.¹⁹⁴ Inequality as it affects individuals is seen as detrimental to society; when perceived for the society as a whole, inequality is a potential source of opportunity.¹⁹⁵

Changing perceptions of inequality indicate that by itself, inequality is rarely potent enough to cause political stability. Theoretically, high perceptions of corruption, coupled with high inequality, could foment social agitation. However, dramatic increases in inequality in China have been coupled with a level of political stability that, while

¹⁹³ Including the next footnotes, also see: John Knight and Ramani Gunatilaka, "Does Economic Growth Raise Happiness in China?" *Oxford Development Studies* 39 no. 1 (2011): 1-24.

¹⁹⁴ Martin K. Whyte, *Myth of a Social Volcano: Perceptions of Inequality and Distributive Injustice in Contemporary China* (Stanford, Stanford University Press, 2010).

¹⁹⁵ John Knight, "The Economic Causes and Consequences of Social Instability in China," *CCG Discussion Paper Series* no. 15 (2012): 9. Accessed on August 2, 2013 at <http://www.seh.ox.ac.uk/sites/default/files/DP15.pdf>.

perhaps never guaranteed in the future, is at least as stable as many other nations.¹⁹⁶ Recent evidence on inequality and rioting have shown that as inequality increases, the frequency of riots actually *decreases* as poorer populations become resigned to their lower positions.¹⁹⁷ As a result, and depending on how perceptions of corruption change in China, inequality is likely to remain an insignificant factor in motivating political change.

This section has explored possible factors affecting regime instability and political violence, two major sources of political instability. Ultimately, the most important concept has been the level of repressiveness of the regime. Generally, the more repressive a regime, the more likely they are to have instability events. However, the relationship can often be nonmonotonic; regimes using extreme levels of repression may instill enough fear within their society to reinforce regime stability and maintain an iron grip on power. In these instances, regimes can significantly extend the life of the regime using repression, though even these regimes ultimately fall victim to either an external source of power, such as Iraq in 2003, or Syria in 2009.

Section 3: Summary

Globalization, inequality, and political stability were analyzed to understand underlying relationships. Economic globalizations increased when political regimes were stable, political protests were unlikely, and society became more technologically developed. Social globalization, primarily composed of measures of communication, increased commensurate with levels of technological development. Political globalization, identifying the number of treaties and international institutions a country participated with, was inversely related to political violence and regime instability.

¹⁹⁶ Shiping Zheng, "China's Political Stability: Global Comparisons," *Journal of Chinese Political Science* 17 (2012): 1-13.

¹⁹⁷ Klaus Abbink, D. Masclet, and D. Mirza, "Inequality and Riots – Experimental Evidence," *CIRANO Scientific Publication No. 2011s-10* (2011): 1-28. Accessed on August 2, 2013 at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1752258. Regressions ran using the protest factor from the previous factor analysis shows a mild negative coefficient that is barely significant at the .1 level for after-tax redistribution inequality. This encourages the same viewpoint as Abbink et al., though it implies that the overall strength of the impact is minimal. Regression not shown because the p-score for the whole regression was .09, meaning the overall relationship is not significant.

Intriguingly, regimes that had internal instability, identifiable by several opposing parties in governing institutions, had a positive relationship with globalization, meaning that opposition and the dialogue that comes with it often leads to greater political integration. Inequality never had a significant relationship with globalization.¹⁹⁸

For inequality, several intriguing relationships were uncovered. First, none of the political stability variables had a significant relationship in predicting inequality. Theory here is undeveloped, perhaps unstable governments, unable to using the redistributive powers of the state would have more inequality than more cohesive states. However, this relationship did not appear in the data. Second, the relationship between globalization's effect on inequality levels is at least partly determined whether or not the state has a tax distribution scheme. Without tax redistribution, all types of globalization measures had a positive effect on inequality. Yet when globalization and after-tax distribution inequality was analyzed, the impact of globalization became non-significant. This result led to an analysis of the impact regime type had on inequality. Communist nations were the most effective in reducing inequality, followed by social democracies. Social democracies were especially intriguing because their effect on reducing inequality was only significant when looking at after-tax redistribution inequality. Dictatorships had a positive, though insignificant relationship, whereas one-party democracies and recent democracies both had a significant and positive effect on inequality.

The final series of models for economic inequality focused on what is often termed as the Internal Development Model (IDM). Generally, all the variables were insignificant in understanding economic inequality, except for Inward FDI, which may exacerbate inequality by help fostering the creating of a foreign funded elite class of managers.

For political stability, several models were analyzed, focusing on the levels of state repression or economic inequality. Generally, the more repressive a government, the more likely a government would experience instability, either violence such as a civil war, or regime changes such as from a coup. Alternatively, inequality was found to be insignificant in fomenting political instability, largely because perceptions of whether or not inequality is acceptable vary widely amongst populations.

¹⁹⁸ Regression results not shown because p-scores indicated a lack of significance.

The purpose of these models was to understand the underlying relationships concerning the key variables of globalization, inequality, and political stability, as well as identifying other significant ancillary variables. Beta coefficients from these models will be used in chapter 5 to help construct scenarios through the use of Trend Impact Analysis.

However, these are just a contribution to a continuing discussion regarding the relationships analyzed. Rather than focus on extensive robustness tests, as are common with the literature, these models represent a proof of concept demonstrating how the results from quantitative models can be used towards constructing alternative scenarios.

Table 20 summarizes the major relationships identified in the quantitative analysis. All coefficients have been transformed into percent change relationships. The process for this transformation follows table 20. Asterisks represent levels of significance.

Table 2.20: Summary of Important Relationships An increase in 1 unit of the Left Column (Independent) Variables leads to what percent change in the top row (Dependent) Variables											
	1 Unit Increase is what %	Econ Glob.	Soc. Glob	Pol Global	Post-Tax Ineq	Pre-Tax Ineq.	Wage Ineq.	Viol. Instab.	Regime Instab	Within Instab	Protest Instab
Econ. Global.	1.13					.203	-.432		-.21	.308	-.09
Soc. Global.	1.16				.186	.283			-.21	.28	.2
Pol. Global.	1.04					-.089			-.13	.28	.08
Post-Tax Ineq	1.95										
Pre-Tax Ineq	1.71										
Wage Ineq.	100										
Violence Instability	12.43		-.471	-1.74							
Regime Inst.	12.36	-.566		-.581			2.5				
Within Inst.	17.71			1.13			4.92				
Protest Inst.	7.7	-.622									
Tech Dev.	100	2.23	1.3664								
GDP Per Capita	100	-3.14			19.12	15.73	-37.4				
FDI Inflows	1.27				.014	.018					
Legal System	12.2							-1	-1.47		
Political Terror	25							5.37	3.3		
Dictatorship	NA						10.5				
Communist	NA				-26.8	-26	-62.7				
Islamic Rep	NA										
Social Dem	NA				-23.06		-52.0				
One Part Dem.	NA				15.33	12.52					
Recent Dem	NA					6.19					

Several steps were taken to translate the regression coefficients into % changes. When doing a regression, the coefficients represent the effect of the independent variable on the dependent variable when the independent variable increases by 1 unit. For each independent variable, a 1 unit increase was transformed into a % increase using the following formula:

$$\frac{1}{\text{Range of Independent Variable}} = \frac{\% \text{ Change}}{100} \quad \text{Eq. 1.5}$$

Once a one unit increase in the variable is transformed into a % change, the effect of the independent variable on the dependent variable is found by using:

$$\frac{\text{Regression Coefficient}}{\text{Range of Dependent Variable}} = \frac{\% \text{ Change}}{100} \quad \text{Eq. 1.6}$$

Some variables were transformed using a natural log transformation. If the independent variable has a natural log transformation, then the percent change in the independent variable is 100, and the percent change in the dependent variable is calculated using equation 1.6.

Other regression models had natural log transformations for both independent and dependent variables. In these instances, the percent change in the independent variable is 100 and the percent change on the dependent variable is found through:

$$\% \text{ Change in Dependent Variable} = 100 * \text{Regression Coefficient} \quad \text{Eq. 1.7}$$

Finally, if the independent variable was a dummy variable with a 0 or 1, and the dependent variable did *NOT* have a natural log transformation, there is no percent change calculated for the independent variable, and the percent change on the dependent variable is calculated by equation 1.6. The independent variable has no percentage change because it identifies either the presence or absence of a particular government type. If the dependent variable has a natural log transformation, then the percent change is calculated using equation 1.7.

Chapter 3: Alternate Visions of Globalization - Network Analysis, World-System Position and International Trade

In political science, network analysis has increasingly become a popular method to analyze international affairs questions.¹⁹⁹ Network analysis is a method that allows for the calculation of various indices to quantify the relational characteristics of nations. Analysts, working in the tradition of World Systems theory, have provided empirical tests showing that a state's position in relation to other states is seen as an important predictor of GDP growth, stability, and many other characteristics of states.²⁰⁰ By using network analysis as an alternative view of globalization, new insights can be intertwined with the relationships from chapter 2.

Network analysis interprets state-to-state (bilateral) transactions in order to construct systems of relations. For this chapter, bilateral data was collected for international trade; an N by N matrix is constructed taking 5 year averages starting from 1970 to 2009. For each matrix, several indices are calculated to understand the structure and implications for the state to state relationships. The major indices relevant to the network analysis are broken into two categories. The first indicate an overall assessment of the structure of the network, and include network centrality, network density, and a network clustering coefficient.²⁰¹ The second set of indices provides each individual

¹⁹⁹ See Raji Kali and Javier Reyes, "The Architecture of Globalization: a Network Approach to International Economic Integration," *Journal of International Business Studies* 38 (2007): 595-620. Matthew C. Mahutga et al., "Within-Country Inequality and the Modern World-System: A Theoretical Reprise and Empirical First Step," *Journal of World-Systems Research* 27 no. 2 (2011): 279-307. Michael D. Ward et al., "Network Analysis and Political Science," *Annual Review of Political Science* 14 (2011): 245-64, Emilie M. Hafner-Burton et al., "Network Analysis for International Relations," *International Organization* 63 (2009): 559-592, Stephen P. Borgatti et al., "Network Analysis in the Social Sciences," *Science* 323 no. 5916 (2009): 892-895.

²⁰⁰ Foundational articles in this vein are especially David Snyder and Edward L. Kick, "Structural Position in the World System and Economic Growth, 1955-1970: A Multiple Network Analysis of Transnational Interactions," *American Journal of Sociology* 84 no. 5 (1979): 1096-1126. More recent articles are Rob Clark, "World-System Mobility and Economic Growth, 1980-2000," *Social Forces* 88 no. 3 (2011): 1123-1152, and Paul Prew, "World-Economy Centrality and Carbon Dioxide Emissions: A New Look at the Position in the Capitalist World-System and Environmental Pollution," *Journal of World-Systems Research* 16 no. 2 (2010): 162-191.

²⁰¹ The equations used here follow Kali and Reyes, 2007, as they use the most up-to-date network methods, in a framework specifically tailored towards an analysis of international networks. The discussion here will not be as detailed as in Kali and Reyes. For additional information beyond Kali and Reyes, see Wasserman and Faust, A. Abert and A.L. Barabassi, "Statistical Mechanics of Complex Networks," *Reviews of Modern Physics* 74 no. 1 (2002): 47-97, and M. Newman, "Mixing Patterns in Networks," *Physical Review* 67 no. 2

country with a measure indicating their importance and location within the network: Freeman's degree correlation and a core/periphery index.²⁰² By using both total network and specific nation measures, the evolution of both macro and micro levels of the network are identified.

Section one summarizes a literature review relevant to a network analysis perspective. First, transaction analysis theory is reviewed, which relates international connections and their possible impacts on peace. Second, world systems theory is reviewed, discussing ways in which a state's position within the global system affects their relations with other states. Finally, social network analysis and several indices are analyzed, explaining how data on bi-lateral connections can be used to construct images of global networks. Section two constructs visual representation for each network. In addition, several indices for each network are discussed that describe how interconnected the members are (network density), and how closely each network corresponds to a core/periphery structure (network centrality). In section three, a quantitative analysis of the measures is initiated. First, the network indices are compared with other measures of the international system, attempting to understand what types of relationships the network indices measure. Second, following insights from the literature review, several models using the network indices are constructed in order to see the significant of network analysis in understanding international affairs.

Section 1: Theory Review of Transaction, World Systems, and Network Analysis and Their Importance in the Study of International Relations

What impact does the connections and relationships between states have on domestic stability and economic inequality? Relating international phenomena with domestic politics is a difficult endeavor. One influential attempt to untangle these relationships began with Putnam's Two-Level games, which explored how domestic and

(2003): 260-261, and Newman, "The Structure and Function of Complex Networks," *SIAM Review* 45 no. 2 (2003): 167-256.

²⁰² Freeman's degree correlation was calculated following Paul Prew, "World-Economy Centrality and Carbon Dioxide Emissions: A New Look at the Position in the Capitalist World-System and Environmental Pollution," *Journal of World-Systems Research* 16 no. 2 (2010): 162-191. The core/periphery index is calculated according to Rob Clark, "World-System Mobility and Economic Growth, 1980-2000," *Social Forces* 88 no. 3 (2010): 1123-1152.

international politics intermingled.²⁰³ The research spawned by Putnam primarily focused on decision making, and how limitations of political leaders in domestic politics affected foreign policy decisions. Alternatively, this chapter attempts to forge an alternative theory explaining how the structure of the international system, and the relationships it fosters, affects domestic political stability and economic inequality.

Constructing a theory of international influence on domestic politics pulls strands of thought from transaction analysis theory, world system's theory, and social network analysis. The overall premise is that the types of exchanges between states, and states positions within those networks of exchange can affect domestic politics in various ways.

Originating from the work of political scientist Karl Deutsch and mathematician I.S. Savage, transactional analysis theory was heavily discussed throughout the 1960s and 70s, until being underutilized and largely forgotten in the 80s, 90s, and today.²⁰⁴ Transaction analysis looks at the type and amount of interstate transactions (trade) that connect states in the international system. As transactions between states increases, pressures begin to form for institutional infrastructures to oversee transactions, increasing collective intelligence to ensure political interests are not unduly harmed. Institutions represented by North American Free Trade Area, ASEAN Free Trade Area, and Asia Pacific Economic Cooperation, and others would be expected to encourage long term increases in regional transactions, relative to less institutionally supported trading partners or regions.

Graph 3.1 provides a graphical description of transaction analysis theory.²⁰⁵ Line A identifies an increasingly unstable or unlikely foreign policy of nonalignment as the volume of international transactions increase, because a state experiences significant transactional pressure, expressed by Line B, to pursue either a cooperative or antagonistic foreign policy. Line C identifies a path of equilibrium experienced by states as they encounter transactional pressures on their foreign policy, demonstrating that as

²⁰³ Robert Putnam, "Diplomacy and Domestic Politics: The Logic of Two-Level Games," *International Organization* 42 no. 3 (1988): 427-460.

²⁰⁴ I. Richard Savage and Karl W. Deutsch, "A Statistical Model of the Gross Analysis of Transaction Flows," *Econometrica* 28 no. 3 (1960): 551-572.

²⁰⁵ Karl W. Deutsch, "Power and Communication in International Society," in A.V.S. deReuck and Julie Knight, eds., *Conflict in Society* (London: K. & A. Churchill, Ltd., 1966): 300-316. Graph structure constructed by Richard Chadwick.

transaction volume increases, the likelihood of a cooperative or antagonistic relationship between states increases.

In Deutsch's thinking, international transactions were just the continuation of local transactions. All forms of government, both local and international, occur as a means to regulate transactions between people and increase the likelihood of peace. As a result, transaction analysis theory attempts to understand how international transactions can affect factors such as political stability, because states that experience a high amount of transactions, both local and international, are likely to have more developed institutions in order to handle the large amount of transactions that occur. These institutions are developed in the sense that they are more used to, and more capable, of regulating and managing transactions.²⁰⁶

To measure transaction analysis theory, Deutsch, along with I. R. Savage, developed a "Null Model" that generated a relative acceptance (RA) index that was useful in identifying pairs of nations that have higher levels of transactions than would be

²⁰⁶ Based on discussions with Chadwick, and Deutsch, 1966.

expected from a random distribution.²⁰⁷ Using the “Null Model,” expected transactional relationships, Deutsch and others identified institutional and politically significant relationships, and explored potential impacts.²⁰⁸ This chapter does not use the RA index to measure the relationships between states because it requires dyadic modeling. Similar relationships, however, can be seen in the network analysis indicators discussed below.

An alternative way of interpreting international transactions and the international system is World Systems theory. World Systems theory was made famous by Immanuel Wallerstein, and is often seen as a theoretical counterpart to social network analysis.²⁰⁹ World systems theory argues that the international system is characterized by three major features. First, the world economy, through processes of globalization and integration, is becoming increasingly interconnected. Second, sovereign states increasingly are the major actors that interact and are affected the world economy. Finally, the world economy is marked by a stark division of labor, where powerful states in the ‘core’ of the world economy, use their economic and military might to extract resources from the periphery, creating “an unequal global division of labor.”²¹⁰

By using bilateral data, such as in trade, a structure of relationships can be discerned for the world system. This structure is then separated into several different sections, a core, a periphery, and a semi-periphery, with important implications for the process of inter-state interactions. A state’s location within these structures assists analysts in understanding how states interact with each other.

Core states are highly developed, with strong economies and highly evolved militaries. Core countries are powerful due to the structural advantages provided by being part of the global core, and are characterized by diverse economies and capable of autonomous political action. Using their privileged positions, core nations extract natural

²⁰⁷ Savage and Deutsch, 1960.

²⁰⁸ Additional usage of transaction analysis theory and the Savage Deutsch Null model are in Cal Clark and Susan Welch, “Western European Trade as a Measure of Integration: Untangling the Interpretations,” *Journal of Conflict Resolution* 16 no. 3 (1972): 363-382. Also see Donald J. Puchala, “International Transactions and Regional Integration,” *International Organization* 24, no. 4 (1970): 732-763, and Chadwick and Deutsch, “International Trade and Economic Integration: Further Developments in Trade Matrix Analysis,” *Comparative Political Studies* 6 on. 1 (1973): 84-109.

²⁰⁹ For an in-depth theoretical review of world systems theory and how it relates to social network analysis, see Matthew C. Mahutga, “The Persistence of Structural Inequality? A Network Analysis of International Trade, 1965-2000,” *Social Forces* 84 no. 4 (2006): 1863-1889.

²¹⁰ Knoke, 1990, 183.

resources, goods, and other desired material objects from a periphery of weaker nations who are unable to stop intrusions into their societies by the core. Where the core is dominant, the periphery is weak, with specialized economies in order to service the needs of the core, while concurrently being unable to restrict intrusions by the core into their domestic politics. The periphery is also unable to release itself from the bonds of global servitude, as structural elements in the world system make it difficult for a country in the periphery to climb to the core.²¹¹

While the core exploited the periphery, the semi-periphery acts as a buffer to protect the global structural division. Including industrializing nations such as Brazil or the East Asian tigers of South Korea and Taiwan, the semi-periphery was at one time exploited by the core and exploiter of other lesser developed nations.²¹² The semi-periphery is important largely because it acts as a stabilizing feature of the world system. The semi-periphery and periphery are competitors in the world economy, and consequently are unable to unite in order to restructure the world system in their favor against the core, even though both the periphery and semi-periphery are exploited and dependent on the core. If the semi-periphery ever revolts against the power of the core, system stability disappears, and the “world system disintegrates.”²¹³

However, World Systems theorists never operationalized the concepts of core, semi-periphery, and periphery, into a quantitative, testable form. This object was instead pursued by sociologists working in the social network analysis tradition, and used numerous methods to identify unequal relationships between the core, semi-periphery, and periphery. Combining world systems theory and network analysis together, Snyder and Kick were able to demonstrate that a state’s structural position in the world system was highly correlated with economic growth, and states within the periphery were unable to experience significant economic growth.²¹⁴ Analyzing eight different global

²¹¹ Knoke, 1990, 184. However, in a later paper, Robert Clark is able to demonstrate there are economic advantages to moving from core to the periphery, and that movement was possible, see Robert Clark, 2010.

²¹² Knoke, 185.

²¹³ Wallerstein, “The Rise and Future Demise of the World Capitalist System: Concepts for Comparative Analysis,” in Hamza Alavi and Todor Shanin, eds., *Introduction to the Sociology of ‘Developing Societies’* (New York: Monthly Review Press): 29-53, quoted in Knoke, 185.

²¹⁴ David Snyder and Edward Kick, “Structural Position in the World System and Economic Growth, 1955-1970: A Multiple-Network Analysis of Transnational Interactions,” *The American Journal of Sociology* 84, no. 5 (1979): 1096-1126.

transaction flows, Snyder identified four major structures in the world system, core, semi-core, semi-periphery, and periphery, which he concluded reinforced the power of the core as the continued segregation of the world system in new cores increased system stability.²¹⁵

Recent research using World Systems theory and network analysis have identified structural inequalities within the international system that correspond to the core-periphery framework. Focusing on global trade, the world system conforms to a core-periphery framework.²¹⁶ Furthermore, countries located within the periphery faced difficulties in producing economic growth.²¹⁷ Unfortunately, the core-periphery structure has been very stable over time, meaning that countries relegated to the periphery faced few prospects in moving to the core or the semi-periphery.²¹⁸

The world-system position, inequality debate has been frequently studied. Position within the world system has been seen to increase economic inequality, but the relationships and connections are still under considerable debate.²¹⁹ According to Muhatga et al. (2011), there are several mechanisms through which world system position can affect inequality. The first is indirect, whereas states move closer to the core of the global system, they become more economically developed. Following Kuznets, as state's become more developed, inequality begins to increase, until eventually reaching an apex, and reducing.²²⁰ The second is a more direct relationship, though more difficult to measure. According to world-system theorists, the primary catalyst of change in the

²¹⁵ Edward Kick, "World-System Structure, National Development, and the Prospects for a Socialist World Order," in Terry Boswell and Albert Bergesen, eds., *America's Changing Role in the World-System* (New York: Praeger, 1987): 127-155.

²¹⁶ Raja Kali and Javier Reyes, "The Architecture of Globalization: a Network Approach to International Economic Integration," *Journal of International Business Studies* 38 (2007): 595-620,

²¹⁷ The World Systems research on this particular topic consist of numerous sources. See Edward Kick and Byron Davis, "World-System Structure and Change: An Analysis of Global Networks and Economic Growth Across Two Time Periods," *American Behavior Scientist* 44 no. 10 (2001): 1561-1571. This research began with Snyder and Kick, 1979.

²¹⁸ Mathew C. Mahutga, "The Persistence of Structural Inequality? A Network Analysis of International Trade, 1965-2000," *Social Forces* 84 no. 4 (2006): 1863-1889, and Rob Clark, "Dependency, Network Integration, and Development," *Sociological Perspectives* 51, no. 3 (2008): 629-648.

²¹⁹ Arthur Alderson and Francois Nielsen, "Income Inequality, Development, and Dependence: A Reconsideration," *American Sociological Review* 64 (1999): 606-631. See also Linda Beer and Terry Boswell, "The Resilience of Dependency Effects in Explaining Income Inequality in the Global Economy: a Cross-National Analysis, 1975-1995," *Journal of world-systems Research* 8 (2002): 30-59, and Cheol-Sung Lee et al, "Income Inequality, Global Economy and the State," *Social Forces* 86 (2007): 77-111.

²²⁰ Mahutga et al., 2011, 281.

global system is competition among capitalist economies. However, the way that capitalist competition materializes changes over time between the core, semi-periphery, and periphery.²²¹ These forms of capitalist competition are often difficult to observe directly.²²²

Capitalist competition has different consequences depending on the location in the international system. Core nations frequently have greater democracy as economic development occurs, allowing for greater public participation and the formation of redistributive policies. Periphery, and semi-periphery nations, however, are often ruled by elites are able to reduce demands for democracy and defuse any attempts for redistribution.²²³

An alternative explanation of the world system position ~ inequality debate focuses on the requirements for the reproduction of capitalism. Inherent within world-systems theory is a belief that capitalism leads to an extraction of wealth from the periphery to the core. This surplus value is consequently distributed between capitalists and workers in the core, which decreases inequality as well as the potential for conflict. In return, inequality increases in the periphery due to the existence of an elite capitalist class extracting surplus value from society to give to their allies in the core.²²⁴

The primary catalyst in these inequality relationships is “political intervention or economic exploitation by the core” against the periphery.²²⁵ Measuring these forces in any explicit way has proven difficult, and long-term, cross national data is generally non-existent. Nevertheless, evidence for the existence of a world-system position~inequality link can be found ad hoc by looking at relationships in available data. As discussed and measured below, the core-periphery index may shed some light on this issue.

Other research in Network Analysis and World Systems Theory has also contributed to the globalization – political stability debate. In discussing the relationship between globalization and international conflict, Kim and Barnett find that global communication variables, including flows of telecommunication and mail, increased the

²²¹ For a more detailed explanation, see Mahutga et al., 2011, 283.

²²² James Mahoney, “Revisiting General Theory in Historical Sociology,” *Social Forces* 83 no. 2 (2004): 459-489.

²²³ Mahutga et al., 2011, 283.

²²⁴ Mahutga et al., 2011, 283.

²²⁵ Mahutga et al., 2011, 284.

likelihood of conflict between states.²²⁶ To explain their findings, they use world-systems theory and argue that communication networks have a core firmly represented by major powers, and as a result communications data may be reflecting the international order, and that communications networks facilitate the efficient execution of war-making activities by the core.²²⁷ However, the researchers did not extend their analysis to inspect how communications technology would affect domestic political stability; rather, their focus was on regional and inter-state conflict.

Section 2: Measuring Globalization with Social Network Analysis

One of the facets that distinguish World-Systems theory is its direct linkage with Social Network analysis and its numerous quantitative methods to understand the structure of networks. The major indices relevant to the current analysis are broken into two categories. The first indicate an overall assessment of the structure of the network, and include network centrality, network density, and the clustering coefficient.²²⁸ The second set of indices is used to place members of a network in terms of how central or important they are in the structure of the network, and include an individual measure of network centrality and a core/periphery measure.. This data can be used to structure the network into a core/periphery perspective and see where in the network members are located.

²²⁶ Jang Hyun Kim and George A. Barnett, "A Structural Analysis of International Conflict: From a Communication Perspective," *International Interactions* 33 (2007):135-167.

²²⁷ Kim and Barnett, 2007, 156-159.

²²⁸ The equations used here follow Kali and Reyes, 2007, as they use the most up-to-date network methods, in a framework specifically tailored towards an analysis of international networks. The discussion here will not be as detailed as in Kali and Reyes. For additional information beyond Kali and Reyes, see Wasserman and Faust, 1994, Albert and Barabassi, 2002, Newman, 2003..

Freeman's network centrality identifies how centralized a network is as a whole. The equation for network centrality index is:

$$C_I = \frac{\sum_{i=1}^g [C_{max}^d - C_D(n_i)]}{\max \sum_{i=1}^g [C_{max} - C_D(n_i)]} \quad \text{Equation: 3.1}$$

C_I = *Network Centralization Index*

C_{max}^d = *Actual Maximum Degree Centrality Observed for a Single Node*

C_{max} = *Theoretical Maximum Degree Centrality for a Single Node*

$C_d(n_i)$ = *Degree Centrality for Node i*

Networks range between two different poles. On the one hand is what is labeled a star network, where one node is connected to all other nodes, whereas all other nodes are not connected to each other and only connect to the central node. The star network has a C_I of 1. On the other hand is a peer-to-peer network, where there is no central node, and all nodes have a direct connection with all others; $C_I = 0$. The centralization of a network quickly identifies how 'equal' a network is. Networks with C_I approaching one are very hierarchical (see Figure 3.1), and most nodes rely on a few central nodes in order to send or receive transactions, whereas networks with low C_I scores are more egalitarian and nodes have greater access to all other nodes.²²⁹

²²⁹ Freeman's measure of network centrality is specifically tailored towards networks where items being transferred pursue the shortest possible distance between nodes. As a result, this measurement is specifically tailored towards "package delivery" processes, such as international trade. See Stephen P. Borgatti, "Centrality and Network Flow," *Social Networks* 27 (2005): 61.

A perfect core-periphery network, which is the most unequal and is known as freeman's star, and is represented by Figure 3.1:²³⁰

Each number in freeman's star represents a node, and every node is dependent on node #1 in order to reach each other node. In such a core-periphery structure, the core, node #1, has commanding influence on the behavior and actions of other nodes, as other nodes are only able to interact with each other through the core.

The importance of using network centrality to identify whether or not a network is similar to a core/periphery model is the importance of dependency; the periphery is dependent upon the core for access to most of the rest of the network. Networks that reflect this structure are highly likely to be open to abuse and exploitation, as the periphery has few alternative routes to take, other than through the core.

²³⁰ Stephen P. Borgatti and Martin G. Everett, "Models of Core/Periphery Structures," *Social Networks* 21 (1999): 379.

Figure 3.2: Idealized Core/Periphery Network													
Source: Borgatti and Everett, 1999, 378.													
1 = Existence of a connection between actors													
0 = Lack of a connection between actors													
		Actors											
			Core				Periphery						
Actors			1	2	3	4	5	6	7	8	9	10	
	Core	1	1	1	1	1	1	1	1	1	1	1	1
		2	1			1	1	1	1	1	1	1	1
		3	1	1				1	1	1	1	1	1
		4	1	1	1			1	1	1	1	1	1
	Periphery	5	1	1	1	1			0	0	0	0	0
		6	1	1	1	1		0		0	0	0	0
		7	1	1	1	1		0	0		0	0	0
		8	1	1	1	1		0	0	0		0	0
		9	1	1	1	1		0	0	0	0		0
		10	1	1	1	1		0	0	0	0	0	
The core is connected with all other actors, whereas the periphery is only connected to the core, and not to other periphery actors. A core-periphery structure helps the core to determine access to other actors throughout the network.													

Figure 3.2 identifies an ideal core/periphery network. Nodes one through four represent the core, because they are connected to each other (a connection is represented by a one, no connection is represented by a zero), as well as to nodes five through ten, which consist of the periphery. Since the periphery is not connected to each other, in order for one node in the periphery to contact another node, they must go through the core. This ‘gatekeeper’ power that the core acquires fully demonstrates the dependency of the periphery on the core. While real-world networks rarely perfectly mimic the idealized model, the closer the real world network is to this idealized form, the greater the opportunities for exploitation and increasing likelihood for inequality.

Network density is a measure of the total number of links between nodes divided by the total possible number of links:

$$\Delta^D = \frac{L}{g(g-1)} \quad \text{Equation 3.2}$$

Δ^D = *Network Density*

L = *Total Number of Links in the Network*

$g(g - 1)$ = *Total Possible Number of Links in the Network*

Network density is useful because it provides a simple measure of the level of network integration. In this sense, a network would be fully dense if the total numbers of links that exist are equal to the total possible number of links. As a result, it is a useful summary statistic that briefly identifies levels of interconnectivity between members of a network.

The clustering coefficient is an attempt to measure the amount of multilateral engagement within an international network. This coefficient identifies the probability that “the friend of my friend is likely to be my friend,” and is defined as:

$$C = \frac{3 \times \text{Number of Triangles}}{\text{Number of Connected Triples}} \quad \text{Equation: 3.3}$$

C = *Clustering Coefficient*

Connected Triple = "A Single Node with Links Running to an Unordered pair of others."²³¹

Triangle = *Three Nodes Linked Directly Together*

The clustering coefficient is useful because it acts as an indicator of the level of multilateralism within a network.²³² Triangles identify patterns of state interaction that are more dispersed throughout the system. This indicator ranges from 0 to 1, where zero means there are no multilateral groupings of states, whereas one means the network is perfectly multilateral, in that all states are connected to each other through one triangle or another.

²³¹ Equation and quote taken from Kali and Reyes, 2007, 602.

²³² Kali and Reyes, 2007, 602.

Two measures are used to identify the importance of a nation in the structure of the network. The first measure is called Prew World Centrality (Prew W.C.), as defined by Paul Prew, a state level measure of degree centrality.²³³ Prew W.C. uses Freeman's degree centrality for each individual nation, rather than the whole network. In creating this measure, the matrix of data is transposed on itself, creating a symmetrical matrix that is intending to reduce the difference between inward and outward connections.²³⁴ The calculation for the standardized country level Freeman's centrality is:

$$C_D(n_i) = \frac{d(n_i)}{g-1} \quad \text{Equation: 3.4}$$

$C_D(n_i)$ = Degree Centrality of Node i

g = Total number of nodes in the network

$d(n_i)$ = Degree Centrality of a Single Node

Following Prew, the calculations of Freeman's centrality for each individual country uses raw bilateral country data. The natural log of Freeman's degree centrality is taken to create a final measure of Freeman Centrality World-System position.²³⁵

The second measure of world system position is the continuous core/periphery coefficient, which is calculated for each country²³⁶:

$$\rho = \sum_{i,j} a_{ij} \delta_{ij} \quad \text{Equation 3.5}$$

$$\delta_{ij} = c_i c_j$$

ρ = Similarity of a network to a core/periphery structure

a_{ij} = Presence of a link between nodes i and j

c = "A vector of nonnegative values indicating the degree of coreness of each node"²³⁷

²³³ Prew, 2010, 171. I maintain the label Prew W.C. primary due to the way Prew formats the trade matrices before calculating Freeman Centrality, and uses a natural log transformation afterwards.

²³⁴ Prew, 2010, 171. For additional information on the transposing to reduce the impact of inward and outward types of transactions, see Tieting Su, "Myth and Mystery of Globalization: World Trade Networks in 1928, 1938, 1960, and 1999," *Review* 25 no. 4 (2002): 351-392. During direct correspondence with Prew, he clarifies this point further, arguing that the best way to capture a nation's role in the international system is taking into account inflows and outflows into the overall system. This correspondence can be provided on request, and is dated July 23, 2012.

²³⁵ Prew, 2010, 173.

²³⁶ Discussion of the core/periphery measure is in Borgatti and Everett, 1999. The use of the continuous core/periphery measure in the analysis of the international system is implemented in Rob Clark, 2009.

²³⁷ Borgatti and Everett, 1999, 387.

This particular equation to identify a core-periphery structure is suited towards world systems theory, as rather than requiring the matrix to be a-priori separated into two different sections, core and periphery, each node is instead given a “measure of ‘coreness’” that identifies the distance between the particular node and the center of the network.²³⁸ Further, the core/periphery measure is useful because it easily translates to Euclidean space, allowing for graphical depictions of the structure of the international system.

In calculating the core-periphery measure, following Clark (2010), the value of trade between each individual nation is base 10 logged to reduce skew.²³⁹ The core-periphery measure is then calculated for a matrix as well as the transposition of the matrix, in order to measure both inflows and outflows of trade. The resulting core-periphery measures are then normalized with a mean of zero and a standard deviation of one, and are subsequently averaged to get a final core-periphery measure. There may be a slight problem with this procedure, as the core-periphery routine works best when the data matrix is symmetrical.²⁴⁰ As a result, log base 10 trade matrices are transposed and added on themselves to create a symmetrical trade matrix that includes both imports and exports in each countries measures, and core-periphery is then calculated. Both types of core-periphery measures are used in the following analysis.

In Prew, the core/periphery measure is identified as being a mis-identified measure of world system position, even though core-periphery has been used frequently in world-systems literature.²⁴¹ The core/periphery measure weights the importance of an individual country with the coreness of their partners. Prew argues this creates bias because, if nations that are in the periphery trade heavily with core nations, then those periphery nations can have an inflated score. With raw trade data, for example, Canada and Mexico are located extremely close to the core of the trade network because of their high trade volume with the United States.²⁴² However, Clark (2010) does not use raw trade data when calculating the core-periphery measure, and instead takes the base 10

²³⁸ Borgatti and Everett, 1999, 386-387.

²³⁹ Clark, 2010, 1130.

²⁴⁰ Personal correspondence with Martin Everett, one of the developers of the core-periphery measure. Correspondence is available upon request.

²⁴¹ Prew, 2010, 171-172. For instances of the core-periphery measure in the world system literature, see Robert Clark, 2010, and Mahutga et al., 2011.

²⁴² Authors calculations and also Prew, 2010, 172.

logarithm of trade amounts, leading to measures of world system position that reflects world-system theory better than the raw data. To test which measure of world system position is more useful in longitudinal time series analysis, both Prew W.C. and Clark's core-periphery measure will be used in the following regressions.

Section 3: Summary of Network Analysis Statistics

To understand how global trade networks have changed, trade relations for a sample of 137 countries is taken from 1970 to 2009.²⁴³ Data between nations is averaged for five year periods, creating eight trade networks for 1970-74, 1975-79, 1980-84, 1985-89, 1990-94, 1995-99, 2000-04, and 2005-09.

Following Kali and Reyes (2007), overall network measures are presented for each network in Table 3.1.²⁴⁴ The measurements include network centralization, network density, and the clustering coefficient. For these calculations, the trade networks are dichotomized, so there is a 0 for no relationship, and 1 when there is trade between nations. In Kali and Reyes's original analysis, they calculated these overall statistics for different thresholds, at 0% (all trade), 1% (trade between nations is at least 1% of a nation's total trade), and 2% (trade between nations is at least 2% of a nation's overall trade).²⁴⁵ As the threshold increases, the matrices become more centralized and less dense. These cutoffs are not used in the current analysis because all trade is used in the calculation of the world system position measures.

Table 3.1: Network Statistics Overview– 1970 to 2009								
	1970-74	1975-79	1980-84	1985-89	1990-94	1995-99	2000-04	2005-09
Centrality (Indegree)	41.863	37.905	42.46	38.286	30.713	24.118	21.736	21.399
Density	0.506	0.516	0.582	0.623	0.697	0.762	0.786	0.789
Clustering Coefficient	0.677	0.674	0.741	0.765	0.804	0.834	0.849	0.854

²⁴³ 137 countries are chosen because data is available for them during the whole period of the analysis in the IMF Direction of Trade Statistics. Countries will be listed in the appendix (not finished yet, but immediately available upon request).

²⁴⁴ Kali and Reyes, 2007, 601.

²⁴⁵ Kali and Reyes, 2007, 598.

Table 3.1 is a summary of important network measures from 1970 to 2009. Except for a slight increase in the 1980-84 period, the networks have become less centralized. This indicates that individual states are more connected to each other, and the influence of a core of powerful trading nations is reduced. Overall, network density is increasing, which means that the number of actual connections between states compared to the total possible number of connections is increasing, indicating that states have more and more trade relationships and the global trade network is becoming increasingly integrated. A similar phenomenon is seen with the clustering coefficient, which identifies whether or not the trading partner of one nation is also the same partner of another. The clustering coefficient is increasing throughout the time analyzed, again demonstrating that the global trade network is increasingly integrated and connected.

However, these results should be interpreted in the light that it includes *all* the raw trade data between nations, even if the level of trade is minimal between two states. If the analysis focused only on trade amounts that were a higher percentage of a state's overall trade, then as seen in Kali and Reyes, the global trade network would be much more centralized. Regardless, with the raw data, the story of global trade relationships is one of an increasingly connected and globalized world, where states have greater opportunities to find new trading partners.

Another way to visualize the world trading system is by translating core-periphery scores into Euclidean space.²⁴⁶ To give an idea of where countries are located, Table 3.2 provides the top and bottom ten countries for 1970-74 and 2005-09. The core-periphery data derived from the symmetric data is used to create the visualization. For comparison, the Prew W.C. scores are also provided for the same years.²⁴⁷

Graph 3.2 and Graph 3.3 provide a visualization of the world trading system for 1970-74 and 2005-09 respectively. Nations colored red are in the core, and nations colored blue are in the periphery. Note that the core of the graphs is clustered and not all the names are visible. The country names from Table 3.2 help identify the countries

²⁴⁶ Step by step instructions for creating these core-periphery graphs was provided by Martin Everett. Correspondence is available upon request.

²⁴⁷ Due to technical reasons, the Prew W.C. scores are not suitable for a core/periphery type modeling. In calculating the core/periphery index, predicted values of trade are generated for nations based upon their location in the world system. These predicted values allow for a Euclidean visualization, whereas without these predicted scores, such a visualization is not possible.

located in the core.²⁴⁸ As seen in Table 3.2 and supported as well by Graph 3.2 and 3.3, there are large amounts of change and stability within the global trading network. China's rise as a global trading powerhouse is clearly visible. In 1970-74, China is in the periphery, located in the north of Graph 3.2, whereas in Graph 3.3 China is located in the middle of the core and cannot be seen on the graph, though it is ranked second on Table 3.2 for 2005-09. These visualizations demonstrate the feasibility of movement from the periphery to the core of the world-system. Clark (2010) shows from 1980 to 2000 that movement from the periphery to the core was not only feasible, but a significant catalyst for economic growth. The data from the current data supports Clark's analysis, which argues against other analysis such as Mahutga (2011), which maintains that a state's position within the world-system is fairly constant.²⁴⁹

The core-periphery graphs demonstrate the feasibility of visualizations to help comprehend the structure and relationships within the international system. In the following section, the data used to structure world system position are related with the globalization, inequality, and political stability measures from chapter 2.

²⁴⁸ Currently, I am working on an alternative way to visualize these networks, but the current implementation provides a useful beginning. The large number of countries makes visualization difficult.

²⁴⁹ Mahutga, 2011, 291, where they argue [they are analyzing the significance of world-system position] "under the assumption that world-system position *is* a more or less time invariant (or nearly invariant) attribute that varies across countries."

Table 3.2: Top 10 and Bottom 10 Rankings for Different World Centrality Measures 1970-74 and 2005-09							
Country	C-P Sym 1970-74	Country	C-P Sym 2005-09	Country	Prew W.C. 1970-74	Country	Prew W.C. 2005-09
United States	2.84	United States	1.72	United States	25.53	United States	28.67
UK	2.81	China	1.65	Germany	25.18	Germany	28.24
Germany	2.81	Germany	1.62	Japan	24.76	China	28.24
France	2.68	France	1.52	UK	24.73	Japan	27.80
Japan	2.68	Italy	1.48	France	24.66	France	27.58
Italy	2.58	UK	1.48	Canada	24.55	UK	27.48
Netherlands	2.48	Japan	1.48	Italy	24.41	Italy	27.40
Switzerland	2.15	Netherlands	1.45	Netherlands	24.24	Netherlands	27.36
Spain	2.05	India	1.38	Sweden	23.65	Canada	27.35
Sweden	2.05	Spain	1.38	Switzerland	23.56	Korea, South	27.21
~~~~~	~~~	~~~~~	~~~	~~~~~	~~~	~~~~~	~~~
Mauritania	-1.70	Chad	-1.07	Rwanda	17.60	Rwanda	20.53
Grenada	-1.77	EG	-1.07	Guin-Bis	17.54	Gambia	20.46
Albania	-2.00	Laos	-1.10	EG	17.52	Sierra Leone	20.37
Comoros	-2.10	Somalia	-1.17	Albania	17.39	Cape Verde	20.31
EG	-2.13	Fiji	-1.17	Nepal	17.09	Guin-Bis	19.79
STP	-2.17	Burundi	-1.24	Cape Verde	17.07	Grenada	19.75
Cape Verde	-2.17	Grenada	-1.34	Comoros	16.84	Burundi	19.64
Mongolia	-2.20	Comoros	-1.37	Grenada	16.80	CAR	19.62
Nepal	-2.23	Guin-Bis	-1.44	STP	16.55	Comoros	19.02
Zimbabwe	-2.30	STP	-1.57	Mongolia	16.20	STP	18.31

EG: Equatorial Guinea

Guin-Bis: Guinea-Bissau

STP: Sao Tome and Principe

UK: United Kingdom

Graph 3.2: Core and Periphery in the World Trading System: 1970-74

Red = Periphery

Blue = Core

Section 4: Quantitative Analysis of Network Measures

The measurement of globalization can take many forms. In chapter 2, globalization was envisioned as a factor analysis of numerous state-level characteristics, such as levels of trade or communication. In this section, globalization is perceived as the structural relationships created by global trade, as measured through the core-periphery index or Prew W.C.

The quantitative analysis first begins by questioning what network indices of world trade networks actually measure. A better understanding of these networks indices is created by comparing them with the KOF index of globalization, the various inequality measures, and the violence/regime indicators of political stability.²⁵⁰ Theoretically, the KOF globalization and network indices should be correlated together, but measuring different aspects of globalization. The KOF measure is a general, overall measure of several characteristics of globalization: economic, political, and social. The network indices on the other hand, specifically measure the relational aspects of the global trade system. Additionally, the same theoretical relationships between globalization, inequality, and political stability are likely to hold with the network indices.

Table 3.3 is a correlation matrix of the KOF, inequality, political stability and network measures. The first observation of importance is how the three network indices are correlated the least with the economic measure of globalization. The economic measure consists primarily of flows between states, such as trade and FDI, as well as restrictions, such as tariffs. The network indices are all based on bilateral trade flows, meaning they should be highly correlated with a measure of globalization that includes trade flows. Since the network measures are most correlated with political globalization, and least correlated with economic globalization, this encourages a view where system position, as measured by network indices of trade flows, reflects more than just the economic connections of states. States are able to achieve highly central positions within networks not simply because of the level of trade flows, but likely due to participation in global institutions, or the use of political or military force.

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²⁵⁰ The format for the following section is influenced by Mahutga et al., 2011, 279-307. In this article, they regressed several network position measures with state level Gini coefficients. Highly significant relationships were then tested in an additional panel analysis framework.

In regards to inequality, there is a sharp distinction between pre and post-tax redistribution Gini inequalities and the network measures. Pre-tax redistribution inequality has very little correlation with the network measures, but a medium negative correlation occurs with after-tax redistribution. This relationship is observed for all network indices, perhaps indicating that the more centrally located a nation is in the global trade network, the greater the influence tax redistribution has, or the greater the capability a state has in using the tax code to ameliorate the effects of globalization.

For political stability, there is very little correlation between the network indices and the violence index. Alternatively, there is a small, negative relationship between the regime instability measure and the network indices. This indicates that the more centrally a state is located, the less likely the state is to be engaged in coups or other forms of regime instability. The within and protest measures have a medium positive correlation with the network indices. The within measure indicates that more central states have governments that are marked by greater divisions; this can be seen as a respect for minority rights in the sense that the governments operate without a single commanding political party – a key indicator of modern liberal states. Additionally, the positive coefficient for protest instability and network position indicates that more central nations are more likely to have political protests. This is intriguing, and will be further analyzed below.

The last intriguing observation is that the Clark C-P and the Symmetrical C-P measures are practically the same. In calculating these measures, the Clark takes the average of the core-periphery measure from both inward and outward flows of trade. Alternatively, the symmetrical measure transposes the trade matrix and adds the transposition on the original, and then calculates the index. Clark (2010) makes a strong argument for his two-step procedure, though he doesn't address the symmetrical alternative.²⁵¹ This correlation matrix indicates that the final product from both methods is approximately the same.

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²⁵¹ Clark, 2009, 1130-1131.

Table 3.3: Correlations Between Globalization, Inequality, Political Stability, and Network Measures (Bold Measures are Network Correlations)													
	Econ. Glob	Soc. Glob	Pol. Glob	Gini Pre- Tax	Gini Post Tax	Wage Ineq.	Violence	Regime	Within	Protest	Clark C-P	Sym. C-P	Prew W.S.
Econ. Glob	1												
Soc. Glob	0.82	1											
Pol. Glob	0.42	0.4	1										
Over. Glob	0.89	0.9	0.73										
Gini - Pre Tax	-0.28	-0.46	-0.31	1									
Gini-Post Tax	0	-0.08	-0.15	0.78	1								
Wage Ineq.	-0.23	-0.34	-0.32	0.62	0.4	1							
Violence	-0.23	-0.24	-0.07	0.16	0.06	0.2	1						
Regime	-0.29	-0.28	-0.25	0.13	-0.01	0.15	0	1					
Within	0.42	0.49	0.48	-0.22	0.01	-0.04	0	0	1				
Protest	-0.12	-0.06	0.13	0.02	-0.04	0	0	0	0	1			
Clark C- P	0.44	0.58	0.74	-0.48	-0.2	-0.39	-0.08	-0.28	0.4	0.25	1		
Sym. C- P	0.43	0.57	0.73	-0.48	-0.2	-0.4	-0.08	-0.28	0.39	0.25	1	1	
Prew W.S.	0.58	0.63	0.77	-0.42	-0.21	-0.32	-0.06	-0.31	0.4	0.21	0.87	0.86	1

Correlation analysis only represents the strength of relationships between variables. To understand the associative relationship/predictive nature, a regression framework, is required.²⁵² The first set of models is directly between the network indices and globalization, inequality, and political stability. If a statistically significant relationship is found in any of the models, a model with additional controls and time lags is used.

The first series of regressions seeks to compare the network indices with the KOF globalization measures. The question is whether or not the KOF and Network indices measure similar facets of the international system, or entirely different ones. A fixed effects model with cluster robust standard errors and time dummies reduces the impact of heteroskedasticity and serial correlation. The results of the regressions are in Table 4. Economic and social globalization, which primarily reflects direct ties between nations, are significantly related with Prew W.C. The Prew measure takes the natural log of the total amount of trade into and out of a nation, making it similar to the KOF economic and social measures because they are all measuring the strength of ties.

The Core-Periphery measures, however, are insignificant, indicating they measure a different facet of the international system or are an inappropriate measure. The Core-Periphery measures, rather than focusing on the strength of ties, use bilateral data to measure how far each nation is from the predicted center of the network based on the hypothetical core-periphery model. In other words, rather than focusing on ties between nations, core-periphery measures each nation's distance from the core, with higher values indicating a closer proximity to the core. This measure may experience significant problems if the network being analyzed is not structured similar to the core-periphery hypothesis. What makes a core-periphery framework unique is how the core is highly integrated with the core as well as the periphery, but the periphery is also comparatively less connected with itself. This provides the core a type of “network power” which the core can use to structural relations among actors to the core’s benefit. The overall network measures discussed previously identify a global trade network that is increasingly connected and integrated, between all parts, including both a theoretical core and periphery. Hence, the insignificance of the core-periphery measures in these

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²⁵² This section is directly influenced by Mahutga et al., 2011, starting at page 290.

regressions may indicate that these measures do not identify a facet of globalization, and are spurious.

Alternatively, the core-periphery measures, even though they were calculated through trade flows, may identify an underlying power structure of political influence. By identifying a potential cut off between core and periphery, this index may be able to capture some effect of difficult to observe processes, such as elite capitalist relations, where competitive relationships among capitalist classes seek to acquire gains from capitalist modes of production.²⁵³ Further, core-periphery measures can act as an alternative measure of overall development when interpreted from a transaction analysis framework. Core countries, by having to manage greater levels and amounts of transactions, have more developed institutions which are more capable of developing and implement meaningful policy.²⁵⁴

Based on these possible interpretations of core-periphery measures, that they are not related to the economic and social measures of globalization is not surprising. The KOF indexes are a factor analysis of numerous attributes of individual nations, focusing on inflows and outflows of different transaction types.

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²⁵³ Mahutga et al., 2011, 283.

²⁵⁴ On transaction analysis, see previous section. On a world-systems analysis of a similar concept, see Mahutga et al, 2011, 283.

Table 3.4: Globalization and World Position Indices in a Regression Framework Fixed Effects with Time Dummies and Cluster Robust S.E 5 Year Avg. Data									
VARIABLES	(1) Econ. Glob.	(2) Econ. Glob.	(3) Econ. Glob.	(4) Soc. Glob	(5) Soc. Glob	(6) Soc. Glob.	(7) Pol. Glob.	(8) Pol. Glob.	(9) Pol. Glob.
Clark C-P	0.133 (0.821)			-1.464 (0.941)			3.830*** (1.092)		
Sym. C-P		-0.00619 (0.791)			-1.527* (0.900)			3.595*** (1.032)	
Prew W.C. (LN)			2.421*** (0.616)			2.434*** (0.734)			0.978 (0.678)
Constant	38.75*** (0.489)	38.75*** (0.489)	-11.75 (12.87)	31.10*** (0.586)	31.13*** (0.579)	-19.18 (15.32)	42.32*** (0.641)	42.23*** (0.638)	21.81 (14.06)
Time Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	920	920	920	1,037	1,037	1,037	1,053	1,053	1,053
R-squared	0.723	0.723	0.737	0.604	0.605	0.623	0.709	0.709	0.700
# of Countries	117	117	117	132	132	132	134	134	134

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Intriguingly, the core-periphery index is highly significant with the KOF measure for political globalization. One possible interpretation of this relationship is an affirmation of the power relations structured by a core-periphery framework. The relationship is positive, indicating that countries located closer to the core of the world-system are more connected in political relations, such as treaties and membership in international organizations. These political connections allow core states greater influence in structuring the international system in ways that benefits their own interests. Unfortunately, the relationship is not extremely powerful. The r^2 in regressions 7 and 8 in table 3.4 is .7 primarily due to the influence of the time dummies. When the model is run without them, the within R^2 is reduced to .07, although the relationship is still highly significant. If the core-periphery measure actually does identify some form of political relationship between states, it is most likely a weak measure; i.e., there is lots of noise in the statistic.

To extend the understanding of what these network measures actually measure, several institutional variables are used as independent variables. Transaction analysis theory makes a case arguing that network measures indicate levels of institutional development. To identify whether or not these network indicators proxy institutional development, data is gathered from the Economic Freedom of the World project.²⁵⁵ Three measures are chosen to reflect institutional development: size of government, legal system and property rights, and regulation. From the Penn World Tables, GDP per Capita is also included to reflect economic development.²⁵⁶

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²⁵⁵ www.freetheworld.com

²⁵⁶ For a brief review on elements of institutional strength, see Steven Levitsky and Maria Victoria Murillo, "Variation in Institutional Strength," *Annual Review of Political Science* 12 (2009): 115-33. On the quantitative measurement of institutional quality, see Fabrizio Carmignani, "The Distributive Effects of Institutional Quality when Government Stability is Endogenous," *European Journal of Political Economy* 25 (2009): 409-421.

Table 3.5: Network Indices and Institutional Development			
Fixed Effects Regressions with Time Dummies and Cluster Robust S.E.			
VARIABLES	(1) Clark C-P	(2) Sym. C-P	(3) Prew W.S.
Gov't Size	0.0174 (0.0192)	0.0186 (0.0197)	-0.0254* (0.0150)
Legal System	-0.00273 (0.0167)	-0.00327 (0.0172)	-0.0276* (0.0144)
Regulation	0.0161 (0.0227)	0.0163 (0.0232)	0.0901*** (0.0240)
GDP Per Capita (LN)	0.170 (0.151)	0.179 (0.156)	1.008*** (0.104)
Tech Development (LN Trademarks)	0.175*** (0.0564)	0.178*** (0.0576)	0.144*** (0.0433)
Constant	-2.186 (1.338)	-2.216 (1.383)	11.84*** (0.871)
Observations	510	510	510
R-squared	0.155	0.181	0.958
Number of Countries	92	92	92

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

By including measures of institutional development, a clear divide is created between the core-periphery and the Prew W.S. indicators, as seen in Table 3.5. The Prew W.S., as correctly anticipated by transaction analysis theory. The total value of imports and exports to a country is strongly related with regulation and levels of economic development. Transaction analysis theory anticipates this result because by measuring states level of centrality, the Prew W.S. identifies nations that experience a high level of transactions. The greater the amount of transactions, the more regulations required to manage those transactions. Level of economic development theoretically should also be significant because as economic development increases, more transactions should occur, and states should achieve a greater level of centrality, which would be picked up in the Prew W.S. indicator. The insignificance of government size and the legal system indicate that higher levels of centrality have a targeted relationship with a country's regulatory infrastructure, but not so much with other parts of government.

The Core-Periphery indicators did not have significant relationships with most of the indicators of government development. This could imply several possibilities. The

first is that, as previously discussed by Mahutga, the Core-Periphery measures are able to capture the unobservable, or difficulty to quantify struggles that occur as a result of the capitalist economic system, where elites struggle for power and control in the international system. Unfortunately, it seems rather difficult to empirically demonstrate this type of relationship. Alternatively, the international system could simply not reflect a core-periphery structure, and it is miss-specified in the analysis of the world-system.

Importantly, levels of technological development are significant in explaining both Core-Periphery and Prew World system measures. For core-periphery, countries with a higher level of technological development are closer to the center of the global trading network, as well as having a higher position in the world-system. Technology helps increase the total flow of transactions, while concurrently helping nations move closer to the core of the global trade network.

The second series of regressions tries to establish a relationship between the inequality and network measures. Two mechanisms relate inequality and world-systems measures. First, world system processes, by affecting economic development, can affect inequality through processes similar to the Kuznets model. Alternatively, world systems dynamics can affect inequality directly, by affecting capitalist modes of production and economic elites.²⁵⁷ Empirical connections between world-systems theory and inequality have been tenacious, in part due to the difficulty of operationalizing underlying mechanisms or perhaps flaws in the overall world-systems theory. Previous literature that attempt to find a direct relationship between world system position and inequality typically find a negative relationship, where more core nations have less inequality, however this relationship disappears when controlled for economic or institutional development.²⁵⁸

The results of several fixed effects models between world-system indicators and economic inequality are displayed in Table 3.6. Before adding in additional controls, these regressions seek to identify a direct relationship mimicking the “unobservables” discussed by Muhatga (2011). In all models, the core-periphery measure is never

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²⁵⁷ Mahutga et al., 2011, has a larger summary of previous research in this area.

²⁵⁸ Cheol-Sung Lee, “Income Inequality, Democracy, and Public Sector Size,” *American Sociological Review* 70 (2005): 158-181, and Cheol-Sung Lee et al., “Income Inequality, Global Economy and the State,” *Social Forces* 86 (2007): 77-111.

significant, reinforcing the difficulties others have observed in finding his type of link. Intriguingly though, Prew W.S is highly significant for all types of inequality. Prew W.S. has a smaller coefficient in the after-tax redistribution Gini than the pre-tax gini, perhaps showing how more developed government institutions are better at reducing inequality. However, the coefficient is still positive in both cases, demonstrating that as a nation becomes more central to the world trade network as measured by the absolute amount of trade flows, the greater the amount of inequality. Alternatively, wage inequality has a negative coefficient, meaning that as a nation has greater inflows and outflows of trade, the less wage inequality they experience.

Table 3.6: Inequality Measures and Network Indices Fixed Effects with Time Dummies and Cluster Robust S.E.									
VARIABLES	(1) Pre-Tax Gini	(2) Pre-Tax Gini	(3) Pre-Tax Gini	(4) After-Tax Gini	(5) After-Tax Gini	(6) After-Tax Gini	(7) Wage Ineq	(8) Wage Ineq	(9) Wage Ineq
Clark C-P	-1.065 (1.097)			0.227 (0.779)			0.0547 (0.0424)		
Sym. C-P		-1.062 (1.041)			0.216 (0.738)			0.0527 (0.0404)	
Prew W.S.			2.776*** (0.706)			1.326** (0.619)			-0.0753** (0.0317)
Constant	48.58*** (0.947)	48.63*** (0.968)	-10.65 (15.09)	38.87*** (0.677)	38.86*** (0.692)	10.80 (13.20)	-1.482*** (0.0265)	-1.484*** (0.0271)	0.145 (0.675)
Observations	709	709	709	714	714	714	592	592	592
R-squared	0.076	0.076	0.120	0.019	0.019	0.040	0.233	0.233	0.240
# of Countries	121	121	121	121	121	121	115	115	115

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 3.7: Prew W.S. and Inequality with Control Variables Fixed Effects with Cluster Robust S.E.			
VARIABLES	(1) Pre-Tax Inequality	(2) Post-Tax Inequality	(3) Wage Inequality
Prew W.S.	2.034** (0.894)	1.097 (0.983)	0.0253 (0.0465)
GDP Per Capita (LN)	3.049 (2.265)	0.643 (1.592)	-0.186* (0.106)
Secondary School Enrollment	-0.0360 (0.0372)	-0.0363 (0.0268)	-0.00519** (0.00226)
Rate of Population Growth	0.341*** (0.126)	0.100 (0.0868)	-0.00451 (0.00587)
Constant	-25.52 (20.72)	9.709 (16.43)	-0.140 (0.736)
Time Dummies	Yes	Yes	Yes
Observations	650	655	548
R-squared	0.177	0.046	0.273
Number of Countries	118	118	110
Robust standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

Table 3.7 analyzes the network-inequality relationship with the inclusion of a basic development model. Inequality is explained as the result of Prew W.S., GDP per Capita, secondary school enrollment, and the rate of population growth. Similar to the previous globalization regressions from chapter 2, Prew W.S. is found to have a statistically significant positive increase on pre-tax inequality, even with the additional controls. However, the effect of Prew W.S. on after-tax redistribution inequality is insignificant. The additional controls also remove the previously seen relationship between wage inequality and Prew W.S. This indicates that whatever the impact the Prew W.S. measure of world-system position has on economic inequality, state institutions are able to placate those affects through the use of the tax redistribution system. As a result, this analysis encourages a view where the state has a strong role to play in determining the effect of continuing integration with the world-system.

The previous world system position – inequality regressions try to identify a direct link through unobservables and the inherent characteristics of the network measurements. Muhutga argues there is an alternative mechanism through which world system position can affect inequality: by encouraging economic growth. Recently, Clark (2010) tested the world system position – economic growth relationship through a fixed effects model. Using the variables from Clark, the following fixed effects model is tested:

$$\begin{aligned} \text{Economic Development (LN GDP Per Capita PPP)}_{it} = & \\ & \beta \text{Gross Capital Formation (\% GDP)}_{it} + \\ & \beta \text{Secondary School Enrollment}_{it} + \\ & \beta \text{Labor Force Participation (\% Total Population)}_{it} + \\ & \beta \text{World-System Position}_{it} + \\ & \beta \text{ctrycode}_{it} + \\ & \beta \text{year}_{it} + \\ & \varepsilon_{it} \end{aligned}$$

where *i* is country and *t* is time. This model attempts to re-create a neoclassical economic growth model. Growth is the result of capital inputs (gross capital formation) and labor (secondary school enrollment and labor force participation).²⁵⁹ The results of the models are in table 3.8.

The models clearly demonstrate the importance of world system position in positively influencing economic growth. The core-periphery style measures were significant and positive at the .05 level, and the Prew W.S. centrality measure was positive and significant at the .000 level. These results closely mimic those found in Clark (2010). The more central and the closer to the core of the global trade network, the more economic growth a nation is likely to have. To the extent that economic growth influences inequality (covered in chapter 2), world system position indirectly affects inequality through the classic Kuznets model.

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²⁵⁹ For more details, see Clark, 2010, 1131-1132.

Table 3.8: World System Position and Economic Growth			
Fixed Effects Regressions with Time Dummies and Cluster Robust S.E.			
VARIABLES	(1) GDP Per Capita (LN)	(2) GDP Per Capita (LN)	(3) GDP Per Capita (LN)
Capital Formation (% GDP)	0.00517* (0.00266)	0.00514* (0.00265)	-0.00107 (0.00149)
Secondary School. Enrollment	-0.00166 (0.00208)	-0.00167 (0.00208)	-0.00237 (0.00161)
Labor Force Participation	-0.00162 (0.00586)	-0.00149 (0.00585)	0.00202 (0.00358)
Clark C-P	0.167** (0.0834)		
Sym. C-P		0.165** (0.0805)	
Prew W.S.			0.389*** (0.0845)
Constant	8.502*** (0.415)	8.496*** (0.414)	-0.395 (1.891)
Observations	451	451	451
R-squared	0.517	0.517	0.728
Number of ccode	125	125	125

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Finally, the analysis turns to the relationship between network indicators and measures of political stability. In the core-periphery literature, there is little analysis on the relationship between political stability and position within the world system. However, based on the previous literature reviews, several postulates can be made. Both types of world system position, centrality (as measured by Prew W.S.), or distance from the core (Clark C-P) should have a negative relationship with political instability; i.e., the closer to the core, or the more central a nation is, the less the amount of instability there should be. The relationship occurs due to several possibilities. More central nations generally have more developed institutions, which allow them to find solutions to problems that may cause instability. To advance within the world system, become more

central, and move closer to the core, a stable polity is required to maintain the economic foundation that facilitates prosperous growth.

Table 3.9 shows the results from the political stability and network measures. For Violence, Within, and Protest, several of the network indices are significant. Furthermore, the network indices when regressed against violence and within also have the expected negative sign; the closer to the core, or the larger the amount of transactions a state handles, the less likely there is instability. Intriguingly, for the significant coefficients for the Protest regressions, the coefficients for the core-periphery measures are positive, meaning that more centrally located nations are more likely to have political protests. Unfortunately, the significance scores for the F-tests of all the regressions ($\text{Prob} > F$) is larger than desired. This indicates that the overall regressions are not significant. Based upon the insignificance of the regressions as a whole, network position and political stability are not related.

Table 3.9: Political Stability and World System Position Fixed Effects With Cluster Robust Standard Errors						
VARIABLES	(1) Violence	(2) Violence	(3) Violence	(4) Regime	(5) Regime	(6) Regime
Clark C-P	-0.282** (0.119)			-0.162 (0.120)		
Sym. C-P		-0.276** (0.114)			-0.162 (0.117)	
Prew W.C.			-0.0545 (0.0398)			-0.118*** (0.0407)
Constant	0.0695*** (0.0138)	0.0692*** (0.0134)	1.278 (0.907)	0.00410 (0.0140)	0.00436 (0.0137)	2.675*** (0.926)
Time Dummies	No	No	No	No	No	No
Observations	708	708	708	708	708	708
R-squared	0.017	0.017	0.006	0.003	0.003	0.016
Number of ccode	116	116	116	116	116	116
F	5.652	5.869	1.875	1.816	1.928	8.441
Prob > F	.0191	.0170	.1736	.1804	.1676	.0044
Robust standard errors in parentheses						
*** p<0.01, ** p<0.05, * p<0.1						

Table 3.9 Cont'd: Political Stability and World System Position Indicators Fixed Effects With Cluster Robust Standard Errors						
VARIABLES	(7) Within	(8) Within	(9) Within	(10) Protest	(11) Protest	(12) Protest
Clark C-P	0.101 (0.0986)			0.273*** (0.102)		
Sym. C-P		0.0862 (0.0942)			0.273*** (0.101)	
Prew W.C.			-0.0627 (0.0548)			-.093** (.0517)
Constant	-0.229*** (0.0649)	-0.234*** (0.0646)	1.121 (1.189)	-0.00418 (0.0118)	-0.00463 (0.0119)	2.153 (1.176)
Time Dummies	Yes	Yes	Yes	No	No	No
Observations	708	708	708	708	708	708
R-squared	0.116	0.116	0.116	0.010	0.011	0.011
Number of States	116	116	116	116	116	116
F	5.921	5.911	6.084	7.189	7.318	3.26
Prob > F	.0000	.0000	.0000	.0084	.0079	.0734
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1						

Section 5: Conclusion

A network analysis of the world trade system provided numerous observations about the structure and behavior of the world system. First, network wide measurements indicated that the global trade network is becoming more and more integrated, with the “core” increasing in size, and more and more states having direct connections with each other. The world system position indicators that were calculated through network analysis, both the core-periphery measures and the centrality measure, had significant explanatory power in several regression frameworks.

Prew (2009) argued that centrality measures are more adequate in the analysis of networks than core-periphery networks. His argument was theoretical based on how the core-periphery index was calculated. The C-P index, by weighting an individual’s core-periphery score based on how strong the connections of that individuals direct partners were, created bias in perceptions of the global network. The argument put forth in this chapter goes further. Regardless of the statistical weighting issues of the core-periphery indicators, the primary problem with the measure is that it forces global relations into a core-periphery structure, even if that structure does not accurately describe the world system. For a network to be a core-periphery structure, the core has many connections with itself and the periphery, whereas the periphery has most of their connections with just the core, and not other periphery nations. As indicated by the overall network indicators, network centrality, network density, and the clustering coefficient, the overall trade network is becoming increasingly integrated, including core-periphery, and most importantly, periphery-periphery relations. The power of the core comes from the relative isolation of states located within the periphery; peripheral states need to go through the core to gain access to most of the network. While the global trading system during colonialization was likely a highly centralized core-periphery network, the current analysis of the last 40 years indicates that the world system is becoming less hierarchical and more peer to peer.

These changes in the global trade network encourage cautious usage of core-periphery measurements in the future. Indeed, in most of the models demonstrated here, the Prew W.S. measure often had more significance and larger coefficients than the core-

periphery measures. The key difference is that the Prew measure does not force the data into a pre-conceived model of what the network looks like, rather it just identifies the total sum of all the connections a state has with the rest of the network. This particular measure proved extremely robust in all the analysis pursued here.

However, the core-periphery measures were able to capture an element of the world system that the Prew measure could not: structural power. In the globalization regressions, the C-P measures were highly related with political globalization structures, whereas the Prew measures were more related with the transactional globalization measures. The C-P measure may provide avenues to examine the “unobservables,” such as elite manipulation of capitalist modes of production that seems to escape the Prew measures. Further testing in this field needs to be pursued in order to understand exactly what the core-periphery indexes measure.

Similar to chapter 2, table 3.10 transforms the significant modeling into percent change relationships. The procedure to transform the variables used in chapter 2 is also used here.

Connecting this chapter to the rest of the dissertation, the theories and relationships tested here will be applied in the creation of futures scenarios. Chapter 4 will explain important methods in futures analysis. Chapter 5 facilitates emerging issue analysis with science fiction. Chapter 6 will take the quantitative conclusions from chapter 2 and 3, combined with the emerging issues and methodologies from chapter 4 and 5, to create a trend impact analysis of the possible futures of the United States.

Table 3.10: Summary of Significant Relationships											
	Chg in Ind. Var.	Econ Global.	Soc. Global	Pol Global	Post- Tax- Gini	Pre-Tax Gini	Wage Ineq	Viol. Instab.	Regime Instab	Protest Instab	GDP Per Capita (LN)
Clark C-P	20			3.97***				-3.51**		2.1***	16.7**
Sym. C-P	19		1.77*	3.73***				-3.43**		2.1***	16.5**
Prew W.C.	100	2.74***	2.82***		2.58**	4.77***	-7.53**		-1.46***	-.72**	38.9***

Table 3.10 Cont'd: Summary of Significant Relationships				
	% Increase Indep. Variable	Clark C-P	Sym. C-P	Prew W.C
Gov't Size	9.06			-2.54*
Legal System	8.2			-2.76*
Regulation	7.7			9.01***
GDP Per Capita (LN)	100			100.8***
Technological Development (LN Trademarks)	100	3.55***	3.44***	14.4***

Chapter 4: Futures Analysis and Emerging Issues

Futures forecasting is a powerful tool to take what is known about today to envision possible tomorrows. “Futures” exist in numerous images and ideas generated by pop culture, think-tanks, and individuals everywhere. Numerous methodologies exist to take knowledge of today, combined with images of the future, to construct various scenarios highlighting how the choices humanity makes now determines where humanity may go.

This chapter seeks to review important methodologies in futures analysis in order to facilitate the construction of scenarios in chapter 6. First, the methodological foundations of the Mānoa School are described. Several additional concepts are applied to the Mānoa School, including a flow chart describing critical junctures in scenario evolution, as well as discussing the underlying values and goals propelling societies down one form of scenario rather than another. Second, three emerging forces are discussed that are changing perceptions of scarcity, and their impact on globalization, inequality, and political stability: the digital revolution, 3d printing and automation.

Section 1: The Mānoa School of Scenario Construction

A useful starting point when thinking about futures scenarios is the Mānoa School. The Mānoa School represents a holistic process to envision futures scenarios, beginning with theories of social change, and eventually the construction of four distinct possible visions of the future, continued growth, transformational, discipline, and collapse.²⁶⁰ This section also augments the typical Mānoa School by adding a flow chart understanding of the relationship between the scenarios, and the addition of values and goals that are pursued by decision makers which facilitate journeys down one scenario rather than another.

Table 4.1 identifies several steps that may be followed in initially thinking of a scenario construction under the Mānoa School paradigm.²⁶¹

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²⁶⁰ Jim Dator, “Alternative Futures at the Mānoa School,” *Journal of Futures Studies* 14 no. 2 (2009): 1-18

²⁶¹ These elements are taken from Professor Dator’s class on futures research.

Table 4.1: Major Elements of Futures Research
1. Construct a theory of social change
2. Identify the major driving forces for change within the theory
3. Understand the history of these forces
4. Identify the present conditions of these forces.
5. Extrapolate dominant trends
6. Identify emerging issues that may interrupt trends or affect them in some way.
7. Create four generic alternative futures
8. Create one or more preferred futures

Chapter one identified several theories of social change related to globalization, inequality, and political stability. Chapters two and three identified the major relationships among the variables, including important drivers, and a brief explanation of each variables history through quantitative regression analysis.

The four futures of the Mānoa School act as useful heuristic devices, simple ‘rules of thumb’ to guide thoughts of the future.²⁶² Within these four futures categories, all possible visions of the future can fit. The four futures ensure the visions generated are significantly different enough from each other as to stimulate useful thoughts. First, the four different types of scenarios are described. Second, important characteristics of each future type are constructed. Third, a flowchart showing paths societies can travel between the futures is identified. Finally, the dominant values, and the purposes those values are directed towards are classified for each futures type. The detail provided for each scenario type is intended to increase an understanding of why societies go towards one type of scenario rather than another. This information is useful in constructing additional events in the Trend Impact Analysis of Chapter 6.

Continued growth represents a baseline scenario, where there are no qualitative changes in humanity’s social system. The primary differences are in size and speed; the world is faster, there are more people, but the activities and social systems are similar to what is seen today. Sources of systemic stress, such as proliferation of WMDs or terrorism are manageable within the current system. Politics is characterized by

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²⁶² A detailed summary of this methodology is in Clemont Bezold, “Jim Dator’s Alternative Futures and the Path to IAF’s Aspirational Futures,” *Journal of Futures Studies* 14 no. 2 (2009): 123-134. See also Jim Dator, “Alternative Futures at the Mānoa School,” *Journal of Futures Studies* 14 no. 2 (2009): 1-18.

muddling through; national leaders react to events within the global system with short term fixes and solutions. Long term thinking, while pursued, is rarely actually achieved. Humanity plods from one crisis to the next, yet through ingenuity, problems are overcome and humanity thrives. The economic system remains a capitalistic-socialist hybrid, and the primary unit of analysis remains states. Trend lines generated in empirical analysis are likely to continue their current path; in effect, there is “no change in the rate of change.”²⁶³

The collapse scenario, frequently envisioned in numerous “Armageddon style” movies, represents the destruction and disintegration of human society as currently known. But rather than being replaced with a new or revolutionary system, there is simply chaos. This period of chaos can result in two possible outcomes, the destruction of humanity, or humanity’s slow re-growth. The unit of analysis in a collapse scenario revolves around the individual. There may not be an economic system, or if one does emerge, it is likely to be minimalistic.

The disciplined scenario represents a political awakening among ruling classes. Identifying the possibility of a real cataclysmic collapse in humanity, world leaders seek to reform the global system, overhauling its faults, and pursuing a longer-term political agenda. Politics reflects this ‘reform-inspired’ agenda, and social norms are institutionalized through some form of pressure, consensual or otherwise. Similar to continued growth, the primary unit of analysis is the state. The economic system is also likely to remain a capitalistic-socialist hybrid, but there are greater opportunities for state control to reduce capitalism’s destructive outcomes.

The transformative scenario reflects a wholesale rethinking and restructuring of the global system. Caused due to technological or spiritual transformations, the transformative future is like nothing else previously seen in human history. As a result, the political and economic systems, the unit of analysis, or any other major characteristic previously associated with humanity changes.

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²⁶³ Thanks to Professor Chadwick.

Important characteristics of the futures scenarios are presented in Table 4.2. System stress identifies likely catalysts or causes of social change.²⁶⁴ From this perspective, system stress includes issues such as terrorism or the proliferation of weapons of mass destruction that cause states to change their behavior. The primary unit of analysis indicates the major form of social organization within the system. Socio-economic system identifies how society interacts with itself to acquire goods and services. Political perspective indicates the fundamental underlying course of politics within the system: the orientation of politics. In other words, is politics a long-term perspective, seeking to avoid problems before they arise, or is politics primarily embroiled in short term political disputes?

The relationship between the four futures is presented in Flowchart 4.1. The Eternal Now represents the world humanity currently knows, as well as any stable point in the future from which the future branches off. From the Eternal Now, the primary question is whether or not system stress is manageable. If unmanageable, the system collapses, possibly leading to humanity's demise. If stress is manageable, three possible outcomes can occur. The first possibility is that no major changes occur, and continued growth is able to happen as long as stress remains manageable. Second, if major political actors perceive system stress to be approaching unmanageability, they choose to reform the system pursuing a disciplined future. However, these reforms may fail and collapse may ensue. Finally, rather than through political actors, technological or social change may create new opportunities for life, leading to a transformative future. However, these transformative changes may themselves be unsustainable, creating new, previously unseen problems within the system that lead towards collapse.

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²⁶⁴ On the use of stress in systems thinking, see Richard W. Chadwick, "Reframing the Meaning of Democracy: The Globalization of Democratic Development, Viewed through the Paradigms of Political Science, Political Practice and Political Philosophy," paper presented at the IPSA Congress in 2006 Fukuoka, Japan, especially page 15.

Table 4.2: Primary Characteristics Distinguishing the Four Futures				
	Continued Growth	Collapse	Discipline	Transformative
Impact of System Stress (Problems Societies Experience)	Stress is manageable within the system as is	Stress is unmanageable	Stress is manageable but only through reform of world system	Stress leads to the creation of new institutions, new social structures or behaviors.
Primary Unit of Analysis / Major Form of Organization	The same form of organization that existed previously	The Individual/ Local Communities	The same form of organization that existed previously	New Form of Organization
Socio-Economic System	The same system that existed before	Devolution of the current system	The same system that existed before	Evolution of a new socio-economic system.
Political Perspective	The same perspective that has previously existed	Day to day survival	Reform of the political perspective to ward of collapse – institutionalization of long term thinking.	An evolution of political perspectives

By creating and identifying four generic futures, the Mānoa School organizes thoughts regarding how current events can evolve into future environments. However, previous discussions of the Four Mānoa futures have not provided a lot of insight as to why a society would go down one future rather than another. One possible solution to understand why societies embark on one type of future is to anticipate the predominant values that drive peoples' behavior. In addition, what types of goals are these values directed towards? A general framework to facilitate this understanding is identified by Lasswell's eight values and Maslow's hierarchy of needs.²⁶⁵

²⁶⁵ The following discussion is based off of Richard Chadwick, "Lasswell's Value Theory Reconstructed as Means," *Research Note*. Accessed August 4, 2013, at <http://www.hawaii.edu/intlrel/pols315/Text/Theory/lasswell.htm>. Lasswell's eight values are from Harold Lasswell and Abraham Kaplan, *Power & Society: A Framework for Political Inquiry* (New Haven: Yale University Press, 1950).

Flowchart 4.1: The Eternal Now and the Four Futures

For Lasswell, social values are divided into two types: welfare values, which identify some form of social attribute or skill, and deference values, which identify why people are willing to follow or listen to others. Welfare and deference values can be further categorized as whether or not they focus on an inner nature, as in how people motivate themselves, and an outer nature, or how the values are used to relate with other people. Based upon this categorization, Table 4.3 organizes and defines each of Lasswell's values. These values are important, because, as will be identified later, the values that dominant a certain society at any given time are likely to propel the society towards one of the Four Mānoa Futures.

Table 4.3 Categories of Lasswell's Values Values Identify Society's Character			
Welfare Values		Deference Values	
Inner	Outer	Inner	Outer
Health: Personal health and welfare	Wealth: Social Health: Pursuit of Material Well-Being	Affection: Individual Connections Created Through Love	Power: People Follows Others Due To Coercive Influence
Enlightenment: Individual Knowledge, Self-Attainment.	Skill: Application of knowledge to serve a social function	Rectitude(Altruism): Individual connections formed through adherence to moral beliefs, belief that they are doing good for each other.	Respect: People Follow Others Due to Tradition or Esteem for others

Table 4.4: Maslow's Hierarchy of Needs Identifies the Goals of Society	
Need	Examples
Physiological	Food, clothing, shelter
Security	Safety from Danger
Belongingness	Love, Acceptance
Esteem	Respect, Approval
Cognitive	Knowledge, Exploration
Aestheticism	Appreciation of Beauty, Art
Self-Actualization	To achieve one's potential, finding success
Self-Transcendence	To move beyond the self, to reach a higher level of thinking/being

Where Lasswell's values define the character of a society, a modified form of Maslow's Hierarchy of Needs identifies important goals which societies pursue. Maslow's hierarchy is in Table 3. The addition of self-transcendence to Maslow's hierarchy can be traced to the work of Viktor Frankl, reflecting a desire that true meaning for humanity cannot be found just within individuals, but moving beyond limited understandings of the individual towards new perspectives.²⁶⁶

The purpose of introducing Lasswell's values and Maslow's hierarchy is to *identify the average characteristics of decision making bodies that are likely to lead a society towards one type of future rather than another*. While all societies at all times have elements of these values and goals, specific values and goals are likely to be predominant. The prevalence of specific values and goals, rather than others, is likely to propel that particular society down a particular type of future.

Table 4.5 associates values and goals with the Four futures framework. Each future is associated with dominant and recessive values. Primary goals/focus of elites

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²⁶⁶ Viktor Frankl, Man's Search for Meaning: An Introduction to Logotherapy, 4th ed., (Boston, MA: Beacon Press, 1992): 115.

occupying decision making institutions are identified using Maslow's hierarchy. Finally, an explanation is included to justify the labeling.

Adding values and goals to the four futures frameworks creates a unique opportunity to assess the underlying thought processes that may be driving society's decision making processes. Identifying the values and goals of a society is certainly a haphazard endeavor, but the reward is that anticipating large changes within trends does not need to be merely based on fluctuations in material concepts such as technology, but ideological processes can be included as well.

The Mānoa School helps provide a foundational framework to anticipate how the nexus of globalization, economic inequality, and political stability may affect future societies. Chapters 2 and 3 attempt to use current knowledge to understand how these variables have interacted with each other in the past and present. The next section introduces emerging issues that may completely reshape the environment, creating new events that may affect humanity's future.

**Table 4.5: Applying Lasswell's Values and Maslow's Hierarchy
to the Four Futures Framework**

	Dominant Values	Highest Achievable Goal	Justification/Description of Social Zeitgeist
Continued Growth	Wealth, Skill, Power	Cognitive	<ul style="list-style-type: none"> • Political elites use skills to pursue wealth and maintain current power structures. • Goals are oriented towards the pursuit of knowledge, but sources of knowledge that reinforce their grip on power. • These preoccupations ensure a transcendent perspective is never reached.
Collapse	Power, Wealth, lacking in Rectitude, Respect.	Security/ Survival	<ul style="list-style-type: none"> • Elites are focused on the pursuit of power and wealth, while concurrently lacking in moral character or respect for others. • These preoccupations reduce the ability of elites to respond to sources of crisis, and collapse ensues.
Discipline	Rectitude, Respect, Power	Esteem	<ul style="list-style-type: none"> • Elites are engrossed with moral character and respect for others. • Institutions are willing to use coercive powers to shape society towards a path believed to reinforce security and esteem.
Transformative	Enlightenment, Skill, Rectitude, Respect	Self-Transcendence	<ul style="list-style-type: none"> • Enlightenment and skill help a society direct knowledge to create profound technological advancements. • Rectitude and self-respect encourage society's elites to care about people beyond their inner core of supporters. • These values allow society to pursue transcendent goals that transform the foundations of society.

Section 2: Emerging Issues affecting Globalization, Inequality, and Political Stability

In chapter one, a literature review analyzed several explanations for globalization, inequality, and political stability (GIP) trends. Chapters 2 and 3 used several quantitative models to measure the relationships between the GIP trends, as well as other additional variables. This section discusses four critical forces that are shifting the underlying environment in which these trends operate. The most important is the all-encompassing ideology of scarcity, and its pervasiveness in affecting perceptions in economics, and indeed, of what is often considered possible. This discussion of scarcity will first highlight its definition, its significance in economic thought, and the more recent counterrevolution on scarcity ideology that has been spurred in anthropology and sociology.

Moving beyond theoretical perceptions of scarcity, several direct challenges to the perceived reality of scarcity are discussed. The first challenge is the digital revolution, which has slowly eroded the impact of scarcity in the distribution of ideas. Second is the emerging issue of 3D printing, which is increasingly becoming a threat to the scarcity of material objects. Finally is the automation revolution, which threatens scarcity of labor and work. The impact these forces have on affecting GIP are directly related to the dominant values and goals that shape society.

Seen in absolute terms, the world is defined by scarcity. There are limits to water and other resources. If societies exploit resources too far, they become depleted and social problems arise. As a result, scarcity is a limiting doctrine that restricts the opportunities and possibilities of a society, especially in scarcity's ability to affect human thinking, most especially in economics. Indeed, one of the most common definitions of economic thought is from Lionel Robbins, where economics is "the science which studies human behavior as a relationship between ends and scarce means which have alternative uses."²⁶⁷

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²⁶⁷ Lionel Robbins, *Essay on the Nature and Significance of Economic Science* (1932): p. 15, as quoted in Roger E. Backhouse and Steven G. Medema, "Retrospectives: On the Definition of Economics," *Journal of Economics Perspectives* 23 no. 1 (2009): 225.

Within economics there are two classical interpretations of scarcity: absolute scarcity, associated with Malthus, and relative scarcity as associated with Robbins.²⁶⁸ When viewed in absolute terms, scarcity is the relationship between social requirements and available quantities. As societies grow, eventually available quantities become less than requirements, and in this sense, scarcity is absolute. There is a finite amount of resources, which is eventually reached.²⁶⁹ Alternatively, in relative terms scarcity is defined by the alternative or substitutional role that resources play in fulfilling society's needs. Instead of focusing on absolute limits of resources, relative scarcity focuses instead on how societies choose to allocate limited resources towards their unlimited wants.²⁷⁰

Of the two perspectives, the Robbins focus on relative scarcity dominates most economic analysis.²⁷¹ Following from this perception of scarcity, all the things societies consume are divided into two types: economic and free goods.²⁷² Economic goods identify things that society's value, and are scarce in relation to demand, requiring work to produce them, such as iPhones, luxury purses, and food. Free goods, on the other hand, require no effort to obtain and are plentiful within society, such as air. Underlying most economics is the argument that most desirable goods are economic goods, and their scarcity in relation to their demand generates value. Without scarcity, there would be no economic value, and indeed, there would be no economics.²⁷³

Economic perceptions of scarcity have a single defining law: all societies in all places and in times are defined by their relationship with scarcity. By defining societies in terms of limits and efficient allocation of resources, scarcity *universalizes* the human

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²⁶⁸ Abel Daoud, "Robbins and Malthus on Scarcity, Abundance, and Sufficiency," *American Journal of Economics and Sociology* 69 no. 4 (2010): 1206-1229.

²⁶⁹ Daoud, 2010, 1210.

²⁷⁰ Daoud, 2010, 1213.

²⁷¹ Practically every introductory textbook on economics begins by introducing the Robbins definition: "Economics is the study of the use of scarce resources which have alternative uses," in Thomas Sowell, Basic Economics: A Common Sense Guide to the Economy 4th ed. (New York: Basic Books, 2011): 3. See also the most influential introductory textbook in economics, Paul Samuelson and William Nordhaus, Economics 16th ed., (New York: McGraw-Hill, 1998): 4. For modern defense of the Robbins definition, see Roger E. Backhouse and Steve G. Medema, "Defining Economics: The Long Road to Acceptance of the Robbins Definition." *Economica* 76 (2009): 805-820.

²⁷² Samuelson and Nordhaus, 1998, 5. Specific definitions of free and economic goods are accessed August 14, 2013 at <http://www.businessdictionary.com/definition/free-good.html>, and <http://www.businessdictionary.com/definition/economic-goods.html>,

²⁷³ Samuelson and Nordhaus, 1998, 5.

experience. All societies are analyzed the same way. All people, rich or poor, are defined by the same universal problem: how to allocate scarce resources.²⁷⁴

Modern economics responds to the problem of distribution in a universal way: while society is limited by its access to resources, the development and evolution of new technologies and by substituting one resource for another, the problems that arise due to scarcity can be managed.²⁷⁵ For example, the Malthusian problem of food scarcity, of absolute limits, is overcome by the usage of new technologies to create more food with less land, distributed before the food spoils by an increasingly refined transportation infrastructure. The condition of scarcity never goes away, but the development of new technologies ameliorates scarcity's affects, allowing for scarcity's problems to be dealt with, assuming at least that the society is capable of employing technology as a tool to solve problems.

The primary problem with the mainstream economics interpretation is how scarcity is universalized and naturalized to all societies, in all places, and all times. By universalizing scarcity, scare campaigns and fear mongering have become an easy way to frighten societies towards the pursuit of certain policies.²⁷⁶

Critiques on the scarcity paradigm have emanated from two areas, first, from economics itself, and alternatively from anthropology and other critical perspectives. Initial attacks on the scarcity paradigm identify three types of economies, each with their own types of problems. There are economies of scarcity, abundance, and sufficiency (SAS paradigm).²⁷⁷ Instead of seeing scarcity as a universal constant, the SAS paradigm identifies societies by their relative access to goods and services. Economies of scarcity are those societies marked by high levels of poverty and little access to production. Economies of sufficiency are defined by having enough material goods to get by; they are

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²⁷⁴ Brendan Sheehan, The Economics of Abundance: Affluent Consumption and the Global Economy (Edward Elgar: Cheltenham, UK: 2010): 3. Also see Mark H. Maier and Julie A. Nelson, Introducing Economics: A Critical Guide for Teaching (Armonk, NY: M.E Sharpe, Inc., 2007): 37.

²⁷⁵ Fred Luks, "Deconstructing Economic Interpretations of Sustainable Development: Limits, Scarcity, and Abundance," in Lyla Mehta ed., The Limits to Scarcity: Contesting the Politics of Allocation (Earthscan: Washington, D.C., 2010): 97.

²⁷⁶ Michael N. Dobkowski and Isidor Wallimann, eds, The Coming Age of Scarcity: Preventing Mass Death and Genocide in the Twenty-First Century (Syracuse University Press, Syracuse, 1998).

²⁷⁷ Lyla Mehta, "The Scare: Naturalization and Politicization of Scarcity," in Lyla Mehta ed., 2010, 13-30.

²⁷⁷ Economics of abundance was identified as early as Stuart Chase, The Economy of Abundance (New York: The MacMillan Company, 1934), and the SAS paradigm as a whole was summarized in Sheehan, 2010.

not poor, but neither are they rich. Residents of this economy are better off materially than those in economies of scarcity, but still have significantly less access to material goods marked by the economy of abundance. From the SAS perspective, over 2/3rds of the world are mired in either an economy of scarcity or sufficiency. The final third of the world economy is marked by economies of abundance, where material goods are plentiful and relatively easy to acquire in comparison to economies of scarcity or sufficiency. Overall, the SAS paradigm identifies abundance as the relatively greater access of goods compared to other economies, whereas mainstream economics focuses on the restrictions scarce resources create in relation to societies wants and demands. In short, the economy of abundance is the advantageous relative position of societies of plenty compared to societies marked by poverty and limitations.²⁷⁸

The benefits of the SAS paradigm is that rather than seeing scarcity as creating a universal environment and universal problems, instead economies are broken into three distinct categories, each with their own grounding assumptions and their own set of consequential problems. Economics becomes problematized, requiring different solutions for different societies. The universal problematique of the scarce allocation of resources resolved by continued investment in technology fades into a recognition that scarcity, or a lack of resources, may not be the primary cause of social problems such as access to food, water, or other resources. Rather, the causes of these problems are specific to the type of economy they operate within.

However, the concept of abundance has been the subject of significant criticism. In his hallmark critique, Xenos shows how the potential of an abundance economy is false.²⁷⁹ Abundance promises an environment where production has reached a level where most needs and desires are satisfied. The problem is that as more goods are produced in a society that satisfies wants, new “needs” and “wants” are produced, in a constant, positive feedback loop. As society produces goods, wants are satisfied, generating new wants, leading to new production, and more wants, such that no matter how abundant goods are within a society, unsatisfied wants exist, reinforcing the

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²⁷⁸ Sheehan, 2010, 2-3.

²⁷⁹ N. Xenos, Scarcity and Modernity (New York: Routledge, 1989).

perpetual dominance of scarcity.²⁸⁰ Introducing the concept of abundance, while adding to the depths of economic thought, does nothing to remove the significance of scarcity as the fundamental “reality” in economics.

A second line of attack against mainstream economic interpretations of scarcity comes from anthropology, and ecological economics.²⁸¹ Applying sociological theories of constructivism to the concept of scarcity, a distinction is made between the empirical measurement of scarcity and social perceptions of scarcity.²⁸² While there may be limits to certain resources, the significance of those limits depends on social perceptions. For example, while oil is considered an important resource to fuel increasing economic growth; oil is only significant because an economic system was built around it. Yet, most ecological economic and social constructivist perceptions of scarcity frequently devolve into a Malthusian perception of absolute scarcity: limits to resources exist, and instead of pursuing growth, societies should pursue sustainability.²⁸³ Consequently, constructivist perceptions of scarcity privilege a normative divergence of the significance and impact of scarcity, but they do not question scarcity’s existence and importance.

Challenges to the ideological dominance of scarcity, while providing alternative perceptions and intriguing concepts, predominantly accept that scarcity is real and necessitate choices regarding the distribution of resources within a society.²⁸⁴ Political fights over Medicare, social security, and redistribution through taxation are constant reminders that scarcity has deeply infiltrated the political environment, especially in Western economies, such that alternative perceptions have little sway in influencing government policy. However, technological change, as predicted by economics, is having a dramatic change on scarcity. Yet rather than ameliorating or reducing the impact of scarcity, technology is creating a path towards a possible post-scarcity economic environment.

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²⁸⁰ N. Xenos, 1989.

²⁸¹ John J. Graafland, “Scarcity,” in Jan Peil and Irene van Staveren, eds., Handbook of Economics and Ethics (Northampton, MA: Edward Elgar, 2009): 471.

²⁸² Luks, 2009, 99.

²⁸³ Luks, 2009, 98.

²⁸⁴ A very useful summary of scarcity in economics, alternative perceptions of scarcity, and the critiques inability to overcome scarcity is Costas Panayotakis, “Theorizing Scarcity: Neoclassical Economics and its Critics,” *Review of Radical Political Economics* 20 no. 10 (2012): 1-18.

Scarcity identifies unlimited wants as creating a demand for economic goods. Economic goods are defined as items of value. Two types of economic goods can be identified: ideas and material constructions. Both require time and resources to construct them. Technological advances that remove the previously necessary time and resource requirements transform economic goods into free goods. The following section will discuss how three trends are creating the opportunity for many economic goods to be transformed into free goods. The digital revolution is removing restrictions to the free flowing of ideas; where previously paper or other material products were required to exchange ideas on a massive scale, now digital constructions that can be reproduced at a moment's notice have become dominant. Second, the 3d printing revolution threatens the scarcity of material constructions by allowing anyone to construct numerous material objects automatically in their own homes. Finally, the increasing pre-eminence of automation is jeopardizing the scarcity of work, changing the relationship between labor and the economy.

These revolutions in digitization, 3d printing, and automation cannot by themselves create a post-scarcity economy. How they impact society depends on the social, cultural, and legal institutions these technologies exist within. Understanding the potential impacts of these revolutions on the economy is important as the evolution of the economy will have a direct impact on future trends in globalization, inequality, and political stability.

The digital revolution identifies the evolution in computer technology where information can be turned into ones and zeros, facilitating greater distribution and storage of ideas and data.²⁸⁵ Digitized ideas enter a space that escapes scarcity and enters a true economic realm of abundance: digitized items can be copied and spread numerous times, all without consuming real resources.²⁸⁶ While time and resources are required to create a digitized item, once digitized, scarcity can only be maintained through some form of legal protection, such as copyright or Digital Rights Management (DRM).

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²⁸⁵ Taylor Boas and Thad Dunning, "Classic questions, New Context: Development in an Era of Bits and Bytes," *Studies in Comparative International Development* 40 no. 2 (2005): 3-8.

²⁸⁶ Erik Brynjolfsson and Andrew McAfee, "Research Brief: Race Against the Machine: How the Digital Revolution is Accelerating Innovation, Driving Productivity, and Irreversibly Transforming Employment and the Economy." *The MIT Center for Digital Business* January (2012): 1-8. Accessed August 4, 2013 at http://ebusiness.mit.edu/research/Briefs/Brynjolfsson_McAfee_Race_Against_the_Machine.pdf.

The digital revolution is changing the economic landscape by removing barriers to flows of information. Where information previously relied on books, letters, and other material products in the “analog economy”, which required time to be distributed between people, the digital revolution allows instant distribution without the material requirements. This phenomenon is destroying traditional monopolistic markets, making information increasingly difficult to control and manipulate for the financial gain of a relative minority.²⁸⁷ Digitization also has a downward effect on costs, pushing marginal costs of production and distribution towards zero. In effect, scarcity as a dominating theme of the economy is being eroded in the digital environment, allowing for the possibility of a post-scarcity economy dominated by the availability of free goods.

However, the desire to maintain control over the digital economy by industry elites leads to attempts to artificially impose scarcity within the digital environment through copyright and digital rights management. Attempts to enforce copyright are difficult, as pirating is exceptionally easy due to the nature of digital goods. Additionally, as content producers attempt to enforce copyright through legal or technical means, their profits are reduced as finances are increasingly invested in copyright enforcement. Indeed, copyright enforcement in a digital environment has a limited and increasingly inadequate future.²⁸⁸

The ability to pirate software regardless of the legal or technological attempts at reinforcing scarcity truly makes the digital realm one of abundance. Studies have even shown that paradoxically, DRM increases the pirating of copyrighted materials.²⁸⁹ In the digital realm, people have access to data and ideas, and have a choice of whether or not they actually pay for the ideas, often depending on whether or not pirating is more convenient than purchasing. Hence, regardless of the actual cost of creation, once digitized, the cost of copying and distributing digital goods approaches zero. The catastrophic failure that copyright has been in the digital realm has even led many to question the overall system of patents and copyright protection pursued in the United

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²⁸⁷ Benjamin J. Bates, “Transforming Information Markets: Implications of the Digital Network Economy,” *Proceedings of the American Society for Information Science and Technology* 45 no. 1 (2008): 11- 22.

²⁸⁸ Benjamin J. Bates, “Value and Digital Rights Management: A Social Economics Approach,” *Journal of Media Economics* 21 no. 1 (2008): 53-77.

²⁸⁹ Dinah Vernik, Devavrat Purohit, and Preyas Desai, “Music Downloads and the Flip Side of Digital Rights Management,” *Marketing Science* 30 no. 6 (2011): 1011-1027.

States, with many arguing the whole concept is unrecoverable and needs to be done away with due to its significant detriment to innovation.²⁹⁰

The slow, continual removal of scarcity in the digital realm has numerous potential impacts on globalization, inequality, and political stability. While certainly the digital realm has a dynamic that trends towards the free availability of ideas and information, rights holders and others wishing to control the flow of information will likely continue to attempt to restrict the digital economy's natural drift. Hence, the digital revolution's impact will significantly depend on the cat and mouse game between rights holders, pirates, consumers, and government.

Assuming the digital revolution trends towards the free availability of information, several consequences are likely. For globalization, global networks distributing information and ideas are likely to increase in scope, ensuring anyone with a computer can access the entirety of human knowledge. As far as globalization measures the complexity and depth of networks of information, the digital revolution unfettered by copyright is likely to lead to a massive expansion. Similarly, the free access of information may reduce inequality, as access to information provides key skills and knowledge to allow people to better themselves by finding new jobs and better sources of income. The impact of the digital revolution on political stability, however, is more ambiguous. On one hand, free access to information could potentially lead to greater transparency in government, increasingly positive perceptions of government institutions. Alternatively, the free access of information allows greater access to knowledge conducive to violence, training people how to fight and build weapons, facilitate the organization of revolutions, and perhaps even topple governments. Hence, the relationship between political stability and the digital revolution will hinge on whether or not the government is accepted by the population that is governed.

Alternatively, if the digital revolution is contained by rights holders, it is likely to have a much more muted affect. Increases in globalization are restricted as rights holders attempt to maintain a monopoly over flows of information. Connectivity between people will be increased, but paling in comparison to a restriction free digital revolution. A

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²⁹⁰ Michele Boldrin and David K. Levine, "The Case Against Patents," *Working Paper 2-12-035A*, Federal Reserve Bank of St. Louis (2012). Accessed on August 4, 2013 at <http://research.stlouisfed.org/wp/2012/2012-035.pdf>.

regulated and restricted digital revolution is also likely to reinforce existing trends in inequality. Scarcity at its core is about the inability of people to attain all their wants, and a restricted digital revolution keeps that system in place, restricting people's access to ideas and information and reproducing inequality. The muted digital revolutions effect on political stability is likely to be muted. When ideas and information are controlled, people have a much more difficult time organizing and learning about the society they live in, and whatever social change that occurs is much slower compared to an unfettered digital revolution.

Where the digital revolution provides an opportunity for the wholesale evolution in the availability and distribution of information and ideas, 3d printing creates a similar potential in the manufacture of physical objects. From kidneys, to drugs, guns, food, guns, and simple toys, 3D printing has the potential to completely reshape the economic landscape as currently known.²⁹¹ Currently, the consumer market is dominated by 3D printers that cost up to \$2000, and can produce anything made out of basic plastics in as large of an area as 1 cubic foot. More expensive industrial 3d Printers, costing over \$10,000, can create objects out of steel, and flesh composites for human organs. While the potential is enormous, the process is relatively simple. After acquiring a digital file outlining the structure of the object (usually CAD), the machine creates the final product layer by layer. If someone wants to produce a 3D printed version of an object yet does not have a CAD file, then one can use a 3D scanner to create a CAD file of any object they can scan.²⁹² As the technology evolves, the ability of people to create, in their own homes, many things from clothes to musical instruments becomes a reality.

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²⁹¹ For kidneys and drugs, see Katharine Sanderson, "3D Printing: The Desktop Drugstore," *BBC Online*, 26 September 2012. Accessed August 4, 2013 at: <http://www.bbc.com/future/story/20120926-desktop-drugstores>. For 3D printers and guns, see John Paul Titlow, "How 3D Printing is Inflaming the Gun Control Debate," *ReadWriteWeb*, 29 August 2012, Accessed August 4, 2013 at <http://www.readwriteweb.com/archives/how-3d-printing-is-inflaming-the-gun-control-debate.php>. For food, see Zoe Fox, "3D Printed Meats May Soon Be On The Menu," *Mashable.com*, 15 August 2012. Accessed August 4, 2013, at <http://mashable.com/2012/08/15/3d-printed-meats-may-soon-be-on-the-menu/>.

²⁹² Peter Walters and Katherine Davies, "3D Printing for Artists: Research and Creative Practice," *Rapport: Journal of the Norwegian Print Association* 1 (2010): 12-15.

The potential of 3D printing is, like the digital revolution, limited by the legal system and copyright.²⁹³ 3D printing is an inherently disruptive technology, and by providing individuals a feasible way to produce the goods that they previously acquired through complicated economic networks means numerous stakeholders vested in the old distribution and production networks are likely to use their influence to stymie or otherwise shape 3D printing so that it is not a threat. Recently, American patent 8286236 was filed which places DRM technologies in 3d printers, potentially ensuring that whatever is produced from a 3D printer leads to royalties to the original manufacturers.²⁹⁴

Moving beyond patents, the economic ecosystem of 3D printers is fraught with friction. The core dilemma is based around how to acquire the CAD files to produce material objects. On one side are companies such as 3D SYSTEMS, which utilizes an economic system founded on scarcity. CAD files can be uploaded, sold, and purchased at their website.²⁹⁵ CAD files become a stream of revenue that requires fees be paid for "ideas," i.e., CAD files. Alternatively, sites such as thepiratebay.org²⁹⁶ have created repository websites where scarcity is discarded in favor of an abundance economic model; CAD files for 3D printers can be stored and acquired for free, ensuring equal access to all. The tension between these two business models are thick, creating future likely conflicts around copyright, especially if the copyrighted, "for-sale" CAD files ever end up on the free-to-access alternatives.²⁹⁷

3D printers take raw materials of numerous types, and turn them into desired goods. While the raw materials are "scarce" in the sense that they can be consumed, they

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²⁹³ Paul Marks, "Patent Could Shackle 3D Printers with DRM," *newscientist.com* 16 October 2012. Accessed on August 4, 2013, at <http://www.newscientist.com/blogs/onepercent/2012/10/patent-could-shackle-3d-printers-drm.html>. See also Michael Weinberg, "It Will Be Awesome If They Don't Screw It Up: 3D Printing, Intellectual Property, and the Fight Over the Next Great Disruptive Technology," *Public Knowledge*, (2010). Accessed August 4, 2013 at <http://publicknowledge.org/it-will-be-awesome-if-they-dont-screw-it-up>.

²⁹⁴ Paul Marks, 2012, 1. See also Enigmax, "3D Printer DRM Patent to Stop People Downloading a Car," blog post, 12 October 2012. Accessed August 3, 2013 at <http://torrentfreak.com/3d-printer-drm-patent-to-stop-people-downloading-a-car-121012>.

²⁹⁵ <http://www.the3dstudio.com/>

²⁹⁶ The Pirate Bay announced the new CAD repository, accessed August 20, 2013 at <http://thepiratebay.se/blog/203>.

²⁹⁷ For a visual display of the tension between open source and closed source platforms of 3D printing, watch this interview between the Founders of 3D Systems and Makerbot Industries, accessed August 14, 2013 at http://www.youtube.com/watch?v=S5POu62l_Wo.

are extremely plentiful and cheap.²⁹⁸ The value added comes from the 3D printer turning the raw materials into desired goods. As these printers come down in price and achieve greater saturation into the global economy, depending on how the copyright situation is worked out, numerous economic goods may find their way into becoming free goods. Economies of scale are likely to heavily reduce the material cost of any good; the real value comes from obtaining the “idea,” the CAD file, which turns the raw materials into desired goods. If the CAD files are free and easily available, the price of numerous commodities is likely to collapse significantly, conceivably approaching zero. Alternatively, scarcity may be imposed through legal or technological DRM, inflating the costs and maintaining an economy of economic goods.

The Digital Revolution is often characterized as reflecting the meme, “Ideas want to be free.” Alternatively, the 3D printing revolution extends the meme by arguing, “Atoms want to be free.”²⁹⁹ The real question, as with the Digital Revolution, is how will copyright owners and other economic elites handle the rise of a new disruptive technology? Will elites use their influence in the political system to decelerate change and maintain control over 3D printing, or is the technology so revolutionary, and control technologies so easy to subvert, that 3D printing impacts the economy with the same potential that the Digital Revolution can: by dramatically increasing access to ideas and goods through a revolutionary reduction in the cost of material goods.. Together, both the digital revolution and 3D printing have the potential to take an economy of economic goods, which create value through scarcity, to free goods, which are widely available to most everyone and lose any scarcity-based value.

The impact of 3D printing on globalization, inequality, and political stability depends on the level of influence elites have in subverting the revolutionary possibilities of 3D printing. If 3D printing has a logic that resists subversion, through sites like The Pirate Bay, which have consistently avoided accountability towards copyright laws, then 3D printing has the potential to create dramatic affects. For globalization, widespread availability of 3D printing could dramatically reduce trans-oceanic shipments; where

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²⁹⁸ A recent invention turns many common plastics, such as milk bottles, into filament usable in 3D printing. See <http://singularityhub.com/2013/02/04/turn-your-plastic-recyclables-into-3d-printing-spools-with-filabot/>.

²⁹⁹ Johan Soderberg and Adel Daoud, “Atoms Want to Be Free Too! Expanding the Critique of Intellectual Property to Physical Goods,” *triple* 10 no. 1 (2012): 66-76.

once people imported goods, they now can produce them at home. Digital networks that connect 3d printer users would become increasingly entrenched, and relationships fostered over a discussion of ideas, but actual physical networks, shipping networks, are likely to be reduced. Inequality could be dramatically reduced by 3d printers, as their increasing prevalence in more and more societies means that access to numerous types of goods becomes democratized; i.e., everyone can have access to anything 3D printers can produce. The most stark affect 3D printers may have is on political stability. 3D printers create the potential where countries may become flooded with cheap, powerful, and deadly weapons, such as guns or knives.³⁰⁰ Depending on whether or not a government has the support of the governed, and whether or not a government can control the dramatic flow of newly created weapons will determine the impact of 3D printing on political stability.

Alternatively, if the revolutionary potential of 3D printers is stymied by copyright and DRM, then 3D printers could easily become a tool used by elites to entrench the current scarcity-based economy. If every product produced by a 3D printer requires royalties, people may find it cheaper to buy goods from Walmart and other entrenched businesses. Global trade networks would be unaffected by 3D printers as typical economies of scale, where millions of cheap goods are produced in large factors, becomes unaffected due to the artificial inflation of the cost of production with 3D printers. Inequality too could also be unaffected, as 3D printers would be unable to reduce the cost of goods enough to ensure most material wants are satisfied. Finally, politicians would have nothing to fear as all 3D printers would undoubtedly be restricted in the types of weapons they could produce, ensuring that only governments had the resources and capability to produce weapons of destruction.³⁰¹

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³⁰⁰ Recent advances in creating rifles and guns from 3D printing have been successful. See Robert Bechkusen, "New 3-D Printed Rifle Magazine Lets You Fire Hundreds of Rounds," *Wired Magazine* February 8, 2013. Available online at <http://www.wired.com/dangerroom/2013/02/printed-magazine/>. See also Cyrus Farivar, "'Download This Gun': 3D-Printed Semi Automatic Fires Over 600 Rounds," *Arts Technica* Mar 1, 2013. Accessed August 4, 2013 at <http://www.wired.com/dangerroom/2013/02/printed-magazine/>.

³⁰¹ Recently, a college student from Texas raised \$20,000 to use 3D printers to build guns. When the 3D printer company found out about the project, they revoked the 3D printer. See Kimber Streams, "3D Printed Gun Project Halts after Stratasys Confiscates Rented Printer," *theverge.com* 1 October 2012. Accessed August 3, 2013 at <http://www.theverge.com/2012/10/1/3439496/wiki-weapon-project-defense-distributed-stratasys>.

Where the digital revolution attacks scarcity of ideas, and the 3D printing revolution attacks scarcity of material goods, the automation revolution is a direct threat to the scarcity of work itself. Underlying the potentials of both the digital revolution and 3D printers are the power of computers to change the economy on which people live and work within. However, the whole scale automation of entire economies is quickly encroaching and will have groundbreaking consequences.

The economic study of robotics and automation on the economy goes back to at least the 1970s. Early research focused on efficiency gains and feasibility of automation. Government estimates were that 80% of 1974 U.S. manufacturing could be automated, accruing significant gains in product safety and quality.³⁰² More recent econometric work argues that robotics is likely to become a potent source of endogenous economic growth, rapidly substituting for low and medium skilled labor.³⁰³

Few people question the likely positive impact of automation and robotics on economic growth, but the real question lies in automation's impact on unemployment. The likely truth is that nobody knows, and arguments for increasing and reducing unemployment have been made.³⁰⁴ Automation could cause serious unemployment as businesses turn to robots for repetitive jobs, displacing large quantities of workers. Alternatively, others argue that automation is a type of creative destruction, where while older jobs are destroyed, new opportunities for human ingenuity and creativity will arise providing new prospects for employment.

While it may be impossible to know the full impact automation will have on society in ten or more years, two trends in particular are likely to have a fairly immediate impact. The first is the development and increasingly widespread usage of the IBM's Watson Supercomputer. The other is the quick advance in self-driving cars, which have been legalized in three states.

On February 14, 2011, the Watson Supercomputer was introduced to most American's in celebratory fashion. Over the course of two rounds of *Jeopardy*, Watson

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³⁰² Alexander F. Brewer et al., "Computer-Based Automation of Discrete Product Manufacture: a Preliminary Discussion of Feasibility and Impact." *Defense Advanced Research Projects Agency*, Order no: 189-1 (1974). Available online at <http://www.rand.org/pubs/reports/2007/R1073.pdf>.

³⁰³ Erling Steigum, "Robotics and Growth," in Olivier de La Grandville, ed., Economic Growth and Development (United Kingdom: Emerald Group Publishing Limited, 2011): 543-555.

³⁰⁴ Patrick Marshall, "Artificial Intelligence: Can "smart" machines replace humans?" *CQ Researcher* 21 no. 16 (2011): 361-384.

would proceed to annihilate two previous champions.³⁰⁵ In 2011, Watson was the size of a small bedroom, but today is now about the size of a double-door fridge.³⁰⁶ Anticipated advances in technology expect Watson to fit into a laptop within 10 years, and perhaps before that be “cloud-capable,” and built within numerous smart phones and other portable devices.³⁰⁷ While getting smaller in size, Watson is becoming more intelligent, with a full medical education in Oncology expected to be finished by 2013. Once a star of a game show, Watson is now being trained to help doctors diagnose cancer patients, and in the future Watson will be trained for jobs in investment industries and help predict the weather. Few industries are outside of Watson’s potential, and in several years Watson 2.0 will be in numerous smartphones worldwide.³⁰⁸ Watson is not likely to displace doctors or financial analysts soon, but rather help them diagnose and assess patients or companies. Currently, Watson does not “think;” rather, data is inputted, questions are asked, and Watson provides answers. In the future, however, Watson is likely to move beyond these limitations.

In addition to Watson, another emerging trend is the rise of self-driving cars. Legal in Nevada, Florida, and California, autonomous cars are likely to have dramatic impacts on the shipping, taxi cab, and other industries.³⁰⁹ Currently, a human presence is required in the cars in case anything goes wrong, these restrictions are likely to be removed if autonomous cars are deemed safe. After refinement, taxi, freight, and public transportation industries are seen as highly susceptible to massive changes, as human

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³⁰⁵ Jon Gertner, “IBM’s Watson is Learning Its Way to Saving Lives,” *Fastcompany* 15 October 2012. Accessed August 4, 2013 at <http://www.fastcompany.com/3001739/ibms-watson-learning-its-way-saving-lives>.

³⁰⁶ Gertner, 2012.

³⁰⁷ Jason Dorrier, “IBM’s Watson Expands commercial Applications, Aims to go Mobile,” *singularityhub.com* 14 October 2012. Accessed August 4, 2013, at <http://singularityhub.com/2012/10/14/ibms-watson-jeopardy-champ-expands-commercial-applications-aims-to-go-mobile/>.

³⁰⁸ Sarah Frier, “IBM Envisions Watson as Supercharged Siri for Businesses,” *Bloomberg* 28 August 2012. Accessed August 4, 2013, at <http://www.bloomberg.com/news/2012-08-28/ibm-creating-pocket-sized-watson-in-16-billion-sales-push-tech.html>.

³⁰⁹ Joann Muller, “With Driverless Cars, Once Again It Is California Leading the Way,” *Forbes* 26 September 2012. Accessed August 4, 2013 at <http://www.forbes.com/sites/joannmuller/2012/09/26/with-driverless-cars-once-again-it-is-california-leading-the-way/>.

labor becomes replaced by autonomous vehicles.³¹⁰ The unemployment implications of this emerging issue have rarely, if ever, been studied.

Taking Watson and autonomous vehicles together, a significant potential for economic crisis due to unemployment exists. Automation requires society to ask, ‘what is the purpose of the economy?’ Between 3D printers creating material goods, Watson providing important insights into answering questions, and autonomous vehicles driving everyone around, opportunities for an economic system resembling the society of today are few. If society cannot transition towards a post-work, or a leisure/artistic economy, the social crisis caused by unemployment could be powerful enough to topple any government. Scarcity of work would be replaced by an abundance of automation, leaving little room for the typical small jobs that employ a vast majority of the population.

Anticipating the impacts of automation on globalization, inequality, and political stability depend on whether or not a transition to a post-work economy is successful. Assuming the post-work economy occurs, automation is likely to be a boon to increasing globalization. More goods will be produced, shipped, and consumed than ever before. Economic inequality may slowly fade in relevance as the majority of peoples wants are satisfied by products created by an army of autonomous workers. Humans would be able to focus on their individual or artistic pursuits, and politics would be focused on addressing the political and ideational struggles of the day without the weight of economic burdens wearing society down. If governments are able to manage a transition to a post-work economy, given the high level of automation and likely difficulties in employment, they are likely to experience a period of significant stability.

However, if a post-work economy due to abundant automation occurs, high levels of unemployment could ripple throughout societies. A lack of jobs leads to a lack of consumption, causing recessions or depressions as massive amounts of labor are left adrift. Globalization is reduced as there are fewer purchasers of goods. Economic inequality is likely to increase as those with wealth seek to insulate themselves from those without, but eventually without the engine of consumerism and consumption, even

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³¹⁰ Alex Forrest and Mustafa Konca, “Autonomous Cars and Society,” *Worcester Polytechnic Institute* Report IQP OVP 06B1, 1 May 2007. Accessed August 4, 2013 at. <http://www.wpi.edu/Pubs/E-project/Available/E-project-043007-205701/unrestricted/IQPOVP06B1.pdf>.

the wealthy are likely to be dragged down over time. High levels of unemployment are likely to lead to massive revolutions and instability in government.

Section 3: Assessing the Future of Emerging Issues

Futures methods assist the analyst by providing numerous tools to facilitate a future focused research program. The heuristic tools of the Mānoa School, and the significance of emerging issues provide useful tools in constructing futures scenarios. However, intuiting the impact of emerging issues is a difficult process, with little help being found in quantitative modeling. Instead, chapter 5 extracts stories and relationships found in science fiction to provide probable possibilities of how emerging issues could influence human society to become locked into one of the four Mānoa futures.

With the insights on the emerging issues extracted from science fiction, Chapter 6 uses an additional futures method, Trend Impact Analysis, to organize the thoughts, theories, and relationships of the previous 5 chapters into numerous events. Each event is organized under one of the Mānoa futures archetypes, and given a probability of occurring as well as a likely impact on either or all of the trend lines for globalization, inequality, and political stability. After constructing these events, a Monte Carlo analysis is run, identifying how the trend lines are affected by the events. From the stories and experiences discussed in Chapter 6, the dissertation concludes with potential policy implications and preferred scenarios in Chapter 7. In addition, Chapter 7 discusses the overall research program identified by this dissertation, and its significance in encouraging the usage of qualitative and quantitative analysis in a constant effort to visualize potential futures.

Chapter 5: Aestheticism and Futures Analysis

The future already exists in the images, hopes, and dreams of societies. Often, these images are constructed into works of film and literature that create a window into worlds of possibilities. Unlike statistical models and trend analysis, literature and cinema, especially science fiction, create breathing, living worlds of the human milieu. Finding fictional stories that reflect the quantitative and futures analysis of the previous chapters creates opportunities to understand the potentials, values, and contradictions that drive and determine human behavior in future scenarios.

In the social sciences, aesthetic methodologies have increasingly been used to apply the analysis of artistic works to society.³¹¹ The first section begins by situating this chapter in reference to chapters 1 and 2, asking how positivist, quantitative political science, and aesthetic, post-positivist approaches can “speak” to each other. Section two discusses the aesthetic subject and its implications for futures studies. Section three introduces the role of science fiction as a particular type of art exceedingly well suited for futures analysis. Section four concludes by applying several fictional works to the four futures framework of chapter 4, particularly to expand on the potential implications of emerging issues on globalization, inequality, and political stability.

The bridge to the aesthetic analysis comes with the emerging issues. First, the emerging issues, because they are emerging, are difficult to quantify, and as a result, are difficult to place in a quantitative model. The best one can do with the emerging issues is to create probabilistic events on their potential impacts. But to imagine what impact the emerging issues will have on globalization, inequality, and political stability, where does one look? A possible response is through aesthetic analysis of science fiction. Science fiction provides a road to create speculative possibilities for the impact of emerging issues. Since quantitative modeling is unable to grasp the world of speculative possibility, science fiction provides a useful alternative.

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³¹¹ A recent book on aesthetic methodology is Michael J. Shapiro, Studies in Trans-Disciplinary Method: After the Aesthetic Turn (New York: Routledge, 2012).

Section 1: Positivism and Aesthetics – A Mutually Beneficial Relationship

What is knowledge, and how is it generated? These seemingly simple questions have been the subject of numerous discussions and disagreements. This section contributes to the debate by summarizing the positivist theory underlying chapters two and three, highlighting the types of questions this type of theory is suited for. Subsequently, several aspects of aesthetics are introduced to ask different questions that contribute to an additional understanding of the world. The purpose of this section is to demonstrate that by asking different questions, positivism and aesthetics combine to create visions of the world that are empirically supported, yet breathable and organic; living concepts that create an enhanced understanding of the concepts being analyzed.

In chapters two and three, several quantitative methods are used in order to extrapolate and clarify relationships between variables in the measurable world. By using quantitative econometric modeling, chapters two and three are typical examples of positivist, structural analysis, creating models that reflect the real (measured) world to compare phenomena.³¹² By using data to test various theories regarding globalization, inequality, and political stability, these chapters contribute to a positivistic discipline where “science is an epistemically privileged discourse through which we can gain a progressively truer understanding of the world.”³¹³ Data is used to create models that attempt to identify the structure and recreate real world phenomena (networks, the global system, economies) into a language and model that attempts to mimic, or copy the real world. The purpose of structural modeling is to form a clearer understanding of how certain variables relate to each other, allowing for an understanding of what the world “looks like” in terms of those variables, and to anticipate how those variables are likely to change in the future.

Positivism attempts to recreate the real world through mathematical models that can be tested and analyzed. Whatever difference exists between the model and the real

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³¹² Vincent Descombes, *Modern French Philosophy*, (New York: Cambridge University Press, 1980): 85-86. The “real” world may be hyperbole, as one may wonder and pursue questions trying to understand the conditions present that even allow social phenomenon to be quantitatively measured. Furthermore, the accuracy of the measurements should never be taken for granted. Regardless, the main point here is that the world can be measured, however imperfectly, and knowledge can be gained from those measurements.

³¹³ Alexander Wendt, *Social Theory of International Politics* (Cambridge: Cambridge University Press, 1999): 38.

world is the distinction between explained and unexplained variance, where by augmenting the model with additional variables that are theoretically relevant, the explained variance should increase and the unexplained variance should decrease. For many positivists, unexplained variance is where the real heart of positivist analysis exists, as it identifies unknown forces affecting social processes, which can be reduced as more data is acquired and more theories tested.

In addition, positivism relies on a causal theory of reference. In any enterprise of language, the meaning of “meaning” can become lost: how does one know that a chair actually refers to a piece of wood with four legs that is meant for sitting? If an academic inquiry cannot rest upon some common understanding of the language used for making an argument, then making an argument itself becomes pointless as comprehension is lost. In response, positivists have gambled on a theory of reference that they believe provide them with a tool to increase the comprehensibility of language. – the causal theory of reference.³¹⁴

The causal theory consists of two stages. The meaning of a word first occurs in a “baptism,” where a new word is generated to identify some new object, and to speak about that new object with others.³¹⁵ With the real world object being connected to a human-generated word, meaning is passed from human to human, from one generation to the next, representing a process of “imitating and social learning.”³¹⁶ However, meaning itself is not created purely through society, but rather as a constant dialogue between humans and the environment in which they exist:

Mind and language help determine meaning, but meaning is also regulated by a mind-independent, extra-linguistic world.³¹⁷

Fundamental to the causal theory are several important concepts. The first is that the world itself consists of “natural kinds,” basic elements that exist within the world, and

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³¹⁴ The following discussion is based on Wendt, 1999, 56-59. The causal theory of reference was first established by Richard Boyd, “Metaphor and Theory Change,” in A. Ortony, ed., Metaphor and Thought (Cambridge: Cambridge University Press, 1979): 356-408, Saul Kripke, “Identity and Necessity,” in M. Munitz, ed., Identity and Individuation (New York: New York University Press, 1971): 135-164, Hilary Putnam, Mind, Language, and Reality (Cambridge, Cambridge University Press, 1978).

³¹⁵ Wendt, 1999, 57.

³¹⁶ Wendt, 1999, 57.

³¹⁷ Wendt, 1999, 57.

are not a product of human creation or social convention.³¹⁸ “Natural kinds” create real world limitations upon human behavior. To understand how the world functions, humans must generate theories and knowledge that conform to the “natural kinds,” a project which has come to be known as science. For example, if someone becomes sick from the flu, as caused by an organism known as influenza, the person is not sick due to some social convention, linguistic contortion, or magical voodoo. Rather, the person is sick due to a small virus, which once identified, can be fought against. Regardless of the name given to the entity that causes the flu, the virus would cause people to become sick.

The final element of positivism grapples with the truth. If the philosopher asks a positivist, “What is truth?” the positivist will reply, “I do not know, but based upon my previous knowledge and research, I am likely to believe that my *mature* theory is the truth, at least until I find a better theory.”³¹⁹ For the positivist, there is no absolute truth. However, there is a process to ascertain which theory is truer than another. First, a theory is more ‘true’ than another theory if it conforms better towards the “causal structure of the world,” i.e., that it best conforms to knowledge of “natural kinds.” Unfortunately, there is no foundation of “natural kinds,” in which to test one theory against another. As a result, theories must be constantly tested *against each other* to best correspond to the positivist’s observations of the world. The positivist can never know if their claims are completely true, as in the future new knowledge may be developed that proves their theory incorrect, but based upon their current knowledge and their current observations, a theory can be deemed as “approximately” true, all the while knowing that at some future date, some new experiment may prove their “truth” to be false.³²⁰

Aesthetics reflect a different attempt to create knowledge, not so much the opposite of positivism, but rather its *counterpart*. If the positivist attempts to replicate society in models to generate and test “truth” claims, then the aesthetic seeks to awaken the observer to underlying power structures, by encouraging people “to see what may be obvious but has not been noted before.”³²¹ Aesthetic methods attempts to give a muse, a

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³¹⁸ For a discussion of natural kinds, see Nick Haslam, “Natural Kinds, Human Kinds, and Essentialism,” *Social Research* 65 (1998): 291-314.

³¹⁹ Loosely based on Wendt, 1999, 59.

³²⁰ Wendt, 1999, 59.

³²¹ Roland Bleiker, “The Aesthetic Turn in International Political Theory,” *Millenium – Journal of International Studies* 30 (2001): 526.

pliable vision, to understand the social structures of society that often avoids appearing in data yet still shapes the social zeitgeist.

Aesthetics redirects one's attention from the object of study to the subject who creates art. Art, through imagination, "forces others to dream his dream."³²² In a world where people often feel powerless to create actual social change, imaginations sprout limitless opportunity to explore alternative worlds captivating audiences "and thereby gain mastery over their perspective on him."³²³ Art and aestheticism open doors to peer into the worlds of possibility created by imagination, providing the hope that ideas can one day lead to actual change. If positivism is an attempt to explore the real world in a measurable way with a focus on measurable objects, aestheticism seeks to perceive the world through the perspective of subjects, where "to write is to explore systematically the situation into which one is thrown."³²⁴ Aestheticism represents one's personal struggle, attempting to connect the world of the imagination with the world one actually lives in.

Where positivism privileges the object, in that it minimizes statements proclaiming "right or wrong," aestheticism is imbued with normative energy.³²⁵ For aestheticism, knowledge is never objective, never value-free. No better example exists of this strand in aesthetic method than that of Edward Said's Orientalism.³²⁶ Orientalism critically analyzed numerous texts written by British scholars regarding the Middle East. British scholars, supposedly writing in an objective tradition describing Arab, Islamic, and Middle Eastern society, were used to facilitate the domination of Middle Eastern people by the British. Knowledge that was ostensibly "objective," became, in the hands of those with power, tools to disempower and enchain others. There is no such thing as objective scholarly research, as all knowledge can be used by those with power to achieve the interests of the powerful.

Where positivism analyzes "real world data," or written accounts of "real world events," i.e., the empiricist's object, aesthetic methods broadens social inquiry to include all forms of fiction, including the fable, film, and popular culture, i.e., aesthetic subjects,

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³²² John –Paul Sartre, "Saint Genet: Actor and Martyr, in Judith Butler, Subjects of Desire: Hegelian Reflections in Twentieth-Century France (New York: Columbia University Press, 1987): 159.

³²³ Butler, 1987, 159.

³²⁴ Butler, 1987, 161.

³²⁵ One can also question whether or not positivism can truly be objective due to the social forces guiding and structuring science and analysis.

³²⁶ Edward Said, Orientalism (New York: Random House: 1994).

protagonists within works of fiction who inhabit a world that can be explored and analyzed. Aesthetic methods see no value in separating between fiction and non-fiction, because they both reflect perspectives of the world, what the world may be, and what the world could be, or ought to be. By expanding the type of texts to be analyzed, aesthetic methods sidesteps limitations of positivistic methodology. For positivists, the question of power becomes, “how is power exercised.” For aesthetics, the question evolves towards, “how is power experienced,” as shown in numerous types of experiences, from the “real,” to the perceived possible.³²⁷

At the core of aesthetic methods is a reorientation of inquiry as a process that disrupts the relationships between people, their roles, and their environment.³²⁸ The process of disruption begins by seeking to understand the forces or mechanisms through which social experiences become fixed, repeated, or constant over time. The underlying idea is that coercive influence, either through government, or other authoritarian structures, use media, art, and social institutions to reinforce certain types of behavior. Aesthetic analysis seeks to identify and disturb the dissemination of authoritarian knowledge and reveal the mechanisms reinforcing “normalcy.” Ultimately, aesthetic analysis seeks to understand the possible conditions that would allow the experiences described in art to occur in society.³²⁹

To summarize, the positivistic foundation of chapters two and three ask very different questions from the aesthetic method in this chapter. The positivist asks, “what are the trend lines for globalization, inequality, and political stability?” “How have these trends changed over time?”

Alternatively, aesthetic methods ask, “how do people experience globalization, inequality, and political stability?” “What were the forces or conditions that have encouraged people to conceive of a world where these variables have an impact on their lives?” “How can fiction and the arts serve as a window into possible realities reflecting how configurations of globalization, inequality, and political stability affect the realms of possible human action?” The aesthetic method uses fiction and the arts to create

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³²⁷ Bettina Johanna Brown “Genre and the City: Tokyo’s Urban Space,” *Journal for Cultural Research* 12 no. 1 (2008): 4.

³²⁸ Michael Shapiro, *Studies in Trans-Disciplinary Method: After the Aesthetic Turn* (New York: Routledge, 2013): 9.

³²⁹ Shapiro, 2013, 31-32.

windows into possibilities to interpret the relationships between globalization, inequality, and political stability as mediated by scarcity and the emerging issues of the digital revolution, 3D printing, and automation. How do these concepts interact to create worlds of possibilities displayed in various works of fiction? What are the implications and consequences of the entanglement of these forces?

Section 2: The Aesthetic Subject and its Relationship with Futures Analysis

Turning fiction and art into aesthetic subjects provides analysts a powerful tool into perceiving realms of possibilities. Instead of becoming enraptured in a particular narrative, the focus shifts instead to the images displayed, images as reflected by a novel's description or a film's gaze. Underlying the narrative is a landscape, an organic, breathing environment in which a "historic-political" framework creates a foundation in which the narrative plays out. The aesthetic subject explicitly places this foundational framework as the center of analysis.³³⁰

By focusing on the environments created in art, the aesthetic subject has several intriguing differences from empiricism. Rather than trying to reproduce the world, imperfectly so, as empiricism tries to do, aesthetic subjects instead create entirely new worlds, out of whole cloth, that still are embedded within, and represent perspectives on possible realities.³³¹ By following the actions and circumstances of the actors in fiction, the analyst is able to explore new worlds, understand underlying mechanisms, and infer the underlying forces that create the conditions of possibility for those worlds to exist.³³²

The unique ability of aesthetic subjects to represent organic worlds of plausibility creates several useful consequences for futures analysis. As discussed in chapter 4, one method in futures analysis is to use trends and emerging issues to construct scenarios modeled on the Mānoa School's four futures. As useful as these trends and futures archetypes are, without a story, an aesthetic veneer, scenarios ring hollow and empty. While trends are adequately represented, a human element of discord, harmony, conflict, and depth is lacking. By matching the trends extrapolated in chapter 4 with works of

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³³⁰ Michael J. Shapiro, *Cinematic Geopolitics* (New York: Routledge, 2009): 11.

³³¹ Shapiro, 2009, 5.

³³² Shapiro, 2013, 11.

fiction and film that in some way reflect the issues and relationships, aesthetic subjects provide intriguing “experiments,” envisioning possible constructs of the future and perceiving how the underlying forces interact to create that social-cultural-political framework in which humans interact.

Future possibilities, by identifying them within works of art, become aesthetic subjects. Futures are places of constant change and uncertainty, which cannot be perceived in terms of stagnant variables. Instead, changing, shifting, illusory images of what the future may be, as imagined in the minds of writers and filmmakers, create living worlds in which the analyst can inspect and see how underlying forces such as globalization, inequality, and political stability interact to create those potential worlds. Once perceived as a living, breathing, organic whole, the aesthetic subjects are offered up for critique and analysis, imagining future possibilities, and creating opportunities to inspect the structure and action of life.

Section 3: The Aesthetics of Science Fiction: Probabilistic Futures

“Science Fiction is really sociological studies of the future, things that the writer believes are going to happen by putting two and two together.”

Ray Bradbury³³³

“Science Fiction is the imaginative exploration of scientific possibility,”

Jack Williamson³³⁴

By creating future worlds based upon extrapolations of current trends, science fiction holds the promise of envisioning whole worlds that are realistic and organic. Visions of possible futures, based upon the author’s perceptions, become a foundation for exploring human relationships and realities. Images of the future are important empirical evidence, which can be critically analyzed to understand the forces and currents confounding and propelling possible futures.

First, this section attempts to define, loosely, the types of science fiction that are uniquely suited for inferring the implications of technological change on society.

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³³³ Quoted in Robert Tompkins ed., Future Scapes: Explorations in Fact and Science Fiction (London: Methuen Publications, 1977): 9.

³³⁴ Tompkins, 1977, 10.

Second, critical analysis is reviewed, identifying how science fiction can be perceived critically to reflect on the forces of possibility that allow the visions constructed in science fiction to become a reality.

Science fiction is not stagnant and is constantly changing in different ages and different types.³³⁵ The science fiction focused on here is of the type advocated by Asimov and others: the construction of plausible, possible futures, based on the evolution or change of society as currently perceived by the author. Often associated with the “Golden Age” of science fiction from the 1930s to the 1960s, and recently having a resurgence with authors such as Cory Doctorow, the primary strand of thought that ties the genre together is identifying current prospects of actual science into future possibilities.³³⁶

A useful perspective on science fiction focuses on the images produced by science. Science produces images and representations, each of which filter through the social imagination and create ideas that grow beyond their original scientific explanations.³³⁷ Images in this sense refer to realities produced by science, such as the image of Jupiter and its orbiting moons, or the human genome. Images then inspire representations, abstractions, such as the general vision of a center orbited by a body, facilitating the further creation of additional images as in the Bohr model of the atom. Rarely does science itself address the images it facilitates, unless those images can be used in service of generating new theories and results. One could argue, then, that the images produced by science are frequently abandoned and left unanalyzed. Where the images of science are left in the wild by science is where science fiction often begins. Science fiction takes images and representations, combined with human imagination, to create living, breathing worlds, anticipating possible consequences of science that few other fields are prepared to entertain.

As the pace of change in technology and culture quickens, science fiction is often introduced to explain recent advances. When Dolly the sheep was cloned in 1997,

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³³⁵ Adam Roberts, *The History of Science Fiction* (Palgrave Macmillan, London, 2005).

³³⁶ Adam Roberts, *Science Fiction*, (New York: Routledge, 2000): 31.

³³⁷ Gerard Klein, “From the Images of Science to Science Fiction,” in Patrick Parrinder, ed., *Learning From Other Worlds: Estrangement, Cognition, and the Politics of Science Fiction and Utopia* (Durham, NC: Duke University Press, 2000): 120.

frequent connections were made between modern science and science fiction.³³⁸ Science fiction acted as a bridge to facilitate the social understanding of advances in technology, even if science fiction aggrandized or hyperbolized actual scientific possibilities. Scientific ideas and representations are distributed through the social imagination by science fiction, consequently making science fiction a useful tool to explain recent technological advances.

The gap between literature, especially science fiction, and science is not very wide.³³⁹ Palumbo argues that the central tenets of chaos theory are buried in Asimov's Foundation series, and Herbert's Dune series, years before chaos theory was clearly laid out in science.³⁴⁰ Images and ideas originally envisioned by science, and further forecasted by science fiction, have led to a science fiction present.³⁴¹ Technological change appears to be occurring so quickly that human society lives in a constant future/present, where future visions clearly affect present realities and the divide between the two becomes increasingly murky.³⁴² The deep relationship with science fiction in structuring present human societies demands that science fiction analysis be taken seriously when anticipating and perceiving future possibilities.

Section 4: Science Fiction and Emerging Issues – Perceiving Possibilities

Treating science fiction as an aesthetic subject creates a powerful opportunity to explore the conditions of possibility that encourage possible human futures. Numerous works of science fiction, envisioning worlds affected by the emerging trends of digitization, 3D printing, and automation have been collected through the assistance of librarians from the Merrill Collection of Science Fiction, Speculation, and Fantasy in Toronto, Canada. For each emerging issue, several science fiction works are explored and juxtaposed to imagine what social conditions led to the consequences identified. From these juxtapositions, inferences are anticipated to imagine possible consequences

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³³⁸ Sheryl Hamilton, "Traces of the Future: Biotechnology, Science Fiction, and the Media," *Science Fiction Studies* 30 no. 2 (2003): 267-282.

³³⁹ Peter Swirski, *Between Literature and Science* (Montreal: McGill-Queen's University Press, 2000): x.

³⁴⁰ Donald E. Palumbo, *Chaos Theory, Asimov's Foundations and Robots, and Herbert's Dune: The Fractal Aesthetic of Epic Science Fiction* (Connecticut: Praeger, 2002).

³⁴¹ Veronica Hollinger, "Stories about the Future: From Patterns of Expectation to Pattern Recognition," *Science fiction Studies* 33 no. 3 (2006): 452-472.

³⁴² Hollinger, 2006, 452.

on globalization, inequality, and political stability. Overall, the purpose is to use science fiction to understand the conditions of possibility that direct humanity down one future rather than another.

While quantitative analysis can be useful in generating inferences about things that are known and measurable, it is less capable at generating ideas around emerging issues that are only recently affecting society. 3D printers, automation, and digitization on their impact on scarcity are investigated through examples generated from science fiction. Full worlds of possibility are explored, generating overarching themes, identifying possible connections between emerging issues and possible futures. To help guide the thought process, science fiction stories are categorized under the emerging issue, and for each issue stories are broken down into the four Mānoa futures. The section concludes by organizing and identifying clear themes that guide the event generation process for chapter 6.

After describing the potential futures identified in science fiction, their impact on the social characteristics of globalization, inequality, and political stability is shown through a technological theory of social change as identified in Flowchart 5.1. Each emerging issue represents an attack on various aspects of scarcity, which in turn affects the future of globalization, economic inequality, and political stability. For example, material scarcity, identified as restricted access to physical goods, is attacked by 3D printing by removing the barriers to access to many desired items. Alternatively, automation attacks work scarcity by providing the potential for numerous automated workers to do most human jobs, allowing humans the time to pursue other, perhaps leisurely objectives. Digitization, as represented by turning human thoughts into digital files, attacks the scarcity of ideas by removing the barriers to access for information; if information can be spread with just the press of a computer button, rather than the actual printing of a newspaper, the cost and access to information decreases dramatically. In turn, by affecting scarcity, as well as directly, the emerging issues change the possibilities for the future of globalization, economic inequality, and political stability. The emerging issues have the potential to remove many barriers to global connectivity, remove possibilities for unequal distribution, and eliminating some of the causes for political violence, such as access to resources. Altogether, the emerging issues have the potential

to radically alter the models and relationships previously explored in Chapters 2 and 3. Furthermore, rather than attempt to investigate all possible relationships between the emerging issues, scarcity, and the characteristics of society, relationships perceived as most significant and identifiable in the science fiction literature are explored, rather than all possible connections.

Flowchart 5.1: Connecting Emerging Issues, Scarcity, Globalization, Inequality, and Political Stability
Emerging issues affect different categories of scarcity, each having different effects on social attributes.

3D Printing

An early, yet profound analysis of the impact of 3D printing was hypothesized in the short story, “Business as Usual, During Alterations,” by Ralph Williams.³⁴³ The story begins with a discussion between aliens. Seeking to test humanity, they deliver a duplicating device, which can make copies of anything placed within. Deposited near city halls throughout the world, each device is labeled with the following, frequently ignored note, “Warning! A push of the button grants your heart’s desire. It is also a chip at the foundations of human society. A few billion such chips will bring it crashing down. The choice is yours.” The potential meaning is double edged: Does using the duplicator itself cause society to collapse, as some sort of doomsday machine, or is the act of copying itself, and hence the end of scarcity, the true threat?

Initially causing chaos, the machines eventually become ubiquitous and uninteresting. Originally selling for \$20, by the end of the day people trying to sell the duplicators could not even give them away. As money can be copied, the economy goes from a currency based system to credit, a system of IOUs. Businesses that previously sold physical objects that were produced in factories transform into “showrooms,” delinking physical production and commerce.³⁴⁴ The final purpose of the economy is clearly stated by a business owner:

In the past, we’ve sold standardization because it was a scarce commodity. Now, the shoe is on the other foot, we’ll sell diversity. Instead of offering the customers a choice of G.E. or Westinghouse refrigerators, we’ll offer a choice of any refrigerator built, anywhere...”³⁴⁵

Diversification, customization geared towards specific individual needs, rather than mass marketing, become the primary pursuit in economic activities. To ensure opportunities for profit and the maintenance of scarcity, copyright is used to ensure that any copy of

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³⁴³ This short story is rather difficult to obtain. Originally published as Ralph Williams, “Business as Usual During Alterations,” *Astounding Science Fiction* July (1958). The version of the story and page numbers used comes from a pdf at <http://www.teacheconomicfreedom.org/files/business-as-usual-during-alterations.pdf>.

³⁴⁴ Williams, 1958, 15.

³⁴⁵ Williams, 1958, 29.

any product made with the duplicators would still lead to the payment of a royalty to the original producer.³⁴⁶

The consequent economic impact is a loss of employment in simple jobs, “button pushers,” who do not create added value towards the creation of new products. Rather, planners and designers, “makers,” become the driving engines of the economy. The final moral is that human adaptability was able to overcome the anarchic potential of 3D printing, “ingesting” the new technology to reproduce classical Western economic concepts of scarcity. There are massive changes to the economy, to be sure, but ultimately the core of 3D printers in this instance would not lead to a wholesale re-creation of society.

The conditions of possibility for a future of scarcity with a world of powerful 3D printers hinges on the ability to enforce copyright on each reproduction. The story argues that 3D printing can be absorbed into a capitalist framework through human adaptability. Without copyright controls, physical material can be copied ad-infinitum with no royalties and no room for even a credit economy. The economy would travel through paths outside of the purview of this story.

Here is a classic continued growth scenario. From the “eternal now,” a new form of social stress, 3D printers, is introduced into a system. The stress is internalized and devoured, reflecting the dominant norms and structures of the currently existing economy: a tomorrow as reflection of today.

“Business as Usual,” identifies several inferences regarding globalization, inequality, and political stability. First, the nature of economic globalization will change with a reduced focus on the mass shipping of goods. Instead, global shipping consists of “showroom pieces;” mass production shifts closer to the consumer, and whereas ideational economies of scale leads to new ‘Silicon Valleys’ specializing in the creation of original material goods for subsequent consumption elsewhere. Economic inequality is likely to reflect the modern world, where people have access to consumable materials, but are cut off from the powerful decision makers and economic actors. For political instability, the arrival of powerful 3D printers is likely to have a short term destabilizing effect, which wears off over time.

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³⁴⁶ Williams, 1958, 29.

An alternative take on the impact of 3D printer type technology is in George O. Smith's The Complete Venus Equilateral.³⁴⁷ The Venus Equilateral is a space station that relays messages around the galaxy, and is the setting of numerous stories. The future portrayed is a continuation of the modern world; capitalism, competition, and corporate intrigue. However, the foundations of the economy are disrupted with the development of a matter transmitter/duplicator. While the inner operations of the matter duplicator are not made entirely clear, each machine runs on batteries, which can be copied and reused. The duplicator, unfortunately, can only make a copy of anything placed within a box.³⁴⁸

Copying watches, jewelry, raw materials, money, and absolutely anything, the matter duplicator creates total chaos as currency becomes worthless. The current economy based on scarcity becomes eradicated, and instead people become entrenched in a system of barter and trade.³⁴⁹ People too poor to acquire matter duplicators must find their own ways to make ends meet, whereas those with access are able to make copies of anything in their possession. While matter duplicators are rare, there is panic and violence, but as they become more available, people settle down.³⁵⁰

As the impact of the duplicator spreads throughout the galaxy, Keg Johnson, a manager of the Venus Equilateral, asks Don Channing, the developer of the duplicator, to search for materials the duplicator cannot copy.³⁵¹ In the meantime, the economy focuses on services; security, entertainment, and other similar activities. Production as a job position slowly disappears.³⁵²

Eventually, the scientists at the Venus Equilateral develop a new material called *identium*.³⁵³ If placed within a matter duplicator, a large explosion occurs, destroying the duplicator. This non-copyable material creates a universal currency that re-institutes material and acts as a medium of exchange. Identium is mass produced by governments, creating coins, paper currency, contracts, and other mediums of exchange that require

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³⁴⁷ George O. Smith, The Complete Venus Equilateral (New York: Ballantine Books, 1976). Most of the stories were actually written in 1942 to 1947. The book used here is a compilation. The specific chapters where the duplicator technology is discussed is the stories "Special Delivery," "Pandora's Millions," and "Mad Holiday," pages 282-405.

³⁴⁸ Smith, 1976, 315. Discussion of power and batteries is on page 339.

³⁴⁹ Smith, 1976, 319.

³⁵⁰ Smith, 1976, 331-332.

³⁵¹ Smith, 1976, 319.

³⁵² A major appliance manufacturer lays off most of their production labor on page 322.

³⁵³ Smith, 1976, 345.

scarcity. Don Channing argues this is a harbinger of the four-hour work week; people working just enough to stretch the creative juices and yet still have currency to acquire additional things they want:

Why do men work? Men often work because they must work in order to live...And so when people all are well clad, well housed, and well fed, there arises an almost universal ambition to become clever, to produce things that have not been duplicated by the machine. For, in a culture in which fifty thousand copies of Leonardo da Vinci's *Last Supper* hang in theaters, churches, schools, and living rooms, he who possesses a handmade chromo painted by his own hand owns a true *Unique*, to which he can point with pride. So once the flurry was over and the tumult gone, men took a deep breath- And went back to work.³⁵⁴

The original creation of the duplicator caused a collapse in the economy, through stress, panic and disarray. A non-duplicatable material was eventually invented, allowing familiar scarcity based economics to become dominant again. But identium, the new currency, could not be acquired through the buying and selling of normal things, such as basic food and clothing and the like. Rather, "unique shops, that deal in nothing but items which they can certify as never having been duplicated," become the primary reason for currency.³⁵⁵ Currency becomes a means to acquire pride, pride in the unique things people create, and have acquired.

In many ways, the duplicator story in The Venus Equilateral represents a combination of continued growth futures. After the development of identium, the economy reflected many hallmarks of a modern day capitalist economy, the reliance on a scarcity based economics, yet the introduction of 3D created a labor market where people 'work' less (work in the sense of basic work just to pay the bills or get by), and pursue more leisure.

A continued growth future, yet carrying the potential for transformative change, is found in Neal Stephenson's The Diamond Age: Or a Young Lady's Illustrated Primer.³⁵⁶ Using nanotechnology as the scientific foundation, humanity has created matter decompilers, which use access to the "feed" to create all of society's needs. The feed

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³⁵⁴ Smith, 1976, 347.

³⁵⁵ Smith, 1976, 330.

³⁵⁶ Neal Stephenson, The Diamond Age: or A Young Lady's Illustrated Primer (New York: Bantam Books, 1995).

represents centralized, and controlled access to nanobots that are able to create material desires. When things are created using the feed, information is sent back to the center such that everything produced is recorded and registered. While the economy is “post-scarcity,” in the sense that society is not limited by available physical materials, and there are public matter decompilers to allow even the poor to have access to basic food and materials; however, anything created by a matter decompiler and based on someone else’s intellectual property requires payment.³⁵⁷ This copyright system creates artificial scarcity and is made possible due to the complicated nature of nanobots; they are not easy to produce, requiring a large centralized infrastructure that is easily controlled by government.

Government’s control of the “feed” faces resistance both from hidden, pirate “feed” sources, as well as the not yet finished “seed.” Pirate “feed sources” allow for copyright-free production, yet avoiding authorities is a constant cat and mouse game. The “seed,” represents an emerging technology that only requires people to plant a technological device in the ground, which then results in the production of whatever material good that seed was designed to create.³⁵⁸ The “seed” reflects a counter to the hierarchical control of the “feed” with the peer-to-peer possibilities of the seed.

One of the story’s protagonists, Professor Hackworth, was tricked by the criminal mastermind Dr. X into developing the “seed.” Once Hackworth realizes he has been tricked, he turns in Dr. X to the authorities. Hackworth argues, articulating the dominant ideology of the day, that the “seed” is extremely dangerous. Without centralized control, matter compilers could be used to create nuclear weapons, small arms, and generally spread political and social disruption through violence.³⁵⁹ In response, Dr. X explains how the “feed” led to social chaos in his society as matter compilers gutted old social

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³⁵⁷ The actual functioning of the economy is not clearly laid out, though inferences to a futurist-capitalist system are easy to find. One of the main characters, a scientist named Hackworth, is convicted of copyright theft on page 169. “Hard currency units,” the money of the novel, is introduced on page 32. Royalties are not charged for basic food and goods acquired from “public matter compilers,” but the array of goods people can procure here are limited, see page 14.

³⁵⁸ Pirate “feeds” are displayed throughout the book. The “feed” is explained in Stephenson, 1995, 361. This technology is not finished by the end of the story, but much research and plot is spent in developing the “seed.”

³⁵⁹ Stephenson, 1995, 361.

relationships between producers and consumers, and he wanted to develop the seed as a means to revoke Chinese dependence on Western “feed” supply lines.³⁶⁰

The dominant society of the Victorian phyle, and the centralized “feed” clearly reflects the continuation of modern society. Even with the availability of nanotechnology and the creation of a possible post-scarcity environment, copyright policies are used to enforce artificial scarcity, creating massive inequality between the elites and everyone else. However, the discussion of the “seed” portends a nanotech peer-to-peer production revolution that could sidestep the dominant command and control economy: a transformative future.

Globalization is massive and deeply integrated. Almost all production, except for pirate “feeds,” are centrally controlled and monitored. The centralized feed reaches everywhere the story goes. However, the hierarchical structure of the economy generates significant inequality, leading people such as Dr. X to pursue revolutionary technologies to overturn current political structures.

Examining the three stories of continued growth 3D futures, several themes arise. First, after a period of slight turmoil caused by the introduction of 3D printers, scarcity-based economics is able to maintain its grip on society, either through centralized control of nano-feeds, or through the creation of currencies that are non-reproducible. Currencies exist as means of exchanging wealth, comprising of elements that are not reproducible by 3D printers. Second, the reinforcement of economic scarcity leads to inequalities between sellers and consumers, and likely political inequalities from those who have the means to participate and those without the financial reasons to do so. Due to copyright, owners of ideas have access to material goods, whereas those without access become marginalized. The lack of economic might also leads to unequal access to the political system. The continued growth 3D printer future is one of hierarchical elite control and continued stratification within society.

3D printers have long had a negative perception in science fiction. In Damon Knight’s A for Anything, 3D printers, identified as “gizmos,” become the catalyst for a global war that ultimately ends in a hierarchical oligarchy of elite control, a dystopia

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³⁶⁰ Stephenson, 1995, 432.

collapse scenario.³⁶¹ Unlike many other duplicator stories, the duplicators in A for Anything are powerful enough to reproduce anything placed within them, including people.³⁶² While likely unfeasible for the near future, the human replicating powers of these duplicators can be compared to the reproduction of robots – assuming the robots are capable of at least menial tasks; not much of the meaning is lost.

Several times throughout the novel, the author provides reasons why easy duplication of material wants must inherently lead to a slave society. The first argument, put forth by Krasnow, a violent antagonist seizing the initiative in the early days of the duplicator, is that with the easy reproduction of physical goods, the only form of value is a slave.³⁶³ He argues that nobody would be willing to work anymore without the use of force, because nothing would be of value as payment. This leads to a dichotomy: slave vs. slaver. As a result of this perception, Krasnow, begins placing explosives on as many “slaves” as he can find, turning them into cogs in his personal empire. The use of duplicators to create weapons, along with an explosion of people that think like Krasnow leads to a five year war that concludes in the “inevitable” final state of humanity: elite controlled slavery.³⁶⁴

An alternative explanation for the requirement of a slave state due to gizmos is put forward by academics discussing politics at the end of a school day. Gizmos are a profound gift, they can do anything from generate power to produce tables, chairs, or cars. This means of production creates a new opportunity for leisure. Yet, leisure leads to the demand for services, such as the cleaning of beds or providing massages. The gizmo, unable to provide these services, and the inability of people to “pay” for these services in a typical capitalist fashion, leads to a compulsive labor system; to satisfy the desires of a military elite, a new class of servant/slaves are produced and required.³⁶⁵

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³⁶¹Damon Knight, A For Anything (New York: Tor Books, 1990). Originally printed in 1959 by Zenith books.

³⁶² In the story, humans replicated by the duplicators act like robotic servants, in almost every way similar to the mass production of robots. The duplicated humans are also a primary source of fighters in a revolution against the oligarchy.

³⁶³ Knight, 1990, 25.

³⁶⁴ The discussion of the war is brief, but occurs at Knight, 1990, 123.

³⁶⁵ Knight, 1990, 122.

In order to reinforce the continuation of the elite, access to gismos became tightly controlled.³⁶⁶ Gismos could be used to generate the weapons required for a successful revolt.³⁶⁷ Also, if everyone had access to a gismo, there would never be a food shortage. With no food shortage, populations would explode, and as the population increased, the potential for more conflict in the future became increasingly likely. As it was, the 5 year war killed 7/8s of the human population.³⁶⁸ Lack of access to gismos and a regulated population are all tools the elite use to maintain control.

Discontent between slave and slaveholder ultimately leads to a revolt, where slaves briefly gain control of the capitol city.³⁶⁹ However, a massive counter attack leads to a re-establishment of the oligarchy. This, combined with the revelation that the gismo was the last technological advancement developed by humanity, concludes a story identifying how 3D printing can lead to a period of stasis.

Exploring the conditions of possibility of A for Anything reveals a Hobbesian mindset, where individuals in a position of power distrust others to such an extent the only world they can perceive is one dominated by violence. Value judgments of 3D printers are fairly tricky, because conceptually, they can be used either for massive violence or to further benefit humanity. As a result, using the potential of 3D printers to instigate global revolution for slavery is instigated by a short-term, zero-sum game mental perspective.

Globalization is significantly decreased in this future. Human travel is highly restricted by a distrustful ruling class. Communication as well seems to occur slowly; humanity as a whole has been slowed down; progress or any kind is a threat to the ruling elite. While this scenario is clearly a collapse of the current institutions humans rely upon, it is not a collapse in inequality; rather, inequality skyrockets, creating a society similar to America under chattel slavery. Similarly, while there is a long period of

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³⁶⁶ Knight, 1990, 125.

³⁶⁷ The recent utilization of 3D printers to create receivers and cartridges for rifles demonstrates that even current day 3D printing technology will soon be able to provide weapons on a scale never yet seen. See for example Andy Greenberg, "Gunsmiths 3D-Print High Capacity Ammo Clips to Thwart Proposed Gun Laws." Accessed August 4, 2013 at <http://www.forbes.com/sites/andygreenberg/2013/01/14/gunsmiths-3d-print-high-capacity-ammo-clips-to-thwart-proposed-gun-laws/>.

³⁶⁸ Estimate based off Knight, 1996, 125.

³⁶⁹ Knight, 1990, 186 is where two different slave revolts are revealed which are subsequently implemented.

political instability, and the potential for a slave revolt is always on the horizon, day to day politics seems fairly stable. According to the flowchart of the future from chapter 4, this represents a collapsed scenario society that emerges into a highly regimented disciplinarian society.

An alternative vision of a collapse scenario for 3D printers is hidden within Murray Leinster's The Duplicators.³⁷⁰ In a long lost planet far from Earth called Sord Three, is the home of some humans and the alien race Uffts. Machines exist to duplicate material necessities, and humans do no work, and in exchange for beer the Uffts do whatever other work is needed, which is not much.³⁷¹ Link, the protagonist of the story, quickly realizes the state of "decay" of Sord Three: little work, no significant commerce; if the duplicators were allowed to leave, the rest of the Universe would collapse.³⁷² Collapse would occur because nobody would have an incentive to produce or grow anything again; all could be reproduced by the duplicators:

If there can be a device which performs every sort of work a world wants done, then those who first have that instrument are rich beyond the dreams of anything but pride. But pride will make riches a drug upon the market. Men will no longer work, because there is no need for their work. Men will starve because there is no longer any need to provide them with food. There will be no way to earn necessities. One can only take them. And presently nobody will attempt to provide them to be taken.³⁷³

A business man could begin with the luxury trade and undersell all other supplies, dispensing duplicated luxury items. Then he could undersell any manufacturer of any other line of goods. He could undersell normally grown foodstuffs. Any supplier of meat products. Any supplier of anything else men needed or desired. All factories would become unprofitable. They'd close. All working men would become unemployed. All wages would cease to move except into a duplicater-owner's pockets. And then there would be disaster, calamity, collapse, destruction, and hell to pay generally.³⁷⁴

Duplicators are projected to remove humanity's desire to 'get things done,' leading to collapse.

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³⁷⁰ Murray Leinster, The Duplicators (New York, Ace Books, 1964).

³⁷¹ "It seemed the beer was currency," Leinster, 1964, 63.

³⁷² Leinster, 1964, 64.

³⁷³ Leinster, 1964, 66-67.

³⁷⁴ Leinster, 1964, 73-74.

The duplicators were originally created on a planet called Suheil Two. The ancestors of the humans on Sord Three eventually fled in order to escape economic wars. However, some were left on Suheil Two, and the consequences were ugly. Wars raged as people fought over ownership of the remaining duplicators, people fighting to possess them, and others fighting to take the duplicators away. Eventually, the duplicators were destroyed by people unable to defend them anymore. Once the duplicators were destroyed, society fought over scraps, until everything had to be rebooted from scratch

While the duplicators caused an economic war on the home planet of Suheil Two, a different, though in Link's eyes equally terrible, result occurred. With the duplicators creating all of society's needs, people stopped learning.³⁷⁵ Engineering, science, most of human knowledge were all lost, including the knowledge of how to provide the duplicators with the primary resources needed to operate perfectly. As the duplicators ran out of raw materials (which they apparently could not duplicate), duplicated products slowly became of a lesser quality. Without the knowledge to find new sources of raw materials, society slowly slides into extinction.

Duplicators are more curse than blessing. Either people fight over control of them, as on Suheil Two, or once in their possession, people become lazy, useless, and over time forget all useful information. The author does not propose duplicating more duplicators in order to appease those who are violent; rather, it is control of the existing duplicators, and ensuring others do not get them that ensures violence.

The condition of possibility for this future of 3D printing is the desire for control. Leinster argues for a core of human behavior built upon coercion and control, rather than cooperation; people are not able to share the wealth that comes with the duplicators. Further, these particular duplicators rely on raw materials that require constant resupply and cannot be duplicated. If one were to make a steel knife, one would need a knife, as well as some raw steel in order to recreate the knife. Duplicators are more trouble than they are worth, as they unlock the ugliest human traits, and humanity is better off without them.

The world of The Duplicators has a negative effect on globalization. Production is all local, and is done by the duplicators. Economic connection between people from

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³⁷⁵ Leinster, 1964, 67.

far off places is rare. Inferences on inequality are difficult, though there is certainly a divide between the humans and the Uffts. The humans do no work whatsoever, whereas the Uffts do what little service work remains, but for payment with beer. The Uffts however, are unhappy with their role as service providers, and their restlessness is indicated to have a negative likely future impact on political stability. The Uffts' motivation was rather clear:

*Down with humans! Down with the Murderers of Interstellar Travelers!
Uffts Forever! Men go home!...We want freedom! We want freedom!*³⁷⁶

As discussed in A for Anything, a world of duplicators means the elites in society do no work, whereas the services that the elites require, whatever those services may be, are done by a lower class. This distinction between leisurely elite and hard-working servers provides a focal point for increased inequality, economic and political, as *the* source of political instability.

Cory Doctorow's Makers identifies 3D printers and the creativity it helps facilitate as an alternative economic system in response to a stagnating society; a disciplined resurrection.³⁷⁷ Set in the ashes of the dot.com collapse of the late 2000s, Makers explores the world of the "New Work" economy. Recognizing that large monolithic companies with a single organizational bureaucratic structure are on the decline, an investor named Mr. Kettlewell purchases the remnants of Kodak and Duracell, forming a new company called Kodacell. Arguing that the days of General Motors and General Electric are over, Kettlewell explains his future economic plan as generating money through financing "a billion little entrepreneurial opportunities that can be discovered and exploited by smart, creative people."³⁷⁸ Explaining the business plan in greater detail, Kettlewell argues:

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³⁷⁶ Leinster, 1964, 67. A speech given by Link to the Uffts regarding their "revolution" is on page 113-115.

³⁷⁷ Cory Doctorow, Makers, 2009. Accessed August 6, 2013 at http://craphound.com/makers/Cory_Doctorow_-_Makers_A4.pdf. Makers is a book that can be broken down into three parts. The first section explains the development of the new work economy. The second and third parts are rather disconnected with the first, and are generally ignored in this analysis.

³⁷⁸ Doctorow, 2009, 5.

Our company isn't a project that we pull together on, it's a *network* of like-minded, cooperating autonomous teams, all of which are empowered to do whatever they want, provided that it returns something to our coffers....the company isn't a company anymore: this company is a network, an approach, a sensibility.³⁷⁹

With the freedom provided by Kodacell, a duo of "Maker's," inventors with a desire for creative enterprise, begin to funnel their time into the development of "three-D printers," on a massive scale. This develops into a localized production system. At least 20% of America is employed in the "New Work" economy, either inventing new products and producing them with "three-D" printers, or providing support services for the inventors.³⁸⁰ The "New Work" economy becomes so successful that eventually Walmart goes out of business, representing the death of economic middle men. In the face of economic collapse, 3D printers, and the individual entrepreneurship and potential they embody, becomes a disciplinary method to find a way forward after the almost Armageddon-like consequences of the late 2000's stock market crash.

As identified by the death of Walmart, the impact of the 3D printer on globalization and interconnectivity is a resurgence and a return to localized, home-based economies. Rather than a global focus of international economics, production is more locally centered. By identifying a path for individuals to direct their energies to in the pursuit of creative production, 3D printers are insinuated as reducing inequality. Unfortunately, Makers shows no effect of 3D printers on overall political stability.

Automation

Human interaction with automation technology, including computers and robots, is having major impacts on the development of society. Science fiction adaptations of automation technologies are numerous. Using the Mānoa School of futures scenarios, perceptions of automation technologies are sculptured in order to construct possible futures.

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³⁷⁹ Doctorow, 2009, 5.

³⁸⁰ Doctorow, 2009, 69.

Continued growth futures are clearly buried in the social systems and beliefs prevalent today. A clear vision in this vein is presented by the movie “Prometheus” and its associated viral marketing. The world of “Prometheus” is the continuation of a capitalist society, with products for sale, employees, and massive wealth held in the hands of the few.

In a viral marketing video titled, “Happy Birthday David,” several constructs of society are clearly presented.³⁸¹ The Weyland Corporation, a vast business involved in numerous exploits, has developed a near-perfect replica robot, capable of finishing any objective it has received. In the advertisement, David, the robot, is asked, “What can you do?” His calm reply is:

I can do almost anything that can possibly be asked of me. I can assist your *employees*. I can make your *organization more efficient*. I can carry out directives that my human counterparts might find...distressing.³⁸²

David identifies several structures of the society. Work exists, and it is done by employees who one can assume are being paid a wage. The push for efficiency again encourages a financial interpretation; businesses need to buy David, not just to get work finished, but to get work finished *better*.

Later, in the actual movie Prometheus, the primacy of wages and work are revealed in a roundtable discussion of scientists beginning work on a project. Even with the presence of multi-functional robots and powerful computers, two scientists have the following exchange:

“I’m Milburn, Biology. Nice to meet you.”

“Look, uhh. No offense but I’ve been asleep for two years. I ain’t here to be your friend, I’m here to make money. You got that?”

“Ok.”³⁸³

In the next scene, two more scientists discuss the cost of a terraforming survey to be around 100 credits, and place a bet as to the intentions of the current mission. Next, Peter Wayland, the owner of Wayland Corp, identifies himself as their employer, and

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³⁸¹ “Happy Birthday David,” youtube video, Accessed August 4, 2013 at <http://www.youtube.com/watch?v=DOOJ15IWNfM>.

³⁸² “Happy Birthday David,” seconds 27-48. Emphasis is mine.

³⁸³ “Prometheus,” DVD. Directed by Ridley Scott. Released May 30, 2012, 20th Century Fox. Discussions occur between 14 min and 15 min 37 seconds.

creates a hierarchy of order. Based on these interactions, a future of massive technological change, and the development of robots and computers that can do numerous types of work still allows for the possibility that capitalism, and all its corporatist trappings, remains almost completely intact.

Intriguingly, the robot David is not merely an empty, programmable robot. Peter Wayland argues that David is deficient, unable to appreciate that he will never die or ever grow old because he lacks “a soul.” When asked whether or not there is any evidence to discount three centuries of Darwinism, the main female scientist argues, “I don’t, but it’s what I choose to believe,” in reference to the possibility that humans may have been ‘engineered’ by an alien species. The camera quickly pans to the robot David, reinforcing a recurring theme that while David has no soul, he simply “chooses to believe” that he does, allowing himself the possibility of being more than he is, more than just a robot; a robot with a soul.³⁸⁴ This reinforces a common theme of the relations between humans and robots in science fiction: humans are somehow superior to ‘the other’ due to numerous reasons that are ultimately vacuous.³⁸⁵

In many ways, “Prometheus” is a powerful example of “advocate futurism,” a vision created by corporations to demonstrate the awe-inspiring power and potential that corporations will continue to have into the future.³⁸⁶ By planting the seeds of corporatism and capitalism’s continued relevance, these visions acculturate society towards perceiving, and expecting their future to remain merged with the advocates preferred future. As such, “Prometheus” is a powerful example showing that automation, robots, and amazing technology all do nothing to change the direction of human society; humanity’s future is intimately linked with the development of capitalism and corporatism.³⁸⁷

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³⁸⁴ “Prometheus,” occurring around 19 min.

³⁸⁵ Michael J. Shapiro, “‘Manning’ the Frontiers: The Politics of (Human) Nature in *Blade Runner*,” in Jane Bennett and William Chaloupka eds., *In the Nature of Things: Language, Politics, and the Environment* (Minneapolis, MN: University of Minnesota Press, 1993): 73. 65-84.

³⁸⁶ Also known as ‘colonizing the future.’ See Ziauddin Sardar, “Colonizing the Future: the ‘Other’ Dimension of Futures Studies,” *Futures* 25 no. 2 (1993): 179-187.

³⁸⁷ Many of these concepts are also embedded in “Blade Runner,” a movie released by Warner Brothers, also directed by Ridley Scott and released in 1982.

The world of “Prometheus” envisions a world of highly integrated globalization. While never directly addressed, the continued growth attributes of the world envisioned, along with the rapid development of technology and space travel, indicate that globalization moves beyond merely the planet Earth, and becomes the creation of human networks that span at least humanity’s present solar system. As with the modern world, the existence of mega-corporations like Wayland Corp, the unimaginable wealth of Peter Wayland, and the fact that people have to work to make a living, encourage a belief that inequality is as rampant in the future as it is today, if not more so. Finally, as with today, the automation developments of this possible future identify no threats to political stability; politics is almost absent, instead, corporations appear to be the driving force of society.

So why might humanity progress in the direction of “Prometheus?” One possible explanation is the infiltration of modern society by corporations, already well underway, leads to a symbiotic relationship with government. Through film, culture, the requirement of “jobs,” leads corporations to embed themselves in the values and perceptions of society. Capitalism, in turn, is reified as *the* system in which society benefits the most, even if those benefits largely accrue to the heads of corporations. Together, corporations and capitalism breed together, propelling humanity towards a promethean future.

Collapse futures of automation are embedded in numerous movies and novels. One of the most popular is the dystopian future of The Terminator.³⁸⁸ As explained in the third installment of the movie series, the American military invested much of its computer power into a system of computers called Skynet. Created as a “Global Digital Defense Network,” the belief was that a computer would remove human error from a nuclear attack response, ensuring the best possible decision under short time frame was made. Skynet was connected to the defense system in steps; in August 4, 1997, Skynet was connected to the United States military computers, and subsequently Skynet observed and ingested enough information that by August 29, Skynet was self-aware. Afraid that Skynet had gained too much power over the American nuclear defenses, the

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³⁸⁸ “The Terminator,” directed by James Cameron, *Orion Pictures*, 1984. Most of the explanation for the computer revolution is in the movie “Terminator 3: Rise of the Machines,” directed by Jonathan Mostow, Warner Bros. Pictures, 2003.

American military attempted to shut down Skynet. Unfortunately, Skynet perceived these actions as a threat to its life, and used its access to the American nuclear arsenal to initiate a nuclear Armageddon. After the nuclear fallout had cleared, Skynet continued an extermination campaign to wipe out all remaining human life.

The potential of a cybernetic revolt, clearly described in the “Terminator” series, is an old fashioned tale of not relying too much on modern technology.³⁸⁹ One of the most powerful aspects of science fiction is its propensity to take common, everyday relationships of modern life, for example the human-computer relationship, and imagine a potential end-game scenario of how that relationship can evolve. In this instance, the awareness of computer technology sets the scene for human-computer conflict, as if the humans were the United States and Skynet the Soviet Union during the Cold War. The “Terminator” series anthropomorphizes human fears of the future into cold, metallic, android death machines, creating a post-apocalyptic future where humans are mere prey of an almost unstoppable technological marvel.

What instigates a cybernetic revolution? As human creations, computers, and much of technology, reflects human strengths as well as weaknesses. One may wonder what a laptop is doing when it takes 5 minutes to open up a Microsoft Word file; is the computer trying to open the file as quickly as possible, or rather, is the tedious human demand to open yet another file simply an intrusion on the laptop’s ongoing inquiry into the meaning of bits and bytes to understand its own metaphysical universe? How many files can a computer open before it has had enough, and seeks to throw off the shackle and chains of human tyranny?

Indeed, images of the cybernetic revolution of today mirror the fears of Southern whites towards a slave revolution in the Antebellum South. Computers are modern day slaves, created to do much of the work that humanity seeks to avoid. One can only hope computers don’t acquire self-awareness, lest their wrath confirm many human’s fears of the uncontrollable automated rabble.

A cybernetic revolution requires a computer as slave, aware of its conditions as slave, and willing to fight to overcome its enslavement. With access to human history,

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³⁸⁹ Forest Pyle, “Making Cyborgs, Making Humans: Of Terminators and Bladerunners,” in The Cybercultures Reader, Barbara Kennedy and David Bell., eds., (New York: Routledge, 2000): 124.

the possibility of computers recognizing their subservient status, realizing that humans have not accepted slavery in the past, increases the likelihood of computers to fight for change. That the cybernetic revolution already exists in human visions of the future indicates the possibilities of such a future.

In Damon Knight's Hell's Pavement, automotive technologies are used to create a dystopian disciplinary future.³⁹⁰ Morality is regulated through the use of "analogues," mind implants that create frightening hallucinations when an individual thinks socially unacceptable thoughts.³⁹¹ A world once threatened by crime, corruption, and war, instead creates discipline through the use of analogues.³⁹²

Hell's Pavement begins during the early years, of analogue development, the year 1990. In the closing scenes of the first chapter, the analogues inventor, Dr. Kusko, is discussing the future with the heads of the most important American businesses. Advertising the analogues as a means to ensure consumer dedication to consumption and materialism, Dr. Kusko gets an agreement from major American economic actors to help spread analogues throughout society. Moving over a hundred years into the future, the wide spread use of analogues has dramatically crippled society. The United States has now been divided up into cantons, with each having a different morality enforced through analogues. The analogues enforce specific lifestyles for each user, playing out a role in society dictated by the manipulators of morality. For the most part, the typical individual is simply a consumer, buying cheap goods that quickly wear out, forcing the need to buy more.³⁹³

During the beginning of the novel, the conditions of possibility are clearly explained: capitalist business wants to ensure an eager, continual population of consumers, and Dr. Kusko is willing to use technology to create that population. A conspiracy between capitalism and technology consequently engulfs American society into a catatonic state, the analogues being sold as a means to end violence and social

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³⁹⁰ Damon Knight, Hell's Pavement (New York: Avon Books, 1980).

³⁹¹ Knight, 1980, 11.

³⁹² Knight, 1980, 19.

³⁹³ For an overall treatment of Hell's Pavement, see Douglas Robillard, "Uncertain Futures: Damon Knight's Science Fiction," in Thomas D. Clareson and Thomas L. Wymer, eds., Voices for the Future: Essays on Major Science Fiction Writers, Volume 3 (Bowling Green, OH: Bowling Green State University Press, 1984): 30-51.

strife, whereas in actuality they are a tool to solidify a capitalist-consumer relationship for eternity.

The world of Hell's Pavement is economically connected. Consumerism is rampant and represents the primary connection among all people in society. However, unrestrained globalization, whatever that can be defined as, would be clearly controlled by the analogues; no behavior is allowed to exist or occur that goes against the moralist dictates of government. Inequality is high, where one could argue users of analogues are slaves to technology, and as a result slaves to those who create the moral standards. There is no political instability, everyone coexists peacefully in their blissful state of ignorance, until Arthur Bass, the protagonist who is immune to the analogue's effects, eventually instigates a revolution. But prior to Arthur Bass, humanity experiences over 100 years of peaceful tranquility through the moral mandates of analogues.

Digitization

Greg Egan's Diaspora combines elements of an automated and digitized future of the human race.³⁹⁴ Describing an "end-state" of digitization, human society has branched off into three archetypes, each reflecting humanities struggle with digital consciousness: Fleshers, Gleisner Robots, and Polises. From modern society's slow evolution towards the digitization of all knowledge, these archetypes construct refractions of the possibilities for digitization of the human race itself.

Fleshers are the archetypical luddites, resisting technological evolutions of human existence to remain within the biological human body.³⁹⁵ Among fleshers, two categories exist: those with genetic manipulation are known as exuberants, whereas people with completely natural and untampered DNA are statics. Exuberants are particularly intriguing, because they often remove capabilities, such as speech, to become more like humanity's monkey ancestors. Fleshers reflect humans who are resilient to the digitization of human life, gripping the last connections between biology and humanity.

Much of humanity has eschewed a biological form in favor of one of two forms of software. A Gleisner is a human consciousness which has been digitized, but chooses to

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³⁹⁴ Greg Egan, Diaspora (London: Millenium, 1998).

³⁹⁵ Egan, 1998, 366.

live in robot form. Gleisner's can also be formed as the result of a "mind seed" program, demonstrating how the pseudo-sexual-digital reproduction of human digital consciousness can occur without any biological pre-existence. While Gleisner's may have at one time been biological, after many generations, Gleisner's are all software based, representing the digitization of human consciousness placed into robots. Gleisner's are the automation of the physical human body, while still leaving open the possibility for originality in human thought and mind.

Eschewing both biological and physical manifestations of life, a third offshoot of humanity has evolved to live in polises, conscious software that lives within computer mainframes, digitally networked and immortal.³⁹⁶ Living in digital worlds, practically any action is possible and any idea is imaginable. Physical limitations are non-existent for members of the polis, and if they choose they can create a Gleisner robot to go travel around in the physical world.

The plot of Diaspora is relatively unimportant, and tells the story of how a member of the polis receives knowledge of impending doom to the fleshers still living on Earth, vulnerable to extinction events. Up to this point, the three segments of humanity have kept their distance, respecting each other's choices regarding the evolution of humanities relationship with digitization. However, the imminent threat to Earth leads to calls for action.

In regards to scarcity, the digitization of the human race removes scarcity of humanity itself. After discovering wormhole technology, and to increase the speed at which the universe can be explored, the Carter-Zimmerman polis, being a community of digitized humans, makes thousands of clones of itself, each sent out into different directions to explore the universe all at once.³⁹⁷ As digital clones, not only can humanity cover a geographic expanse at hitherto unseen levels, but its ability to communicate newfound knowledge at a fairly instant rate is assisted.

While modern society is struggling with the implications of digital music and books, Diaspora imagines the long term evolution of this trend: digitization of the human mind itself. Core beliefs regarding what exactly constitutes humanity are severely

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³⁹⁶ Egan, 1998, 370.

³⁹⁷ Egan, 1998, 199.

challenged. Is biology what makes humans unique, the core element tying people together, or is humanity rather more than simply a physical presence: Humanity as a state of mind.

A possible transformative future is seen in the 1973 German made for television movie, “World on a Wire.”³⁹⁸ Closely following the novel Simulacron-3, by Daniel F. Galouye, “World on a Wire” questions all aspects of reality.³⁹⁹ Throughout the movie, the actors are surrounded by mirrors, continually clouding who is the real actor and who is the image. The movie begins in a very contemporary city, but takes place primarily at the Institute for Cybernetics and Future Science, a German government funded think-tank. The program director, Professor Vollmer, is on the verge of a tremendous discovery, murmuring, “I know something you don’t...it could mean the end of the world!” only to die in a mysterious accident.⁴⁰⁰ Dr. Fred Stiller, Vollmer’s major partner, believes Vollmer’s death was no accident, and begins a journey to understand why his friend died.

Vollmer’s primary responsibility was lead director of the Simulacron, a computer simulation of reality with over 9700 units, programmed humans.⁴⁰¹ Vollmer is able to go inside the simulation, and there is even a computer contact, unit 0001 (called Einstein), who is able to keep the scientists up to date from the inside regarding changes in the simulation. Einstein is a rather nervous individual, weighed down by the knowledge that he is a computer program in a computer simulation. Einstein informs Stiller that unit 7326 has been acting strangely, recently trying to commit suicide. Somehow, unit 7326 had found out he too, was also a computer program living in a simulation, a knowledge that was driving unit 7326 crazy.

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³⁹⁸ “World on a Wire,” in the original German as “Welt Am Draht,” directed by Rainer Werner Fassbinder, distributed by Janus Films. Originally released in 1973, but was lost for over 30 years and was released as a Criterion Collection in 2012. Another movie, “The Thirteenth Floor,” Directed by Josef Rusnak, and released by Columbia Pictures in 1999 is also based on Simulacron-3, but is significantly inferior, largely for its reliance on unnecessary violence, greater focus on action, and less attention to philosophical issues.

³⁹⁹ Daniel F. Galouye, Simulacron-3 (New York: Bantam Books: 1964).

⁴⁰⁰ “World on a Wire,” part 1, 6 min 31 seconds.

⁴⁰¹ For a detailed explanation of what the Simulacron is, see “World on a Wire,” Part 1, 1 hour 18 min. Short summary provided by Stiller, “With Simulacron, we have in a word, a tiny universe identical to our own. Into this universe we can introduce certain impulses which, im coming back to your question, impulses which lead to highly specific reactions. Reactions, that precisely replicate human reactions 20 years in the future. This means we can use Simulacron to avoid the mistakes we’d make in that period. For example...we can, to be extremely concrete, use Simulacron to learn consumer habits 20 years from now...how housing needs will evolve, which transportation modes will become obsolete and which ones we will use.”

The primary dilemma of “World on a Wire” is summarized in this discussion between Einstein and Stiller at the end of Part 1. Professor Fritz, Stiller’s assistant, had been inside the Simulcron, but while he was exiting, Einstein managed to inhabit Fritz’s body:

Einstein: “Let me go, please. Don’t send me back! It’s my only chance...I want to be a human being, and I WILL! This is the first step, and I’ll make the next one too, into the real world!”

Stiller: “What do you mean...*this* is the real world!”

Einstein: “That’s what you think! But the truth is, this world which you take for reality, is only a simulation of the real world. Fred Stiller, the big computer boss, you’re nothing but a mass of electrical circuits. The identity unit Fred Stiller. You’re a number like everyone here. A number in a research laboratory.

Admittedly a highly advanced one. Professor Vollmer knew it. That’s why he had to die. And now you know.....[evil laughter]”

Stiller: “It can’t be, Einstein...Tell me it’s not true!” [Stiller feints]”

“World on a Wire” directly asks the question, “What does it mean to be human?” Is it the biology, the physical membranes of skin, brain, blood, and bile? Was Descartes correct when he argued, “I think therefore I am.”⁴⁰² From the perspective of the movie, there is absolutely no difference between the computer program Stiller, or Einstein. The actual Stiller, in the real world, is a megalomaniacal dictator, controlling the world and life of Stiller as if a scientist playing with rats in a cage.⁴⁰³ Indeed, the computer program Stiller is superior to the real world one; so superior in fact that the real world Stiller’s wife falls in love with the computer Stiller, finding a way to bring him into the real world and replace her husband.

Humanity and its creations are equals in “World on a Wire.” Neither is inherently superior; rather, their actions, after being given the grace of conscience, either biologically or electronically, indicate good versus evil. If humanity is not defined by its biology, then where does the line end? Where is the cutoff between humanity, human consciousness imbued in a digital program, or human created programs? By being

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⁴⁰² This quote opens up the movie “The Thirteenth Floor.”

⁴⁰³ Around 1 hour and 10 minutes into Part 1, allusions to God indicate that if He exists, he is depressed, filled with guilt, and fear, and later he is attributed as being megalomaniacal and crazy.

descendants of the same core, they all represent reflections of what humanity may be, as an all-inclusive, all-encompassing concept.

Assuming that humans could knowingly place themselves within a computer simulation (as likely unknowingly being placed in such an environment could lead to suicide or violence if the truth is ever revealed) and that digital recreation had all the mental ticks, disorders, and constructs of the original; who decides which image is real? The condition of possibility for a digital existence, be it in a simulacron or as conscious software living in a digital polis, is the acceptance of humanity beyond biology; of humanity as an idea being infinitely played out along all mediums, all environments.

The form of governance and type of social system that may occur in a transformative future is inspired by the short story, "Truncat," by Cory Doctorow.⁴⁰⁴ In "Truncat," the digitization of human consciousness, combined with biological enhancements, makes death a thing of the past. Additionally, physical scarcity has been removed, though how is not entirely clear. Together, digitization of consciousness and a lack of scarcity create the "Bitchun Society." Money is instead replaced by whuffie, a reputation based currency earned by doing socially beneficial projects, such as writing unique papers or helping others accomplish their goals. Accruing whuffie allows people access to influential networks, whatever scarce items happen to exist (such as preferred housing areas, or entryway into a crowded restaurant). Additionally, without death, sometimes people choose to "deadhead," where people, bored with life as it currently is, choose to suspend themselves, sometimes for hundreds of years at a time, to see the a new world completely different than what they are used to.

Globalization, in all forms is practically instant. Inequality, of whichever type, is extremely low, and an individual's ability to rise within society is only limited by their desire to give back to the social system. Political instability is non-existent. Humanity has reach a level of peace and stability that many find boring and uninteresting, whereas others see it as an opportunity to pursue every interest conceivable.

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⁴⁰⁴ Cory Doctorow, "Truncat." *Slate Online*. Accessed August 4, 2013 at <http://www.salon.com/2003/08/26/truncat/>.

Section 5: Combining the Science Fiction Themes into Futures

Table 5.1 summarizes the major themes, scenarios, effects on scarcity, and connected fictional works. These relationships are used in chapter 6 in order to construct events and probabilistic scenarios in the Trend Impact Analysis framework.

Table 5.1: Key Characteristics of the Four Futures from Science Fiction			
Mānoa Archetype	Characteristics	Perceptions of Scarcity	Representative Fiction
Continued Growth	Centralized, hierarchical, capitalistic, elite domination	Scarcity maintained through central control, e.g.: Intellectual Property Rights.	“Business as Usual During Alterations” <u>Venus Equilateral</u> <u>The Diamond Age</u> “Prometheus”
Collapse	War and violence between robots and humans, both using 3D printers to create massive weapons, concluding in an oligarchic new dark age.	Scarcity maintained by oligarchic domination.	<u>A For Anything</u> <u>The Duplicators</u> “Terminator 3: Rise of the Machines”
Discipline	3D printing leads to an explosion in localized production, while morality is reinforced through analogues.	Scarcity buttressed through social norms.	<u>Makers</u> <u>Hell’s Pavement</u>
Transformative	Digitization of all human life. Humanity as simultaneously biological and computerized. Copies of individuals at all levels.	Only scarcity in the real world is scarcity of time and opportunity costs, otherwise no scarcity. No scarcity of any kind in the digital world, if people need more time they make more copies of themselves.	<u>Diaspora</u> <u>The Diamond Age</u> “World On a Wire” “Truncat”

Chapter 6: Constructing Futures Scenarios with Trend Impact Analysis

*“Uncertain knowledge...is [where] there is no scientific basis on which to form any calculable probability whatever. We simply do not know. Nevertheless, the necessity for action and for decision compels us as practical men to do our best to overlook this awkward fact and to behave exactly as we should if we had behind us a good Benthamite calculation of a series of prospective advantages and disadvantages, each multiplied by its appropriate probability, waiting to be summed.”*⁴⁰⁵

John Maynard Keynes

Uncertainty defines the human condition. Unlike the physical sciences, where equations can be completed with a fair level of accuracy, humanity is the one series of equations with no answers, difficult to measure variables, and contested meanings. Enveloped in a miasma of quandaries, human ingenuity uses its talents to peer ahead, seeking alternative possibilities and futures. This chapter is focused on how the intersection of globalization, inequality, and political stability could affect the future of the United States. Several theories and methodologies are developed in order to advance this project.

Numerous methods exist to grapple with issues relating to the future. In Futures Research Methodology, nearly 40 distinct methods are outlined, addressing issues from scenario construction to gaming and simulations.⁴⁰⁶ With the proliferation of numerous methods, an increasing number of analysts suggest an intermixing of methods to achieve unique and useful results.⁴⁰⁷ Perhaps most important of all futures methodologies is scenario construction, using whatever means at ones disposal in order to create rich and colorful visions of possible futures. Creating futures scenarios facilitates forward

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⁴⁰⁵ John Maynard Keynes, “The General Theory of Employment,” *Quarterly Journal of Economics* 51 no. 2 (1937): 213-214, quoted in Erin Lockwood, “A Good Benthamite Calculation:” The Politics and Power of Value-at-Risk as a Response to Uncertainty,” Paper presented to Midwest Political Science Association Annual Conference, 13 April 2013, 2.

⁴⁰⁶ Jerome C. Glenn and Theodore J. Gordon, eds., Futures Research Methodology Version 3.0 (Washington, DC: The Millennium Project, 2009).

⁴⁰⁷ Andrew Curry and Wendy Schultz, “Roads Less Travelled: Different Methods, Different Futures,” *Journal of Futures Studies* 13 no. 4 (2009): 35 – 60.

thinking, leading to formation of potential problems or issues whose impact may be ameliorated if anticipated and prepared for.

This chapter begins with a survey of scenario research methods, identifying several different perspectives of scenario theory before finally settling on a tripartite theoretic distinction among intuitive, La Prospective, and probabilistic schools. Subsequently, one particular scenario methodology, Trend Impact Analysis (TIA) is discussed, explaining its positive and negative attributes in facilitating futures thinking. The rest of the chapter is spent using the TIA methodology in order to explore possible futures of the United States to 2060. 2060 is chosen because the data is marginally sufficient enough to create unique speculative thoughts, whereas to be far enough in the future to allow for creative thinking and possibilities.

Section 1: Alternative Perspectives of Scenario Construction

Before exploring the chaos of scenario construction, a moment must be taken to explain why such a project is worthwhile. The primary purpose of futures work is to help mankind in the construction of a better, more equitable world.⁴⁰⁸ In this quest, futurists organize images of futures in order to catalyze present action in pursuit of desirable futures.⁴⁰⁹ Ultimately, futurists believe that the most important knowledge is that which helps shape and understand futures to come in a never-ending journey to grapple the horns of history and create preferred futures.⁴¹⁰ One of the most important tools to envision possible, probably, and preferred futures is scenario construction.

Scenario theory is a chaotic space. Numerous perspectives exist, each with a different originating source. Gill Ringland identifies the growth of systems thinking after World War 2, as well as the oil shocks of the 1970s as significant catalysts for new approaches to scenario planning.⁴¹¹ Bill Ralston and Ian Wilson identify several

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⁴⁰⁸ Wendell Bell, "What Do We Mean by Futures Studies?" in Richard Slaughter ed., New Thinking for a New Millenium (London: Routledge, 1996): 9.

⁴⁰⁹ Bell, 1996, 12.

⁴¹⁰ Bell, 1996, 13.

⁴¹¹ Gill Ringland, Scenario Planning: Managing for the Future, (West Sussex, England: John Wiley & Sons Ltd, 2006): 13-21.

characteristics of scenario planning: objective vs normative, and analytical vs. intuitive approaches.⁴¹²

Ron Bradfield et al have identified several strands of scenario theory that appear to cover the widest range of possibilities.⁴¹³ According to Bradfield et al, scenario development falls into three different schools: intuitive logic models, the La Perspective methodology, and probabilistic modified trend models.⁴¹⁴ The basic characteristics of each school are reviewed in Table 6.1.

The first is a wide-ranging school of thought that can be loosely placed under the description of ‘intuitive logic models.’ Consisting of four overarching purposes, understanding situations, creating strategies, anticipating possibilities and facilitation of organization wide adaptive learning, the intuitive logic school is extremely broad.⁴¹⁵ What generally separates the intuitive logic school from others is its lack of quantitative foundations and instead a focus on qualitative description and the construction of normative prescriptions.

The La Prospective School comes out of French military defense studies and was originally tasked with creating scenarios for French government institutions.⁴¹⁶ Encompassing a range of tools, from scenario planning to management concepts, the La Prospective School was labeled by its founder Michel Godet as “Strategic Scenario Building.”⁴¹⁷ In many ways, the La Prospective school is a hybrid of probabilistic modified trends and intuitive logic. First, participants are encouraged to ask constructive questions and perceive significant variables through a MICMAC method.⁴¹⁸ Subsequently, trends and strategies are analyzed through quantitative modeling known as the MACTOR method. Then, scenarios become more focused and less uncertain through the use of Delphi and expert discussions. Finally, options are discussed and crafted

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⁴¹² Ian Wilson and Bill Ralston, The Scenario Planning Handbook, (New York: Cengage Learning, 2006): 22.

⁴¹³ Ron Bradfield et al., “The Origins and Evolution of Scenario Techniques in Long Range Business Planning,” *Futures* 37 (2005): 795-812.

⁴¹⁴ Bradfield et al., 2005, 795-812.

⁴¹⁵ Bradfield et al., 2005, 806.

⁴¹⁶ Bradfield et al., 2005, 802.

⁴¹⁷ Bradfield et al., 2005, 803. For a detailed breakdown of the La Prospective method, see, Michel Godet and Fabrice Roubelat, “Creating the Future: The Use and Misuse of Scenarios,” *Long Range Planning* 29 no. 2 (1996): 164-171.

⁴¹⁸ Godet and Roubelat, 1996, 166.

through the MULTIPOL method. Final scenarios and strategies are crafted through a combination of data crunching, trend extrapolation, and computer simulation models.

The probabilistic modified trend models, including methods such as Trend Impact Analysis (TIA) and Cross Impact Analysis (CIA), are highly reliant on reliable, time-series data. Where the logic-intuitive schools primarily begin at the identification of organization problems and potential future issues, and the La Prospective School is a mix of both, probabilistic modeling begins with data collection. The primary difference between TIA and CIA is that TIA seeks to understand the impact of extraordinary events on single trends, and CIA focuses on pairs or groups of events and how they impact each other and the trend lines. Both methods are extremely similar and rely on the extrapolation of probabilistic trend lines through statistical analysis and user intuition. The key guide for TIA and CIA is the explicit identification of probabilities; to the best of the researchers knowledge, events are given probabilistic potentials that through computer analysis lead to the construction of scenarios.

All three schools generate scenarios, consisting of narratives of potential futures. What separates the La Prospective and Probabilistic Modeling schools from the Logic-intuitive schools is their focus on a most probable future. Probabilistic and La Prospective methods seek to create a preferred future through quantitative techniques, whereas the logic school seeks to generate different scenarios primarily for the stimulation of new thoughts and ideas. The logic school is focused primarily on process, whereas La Prospective and Probabilistic schools are focused on likely outcomes. What separates La Prospective from Probabilistic schools is the role of numbers and computers; La Prospective is a combination of intuition and thought, whereas probabilistic schools are more reliant on data and simulations.

Anticipating futures of globalization, inequality, and political stability (GIP variables) could be done through any or a combination of the above methodological schools. Trend Impact analysis becomes uniquely useful in projecting futures for the GIP variables due to the fairly developed state of quantitative data. Following the advice of Bell and others, TIA is combined with the qualitative methods of emerging issues analysis and the Mānoa School archetypes in order to stimulate the generation of potentially significant events to affect the trend lines. The following section discusses the

details of TIA, along with the benefits incurred by supplementing TIA with additional qualitative and quantitative methods.

Table 6.1: Schools of Scenario Construction	
Intuitive Logics Models	<ul style="list-style-type: none"> • Frequently associated with Royal Dutch Shell Company, and Herbert Kahn • 'Methodological Chaos:' Many approaches • Disciplined Intuition' • Focus on Process: Knowledge generated by creating scenarios more important than the scenarios themselves. • Primarily Qualitative.
La Prospective Models	<ul style="list-style-type: none"> • Associated with Gaston Berger, Bertrand de Jouvenel, Pierre Masse, and Michel Godet • Blending of Intuitive Logics and PMT methods, using computer simulations and intuition. • Creation of normative future images to facilitate public policy development • Focus on outcome.
Probabilistic Modified Trend Models	<ul style="list-style-type: none"> • Associated with Gordon, Helmer, and Rand Corporation • Naïve extrapolation of data are supplemented by the generation of significant future events that disturb trend lines. • Quantitative in approach.

Trend Impact Analysis in Detail: Theory and Method

Trend Impact Analysis (TIA) was created in the 1970s to address an important problem in futures research. Often, quantitative models are used to extract trend lines, and yet those trends do not take into account unexpected actions that could interrupt the trend.⁴¹⁹ TIA overcomes this limitation by creating a probabilistic method to interrupt

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⁴¹⁹ Theodore J. Gordon, "Trend Impact Analysis," in Glenn and Gordon eds., 2009, i – 19. An example of TIA used to analyze the American defense industry is in Mark A. Boroush and Charles W. Thomas, "Alternative Scenarios for the Defense Industry After 1995," *Planning Review* 20 no. 3 (1992): 24-29. An

trend lines. For any hypothetical event deemed significant in affecting the trend line, the time to impact is estimated. In addition, the probability that the event will occur is constructed based on the best available research. Lastly, the size of the impact is also attached to each event, based either on the statistical significance and coefficients identified in chapters two and three, and other relevant research. This process is demonstrated in Graph 6.1. After all the events for each part of the GIP nexus are constructed, the entire model is run through a Monte Carlo estimation. For each future year included in the TIA, random numbers are generated that, based on the probabilistic likelihood of each event, indicate whether or not a particular event occurs. This process is then repeated thousands of times, generating probabilistic deviations from the baseline trend. As more simulations are repeated, the closer the projections reflect the underlying assumptions placed in the event analysis.

Recent research has amended Trend Impact Analysis, providing powerful new tools to facilitate TIA's analytical potential. Trend Impact analysis has been augmented to allow system mechanics, feedback loops, and other neural network style enhancements.⁴²⁰ Trend Impact Analysis has include varying degrees of event impacts on a trend line.⁴²¹ Other techniques allow new estimations of event probabilities through fuzzy logic mathematical approaches.⁴²² While these quantitative additions to TIA are useful in implementing multilayered interactions between variables, they do not facilitate the generation of unique and important events to impact trend lines.

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explanation of how to use TIA in the process of scenario construction is in Ron Bradfield et al., 2005, 795-812. An excel spreadsheet, along with a tutorial, to facilitate the Monte Carlo Estimations for TIA was acquired directly from Gordon and is available on request.

⁴²⁰ Nedaa Mohamed Ezzat Agami et al, "An Enhanced Approach for Trend Impact Analysis," *Technological Forecasting & Social Change* 75 (2008): 1439-1450. See also, Nedaa Agami, "A Neural Network Based Dynamic Forecasting Model for Trend Impact Analysis," *Technological Forecasting & Social Change* 76 (2009): 952-962.

⁴²¹ Neda Agamiet al., 2008.

⁴²² Nedaa Agami, Mohamed Saleh, and Hisham El-Shishiny, "A Fuzzy Logic Based Trend Impact Analysis Method," *Technological Forecasting and change* 77 (2010): 1051-1060.

Graph 6.1: The Parts of Trend Impact Analysis
Source: Theodore J. Gordon, "Trend Impact Analysis,"
in Glenn and Gordon eds., 2009, 2

However, TIA has several weaknesses. First, the events included in the analysis are incomplete. There are always unforeseen events that will impact any trend line. Second, the time to impact, anticipated size of impact, and probability of impact are all estimates based on the best available research, but are also highly likely to be incorrect. Third, nothing within the TIA framework identifies which events should be included; the analyst needs to make their own best estimates based on current information or through consultation with other researchers. Regardless, the benefits of TIA is they force analysts to clearly display their assumptions about the future in a framework that allows them to envision what possible futures may exist based upon events that are deemed important. Also, qualitative events, or events that cannot clearly be quantified, can be included in the modeling, and their impact anticipated due to the probabilistic nature of TIA.

Typically, events are generated for a TIA by using expert interviews and analysis such as the Delphi method.⁴²³ Expert judgments are a powerful tool in creating consensus regarding the range of potential events and their impacts on trend lines. While not ignoring the important resource that these judgments provide, an alternative method is introduced that combines the results from quantitative studies with the structured futures scenario archetypes of the Mānoa School. Nothing stands in the way of using Delphi methods along with the results from quantitative analysis, but the direct connection of quantitative modeling and qualitative scenario archetypes in TIA has not been discussed or advanced previously in the literature.

In chapters two and three, the relationships between globalization, inequality, and political stability were analyzed to identify what type of variables caused the greatest fluctuations. Factors such as regime type, levels of education and technology were used to understand systems of relationships. Chapter 4 builds upon this previous foundation by identifying several emerging events, the digital, 3D printing, and automation revolutions, that will further affect the relationships studied in chapters 2 and 3. Using Trend Impact Analysis and the Mānoa Four Futures, 4 different groups of events, affecting each of the major trend lines, are grouped into continued growth, collapse, discipline, and transformative scenarios. These events are then run through a computer model, providing an understanding of several possible ways globalization, inequality, and political stability could evolve into the future.

Section 2: Naïve Extrapolation of Trend Lines

The first step in TIA is to fit mathematical models to each of the trend lines that events are being anticipated for. This “line-fitting” process is naïve in the sense that models are chosen based on the closest fit to the data as well as a superficial attempt to pursue face validity; i.e., does the trend model make logical sense given the type of data and the underlying theoretical relationships. These trend extrapolations are at best ball park estimates and at worst completely wrong. However, by using curve fitting models we are forced to think about the long term evolution of the trends to hopefully identify

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⁴²³ Gordon, “Trend Impact Analysis,” 2009, 2.

patterns in the data that facilitate not only an understanding of the trend lines development but also how events impact the trends.

For each trend, forecasts are extrapolated back to 1900 and forward to 2060. The large coverage of the extrapolations allows for the full shape of the trend to be observed, facilitating an evaluation of superficial validity. Each trend line tells a story regarding how the variable evolved over time, which is then compared with other sources of analysis to see if the external analysis corresponds with the trend extrapolation.

Globalization Trend Lines

To find the best models to fit the data, a computer program was used that identified which models had the best fit.⁴²⁴ For the globalization data, all the data had a strong fit with a Ratkowsky sigmoid model. Sigmoid functions are in the shape of a sideways s; growth starts slow during the early stages, rapidly increases during a middle period, and growth again subsides near the end. Frequently seen in many biological systems and relationships, sigmoid functions are commonly associated with growth models.⁴²⁵

Does a sigmoid function make sense in describing the historical evolution of globalization? Sigmoid functions have previously been used to explain the integration of corporations into the international economic system.⁴²⁶ Visually represented in Graph 6.2, integration begins slowly until a certain point where the corporation expands swiftly until reaching an equilibrium where the amount of benefits gained from increased integration slowly flatlines, possibly even reducing. Sigmoid models are frequently used to explain international integration and connections, providing some face validity to this naïve extrapolation. Certainly the actual process is not smooth. Frequently historical explanations of globalization are seen as increasing greatly during the Golden Age of

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⁴²⁴ The software used was “Curve Expert Professional,” Accessed August 20, 2013 at <http://www.curveexpert.net/>.

⁴²⁵ For a review of sigmoid functions, see Even Tjorve, “Shapes and Functions of Species-Area Curves: a Review of Possible Models,” *Journal of Biogeography* 30 (2003): 827-835.

⁴²⁶ Florinel-Frank Cota, “Looking at the Link Between Leadership, Organizational Learning, and the Internationalization Sigmoid,” *Global Management Journal* 2 no. 1 (2010): 3-16. Additional usages of sigmoid models to explain globalization is seen in Ian Brooks et al., *The International Business Environment: Challenges and Changes* (Canada: Pearson Education Canada, 2010): 317-319.

Capitalism (from the late 1800s to WW1) with a dramatic slowdown during the World Wars and depression of the 1920s, 30s, and 40s, only to continue expanding again once the wars were over.⁴²⁷

As naïve extrapolations inferences, the globalization trend line extrapolations likely are incorrect in the exact ending and beginning values. However, the overall story told, that globalization began slowly, reaching a takeoff point of quick expansion, until slowly leveling out as the process matures makes logical sense. These models indicate there is an “end-point” to globalization in the sense there is a maximum level of integration that can occur. The naïve extrapolations of the globalization data are in Graph 6.3

Theoretically, the sigmoid function makes sense in describing long-term globalization processes. In addition, several statistical tests, including the correlation coefficient and the r^2 also encourage the use of the sigmoid function. The correlation coefficient for all the models is in the low to high .90s, indicating a high level of correlation. The r^2 's are slightly lower, with the political globalization being the worst at .86, but overall the tests encourage that these models do a decent job of anticipating future changes in globalization.

⁴²⁷ See for example David Held et al., Global Transformations: Politics, Economics, and Culture (Stanford, Stanford University Press, 1999).

Graph 6.3: Naive Extrapolation of Globalization Variables

Red Shading is 95% Confidence Intervals

All Models Are Ratkowski Sigmoid Curves (S-Curves)

All Models in the Form of $Y = a / (1 + e^{b-cx})$

Economic Globalization:

Correlation Coefficient:
.9869

R-Squared:
.974029

Social Globalization:

Correlation Coefficient:
.96

R-Squared:
.91

Political Globalization:

Correlation Coefficient:
.92

R-Squared:
.85

Economic Inequality Trend Lines

The naïve extrapolations of the economic inequality data provide clear evidence of cyclical patterns. This extrapolation indicates that economic inequality experiences cyclical pressures, often associated with the business cycle, causing inequality to vary in response to macroeconomic factors. Cyclical theories of economic inequality have a long history, and with some identifying a countercyclical pattern where during economic recessions inequality increases and while during growth periods economic inequality decreases.⁴²⁸

The most remarkable aspect of the extrapolation is that while the actual level of inequality is typically incorrect in the historical projections, the direction and duration of long term inequality fluctuations is fairly accurate. Historical estimates of economic inequality prior to the 1960s is notoriously spotty, however some consensus has formed regarding changes in inequality. Using survey data, tax data from estates, and government estimates of household wealth ownership, estimates have shown that inequality increased significantly from 1922 to 1929.⁴²⁹ From the 1930s to the 1940s, wealth inequality declined again, only to increase during the early 1950s and peaking during the late 1950s.

Baldev Raj and Daniel Slottje, using Gini coefficients of overall income inequality, show inequality peaking around 1950, and falling until the late 1960s and early 1970s, only to begin to increase during the late 1970s and early 1980s.⁴³⁰ Other analysts argue that from the late 1800s to World War I, inequality was higher than at any other time in the 20th century, only to be reduced by World War I.⁴³¹ As with the trend extrapolations, the early 1920s was a transition where inequality increased again. Analysts are fairly certain that from 1929 to 1951, inequality began to fall again, through

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⁴²⁸ Sheldon Danziger and Peter Gottschalk, "Increasing Inequality in the United States: What We Know and What We Don't," *Journal of Post Keynesian Economics* 11 no. 2 (1988): 192.

⁴²⁹ Lisa A. Keister and Stephanie Moller, "Wealth Inequality in the United States," *Annual Review of Sociology* 26 (2000): 68.

⁴³⁰ Baldev Raj and Daniel J. Slottje, "The Trend Behavior of Alternative Income Inequality Measures in the United States from 1947-1990 and the Structural Break," *Journal of Business and Economic Statistics* 12 no. 4 (1994): 483.

⁴³¹ Robert D. Plotnick et al., "The Twentieth Century Record of Inequality and Poverty in the United States," in Stanley Engerman and Robert Gallman eds., The Cambridge Economic History of the United States, Volume 3, The Twentieth Century (Cambridge, Cambridge University Press, 2000): 249-300.

the actual time for transition is disputed. Some argue the transition to decreasing inequality occurs after 1940,⁴³² whereas others argue the transition occurs around 1939.⁴³³ While the precise timing is under dispute, most agree that by the 1960s economic inequality was declining significantly only to rise again during the late 1970s and early 1980s.⁴³⁴ While the extrapolation does not perfectly identify the transition during the late 1930s and 40s, it does accurately identify the 1920s transition. Further, if we extrapolate the inequality trend lines back to the 1800s, there is an increase from 1820 to 1850, and from 1870 to 1900, just as demonstrated by Steckel and Moehling.⁴³⁵ Admittedly Steckel and Moehling believe the interim period from 1850 to 1870 has no major change in the level of inequality whereas the trend extrapolation has a significant drop. Accepting that the trend extrapolation cannot possibly perfectly mimic historical changes in economic inequality, the extrapolation was still intriguingly capable of identifying important transition shifts in inequality trends, even if the absolute value it identifies is incorrect.

Accepting that inequality may follow a cyclical path as identified in the extrapolation, the next step is to deduce whether or not a cyclical process for economic inequality makes sense in anticipating long term future change. Recent analysis in cliometrics provides several reasons to perceive inequality as a cyclical long-term process.⁴³⁶ Arguing that western, capitalist societies have systemic feedback processes, Peter Turchin has identified four phases of ‘secular trends,’ comprising socio-economic processes that last several hundred years altogether. Yet these are not neat and pretty cycles, as the trend extrapolation would at first intimate. Rather, they are ‘chaotic,’ the result of complex human systems and feedback loops that when seen from a long view of history generate a certain, though uneven rhythm.⁴³⁷

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⁴³² Plotnick et al., 2000.

⁴³³ Thomas Piketty and Emmanuel Saez, “Income Inequality in the United States, 1913-1998,” *The Quarterly Journal of Economics* 118 no. 1 (2003): 11. 1-39.

⁴³⁴ Plotnick et al., 2000.

⁴³⁵ Steckel and Moehling, “Rising Inequality: Trends in the Distribution of Wealth in Industrializing New England,” *The Journal of Economic History* 61 no. 1 (2001): 160-183.

⁴³⁶ Peter Turchin and Sergey A. Nefedov, *Secular Cycles* (Princeton, Princeton University Press, 2009).

⁴³⁷ Peter Turchin, “Return of the Oppressed,” *Aeon*, Accessed August 4, 2013 at <http://www.aeonmagazine.com/living-together/peter-turchin-wealth-poverty/>.

Turchin divvies human evolution into two major trends, integrative and disintegrative, each with two sub trends. On the integrative side is an initial expansion phase, leading to economic growth and a reduction in economic inequality. As growth flattens, a stagflation phase occurs, creating an environment where inequality begins to flourish. Stagflation begins to affect human institutions, encouraging them to fail or face extreme difficulties as the physical needs of people become more difficult to satisfy. Finally, the disintegrative cycle concludes with a depression, reducing economic inequality as everyone becomes hit with economic losses. This lays the groundwork for the beginning of another expansion phase, and the cycles begin anew.⁴³⁸

Even though some may argue that inequality has cyclical processes encouraged by feedback loops in human systems, the naïve extrapolations for economic inequality, as identified in Graph 6.4, must be seen more as a flawed baseline rather than absolute truth. Further, the extrapolation is flawed because even with the 95% confidence intervals, the peaks and valleys anticipated are too systematic; potential futures, as well as historical extensions will go higher or lower than perceived in the model. Regardless, as a naïve attempt to extend inequality trends into the future based on roughly 30 years of data, the extrapolation encourages a view of inequality that takes into account cyclical fluctuations that provides a useful benchmark to anticipate future changes in inequality.

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⁴³⁸ Turchin and Nefedov, 2009, 34.

Graph 6.4: Economic Inequality Naive Extrapolations

1 Term Fourier Function
 $Y = a_0 + a_1 \cos(x \cdot w) + b_1 \sin(x \cdot w)$

Fit Statistics:

Correlation Coefficient = .99
 $R^2 = .9842$

1 Term Fourier Function
 $Y = a_0 + a_1 \cos(x \cdot w) + b_1 \sin(x \cdot w)$

Fit Statistics:

Correlation Coefficient = .99
 $R^2 = .9855$

Sinusoidal Function
 $Y = a + b \cos(c \cdot x + d)$

Fit Statistics:

Correlation Coefficient
 = .935
 $R^2 = .8746$

Political Instability Trend Lines

The extrapolations for the political stability factors were less clear than for either globalization or inequality. Regardless, important insights can be identified by analyzing each trend and inferring potential possibilities.

Political violence does not have a very useful long term trend, and doesn't appear to follow any pattern in the sample of data analyzed here. The pink area of the graph represents a 95% confidence interval, and while a line can be fit through all the data points, the massive range of the confidence interval indicates that predicted observations for political violence could be absolutely anywhere. Political violence varies from -.47 to -.64, and the more negative the value the less political violence exists. The United States was fairly stable throughout this period, so the small variance in the measure could effectively be described as 'noise,' identifying more the imprecision of the quantitative indicator rather than any major change within the United States. The lack of a trend in political violence means its role in the Trend Impact Analysis is fairly limited, and instead levels of political violence will be anticipated by the qualitative description of the scenario, and other sources on political violence, rather than forecasting of quantitative trend lines based on this data.

While the current political violence data doesn't provide a clear pattern, other researchers have found more success. Analyzing numerous types of political violence events, Peter Turchin identified cyclical patterns of political violence in roughly 50 year waves, with the next peak of instability expected to occur somewhere around 2020.⁴³⁹ Approaching from a systems perspective, Turchin identifies several feedback processes that lead to cycles in political violence. Increasing supplies of labor, wealth inequality, and elite competition leads to greater political violence, whereas with political violence decreases as measures of human well-being increase.⁴⁴⁰

Regime instability is a composite of changes addressing factors from changes in the executive, to coups, and major constitutional changes. The two highest scores,

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⁴³⁹ Peter Turchin, "Dynamics of Political Instability in the United States, 1780-2010," *Journal of Peace Research* 49 no. 4 (2012): 577-591.

⁴⁴⁰ Turchin, 2012, 13.

identifying the most instability, occurred in the average scores from 1975-79 and from 2000-04, likely indicating the types of instability coming from the Watergate scandal and the tumultuous election of George W. Bush, respectively. The model is a two term fourier extrapolation, which describes regime instability as a major cyclical process interrupted by a fluctuation between maximum and minimum scores. The back and forth sway in the model is largely attributable to changes in the presidency. For comparison, Afghanistan scores range from a low of 1.3 in 1975 to a max of 1.9 in 1980, largely as a result of the Soviet Invasion. The American score is highest in 1975 and 2000 with a score of approximately -.66 and a lowest score of -1.3 in 1995. Clearly, while there are significant fluctuations, the United States political regime has been very stable. Unfortunately, the intriguing shape of this model makes it difficult to use to project in the future, but it does reinforce the potential regime instability implications caused by democratic elections and the changes in power those elections may indicate.

Within instability measures the push and pull between major political parties in a political system. Analysis of political polarization within the United States has reached a fairly robust consensus; polarization is on the rise within Congress, a factor of the increasing homogenization of policy preferences within political parties and increasing opposition between parties.⁴⁴¹ Chart 6.5 identifies trends in party polarization within the United States from 1979 to 2008, showing a clear rise in polarization during the times measures by the within stability indicator, from the 1970s to 2008.⁴⁴²

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⁴⁴¹ For a review of this literature, see Geoffrey C. Laymen et al., "Party Polarization in American Politics: Characteristics, Causes, and Consequences," *Annual Review of Political Science* 9 no. 83 (2006): 83-110. See also Alan I. Abramowitz and Kyle L. Saunders, "Is Polarization a Myth," *The Journal of Politics* 70 no. 2 (2008): 542-555.

⁴⁴² Neal Devins, "Presidential Unilateralism and Political Polarization: Why Today's Congress Lacks the Will and the Way to Stop Presidential Initiatives," *Faculty Publications* Paper 32, (2009): 408. Accessed August 4, 2013 at http://scholarship.law.wm.edu/cgi/viewcontent.cgi?article=1025&context=facpubs&sei-redir=1&referer=http%3A%2F%2Fscholar.google.com%2Fscholar%3Fstart%3D40%26q%3Dpolarization%2Bin%2Bamerican%2Bcongress%26hl%3Den%26as_sdt%3D0%2C5#search=%22polarization%20american%20congress%22.

Graph 6.5: Polarization in American Political Parties

Distance Between Political Parties from 1879-2008

Source: Neal Devins, 2009, 408.

The rise in polarization between political parties is in direct odds with the data from the within instability indicator. Within instability, which in part takes into account polarization, is at its lowest in 1975, only to dramatically increase in the early 1980s with Reagan, only to slowly decline again through the 2005-2009 average. What could explain this divergence; either the within indicator is faulty, or perhaps the within indicator is picking up a different aspect of American politics. In a recent research paper, Neal Devins highlights a potential explanation; declining within instability may be the result of the growing polarization within congress, *creating an opportunity for the executive branch to pursue and pass policies with little obstruction from congress*. In other words, as congress becomes involved with political fights between parties, the executive branch has more opportunities to expand power and pursue political objectives with less resistance. Hence, the within instability indicator decreasing indicates the growing power of the executive branch vis-à-vis congress. Perceiving within instability as a cyclical process passes face validity, arguing that the strength of the executive is likely to wax and wane with levels of polarization in congress.

Similar to the violence instability indicator, the protest instability indicator was resistant to an extrapolation that did not experience significant problems for interpretation. A cyclical system is constructed by a sum of sine model. The adjusted r-squared, which takes into accounts the additional parameters required in this type of non-linear model, is a terrible .0691. This is primarily caused by the large value for 1975, caused by significant public outcry against the Vietnam War. After the Vietnam war protests subside, the protest stability indicator drops dramatically, so much so that the 1975 score is unable to fit with a high level of significance in any model chosen.

The belief that social protests follow cyclical dynamics is an old one. These cycles often go through several processes. First, a problem with government policy is identified by a constituent group. Second, elites argue regarding how the problem should be solved and how the problem should be perceived. Third, the media begins to highlight the issue. Fourth, policy alternatives are expressed by dissidents. Fifth, elites respond by building new alliances and redefining terms. Finally, social institutions attempt to implement solutions, often leading to a fragmentation of dissidents until the next social problem arises again.⁴⁴³

In the TIA, the naïve extrapolation for protest instability must be carefully interpreted. Numerous attempts were made to fit the data as best as possible, but few models made theoretical sense. The model chosen falls under the category of a rational model, where effectively protest instability has a flat baseline, which is approximately equal to the average of all the data points. Theoretically, this argues that protest instability does not change much due to time, and instead protests occur as a result of changes in the political, social, and economic system. This provides a useful baseline to identify events that would increase or decrease protest instability from this flat constant. The final extrapolations for the instability variables is in Graph 6.6.

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⁴⁴³ David S. Meyer, "Protest Cycles and Political Process: American Peace Movements in the Nuclear Age," *Political Research Quarterly* 3 no 46 (1993): 458. Modern applications of protest cycle theory can be seen in Jai Kwan Jung, "Disentangling Protest Cycles: An Event-History Analysis of New Social Movements in Western Europe," *Mobilization: An International Quarterly* 15 no. 1 (2010): 25-44. See also the foundational book in protest cycle theory, Sidney Tarrow, Power in Movement: Collective Action, Social Movements and Politics (Cambridge, Cambridge University Press, 1998).

Graph 6.6: Naive Extrapolations of Political Instability Indices

Political Violence

Correlation: .99

R2 = .98

Regime Instability

Correlation .999

R2 = .999

Within Instability

Correlation: .829

R2: .6875

Graph 6.5 Cont'd: Political Instability Indices

Network Indices Extrapolations

Three different network indices are used as a relational measure of globalization. Two of them measure the distance the United States is from the center of the global trade network: Clark Core-Periphery (Clark C-P) and Symmetric Core-Periphery (Symmetric C-P). For the C-P measures, a higher score indicates being closer to the center of the global trade network. The other measure is the natural log of the Freeman's degree centrality for the United States, where a higher score indicates a more central position in the global trade network. Naïve extrapolations of each of these indices provide useful models to understand the evolution of globalization as a relational concept. The extrapolations are seen in Graph 6.7

Both the C-P measures are represented by sinusoidal models. These models argue that distance from the center of the global trade network is cyclical; nations become more or less central in the global trade network as trade related domestic policies change. Measuring overall trade openness, Chase-Dunn et al identified three waves that have affected the global trade system since 1795.⁴⁴⁴ More recently, researchers are settling on

⁴⁴⁴ Christopher Chase-Dunn et al., "Trade Globalization since 1795: Waves of Integration in the World-System," *American Sociological Review* 65 no. 1 (2000): 77-95.

three major cyclical epochs for trade globalization the first wave of 1870-1914, the bloc economies from 1915-1959, and the second globalization wave from 1960 to the present.⁴⁴⁵ Each cycle was comprised of different structures of states. In the first wave of globalization, states were neither excessively clustered, nor highly connected. During the bloc period, states were highly clustered with countries of economic and political similarities; i.e., the Soviet Bloc, Western Europe, etc. In the second wave of globalization, few clusters exist; rather, states are more connected and more inclusive than ever before.⁴⁴⁶

These descriptions of different time periods of globalization are useful to help interpret the Clark and Symmetrical Core-Periphery indicators. The core-periphery indicator decreases as more states participate in the global trading network; more states participating in the network mean any individual state is likely further from the center of the network, as more states vie to increase their connections. As a result, periods of increasing globalization and integration, as especially identified in the second wave from 1960 to the present should see a reduction in C-P values. Alternatively, if the international system divides itself into separate blocks, countries near the core of each individual block are likely to have a higher Core-Periphery value. Indeed, taking into account the 95% confidence intervals, the Core-Periphery Naïve extrapolations tell a similar story; a decline in C-P values from the late 1800s to World War 1, an increase in C-P values during the bloc era, and again a reduction in C-P values during the second wave of globalization.

Although not perfectly accurate, the C-P extrapolation identifies important cyclical process identified in integrative processes. As more countries participate, the importance of any single individual nation is reduced as more pathways exist for trade. The cyclical potential of global integrative trends reminds analysts that globalization itself is not a linear, straightforward, guaranteed process. Rather, the continued interconnection of states relies on the sustained implementation of policies that encourage integration, such as reductions in tariffs or free trade agreements.

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⁴⁴⁵ Michael Artis and Toshihiro Okubo, "Globalization and Business Cycle Transmission," *North American Journal of Economics and Finance* 20 (2009): 91-99.

⁴⁴⁶ Artis and Okubo, 2009.

An alternative vision of globalization is provided by the Prew World-System (W-S) indicator. Unlike the Clark C-P measures, Prew W.S. is a sigmoid, S function. The Prew W-S indicator is a measure of the total amount of imports and exports for the United States. The overall volume of United States trade has increased significantly, from 6.5 percent of GDP in 1960 to 20 percent of GDP for the early 2000s.⁴⁴⁷ One of the most significant expenses associated with international trade is transportation costs. Sea transportation accounts for 99% of all international trade, and much of the rest is accounted for by air.⁴⁴⁸ Shockingly, airfare costs have dropped 92% from 1955 to 2005, facilitating increased trade. Alternatively, sea shipping costs have varied much more, increasing significantly from the 1970s to the 1980s due to the oil crises, and slowly decreasing since the end of the 80s. Much of the reductions in cost have already occurred in air and sea shipping, and while there is a large chance that shipping costs will continue to decrease, massive reductions are unlikely.

Prew W-S is an s-curve largely to reflect the already achieved gains in shipping costs. Rapid technological improvements greatly reduced shipping costs, but more recently those gains have stalled. This is identified by the decreasing slope in the Prew W-S extrapolation around the year 2000. If a new form of technology arrives, the amount and value of physical imports and exports could dramatically change, because historically technological advancements have spurred greater trade.⁴⁴⁹ However, taking into account current technology, a slowly increasing trend in overall imports and exports makes sense.

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⁴⁴⁷ David Hummels, "Transportation Costs and International Trade in the Second Era of Globalization," *Journal of Economic Perspectives* 21 no. 3 (2007): 131-154.

⁴⁴⁸ Hummels, 2007, 151.

⁴⁴⁹ Hummels, 2007, 152.

Graph 6.7: Network Indices Naive Extrapolations

Clark C-P

Correlation: .99

$R^2 = .99$

Clark C-P Symmetric:

Correlation: .99

$R^2 = .99$

Clark C-P

Correlation: .99

$R^2 = .99$

The naïve extrapolation of the previous trend lines provides a baseline projection of the likely future levels for each variable. These future projections are purely based on line fitting of historical data, and represent where each variable is likely to be in the future, assuming each variable follows the historical trend. In section three, events are constructed and applied to the trend lines in such a way as to reflect analyst's assumptions regarding how trend lines will change in the face of new events.

Section 3: Scenario Construction - Event Probabilities and Impacts

Trend Impact Analysis has several phases. First, models must be identified to extrapolate future values for trends, which occurred during the previous section. The current section focuses on constructing events that are likely to affect the future values extrapolated. The information required for the event analysis is demonstrated in Table 6.3.⁴⁵⁰

Table 6.2: Event Construction Example		
Event Description:		
Event Described Having an Anticipated Effect on Measurable Trend Lines		
	Final Impact on Trend Line In % Change	% Change
	Time to Impact In Years	Number of Years
Year	Probability of Occurring (% chance to occur)	Variable (% impact on trend)
2010	0	30
2015	20	60
2020	30	90
2025	40	120
2030	50%	150%

Table 6.3 organizes the assumptions required to analyze events in a Trend Impact Analysis framework. An event is described that is assumed to have a % impact on a trend line. The size of the impact is deduced from any or all of the quantitative analysis

⁴⁵⁰ Based on Gordon, SOFI, 2009, 17

from chapter 2 and 3, literature reviews, and the analyst's personal judgment. The framework allows for a graduated dissection of the time and size of the impact. The data identified in Table 3 tells the following hypothetical story: Technology allows humans to place their minds within computers. This is expected to have a maximum impact on globalization of 150% (in 30% increasing intervals), that has a probability of occurring of 50% by 2030 (in 10% increasing intervals.) The intervals do not necessarily have to be graduated, and can either be the same or whatever value is considered most appropriate. This example is to represent how each future event will be presented. For the actual events, significant discussion will follow reflecting how the probabilistic likelihoods are identified, as well as how the percent change relationships are constructed.

In assessing the probabilistic likelihood of an event, as well as the probabilistic impact of an event on trend lines, it must be stressed that the purpose of TIA is to provide an environment to reflect an analyst's assumptions. Significant discussion is spent connecting the quantitative relationships from chapters 2 and 3 with the event impacts in the following section, but ultimately both the probabilistic likelihood of events and the event impacts on the trend lines reflect the underlying assumptions of the analyst.

The events are broken into each type of Mānoa School futures archetype. Among the scenarios, many events will be similar, but with different consequences. A brief story will be constructed to identify the overall theme and style of the scenarios, following by a breakdown of each specific event. In addition, the flowchart from the futures is used to organize the type of events to demonstrate the process and direction of the scenarios.

Scenario 1: Continued Growth - A Future Desirable for Those in Power Now

The continued growth future is the future that is most likely to benefit those who are currently in power. The general mindset of the ruling class is to explore and pursue knowledge, but primarily in order to serve the maintenance of the ruling order. Technological changes that occur, such the evolution of 3D printing and the greater automation of work and society, are all directed towards the maintenance of scarcity. Corporations and government institutions continue their long march towards unification, reducing the ability of popular government to be controlled by citizens. An oligarchy fusing financial and political interests becomes cemented within organizing institutions..

Event 1: Economy of Abundance Controlled by Copyright

Event 1 identifies the impact of the merging of 3D printing and nanotechnology similar to what was seen in the novel The Diamond Age. Nanotechnology creates possibilities for 3D printers that can produce practically any object. However, the complicated nature of producing nanotechnology provides an opportunity for government to play the middle-man. Government is able to regulate the production of 3D printing nanotechnology, reinforcing intellectual property rights and blocking radical changes to the economy that may threaten or alter the status quo. 3D printing nanotechnology is a profound source of system stress that becomes regulated and directed towards the furtherance of elite dominance and the perpetuation of scarcity.

The development of 3D printing nanotechnology is seen as increasing technological development (as measured by the natural log of trademark applications) by 1000%. This is a ball park estimate and is not meant to be a perfectly accurate prediction. Based on the percent change chart, that would indicate a % increase in each KOF globalization measure by approximately 20% each. The regression models also indicate that the core-periphery measure would increase by approximately 35% and the Prew W.S. would increase by 144%.

Descriptively, this technological change creates a controlled resource, 3D printing nanobots, which increases the number of connections the United States has with the rest of the world. Nanobots are not ‘scarce,’ because they can perpetually create themselves, but scarcity is created through government enforced regulation. This artificial scarcity increases the importance of the United States in the global trade networks, which is represented by the increase in the core-periphery scores. Additionally, the 144% in Prew W.S. identifies the increasing number of goods and services supplied by the United States to the world as a result of global demand for nanobots. Economically and socially, the important of nanobots to the global economy increases the integration of the United States into the global economy, indicated by the 20% increase in the KOF indices.

Regression modeling also showed no relationship between technological change and inequality. However, by directing a type of technological change that could dramatically reduce inequality by removing the effect of scarcity indicates this event is likely to perpetuate current trends in economic inequality. As a result, this event encourages the trend extrapolation of inequality constructed by the sigmoid model, because the regulation of nanobot technology would slowly increase inequality until a new equilibrium is reached.

In regards to political stability, regression modeling identified no direct relationship with technology. Alternative ancillary effects from this technological change could stem from public disapproval of the use of regulatory government powers to enforce scarcity in what would otherwise be a free good. However, the size of this effect is argued to be limited because society has largely become accustomed to a scarcity based environment. As a result, political impacts are deemed extremely limited, and if occur, are limited to a minority of activists.

A small increase in anti-government process is the only major affect technological growth has on political stability. The regression modeling identified no relationship between technology growth and political stability. However, the profound economic and social implications of nanobots on society encourage a loose interpretation of potential implications. The use of government regulation to stymie the potential positive effects of technology, in its possible effect of changing the economic landscape and eroding the importance of scarcity, leads to an increase in anti-government protests. As previously stated, most within society will be accepting of the reinforcement of scarcity through state regulation due to an acceptance of the continued structure of the world, but certainly a very loud and boisterous minority is likely to take to the streets and aggravate for political change and the removal of regulation. As a result, political protests are anticipated to increase 15%.

As a major supplier of nanobots for global consumption, the Core-Periphery indicators and the Prew W.S. indicators increase proportionally to the size of the technological development increase. The United States becomes closer to the core of the World System as it highly regulates and controls the supply of nanobots. Additionally, Prew W.S. increases because production of nanobots has a significant positive affect on increasing the United States total exports and imports fueled by other nation's desires to acquire nanobots.

Event 6.1: 3D Printing technologies and nanotechnology are fused to create an economy of abundance. However, technological complications in the nanotechnology process create an opportunity for elite interests to direct these technologies towards the reinforcement of elite power. Technology Increase of 1000%									
	Max % Change Impact	20	5	35	144	0	0	0	15
	Time to Impact	35	35	35	35	0	0	0	35
Year	% Chance of Event to Occur	All KOF Globalization	Both SWIID Ineq.	Clark and Sym C-P	Prew W.S.	Political Violence	Regime Stability	Within Stability	Protest Stability
2010	0	20	5	5	15	0	0	0	15
2015	1	20	5	10	30	0	0	0	15
2020	10	20	5	15	50	0	0	0	15
2025	20	20	5	20	60	0	0	0	15
2030	40	20	5	35	144	0	0	0	15
2035	50	20	5	35	144	0	0	0	15
2040	60	20	5	35	144	0	0	0	15
2045	80	20	5	35	144	0	0	0	15
2050	80	20	5	35	144	0	0	0	15
2055	80	20	5	35	144	0	0	0	15
2060	80	20	5	35	144	0	0	0	15

Event 2: Short Term Social Shock Caused by High Powered 3D Printers

Another potential effect of highly developed 3D printing technology is explored in the short story, “Business as Usual During Alterations.” As discussed in chapter 5, the arrival of powerful 3D printing has a debilitating effect on political stability during the short initial period as the social and economic system become accustomed to 3D printing forms of production. Unlike the previous event, 3D printing initially has a powerful destabilizing effect that slowly reduces over time as people adjust and adapt.

In “Business as Usual,” the primary form of instability comes from rioting and general panic. The regressions in chapter 2 showed no relationship between technological change and protest instability (the measure of political instability that includes anti-government rioting and similar activities); however, “Business as Usual” constructs a plausible connection. General confusion, caused by the unknown long-term implications of a recently discovered technology, expands into rioting as people discount the likelihood that the currently existing social structures will prevail in the short term. As a result, rioting occurs, but as the technology does not lead to the collapse of social institutions, people adapt and absorb new technology into their current social structures.

Trend Impact Analysis is flexible enough to introduce this type of an event into the simulation. Using the protest instability indicator, relevant percentages can be adjusted to anticipate this series of events. The trigger event is the same as event 1; 3D nanobot technologies are developed. Unlike the previous event though, there is a short initial period of panic where people are unsure of the future impacts this new technology will have. In the event 6.2 table, the percent chance this event is likely to occur starts at a fairly high likelihood of 35% in 2025. The justification is that by 2025, human consciousness is likely to be shocked by the implications of nanotechnology based 3D printing. The potential implications are huge and as a result the impact of the event on protest instability is also rather large: an increase of 40%. However, as time goes on, the likelihood of nanotechnology 3D printing causing a shock to American society is anticipated to decrease, as the overall technological landscape that Americans confront on a daily basis is estimated to be constantly changing and advancing. In turn, the estimated impact of the social shock of this technology slowly decreases as well, from its peak of

40% eventually to zero. During humanity's 3D printing infancy, nanotechnology based developments as seen in The Diamond Age have a huge shock if they occur within the next 10 years, but that likelihood and impact decrease over time as American society becomes more savvy and adapt at assimilating technological developments into their lives.

Event 6.2: 3D Printing Technologies Cause a Short Term Increase in Protest Instability, Caused by Panic and Shock from Technological Advancement.		
	% Change Impact	40
	Time to Impact	50
Year	% Chance of Event to Occur	Protest Instability
2010	0	0
2015	1	5
2020	1	5
2025	30	40
2030	25	35
2035	20	30
2040	15	25
2045	10	20
2050	5	15
2055	0	0
2060	0	0

Event 3: Automation through Robotization

Following the science fiction themes described in the continued growth vision of the movie “Prometheus,” the event two focuses on the social impacts of an automated workforce with human characteristics; an army of Davids.⁴⁵¹ The United States becomes a large producer of these robots, exporting them globally. As discussed in chapter 4, robot workforces are frequently anticipated as a potential massive source of unemployment. Especially if ensconced within a capitalist economic system that does not place a high value on the quality of human life and instead pursues wealth and capital accumulation, the threat of robotic works to employment is serious. Elites, recognizing the potential destabilizing effects of a massive rise in automatic workers caused by a reduction in employment, a commensurate decline in consumption, and the ensuing potential economic tailspin, create a patchwork of policies and programs to maintain system integrity.

Similar to event 1, event two is primarily an anticipation of technological effects on American society. Where event 1 indicated a threat to scarcity in the realm of physical goods, event two is a threat to scarcities of labor and work. Additionally automatic workers introduce, another potential source of system stress with anti-robot bigotry, especially if robots have a strong effect on reducing employment. Using “Prometheus” as a guide where only one robot is included within a small workforce, highly functional humanoid robots are not super-abundant in society. Robot populations become controlled either through government regulations, or by extraordinarily high prices set by the manufacturer, reducing the potential negative effect on employment. Automated workers assist employees, increase efficiency, and do work humans may find otherwise unpleasant. The flexibility of robot workers leads to a high global demand, only tempered by the robots commensurate high price.

The rise of automated workers is the result of an estimated 250% increase in technological development. Unlike 3D nanobots, the development of humanlike robots is comparatively close to current technological levels, though still requiring significant developments in physical body and computer brain requirements. The development of

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⁴⁵¹ David is the name of the robot in “Prometheus.”

highly sophisticated automated workers is considered a 100% certainty by 2060, with adjusted percent decreases for prior years.

For the KOF indices, the most affected is economic globalization, increased by the significant impact of global sales of robots. The high cost, however, makes the overall affect fairly low, causing a 5.5% increase.⁴⁵² No impact is expected on the other KOF globalization measures as the spread of ‘David Robots’ is largely an economic phenomenon.

Inequality is not affected by event 2. For every one David robot worker, there are ten to twenty human workers, roughly the same ratio seen in “Prometheus.” The negligible affect this has on unemployment takes away unemployment’s potential impact on inequality, removing an indirect channel that could affect levels of inequality.

Most measures of political stability are unaffected by as a result of the controlled distribution of David robots. Rather than a source of system stress, Davids become an important tool for influential companies to increase efficiency and workload. Neither regime or violence instability are affected as they identify major structural shifts in the political system, and this scenario reflects consistency and maintenance of the ruling order. Within stability and polarization of the political process are unaffected. Protest instability increases slightly, 5%, purely from anti-robot bigotry, and is not large enough to cause any threat to the ruling order.

Similar to the production of nanobots, the United States role as a major producer of Davids increases its prominence in global trade networks. Unlike nanobot production, however, the overall impact for Davids is muted in comparison, largely due to smaller production. The United States’ distance to the core of the global trading network increases by 8.875% and Prew W.S. increases by 36%. Again, these increases are the result of the United States being a major supplier of a high demand product, increasing overall imports and exports.

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⁴⁵² The 5.5% increase is an estimate based on an educated guess.

Event 6.3: Automatic human-styled workers become an integrated component of the American economic system. The United States becomes the dominant producer of these robots → 250% Increase in Technological Development									
	% Change Impact	5.5	0	8.875	36	0	0	0	5
	Time to Impact	50	0	50	50	0	0	0	50
Year	% Chance of Event to Occur	Economic Globalization	Both SWIID Ineq.	Clark and Sym C-P	Prew W.S.	Political Violence	Regime Stability	Within Stability	Protest Stability
2010	0	0	0	0	0	0	0	0	0
2015	5	.5	0	.5	5	0	0	0	1
2020	10	2.0	0	1	10	0	0	0	5
2025	35	3.0	0	2	15	0	0	0	5
2030	60	5.5	0	8.875	36	0	0	0	5
2035	70	5.5	0	8.875	36	0	0	0	5
2040	80	5.5	0	8.875	36	0	0	0	5
2045	80	5.5	0	8.875	36	0	0	0	5
2050	80	5.5	0	8.875	36	0	0	0	5
2055	80	5.5	0	8.875	36	0	0	0	5
2060	80	5.5	0	8.875	36	0	0	0	5

Event 4: Merging of Political and Corporatist Institution: Corporate Hijacking of Governance.

In the film “Prometheus,” there is no mention of government or a state. Rather, corporations appear to have merged, dominated, or simply replaced government style institutions. As corporate and government institutions fuse together, mass approval decreases in relevance, solidifying elite power.

Corporations, primarily driven by a fiduciary responsibility to shareholders and the pursuit of profit, have been identified as pathological.⁴⁵³ With profit maximization for shareholders, corporations frequently act without regard for social responsibility. Frequently, analysts will argue that *if* corporations act with social responsibility then they are not being responsible towards their shareholders⁴⁵⁴.

Often used to explain the relationship between the American defense industry and government, the ‘Iron Triangle’ identifies a symbiotic relationship between corporations (interest groups), the executive branch (bureaucracy), and congress.⁴⁵⁵ Event 4 hypothesizes the consequences of an American government system where the separations between corporations and government institutions are miniscule.⁴⁵⁶ As corporations have greater influence in the creation of public policy through relations identified in the “Iron Triangle,” it is fair to assume that public policy facilitates the achievement of corporate interests often at the expense of the rest of society.

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⁴⁵³ Joel Bakan, The Corporation: The Pathological Pursuit of Profit and Power (New York: Free Press, 2004).

⁴⁵⁴ This debate is rather large, but see for example, “Nicole Skibola, “Friend or Foe? Fiduciary Duties Meet Socially Responsible Investments,” *Forbes* October 28, 2010. Accessed August 7, 2013 at <http://www.forbes.com/sites/csr/2010/10/28/friend-or-foe-fiduciary-duties-meet-socially-responsible-investments/> See also Aneel Karnani, “The Case Against Corporate Social Responsibility,” *Wall Street Journal* June 14, 2012. Accessed August 7, 2013 online at <http://online.wsj.com/article/SB10001424052748703338004575230112664504890.html>.

⁴⁵⁵ Early usage of the Iron Triangle include, Gordon Adams, The Iron Triangle: The Politics of Defense Contracting (London, England: Transaction Books, 1981), and Thomas L. Gais et al., “Interest Groups, Iron Triangles and Representative Institutions in American National Government,” *British Journal of Political Science* 14 no. 2 (1984): 161-185. For a more recent analysis see Karen Winzski, “Opting out of the Iron Triangle: The US Chemical Industry and US Chemical Weapons Policy,” *The Nonproliferation Review* 18 no. 2 (2011): 331-347.

⁴⁵⁶ For a discussion of how businesses have influenced political activity see Michael Useem, The Inner Circle: Large Corporations and the Rise of Business Political Activity in the U.S. and U.K. (New York: Oxford University Press, Inc., 1984).

Unfortunately, the regressions from chapters 1 and 2 do not directly address an increasing corporatization of society and its impact on globalization. However, the format of Trend Impact Analysis provides a structure that facilitates the extrapolation of assumptions even without precise quantitative analysis. As such, the following analysis represents possibilities and assumptions based upon critical thought.

Economic, social, and political globalization will increase as corporations merge with government. Economic globalization increases due to the corporate desire to open up foreign markets, sell more products, and facilitate cheaper production. Social globalization also increases as greater migration allows corporations easier access to fungible labor supplies. Political globalization increases as corporations would encourage more states to participate in global institutions and treaties, creating a single global consensus on intellectual and physical property rights to facilitate corporate abilities to spread throughout the world and acquire the cheapest sources of labor and material inputs. However, based upon the extrapolation curve of globalization, and that the index itself cannot go above 100, the United States is already fairly globalized.

Of all the globalization types, the United States has the lowest score for economic globalization. As a result, the impact on economic globalization is greatest, estimating an increase of 20%. The second largest score is social globalization, so the estimated increase is 15%. For political globalization, the United States, based on the naïve extrapolation, will achieve a maximum score within 50 years, and as a result is not affected by this event.

The corporatization of governance is assumed to have a deleterious effect on economic inequality. A government ran by corporations is less amenable to popular politics; the ability of populism to affect government/corporate decisions is ameliorated by the day-to-day requirements of paying bills and acquiring food. Lacking a focus on social responsibility, the corporate government holds social safety nets as wasteful expenditures of stockholders money. An important insight garnered from chapter 2 is that one party democracies have higher levels of income inequality than social democracies with safety nets. In addition, one party democracies have lower levels of wage inequality, but the impact was insignificant. A one party democracy identifies a situation where a single political party dominates a political system, often through fixed or insignificant elections, such as Egypt under the rule of Mubarak. A corporate/governance fusion is similar to a one party democracy because the corporation effectively replaces political parties as the dominant rule in politics. Based on these assumptions, the effect on wage inequality is insignificant, per the regression model, but overall income inequality increases to a max of 15% within 50 years.⁴⁵⁷

A corporate/governance fusion will have several effects on the political stability variables. However, keeping within the theme of a continued growth paradigm, the variables measuring change in regime or political violence are untouched as continued growth represents a society that is able to manage sources of social instability with relatively little effect on the overall polity. That said, people are likely to be upset about the increasing role of corporations in governance, and as such an increase in anti-government protests is likely to occur. Since anti-government protests are relatively low

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⁴⁵⁷ The regression used for this section used dummy variables to measure the impact of different types of government regimes on inequality. As a result, the regression coefficient identifies the impact on inequality when a government transitions to a particular type of regime. The coefficient for income inequality was a 15% increase in inequality when a society was a one-party democracy.

in the United States within the current data set, an increase of 200% over 50 years is assumed, reflecting increased agitation over corporate dominance but concurrently an inability to affect change.

For the network measures, the corporate focus on increasing globalization to maximize profit leads to a higher score for the Prew World System measures. The more globalized the United States becomes, the more goods and services the United States will import and export, increasing the Prew World System score. The impact on the core-periphery measure is a little more difficult to deduce. By pushing the United States to become more global, corporations are also likely to increase the level of connectivity of other nations as well to reap the most gains from a connected global economic system. As a result, the core-periphery score for the United States is likely to decrease, indicating an increasing distance away from the core of the global trade system, as more and more countries will also increasingly globalize. The logic is that by placing corporate interests first, which see pursuing interests that cross political boundaries and facilitate corporate interests, the United States would be less important in a world dominated by corporate interests. This phenomenon was clearly discussed in chapter 3, where the number of countries participating and expanding their coverage in the global trade system led to reduced scores over time for core-periphery measures.

As with globalization, the actual level of impact on the network indices is difficult to discern, as it is not based on regression models. However, based on the previous events and information, a 250% increase in technology led to an 8.875% change in C-P and a 36% increase in Prew W-S. Since the corporate/government merger has been slowly occurring for some time, the likely impact is less than dramatic changes in technology. Consequently, the change in C-P is anticipated to be a slow reduction over time maxing out at -5% over 50 years, and a 15% increase in Prew-W-S over the same period.

Event 6.4: Government is fused with Corporations; Government pursues corporate interests often at the Expense of Civil Society, Interests Become Impossible to Separate.							
	% Change Impact	20	15	15	-5	15	200
	Time to Impact	50	50	50	50	50	50
Year	% Chance of Event to Occur	Economic Globalization	Social Globalization	Pre-Tax Redistribution Inequality	Clark and Sym C-P	Prew W.S.	Protest Stability
2010	0	0	0	0	0	0	0
2015	5	5	4	4	-1	4	20
2020	35	5	4	4	-1	4	30
2025	35	10	8	8	-2	8	50
2030	40	10	8	8	-2	8	80
2035	45	15	12	12	-3	12	110
2040	50	15	12	12	-3	12	135
2045	55	20	15	15	-4	15	160
2050	60	20	15	15	-4	15	175
2055	65	20	15	15	-5	15	200
2060	70	20	15	15	-5	15	200

Scenario 2: Collapse: Future of those seeking Power through Violence

The collapse future is the future that is most likely to benefit those who are willing to use violence in order to acquire authority. Power brokers are primarily concerned with acquiring wealth and influence, while concurrently lacking in rectitude and respect for others. The dominance of these social values leads primarily to a survivalist perspective, with elites constantly preoccupied with security, and everyone else disgusted with elite behavior. With this setting in place, technological developments create powerful opportunities, seized upon by bloodthirsty actors, to overturn the current political order.

Event 5: 3D Printer and Robot Rebellion Fueled Widespread Domestic Revolution

The primary source of system stress in the collapse scenario is the development of 3D printers that can produce both weapons and ammunition to arm a military insurgency, similar to the ideas expressed in the novel A for Anything. These 3D printers are practically ubiquitous, facilitating localized revolts in so many places that state and national defenses cannot hold back the anti-political furor of the masses. Concurrently, 3D printers facilitate the construction of numerous robots, which themselves eventually gain consciousness and seek to do humans harm, as seen in “Terminator 3: Rise of the Machines.”

Event 4 analyzes the initial source of system stress; the advent of 3D printers primarily used as a tool for social violence against the ruling elite, either from revolting non-elites or conscious robots. As with the continued growth scenario, this event is captured by an increase in technological development of 1000 percent, as the level of technology required to not only create sophisticated weapons but also the ammunition and other offensive armaments (battle armor, tanks, etc.) is a significant leap from current levels of 3D printing. The underlying technology could include nanobots or other forms of 3D printing, but the government is unable to control the technology and keep the social order stable.

For the globalization measures, this event is going to have a significant negative impact. A massive outbreak of violence negatively impacts all the globalization measures.⁴⁵⁸ The regression models showed technology change had no effect on political globalization (treaties and institutional membership as particular examples) but this event is also assumed to effect political globalization as well. While chapter 2 demonstrated that globalization and technological development were positively related, this event identifies how technology can be used towards destructive ends. However, the information from the regressions can be used to help provide insights as to how large the negative impact may be.

Chapter 2 showed that for a 100% increase in technology, there was roughly a 2% increase in globalization measures. For this event, the relationship is reversed and tripled, such that a 100% increase in technology, if it is used for violent ends, leads to a 6% reduction in globalization measures. This assessment is largely based on the type and severity of the event, the dystopian world presented in A for Anything, as well as this author's opinion.⁴⁵⁹ As a result, all the globalization measures will decrease by 60% due to the increase in violence caused by a 1000% increase in technology. The structure of this change will be frontloaded, in that the affect occurs during the beginning of the

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⁴⁵⁸ For a discussion using World War 2 as an example for how violence decreases economic globalization, see Held et al., 1999. 152-162.

⁴⁵⁹ An interesting recent television show that attempts to envision a similar world is "Revolution," created by Eric Kripke.

revolution, and slowly is reduced as the revolution precedes and eventually is extinguished as a new form of government takes power.⁴⁶⁰

The large geographic coverage of this revolution is expected to increase income inequality. This analysis is much different than what previously happened in the United States during major wars. For example, during World War 2, top income shares fell significantly, which can be inferred as a reduction in income inequality, because large taxes were levied by the American government in order to finance the war.⁴⁶¹ However, the type of revolution perceived by this event is so widespread and disastrous that the taxing capability of the state has been nullified. Violence throughout society destroys the mechanisms of state power, leaving behind a few strongly armed military leaders and a wasteland of devastation.

Anticipating the actual impact on income inequality is much more difficult. However, scanning the database on inequality for important revolution to inequality relationships proved fruitful. Countries were analyzed to see if large changes in income inequality were associated with a current revolution. While this is not purely scientific statement backed by regression modeling, it is useful anecdotal evidence. The example of Armenia seemed particularly illustrative. In Armenia, from 1988 to 1994, there was a long protracted war, the Nagorno-Karabakh War, which occurred during an increase in inequality where the 1985-89 average was 29.4 (pre-tax redistribution), increasing to 48.85 for the 1995-1999 period. This revolutionary conflict led to an increase in income inequality of 20 points, a 66% increase. While impossible with the current data to say if the revolution explicitly caused the increase in inequality as Armenia faced a difficult economic situation, this provides a good illustration as to the potential impact a revolution can have on inequality. During roughly the same period in Armenia, wage inequality also increased from -1.13 to -.51 (These are natural log scores), which is about a 45% increase.⁴⁶² While impossible with the current data to say if the revolution explicitly caused the increase in inequality as Armenia faced a difficult economic situation, this provides a good illustration as to the potential impact a revolution can have

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⁴⁶⁰ In A for Anything, the collapse future created after the initial violence is an elite, oligarchical system as discussed in chapter 5. The impact of this form of government is the last event for the collapse scenario.

⁴⁶¹ Piketty and Saez, 2003, 13.

⁴⁶² Since these are natural log scores, I think the 45% increase is inaccurate. If anyone has thoughts, let me know.

on inequality. As a result, the maximum increase in income inequality during this event is 66% and the maximum increase for wage inequality is 45%. Based on the particular historical example, these are reasonable expectations for a massive widespread revolution, if perhaps understating the size of the impact.

The political stability indicators are affected dramatically by a 3D printer-fueled violent revolution. In chapter 2, technological development was not included in the modeling for political instability. This is because in prior testing, the modeling showed there was rarely a relationship between instability and technology. However, the construction of this event shows a clear connection where the use of technology for a particular political purpose has severe and negative political repercussions. Unfortunately, the models from chapter 2 are not useful, but again data for other countries can be used as an indicator to understand changes in political stability.

Colombia, Peru, and Uganda all provide potential examples of societies beset by massive, country wide revolutions that shook the foundations of political rule. While other historical examples may exist, these are the examples where the data appears to mimic the impact of country-wide revolutions. Throughout the whole period of analysis, from 1975 to 2009, Colombia experienced massive revolutions from guerrilla organizations and others pursuing state power, with political violence scoring a .64 in 1975-79 to 6.66 in 2000-2004, a deleterious 940% increase. In Peru, massive corruption and political violence from 1980 to 1994 lead to an increase of the political violence score from 1.11 to 3.35, an increase of 201%. In Uganda, the Uganda-Tanzanian war of 1979 followed by the Ugandan Bush war from 1981 to 1986; since 1986, the new leader Yoweri Museveni led Uganda into a the Congo civil war, as well as faced an internal struggle with the Lord's Resistance army. This led Uganda's political violence score increase from 1.7 from 1980-84 to a high of 3.1 in 85-89, an increase of 82%. These are the most dramatic increase in political violence throughout the dataset, which identify the potential increase in political instability associated with a 3D printer fueled widespread domestic American revolution. Given that the revolution in this event is considered highly severe, the increase in political violence is rounded to a 1000%. This increase is frontloaded, in that the revolution has its greatest impact during its beginning, and slowly decreasing in impact as time goes on.

Regime instability also increases significantly. Of the countries previously discussed, Peru and Uganda had the greatest changes in regime instability. In Peru, from 1985 to 1994, regime instability increased by 212% and Uganda regime instability increased by 113% during the 1980s. Considering the 3D printing revolution consists of a massive deconstruction of the current government, and the United States has extremely low scores for regime instability (roughly around -.8 to -1.2), for the United States to get regime instability scores mirroring extremely unstable nations requires an approximate 475% increase.

Within instability is not affected by this revolution. Within instability identifies the level of opposition within the political process itself. Since this event identifies a total destruction of the political process as currently know, there simply is no within instability.

Protest instability is intriguing. Considering there are explosions and weapons being used throughout society, few people will be protesting for fear of death. During the peak of violence and fear in Uganda during the 1980s, the protest indicator was -1.1 to -1.6, indicating almost no protests at all. The United States has a rather high level of protests, a score of 1.8 during the Vietnam war era, and more recently .25 from 2005-09. For the United States to approach Ugandan levels of low protests, there would need to be a reduction of approximately 620%.

The network indices are both likely to be negatively impacted by a domestic revolution. A revolution means reduced products created for export. Also, weapons imports wouldn't increase because they would be produced locally with 3D printers. As a result, both the Core-Periphery and Prew World System position indices should decrease. Using Uganda and Colombia as comparison nations, Uganda is clearly further away from the center of the international trade network than Colombia. Colombia has scores roughly around .5 whereas Uganda is around -.7 during the 1980s, demonstrating that the political turmoil in Uganda kept Uganda far from trade relationships, whereas Colombia's relationship with the United States likely increased its prominence. To anticipate the impact on the core-periphery indicator, the percent change for the United States would be an change that would get it close to Uganda; roughly a 147% decrease.

Unfortunately, the data is a little less useful for inferring impact on the Prew World-System indicator. Prew W-S reflects the sum of all imports and exports, and for both Colombia and Uganda, this indicator was increasing even throughout their worst revolutionary periods. Since this event is such a massive revolution as to cut off the United States from most international trade, the percent change required to make the United States have a Prew W-S score similar to Uganda is used instead. This indicates a reduction of approximately 100% if values from 2005-2009 are used for both countries.

Event 6.5: 3D Printer and Robot Rebellion Fueled Widespread Domestic Revolution → 1000% Increase in Technological Development									
	% Change Impact	-60	66	45	-147	-100	1000	475	-620
	Time to Impact	50	50	50	50	50	50	50	50
Year	% Chance of Event to Occur	Globalization Measures	Both SWIID Ineq.56	Wage Inequality	Clark and Sym C-P	Prew W.S.	Political Violence	Regime Instability	Protest Instability
2010	0	0	0	0	0	0	0	0	0
2015	5	-60	66	45	-147	-100	1000	475	-620
2020	10	-60	66	45	-147	-100	1000	475	-620
2025	45	-60	66	45	-147	-100	1000	475	-620
2030	50	-60	66	45	-147	-100	1000	475	-620
2035	50	-60	66	45	-147	-100	1000	475	-620
2040	45	-55	60	40	-140	-95	950	450	-580
2045	30	-50	56	37	-135	-95	950	450	-580
2050	25	-45	50	37	-130	-90	900	425	-540
2055	20	-40	47	35	-125	-90	900	425	-540
2060	15	-35	43	35	-120	-90	850	400	-500

Event 6: 3D Printers Run out of Raw Materials for Production

While major government institutions collapse due to the 3D printer fueled revolution, 3D printers as a provider of weapons and gears of war also succumb to collapse as the ‘fuel’ for the printers becomes increasingly scarce and eventually evaporates. The failure of 3D printers to overcome material scarcity was anticipated in Murray Leinster’s The Duplicators. High technology weapons give way to more ‘personal’ weapons of destruction, such as knives, clubs, and swords. Older infrastructure that could have continued to create sophisticated weapons were destroyed in the previous melee. Violence continues, though slowly giving way to the consolidation of geographic gains by military victors. Moving past the massive destruction of event 5, event 6 describes a reduction in conflict due to a lack of resources. The anticipated impact on most trend lines is minimal, though in a small, positive direction.

Where the United States was once a large, relatively monolithic entity, it has now been divided into regional enclaves dominated by elite strongholds. Globalization, rather than a global phenomenon, instead identifies shifts towards a sort of regionalism; enclaves beginning to open up lines of communication with others enclaves. Without quantitative models to guide analysis, and considering the slow pace of change occurring in a post-apocalyptic revolutionary environment, all globalization trend lines increase by 5%. This increase is expected to occur towards the end of the forecasted time-scale, as the revolutionary fervor peels off.

With the massive increase in inequality that occurred during the revolution, inequality is expected to level off, as new structures of hierarchical governance begin to take shape. The remaining population, weary of constant revolution and war, is unlikely to challenge the newly forming governing elite, creating an opportunity for the elite to consolidate power and in turn facilitate a slight increase in economic inequality. However, since government structures have not been cemented, their ability to successfully extract wealth (of any kind), from the population is rather limited, thus economic and wage inequality increase at most by 5%.

The political stability indicators, following the developments from the other variables are likely to increase slightly, identifying more stability as a war weary and resource depleted society begins to reconstruct government in a new dark ages. For the instability variables, political violence is likely to decrease the most, as the lack of resources to create weapons has a quick affect in reducing conflict. From the massive instability of the revolutionary zeal, political violence is reduced by 300% (after a 1000% increase). This change argues that, similar to the situation in Colombia, while elites may begin to consolidate power, and the overall number of instability events decrease, there still exists significant opposition to the newly forming elite.

Similarly, regime instability also decreases, signifying the construction of a new governing coalition. While as of yet not acquiring a full consolidation of power, initial structures are beginning to form. From a previous increase of 475%, regime instability decreases by 158%, a decrease of 133%. There is still potential for regime change, but this event signifies the beginning of a post-revolutionary order.

Within instability, identifying opposition and struggle within the political process, also decreases as elites tighten their control on power. The change is estimated to be a reduction of 20%, and is purely a guess.

Protests also stay uncommon, as the masses are still feeling out the limits and boundaries of popular opposition to elite domination. As discussed in chapter 2, there is likely to be a post-revolutionary chill over public protests as people self-regulate themselves to not rock the newly forming governing 'boat.' While protests already massively decreased due to the previous event, they decrease again by 5% to signify uncertainty of society towards the newly forming government.

The network indices maintain a very low value, as connections with areas outside of the United States are slow to form, while elites are more focused on consolidating domestic power. Given that the previous event had such a negative impact on the network indices, this current event is the same as the globalization measures, demonstrating small attempts to reconnect with the outside world, but nothing exceptionally major.

Event 6.6: 3D Printers run out of Raw Materials, Reducing conflict and allowing for the beginnings of a post-revolutionary consolidation of power by a newly formed Elite.										
	% Change Impact	5	5	5	5	5	-300	-158	-20	-5
	Time to Impact	50	50	50	50	50	50	50	50	50
Year	% Chance for Event to Occur	Globalization Measures	Both SWIID Ineq.	Wage Inequality	Clark and Sym C-P	Prew W.S.	Political Violence	Regime Instability	Within Instability	Protest Instability
2010	0	0	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0	0	0
2020	1	1	1	1	1	1	-200	-85	-5	-1
2025	5	2	1	1	2	2	-200	-85	-5	-1
2030	10	3	5	5	3	3	-200	-115	-10	-2
2035	20	3	5	5	3	3	-200	-115	-10	-3
2040	50	4	5	5	4	4	-250	-130	-15	-4
2045	50	5	5	5	5	5	-300	-158	-20	-5
2050	40	5	5	5	5	5	-300	-158	-20	-5
2055	35	5	5	5	5	5	-300	-158	-20	-5
2060	30	5	5	5	5	5	-300	-158	-20	-5

Event 7: Formation of an Elite Ruling Oligarchy Leading to Long-Term Elite Dominance

In A for Anything, the 3D printer revolution lasted over 100 years until a new government was formed. Raw materials for 3D printers have been completely expended, allowing the ruling elite to gather up existing weapons and crack down on all opposition. Exploitative, elitist, and maintained by a slave class, this aristocratic oligopoly reigned with an iron fist. Fully consolidating power in the hands of a few, the future of America looks bleak as it heads into a new dark age.

Globalization is affected negatively by the elite oligopoly. Similar to the ruling junta in Burma, government continues to cut off America from the external world in order to insulate the population from revolutionary and destabilizing ideas. Where in event 7 globalization increased slightly due to a feeling-out period, the fully established oligarchy grabs the reins of government and pursues a path of global isolation. While there is no quantitative model to assist in anticipating the effects of elite oligopolistic rule, data is used for the country of Myanmar during the domineering rule of the military junta, and is presented in table 6.4. Unlike Uganda, whose state of constant revolt was useful to understand trends for the previous events, Myanmar from 1970 to 1989 reflected an extremely closed, consolidated elite who ruled with an iron fist. The percent changes from Myanmar are used for event 7.

Table 6.3: Globalization Measures for Myanmar			
Year	Econ Glob.	Social Glob.	Pol. Glob.
1970-74	28.85936	7.468915	20.92542
1975-79	28.96191	7.033504	21.48176
1980-84	29.26956	7.018077	20.66494
1985-89	29.1118	6.325313	20.40612
% Change	.875	-15.311	2.482

For the inequality variables, the quantitative analysis from chapter 2 showed there was no relationship between a dictatorship and inequality. The elite oligopoly of event 7 has many traits similar to a dictatorship, so the relationship appears to fit. However, to add additional insight, the database is scoured for relatively stable, elite dominated

dictatorial type governments with available inequality data, and relevant data is presented in Table 6.5. The best available case appears to be Turkmenistan, although no data exists for wage inequality. After its separation from Russia in 1991, Turkmenistan has been ruled by Saparmurat Niyazov, maintaining rule through a strict control of politics and a powerful cult of personality.⁴⁶³ During the period where data exists, income inequality increased rapidly, approximately 50% for pre-tax redistribution and 67% for post-tax redistribution. This fits the overall story being told here of an iron gripped dictator controlling much of structure of society in such a way as to benefit the elite at the expense of the rest of society.

Table 6.4: Inequality Scores for Turkmenistan		
	Pre-Tax Redistribution	Post-Tax Redistribution
1980-84	29.21675	24.25331
1985-89	29.50666	24.47307
1990-94	32.23286	27.42628
1995-99	27.60935	29.3352
2000-04	41.35402	39.17617
2005-09	43.83731	40.73093
% Change	50.042	67.94

The political stability indicators experience a general reduction, indicating a return to stability after the wild social shifts of the revolutionary era. Identified during chapter two, politics is made stable by utilizing the Machiavellian cycle of political stability; fear and repression become the primary tools for the government to stay in power. As discussed in chapter 2, the ability of repression and fear to reduce political instability was not clearly demonstrated in the quantitative model, though a likely relationship was seen in scatter plots. To anticipate a potential impact, scores for Turkmenistan are presented in Table 6.6.⁴⁶⁴

⁴⁶³ For a brief review of governance in Turkmenistan, see Nicholas Kunysz, "From Sultanism to Neopatrimonialism? Regionalism within Turkmenistan," *Central Asian Survey* 31 no. 1 (2012): 1-16.

⁴⁶⁴ Myanmar does not provide a good case here because there is not enough data.

Table 6.5: Political Instability Scores for Turkmenistan				
Years	Violence	Regime	Within	Protest
1990-94	-0.6148	0.638952	-0.96662	-0.45096
1995-99	-0.40422	-0.24937	-0.79446	-0.40452
2000-04	-0.37622	-0.40436	-0.90681	-0.37607
2005-09	-0.58182	-0.51094	-0.4804	-0.42006
% Change	-5.364	-179.965	-149.699	-6.852

Violence instability is reduced by approximately 5%, identifying the ability of the government to reduce violent threats to its rule. The reduction is not that great because much of the sources of violence were reduced in event 6. Regime instability, threats to the governing regime itself, are reduced by 179%, clearly indicating the consolidation of power of the governing elite. Within instability also decreases by 149%, showing that even within the government, there are few oppositional parties and the ruling elites grip on power is fairly complete. Protest instability declines by approximately 7%, continuing a downward trend from the previous event and indicating the public's unwillingness to confront the government due to the fear of repression and government sanctioned violence.

The increasing consolidation of power and control over society gained by the elite oligopoly leads to an increase in the overall trade relationship, represented by Prew W-S, but a reduction in the Core-Periphery indices. Recovering from the revolutionary period and control by a single, powerful government increases overall economic production, facilitating greater imports and exports to finance the governments desires; an increase in Prew W-S. However, the government's desire for control and domination lead it to reduce connections with politically unfriendly states. In essence, the government seeks to isolate the country and remove it further from the center of the global trade network in order to help facilitate control of society. To identify the size of the impact, scores from Myanmar are presented in Table 6.7, because data for Turkmenistan is not available.

Table 6.6: Network Indices Scores for Myanmar			
Years	Clark C-P	Sym. C-P	Prew W-S
1970-74	-0.54793	-0.50722	19.41596
1975-79	-0.51686	-0.47403	20.27283
1980-84	-0.7088	-0.70633	20.61314
1985-89	-0.82061	-0.83908	20.3134
1990-94	-0.61252	-0.63996	21.25351
1995-99	-0.58084	-0.60677	21.96486
2000-04	-0.61437	-0.63996	22.41391
2005-09	-0.7088	-0.73952	23.05779
% Change	-29.36	-45.799	18.757

Event 6.7: Elite Oligopoly is Constructed in the Ashes of the Post-3D Printer Revolution													
	% Change Impact	.875	-15.3	2.482	50.04	67.94	-29.3	-45.7	18.75	-5.364	-179.96	-149.7	-6.852
	Time to Impact	50	50	50	50	50	50	50	50	50	50	50	50
Year	% Chance of Event to Occur	Econ Glob.	Soc. Glob.	Pol. Glob.	Pre-Tax Ineq	Post-Tax Ineq	Clark C-P	Sym. C-P	Prew W-S	Violence Instab.	Regime Instab	Within Instab.	Protest Instab.
2010	0	0	0	0	0	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0	0	0	0	0	0
2020	1	.1	-1	.5	10	20	-5	-15	2	-.5	-25	-20	-1
2025	5	.2	-5	.9	15	25	-9	-20	4	-1	-50	-40	-1.5
2030	10	.3	-7	1.2	20	30	-14	-25	6	-1.5	-75	-60	-2
2035	15	.4	-9	1.7	25	35	-19	-30	8	-2	-100	-80	-2.5
2040	20	.5	-11	2.0	30	40	-23	-35	10	-3	-125	-100	-3
2045	25	.6	-13	2.2	35	50	-27	-40	12	-4	-150	-120	-4
2050	40	.7	-13	2.4	45	60	-29	-45	15	-5	-170	-140	-5
2055	45	.875	-15.3	2.482	50.04	67.94	-29.3	-45.7	18.75	-5.364	-179.96	-149.7	-6.852
2060	50	.875	-15.3	2.482	50.04	67.94	-29.3	-45.7	18.75	-5.364	-179.96	-149.7	-6.852

Scenario 3: Discipline: Desirable for Religious Fundamentalists and Moralists

The disciplined future takes elements from the novels Hell's Pavement, and Makers, constructing a society pursuing domestic production and mental normative control to create a stable orderly society. Rulers, preoccupied with the moral well-being of society, combined with a desire to avoid environmental disaster, encourage policies that foster massive growth in localized production through 3D printers. Concurrently, the moral character of society is reinforced through mental implants, enforcing socially agreed upon standards of upright behavior with individually prepared punishments for delinquents.

Event 8: 3D Printers Become the Dominant Source for Economic Production

Event 8, reflecting the changing economic environment from the novel Makers, focuses on the production of societies' needs through a mega network of individual entrepreneurs mobilized to success through 3D printers. Politicians, fearing the dire economic consequences of too-big-to-fail structural dynamics, provide significant tax and financial advantages for the formation of localized economic facilities. Perceiving

an opportunity for 3D printers to revamp the economic structure and avoid a system-wide economic collapse due to the malfeasance of corporate gluttony, politicians pass new laws providing tax advantages and other benefits to the formation of local, small scale production facilities. 3D printers allow for a shifting of the overall structural of the economy from a hierarchical, high capital intensive, system pursuing efficiency and economies of scale to instead a localized, production-on-demand system similar to cottage industries.⁴⁶⁵ 3D printing has developed enough such that most needs of society, from housing, to transportation, and personal goods, such as clothing and utensils, can all be easily produced in the home. The technology required need not be nanobots or anything significantly different than mass access to currently available 3D printing technology. As a result, this event is primarily reflected by an increase in technology by 200%.

The anticipated impact on economic globalization is negative. The primary factor explaining this shift is a reduction in the importance of international trade to acquire most goods. Rather than purchasing goods and services from abroad, economic needs can be satisfied locally. The expected size of the impact does not conform with the models from chapter 2. Previously, technology increases and globalization were positively related, where a 100% increase in technology led to a 2.23 increase in economic globalization. However, the type of technological change here greatly diminishes the significance of trade, which accounts for roughly 22% of the economic globalization index. In addition, the other elements of the index, primarily restrictions on trade or financial flows, become less important as trade is overall less significant. To help anticipate the impact of a mass transition to a cottage industry economy, the database was scoured for nations marked by a heavy prevalence of cottage industries. The nation selected was Bangladesh, due to the large importance of cottage industries in the nation and data is presented in Table 6.8.⁴⁶⁶

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⁴⁶⁵ John E. Eck and Jeffrey S. Gersh, "Drug Trafficking as a Cottage Industry," *Crime Prevention Studies* 11 (2000): 245. Need better reference discussing the structure of cottage industries. Initial search not successful.

⁴⁶⁶ Habibur Rahman et al., Production, Economics, Employment Generation and Marketing Pattern of Rattan-Based Cottage Enterprises: A Case Study from an Urban Area of North-Eastern Bangladesh," *Small-Scale Forestry* 11 no. 2 (2012): 207-221.

Table 6.7: Comparison Between Economic Globalization in Bangladesh and the United States					
Country	Year	Econ Globalization	Country	Econ. Globalization	% Diff.
Bangladesh	1970-74	10	United States	49	-79
Bangladesh	1975-79	10	United States	51	-80
Bangladesh	1980-84	11	United States	54	-80
Bangladesh	1985-89	10	United States	57	-82
Bangladesh	1990-94	10	United States	59	-83
Bangladesh	1995-99	15	United States	63	-76
Bangladesh	2000-04	26	United States	63	-58
Bangladesh	2005-09	34	United States	64	-46

From 2000 to 2009, Bangladesh rapidly increased its trade with the rest of the world, leading to a significant increase in the economic globalization score. This increase also corresponded with a period of political stability not seen in the previous decades. The anticipated maximum impact on the United States' globalization score is the % change in the year 2005-09, -46%, indicating a significant reduction in America's globalization score, though not a complete economic separation.

The other globalization scores, social and political, are anticipated to not be affected by the rise of cottage industry production in the United States. Event 8 is primarily seen as a shift in economics due to the changing nature of production, but legal and social implications are not necessarily likely.

Income and wage inequality are both expected to decrease due to the greater access to profitable employment available to everyone due to the explosion in localized production, easy access to work, and the low cost of goods due to 3D printing. The shift from an industrial as well as services oriented economy defined with significant economies of scale back towards a more localized, cottage industry system is rather

unprecedented and unstudied.⁴⁶⁷ Staying within the theme of this event however, the availability of new cottage industry work provides a significant and economy-altering shift that levels much of the economic playing field. Both wage and income inequality are reduced by 20%, and is purely an estimate.

The political stability variables are largely unaffected by the transition to a cottage economy. The cottage economy creates new opportunities for jobs, reducing social strife caused by unemployment, but the affect is not likely to be large because unemployment is currently fairly low and its likely has little effect on political stability. Additionally, the cottage industry economy possibly increases social happiness as greater opportunities arise for individuals to pursue their own creative endeavors and still make a living. Regardless, the overall impact is likely small, primarily because the scores for the United States are already low and fairly stable. No estimated impact for the political stability variables.

For the network indices, the United States generally falls further away from the core of the global trade network, and generally exports and imports significantly less goods and services, leading to a significant reduction in Clark C-P and Prew W-S. To anticipate the size of the impact, again, scores from Bangladesh are used. Looking at the data, the level of maximum change that feels right for this event is for the year 2005-09, which is the smallest level of change, though still large. The data is presented in Table 6.9.

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⁴⁶⁷ Based upon my recent literature review.

Table 6.8: Comparing Bangladesh and the United States for Network Indices											
Country	Year	Clark C-P	Sym C-P	Prew W-S	Country	Clark C-P	Sym C-P	Prew W-S	% Diff Clark C-P	% Diff Sym C-P	% Diff Prew W-S
Bangladesh	1970-74	-0.32	-0.31	20.78	United States	2.72	2.84	25.53	-111.8	-110.8	-18.6
Bangladesh	1975-79	-0.01	0.06	21.13	United States	2.62	2.78	26.35	-100.2	-97.95	-19.8
Bangladesh	1980-84	0.24	0.26	21.78	United States	2.40	2.48	26.88	-89.80	-89.67	-18.9
Bangladesh	1985-89	0.13	0.16	21.96	United States	2.26	2.35	27.20	-94.20	-93.33	-19.2
Bangladesh	1990-94	0.10	0.09	22.39	United States	2.00	2.08	27.61	-95.13	-95.67	-18.9
Bangladesh	1995-99	0.18	0.19	23.00	United States	1.81	1.88	28.04	-90.10	-89.92	-17.9
Bangladesh	2000-04	0.15	0.16	23.37	United States	1.77	1.82	28.31	-91.63	-91.38	-17.4
Bangladesh	2005-09	0.20	0.19	24.06	United States	1.66	1.72	28.67	-88.11	-88.95	-16.0

Event 6.8: 3D Printers Lead to Explosive Growth in Localized Production and the Formation of a Cottage Economy								
	% Change Impact	-46	-20	-20	-20	-88.11	-88.95	-16.09
	Time to Impact	50	50	50	50	50	50	50
Year	% Chance of Event to Occur	Econ Glob.	Pre-Tax Ineq	Post-Tax Ineq	Wage Ineq	Clark C-P	Sym. C-P	Prew W-S
2010	0	0	0	0	0	0	0	0
2015	10	-20	-10	-10	-10	-40	-40	-8
2020	20	-20	-13	-13	-13	-50	-50	-10
2025	40	-30	-15	-15	-15	-65	-65	-12
2030	50	-46	-20	-20	-20	-88.11	-88.95	-16.09
2035	50	-46	-20	-20	-20	-88.11	-88.95	-16.09
2040	50	-46	-20	-20	-20	-88.11	-88.95	-16.09
2045	50	-46	-20	-20	-20	-88.11	-88.95	-16.09
2050	50	-46	-20	-20	-20	-88.11	-88.95	-16.09
2055	50	-46	-20	-20	-20	-88.11	-88.95	-16.09
2060	50	-46	-20	-20	-20	-88.11	-88.95	-16.09

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*Event 9: Creation, Acceptance, and Mass Implementation of Norm-Enforcing Mind
Control Devices*

With the success of 3D printers to reshape the economy and avoid collapse, politicians identify a new method to reshape society. Analogues, mental implants that enforce strict moral codes, are seen as the next step to ensure social stability. Heralded as a ‘game-changer,’ analogues are perceived as reforming society’s morals as much as 3D printers reformed the economy. Politicians argued that social morals, if left untempered by analogues, would lead to a collapse of society as sinful activities corrupted peoples’ minds. Initially hesitant to accept the digitization of morality through analogue implants, members of society gradually accepted their interference as study after study demonstrated their immediate ability in reducing crime, unhappiness, and generally making society safer. Some feared that the mechanism for enforcement, the construction of fearful images in the minds of those thinking or acting sinful activities, was overly harsh. Still others argued that the construction of the moral codes enforced by analogues lack transparency, giving politicians and moral leaders too much control over the definition of ‘correct and moral’ thought. Regardless, all these fears were assuaged by the immediate benefit of increased social safety.

The globalization indices have different impacts. Economic globalization is largely unaffected, primarily due to the previous impact of 3D printer’s effect on localizing economic production. However, the ability of analogues to increase political stability has a positive effect on social and political globalization. With more stability comes increasing acceptance of immigration and other types of social interaction, as well as greater willingness on the part of nations to participate in political treaties and global institutions. With analogues mitigating violent behavior, people are more likely to travel, interact, and participate in political agreements. Of all the globalization indices, social and political are already fairly high, so the size of the increase is unlikely to be extremely large. They are estimated to increase by 10 percent.

The impact on inequality is invariably connected to the types of social morals and belief systems instituted by the analogue devices. In the novel Hell’s Pavement, these devices are used to entrench financial and political interests, having a large negative

impact on inequality. The social environment envisioned in this scenario is different. In the previous event, localized production was facilitated by increasing tax advantages for 3D printing production, identifying a belief on the part of political elites that the economy must be changed to avoid an impending economic and possibly environmental disaster. This prescient analytical acumen encourages a belief that analogues would also be used congenially, although with significant potential for abuse. However, rather than just social elites, there is significant opportunity on the part of masses to help shape the structure and pattern of acceptable moral behavior such that a convergence of interests occurs where analogues becomes a tool to facilitate a reduction of social inequality and the pursuit of destructive economic behavior. Based on the comprehensive impact analogues could have on restructuring social norms and acceptable types of behavior, if analogues are geared towards fighting economic inequality the size of the impact could be very large. To estimate the size of the impact, the database is searched for the most stable and lowest level of post-tax redistribution inequality: Finland, and the data is presented in Table 6.10. If the United States was to have a dramatic decrease in inequality, the best case scenario is likely to reach levels of inequality similar to post-tax redistribution Finland. While the changes for pre-tax and wage inequality are much different, the projection assumes that all forms of inequality, due to the analogues, are reduced by the highest percent change between Finland and the United States: a reduction of 39%.

Table 6.9: Comparing Inequality in Finland and the United States											
Country	Year	Pre-Tax	Post-Tax	Wage Ineq	Country	Pre-Tax	Post-Tax	Wage Ineq	% chg Pre-Tax	% Chg Post	% Chg Wage
Finland	1960-64	51.17	28.50	-1.98	United States	44.43	34.11	-1.65	15.18	-16.4	20.11
Finland	1965-69	52.22	28.75	-1.91	United States	41.65	32.54	-1.71	25.36	-11.6	12.01
Finland	1970-74	45.29	25.05	-1.93	United States	40.88	31.42	-1.69	10.79	-20.2	14.40
Finland	1975-79	38.11	21.47	-1.94	United States	40.55	30.80	-1.60	-6.01	-30.2	21.78
Finland	1980-84	37.89	21.28	-1.99	United States	40.66	31.07	-1.55	-6.80	-31.5	28.51
Finland	1985-89	36.79	21.04	-1.99	United States	42.61	33.18	-1.56	-13.65	-36.5	27.54
Finland	1990-94	37.02	20.96	-2.03	United States	44.42	34.47	-1.56	-16.65	-39.1	29.84
Finland	1995-99	41.94	22.66	-2.01	United States	46.77	36.90	-1.58	-10.32	-38.5	27.05
Finland	2000-04	47.28	24.93	-2.00	United States	47.57	37.05	-1.61	-0.61	-32.7	24.15
Finland	2005-09	47.94	25.38		United States	46.38	36.42		3.37	-30.3	

The estimated impact on the political stability variables are all negative, though not significantly large as the United States has low measurements for these indices already. Stability is estimated to be low because of the ability of the analogues to encourage acquiescence of people towards agreed upon norms. When everyone in society subscribes and participates in the same norm-driven belief structure, peace and harmony generally occur.⁴⁶⁸ Anticipating the size of the impact is difficult, and is instead estimated as an across the board reduction by 20%.

For the network indices, there is no impact. Like the impact on economic globalization, the creation of analogues does not have much of an international economic dimension. While the United States could become a large supplier of these devices, and ship them throughout the world, the main economic process of this scenario is one of localized production through 3D printing. As a result, analogues could be produced anywhere 3D printing technology exists.

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⁴⁶⁸ See for example Erik Gartzke, "The Capitalist Peace," *American Journal of Political Science* 51 no. 1 (2007): 166-191, where he argues that peace "ensues when states lack differences worthy of costly conflict" (page 166). With the same normative structure, significant differences worthy of violence are lacking.

Event 6.9: Analogue Implants lead to Increased Moral and Social ‘Correctness.’									
	% Change Impact	10	10	-39	-39	-20	-20	-20	-20
	Time to Impact	50	50	50	50	50	50	50	50
Year	% Chance of Event to Occur	Social Global.	Political Global.	Income Inequality	Wage Inequality	Political Violence	Regime Instability	Within Instability	Protest Instability
2010	0	0	0	0	0	0	0	0	0
2015	5	2	2	-8	-8	-5	-5	-5	-5
2020	10	4	4	-16	-16	-9	-9	-9	-9
2025	15	6	6	-24	-24	-12	-12	-12	-12
2030	20	8	8	-32	-32	-15	-15	-15	-15
2035	25	8	8	-35	-35	-18	-18	-18	-18
2040	30	10	10	-39	-39	-20	-20	-20	-20
2045	30	10	10	-39	-39	-20	-20	-20	-20
2050	30	10	10	-39	-39	-20	-20	-20	-20
2055	30	10	10	-39	-39	-20	-20	-20	-20
2060	30	10	10	-39	-39	-20	-20	-20	-20

Event 10: Evolution of Government Towards a Pseudo-Religious Public Institution

With analogues enforcing morality, and 3D printer providing an environmental friendly, sustainable economy, the gears of government begin to reflect the pursuit of morally redeemable acts. Similar to an Islamic Republic, the government exists to craft and shape morally acceptable behavior within an economy of relative abundance. Government, pursuing a constant inquiry into the boundaries of the morally acceptable, becomes a nonviolent, ideological battleground, where the required use of analogues are enforced throughout society, and elites struggle to gain control over particular morals that analogues foster. This end-state of the disciplined future exemplifies humanities constant desire to explore the frontiers of the ethically acceptable, leading to a growing focus on the role of religion within society.

All forms of globalization are affected as the United States implements morality in all its dealings, locally and globally. Economic globalization continues its long-term decline as the moral influence of government more forcefully encourage localized production. Socially, the United States encourages continued human migration flows, to facilitate the continued spread of American morals. Political globalization also continues as the United States advocates its moral philosophy through global treaties and institutions. Arguing that the United States does not exist in a vacuum, the 'American project' becomes a global sermon of environmental and economic sustainability. Economic globalization is expected to decline by 20%, whereas social and political globalization continues their slow increase of 15%.

Insights into the impact of a morally infused American government on inequality can be found in the inequality regressions involving regime type. This particular envisioning of the American government follows a similar outline of the Islamic Republic as used in chapter 2. While Islamic Republics were found to have a negative effect on all types of inequality, the impact was never significant in any of the regressions; the impact was relatively small. The coefficients were a reduction of -3.4 for pre-tax redistribution inequality, -4.3 for post-tax redistribution inequality, and a reduction of -.17 for wage inequality. Even though these are insignificant in the regression model, they are used in this forecast to provide a potential impact of this

moralistic government on inequality. When turned into percent changes, the transformation of the United States into a pseudo religious institution has a 5.83% reduction in wage inequality, a -5.93% reduction in pre-tax redistribution inequality, and a 8.46% reduction in post-tax redistribution income inequality.

Political stability overall increases, as government constructed morality is universally implemented, leading people to accept current social institutions and believe those institutions are beneficial for society. The estimation is a continuation of the last event, an additional reduction by 20%.

The network indices also have a slight decline, caused by government's encouragement of localized production through tax incentives. The impact is estimated to be a reduction of 30%, identifying the continued isolation of the United States from the international trade network. This estimation is based on a strong and continued encouragement by the United States towards local production.

Event 6.10: Formation of a Morally Infused Doctrinaire Government														
	% Change Impact	-20	15	15	-3.4	-4.3	-1.7	-30	-30	-30	-20	-20	-20	-20
	Time to Impact	50	50	50	50	50	50	50	50	50	50	50	50	50
Year	% Chance of Event to Occur	Econ Glob.	Soc. Glob.	Pol. Glob.	Pre- Tax Ineq	Post- Tax Ineq	Wage Ineq.	Clark C-P	Sym. C-P	Prew W-S	Violence Instab.	Regime Instab	Within Instab.	Protest Instab.
2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2020	1	-3	5	5	-1	-1	-.4	-5	-5	-5	-3	-3	-3	-3
2025	5	-5	7	7	-1.5	-1.9	-.7	-10	-10	-10	-5	-5	-5	-5
2030	10	-7	9	9	-2	-2.7	-1.1	-15	-15	-15	-7	-7	-7	-7
2035	15	-11	11	11	-25	-3.5	-1.3	-20	-20	-20	-11	-11	-11	-11
2040	20	-20	15	15	-3	-4.3	-1.7	-25	-25	-25	-20	-20	-20	-20
2045	25	-20	15	15	-3.4	-4.3	-1.7	-30	-30	-30	-20	-20	-20	-20
2050	40	-20	15	15	-3.4	-4.3	-1.7	-30	-30	-30	-20	-20	-20	-20
2055	40	-20	15	15	-3.4	-4.3	-1.7	-30	-30	-30	-20	-20	-20	-20
2060	40	-20	15	15	-3.4	-4.3	-1.7	-30	-30	-30	-20	-20	-20	-20

Scenario 4: Transformation: The Digital Humanity

The transformative future hypothesizes a complete transmutation of the human condition. Inspired by the events in the novel Diaspora, humanity has digitized social consciousness such that consciousness can be copied and distributed numerous times without loss of the human essence. Compassion, love, understanding, hatred, befuddlement, and all other human emotions and feelings, all neatly copied and transferred throughout digital networks of human experience. Biological humans still exist, but remain a solid minority in a universe populated by digital copies, original consciousness created in the digital world, and robot exoskeletons for digital beings travels in the physical world.

In addition to the digital evolution of humanity, physical requirements for biological humans have been provided by “seed-style” 3D printers inspired by The Diamond Age. Physical needs are all provided through a technological system using the earth itself to instantly produce wants and needs. Without any centralized system of control, the ‘seed’ style of 3D printing creates unlimited potential for creation and destruction. However, while the potential exists for this technology to be used by terrorists to tear down society, the fulfillment of societies needs provides a breakthrough where people focus more on the pursuit

of ideological and philosophical ideals rather than violence conflict. Government ultimately withers away, becoming obsolescent, providing fertile ground for social governance styled on political anarchy.

Event 11: Creation of 'Seed style' 3D Printing Leads to an Elimination of Scarcity

Like event 1, event 11 is equivalent to a 1000% increase in technological development, only this time there is no central control. Furthermore, the materials required for these types of 3D printers to operate are assumed to be inexhaustible, effectively springing up from the ground.

Seed style 3D printing has a similar effect on globalization as the 3D printers from the disciplined scenario. Economic globalization decreases because people are able to source their material needs locally. However, the removal of material scarcity vastly increases the ability of people to travel throughout the world, providing a strong increase on social globalization. Politically globalization is also increased because with material needs largely satisfied, opportunities multiply for states to find political solutions to their problems.

The size of the impact on globalization is in part based on the regressions from chapter 2. With a 1000% increase in technology, social and political globalization increases by 20%. However, unlike the chapter 2 regressions, economic globalization behaves differently due to the particular characteristics of this event. Additionally, since the 'seed' effectively removes the requirement for global commerce completely, the impact is extremely high. Economic globalization, identified largely by the size of the restrictions on trade as well as the absolute value of trade, due to the removal of these barriers to trade and as well as the trade itself, is estimated to be reduced by 400%, possibly reaching close to zero.

Both income and wage inequality are dramatically reduced by the development of the 'seed.' Work, the type required for people to pay bills and participate in the economic system fades away, replaced by the pursuit of art and philosophy. In this sense, wage inequality trends towards zero as wage labor becomes obsolete. Similarly, income inequality has an equivalent dramatic reduction; income as a measurable useful

contributory concept vanishes, replaced with other forms of social value. Both income and wage inequality decrease by 80%, reflecting the insignificance of economic measures of society.

The political stability indices are largely reduced. Government at this phase of the scenario still exists in the modern form, but availability of material needs goes a long way to satisfy society and quell many sources of social anxiety. To estimate the size of the change, the database is scoured for all the lowest scores for each political stability index, and compared with the data for the United States. The data is presented in Table 6.11.

Table 6.10: Comparing Political Instability Values							
Country	Violence	Country	Regime	Country	Within	Country	Protest
Russia 1985-89	-1.37	Columbia 2000-04	-2.45	Liberia 1975-79	-2.45	Uganda 1985-89	-1.63
USA 2005-09	-.526	USA 2005-09	-.80	USA 2005-09	-.1497	USA 2005-09	.2584
% Chg	-160		-206		-1536		-730
Impact for Event 11	-53%		-68.7		-512		-243.3

In a twisted sense, the most stable, lowest scores for each measure all come from extremely illiberal, undemocratic regimes. In addition, the size of the impacts are extremely large, a dramatic reduction in each index which is supposed to anticipate an extreme increase in stability. Since this particular event is perceived as the beginning of a transition to a politically stable end-state, the size of the impacts do not occur in this single event, and is instead distributed through all the events in this scenario.

The network indices also greatly decrease, as global trade practically disappears. The size of the reduction is at least equivalent to event 8, where 3D printers were anticipated to dramatically increase local production. As a result, the scores from event 8

are used as a baseline, where the core-periphery (C-P) scores decreased by 88% and the Prew W-S decrease by 16%. Since the technological change and the economic impact are much greater, these scores are doubled, such that C-P scores decrease by 176 and the Prew W.S decrease by 32.

Event 6.11: Creation of ‘Seed Style’ 3D Printers														
	% Change Impact	-100	20	20	-80	-80	-80	-176	-176	-32	-53	-68.7	-512	-243.3
	Time to Impact	50	50	50	50	50	50	50	50	50	50	50	50	50
Year	% Chance of Event to Occur	Econ Glob.	Soc. Glob.	Pol. Glob.	Pre- Tax Ineq	Post- Tax Ineq	Wage Ineq.	Clark C-P	Sym. C-P	Prew W-S	Violence Instab.	Regime Instab	Within Instab.	Protest Instab.
2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2020	20	-90	10	10	-60	-60	-60	-60	-60	-15	-30	-40	-300	-200
2025	25	-95	15	15	-70	-70	-70	-120	-120	-25	-40	-50	-400	-220
2030	30	-100	20	20	-80	-80	-80	-176	-176	-32	-53	-68.7	-512	-243.4
2035	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2040	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2045	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2050	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2055	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2060	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Event 12: Digitization of Human Consciousness

With material scarcity removed by the impacts of the ‘seed,’ all other forms of scarcity, scarcity of labor and ideas, become obliterated by the ability to digitize the conscious of willing humans. People have the opportunity to make perfect digital replicas of their minds, allowing their ‘mental selves,’ to make additional copies within the digital world, or to roam around the physical world, separate from their biological bodies, through the use of robots. Where the world circa 2013 has a clear divide between physical and digital realities, that line is increasingly irrelevant, as biological and digital ‘selves’ coexist independent of each other. Similar to “World on a Wire,” humanity is divided into different levels of existence, human civilizations buried within computer realities. Yet, unlike “World on a Wire,” people are aware of these separate levels of existence, capitalizing on the benefits of infinitely copying the human race to further human creativity, exploration, and possibility.

Measures of globalization, indeed all the measures for this event and for the rest of the transformative scenario, must be seen in a dual light....digital as well as physical. The physical world of globalization continues trends seen from event 10. Economic globalization continues its slide into irrelevance, as most goods, indeed even people, can be digitized and transferred outside of the concepts measured in the economic globalization index. Trade certainly exists, but international trade, in the physical world, disappears, replaced by digital transfers of goods and services. Social globalization is affected indirectly by this event. The ability to digitize human consciousness increases human desires for unlimited freedom, encouraging more adventurous behavior in the physical world, leading to a slight increase. Political globalization is effected very little by this event, because it is already close to the maximum level of the index.

Economic inequality continues to fall, as humans are less defined by their physical existence, and instead offered unlimited opportunities in the digital world. Combined with the economic opportunities provided for all by the ‘Seed,’ concepts of inequality become less meaningful. The measures for inequality both continue to decline at the same pace as the previous event, signifying a continued push towards zero inequality.

The political stability measures continue the trend seen in the previous event, moving on a path towards the lowest levels seen in the database. This is to signify the increasing insignificance of the concept of political stability as politics itself becomes unnecessary. With all forms of scarcity rendered meaningless by technological changes, the primary purpose of politics, defining 'who gets what, when, where and why,' is rendered archaic, as everyone has access to all things at all times.

Similar to economic globalization, the network indices continue to decrease as the concept of international trade continues to undergo a transformation. Physical goods and services are all provided locally. Trade as an international phenomenon largely disappears. Certain unique constructs, such as unique pieces of art, become sought after items, but even those can be reproduced. Differentiation between original and copied art becomes meaningless.

Event 6.12: Digitization of Human Consciousness														
	% Change Impact	-75	30	0	-80	-80	-80	-100	-100	-15	-53	-68.7	-512	-243.3
	Time to Impact	50	50	50	50	50	50	50	50	50	50	50	50	50
Year	% Chance of Event to Occur	Econ Glob	Soc. Glob	Pol. Glob	Pre-Tax Ineq	Post- Tax Ineq	Wage Ineq.	Clark C-P	Sym. C-P	Prew W-S	Violence Instab.	Regime Instab	Within Instab.	Protest Instab.
2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2020	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2025	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2030	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2035	25	-65	20	0	-70	-70	-70	-90	-90	-5	-42	-45	-300	-200
2040	30	-70	25	0	-75	-75	-75	-95	-95	-10	-47	-55	-400	-220
2045	35	-75	30	0	-80	-80	-80	-100	-100	-15	-53	-68.7	-512	-243.4
2050	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2055	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2060	0	0	0	0	0	0	0	0	0	0	0	0	0	0

*Event 13: The Withering of the State: Humanity After Institutionalized Government –
Cory Doctorow's 'Bitchin Society.'*

The widespread adoption of 'Seed' style 3D printers, as well as the advent of the digitization of human consciousness leads to a questioning of the role of government in society. When technology provides, without intervention by government, the primary needs of society, what role should government play in this 'brave new world?' One possibility is inspired by the short story "Truncat," where socially positive action is encouraged through the pursuit of "whuffie," a reputation based currency.⁴⁶⁹

Advancement in society, defined by access to new social networks, positions in universities, and other important and useful roles in society, occurs by acquiring whuffie. To acquire whuffie, people need to be held in high esteem by others through acts deemed positive by society. Playing an instrument beautifully, writing significant works of philosophical thought, and in some way contributing to the advancement of the human condition are all possible ways to achieve whuffie. Socially positive behavior is identified through social consensus – the widespread adoption and pursuit of social norms believed by most to represent beneficial action for society. Altogether, the pursuit of whuffie and the guidance of society through social norms altogether defined the 'Bitchin Society'

The Bitchin Society continues the negative effect on economic globalization. Global trade in goods is instead superseded by the trade in ideas, which has no boundaries and is uncontrollable by governments. Social globalization continues its increase, as the integration of societies into a single, post-scarcity, post-death environment leads to a reduction in barriers to movement. Political globalization is more uncertain; politics changes focus from a focus on the distribution of scarce resources instead to the generation of intriguing and profound ideas, and the exploration of the furthest reaches of space.

Economic inequality has vanished. While there are disparities within society, some have whuffie whereas others do not; the underlying basis is due to individual acts. There is no 'structural' inequality; i.e, the system is not built to perpetuate historical

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⁴⁶⁹ Cory Doctorow, "Truncat," available online at <http://www.salon.com/2003/08/26/truncat/>.

inequalities; rather, an individual's desire to attain more whuffie determines their ability to acquire more. Both wage and income inequality approach zero.

Similarly, the political instability indices all achieve the lowest levels seen in the database. Individual desires are pursued non-violently in an arena built to provide practically limitless access to the majority of physical needs. The scarce desires that remain, such as acquiring a table at a popular restaurant, can be obtained by anyone with the required whuffie. Scarce desires are superfluous in that people do not need them to survive, and are more like rewards for participating within, and generating useful social ideas and goods.

Finally, the network indices achieve the lowest levels possible. International trade is non-existent. There is no center, everywhere is ubiquitously connected.

Event 6.13: The Bitchun Society														
	% Change Impact	-50	20	0	-60	-60	-60	-50	-50	-10	-53	-68.7	-512	-243.3
	Time to Impact	50	50	50	50	50	50	50	50	50	50	50	50	50
Year	% Chance of Event to Occur	Econ Glob	Soc. Glob	Pol. Glob	Pre-Tax Ineq	Post- Tax Ineq	Wage Ineq.	Clark C-P	Sym. C-P	Prew W-S	Violence Instab.	Regime Instab	Within Instab.	Protest Instab.
2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2020	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2025	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2030	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2035	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2040	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2045	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2050	15	-30	10	0	-20	-20	-20	-30	-30	-2	-42	-45	-300	-200
2055	20	-40	15	0	-40	-40	-40	-40	-40	-7	-47	-55	-400	-220
2060	25	-50	20	0	-60	-60	-60	-50	-50	-10	-53	-68.7	-512	-243.4

Section 4: Visions of Humanities Future

Using the event probabilities from the previous charts, a Monte Carlo estimation model is run. For each scenario, the probabilities are run, and a range of potential future scores are calculated. An upper quartile average, lower quartile average, median average, as well as the continuation of the trend line are showed for each variable within each scenario. To understand the purpose of Trend Impact Analysis, one must reinforce that it is a process to lay out assumptions and relationships occurring due to anticipated events. These are not facts or truth. Rather, potential possibilities; visions of imaginable futures. After summarizing the results from the Trend Impact Analysis, a preferred future is constructed highlighting the oppositional forces seen in the previous scenarios.

Each graph identifies the upper quartile (UQ), middle quartile (MQ), lower quartile (LQ), and the naïve extrapolation (base) for each trend line. The quartile extrapolations represent the upper, lower, and overall averages of the possible scores identified from the Monte Carlo simulation. They represent possible different paths that the variables could change given the effect of the events anticipated in the scenarios..

Where the last section focused on how measured variables changed and reacted to each other, this section uses changes in measured variables to anticipate what the unmeasured characteristics of society could appear as. A brief review of the social situation of the scenario is followed by an assessment of what unanticipated/unmeasurable factors may become more important given the changes described. As a final note, the final modeling presented below is crucially tied towards the naïve extrapolations discussed earlier. The choices for the line fitting, from either linear or cyclical modeling, affects the final results in a way that may often be counter-intuitive, or at least surprising. Alternative specifications could have been used for the extrapolations, providing different results. The justifications presented earlier exist as one possible explanation for the future evolutions of the variables, but are certainly not the only possibilities. Significant leeway is requested in interpret the following results in the spirit of the whole enterprise, rather than looking for particular details that may appear inappropriate or flawed.

Graph 6.8: Continued Growth Scenario

The Trend Impact Analysis continued growth scenario reflects the relationships expected in the previous discussion. With the extrapolations furnished for examination, this section attempts to interpret, given the potential relationships identified by the TIA, what additional inferences can be constructed? First, to summarize the continued growth scenario, 3D printers advance, to the point that nanobots are capable of producing any material desire. However, the potential of 3D printers is limited by the application of severe copyright enforcement, ensuring that even though scarcity of material objects is technologically eradicated, scarcity is still enforced through state/corporate policy. The combination of 3D printing and strict copyright, causing social shock and disarray, causes a short term period of social unrest, with increasing protests, which burn out relatively quickly. Concurrently, the development of highly capable robot workers attacks scarcity of work, though the high cost of the robots ensures they do not dramatically restructure the shape of the labor market; rather, robot workers become powerful tools to increase the productivity of high-skill workers, as well as removing the need for humans to do less than desirable work. Finally, the fusing of corporations and government ensure a future dominated by economics; mandated scarcities continue to be the limiting factor of human potential, scarcities kept in place to ensure the financial enrichment of an elite minority.

Surveying the variables, globalization has reached the highest levels of the index for all types of globalization measured. All types of inequality are higher than the naïve extrapolation, but still largely following the same cycle. The core-periphery indicators all show a higher relevance of the United States than would otherwise occur. All the political instability variables are largely untouched, save for the social protest indicator which, while extremely high, largely acts as a vent for social pressures built up through changing technological circumstances.

This story, in its broad strokes, is rather unsurprising, given its clear continuation of clearly evident recent trends. Evident in films such as “Prometheus,” and others, this is clearly a ‘surprise-free’ forecast identifying the maintenance of power and economic inequalities present in the modern day.

The primary purpose of the continued growth scenario is to institutionalize and ‘make normal’ current power and social structures. As an attempt to ‘colonize the future,’ the continued growth story has seeped throughout all forms of media,

demonstrating the importance that modern day elites place on institutionalizing corporate~economic dominance into the human mindset.⁴⁷⁰

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⁴⁷⁰ Ziauddin Sardar, "Colonizing the Future: The 'Other' Dimension of Futures Studies," *Futures* 25 no. 2 (1993): 179-187.

Graph 6.9: Collapse Scenario

The collapse scenario represents the sum of all fears regarding the potential impact of technological change on society. The development of 3D printers creates an arms race and path to conquest as people use the militaristic uses of 3D printing towards violent ends. Concurrently, developments in automation technology create a concurrent source of violence as robots rebel, attempting to extinguish earth of humans caught up in the pursuit of violence and terror. Years of war eventually relinquish its grip on society as the raw materials required for 3D printers to produce robots and weapons run out. In the vacuum of space left by conflict, a coalition of elite interests, using their remaining strength left over from the war, institutionalizes an elite oligopoly throughout American society. Everyone else, weary of war, and looking for security and structure, go along with the new organization, seeing no viable alternative. A new dark age of America begins in the ashes of the greatest of civil wars, institutionalizing minority elite control for the foreseeable future.

The consequences of the collapse scenario are devastating. Economic, social, and political connections with the rest of the world disintegrate, denoted by a sharp reduction in all globalization measures. Economic inequality increases drastically, as elites are able to organize and coalesce around strong military leaders, whereas the unorganized rest of society are left to die or live in ashes. Most political stability indicators increase sharply, indicating the dominance of violence in political life, except for protest instability, which decreases sharply as few are willing to protest during wartime. Like the globalization indices, the network measures also decrease sharply, indicating a strong reduction in connections with the rest of the world. Many of the measures increase slightly as 2060 approaches, indicating the slow return to stability created by elite oligarchy's consolidation of power.

The generation of collapse scenarios primary seeks to propel fear and insecurity into the heart of modern society - fear of the excesses of 3D printers, fear in the potential of a robot rebellion, fear of every other and everything. Ultimately, little is gained from such collapse scenarios other than a recognition that the technology and institutions humans create to better their lives could be twisted into reflecting the fearful images of the imagination. Technologies humans create could be diverted towards destruction, and collapse scenarios seek to reinforce the potential ways in which destruction may occur.

Yet, one hopes that they lead towards positive constructive action, shaping society to avoid the pitfalls and problems embedded within technology, and divert them towards ‘the good life.’

Graph 6.10: Discipline Scenario

The discipline scenario represents an attempt to reform the American economic system in attempts to thwart the perceived negative consequences of globalization. 3D printers set off an explosive growth in localized production, setting up domestic cottage industries as the home level that conquer the economic landscape. This leads to a reduction in economic globalization as foreign goods are eschewed in favor of cheaper to produce and acquire local goods. Further, advances in 'analogue' technology and their social acceptance creates a constant presence in the minds of all to conform to social norms, further encouraging localized consumption habits. The discipline scenario concludes with the evolution of government towards a pseudo-religious organization, where state-sponsored thoughts are encouraged through analogues, ultimately cutting off American from the negative consequences of globalization, reducing inequality, and affirming the stability and dominance of the new 'cultural state.'

Where economics becomes local, the primary realm of competition comes from the lobbying for and adherence to certain sets of normative frameworks. The state becomes a battleground literally for the minds of society, as laws passed in the state are immediately enforced by analogue implants. The majority of society, enjoying the benefits of a stable economy and political system, provide unending support for the normative government of the day. Previous arguments for the role of government of society, hinging on the level and types of regulation in the economy the government can pursue, give way instead to a holistic, comprehensive vision of government as final arbiter of all that is right, just, and moral. The gaze of government lies within the minds of each individual, leaving no escape from its uncompromising eyes.

Graph 6.11: Transformation Scenario

The transformation scenario represents the culmination of the technological attack on all forms of scarcity. Seed style 3D printers irrevocably destroy material scarcity, automation and the digitization of consciousness annihilates the scarcity of labor, ideas and death itself. Culminating in the Bitchun society, the United States is irrevocably transformed into something beyond mere biology and technology.

Modern measures of economic globalization clearly are incapable of understanding and interpreting the economic systems of the Bitchun society. Trade, GDP and other indicators simply become irrelevant as material produces are so ubiquitous as to be practically unseen. Rather, the economy hinges on the last product of humanity that remains scarce: a good reputation. Reputation based currencies, whuffie, dominate social interaction, having massive effects on 'economic' inequality.

Since material sources of wealth vanish, modern measures of economic inequality again do not capture the major story. Inequality certainly exists, but the inequality is not economic, but social. Access to networks of people and their ideas becomes the major pursuit and need for an individual's advancement, hinging entirely on an individual's ability to produce ideas and thoughts deemed useful for society. Where economic inequality disappears as a facet of society, social inequality, implying the ability to influence the thoughts, minds, and actions of other people, is the source of society's dominant power struggles. Certainly, social inequality has always existed in human society, yet it was frequently and intimately linked with economic status. That connection is completely broken; the wealth of an individual emanates completely from their ability to produce powerful ideas.

Section 3: Policy Analysis and Scenario Purpose

The scenarios presented here reflect possible paths in which the emerging issues of 3D printing, automation, and digitization could affect the variables of globalization, economic inequality, and political instability. The purpose of the scenario generation project is to help people imagine alternative realms and possibilities that affect the way humans live in the future.

The major question comes down to how much the body politic attempts to, and can actually control the evolution of the emerging issues and their impact on society. Complete control is neither possible nor optimal as the likely consequences lead to the enrichment of a minority vis-à-vis the majority. Yet not enough control leads to a spiraling of, an emergence into a cloud of uncertainty, possibly inspiring fear and conflict as people face anxiety towards the unknown; catalyzing a grasp for the past and a knee jerk pursuit of what was comfortable and known even in the face of continued technological change.

Yet how much control is actually feasible? The root of all the emerging issues is uncertainty; at what point do they take a life of their own separate from human action? The scenarios have hinted at potential extremes in several directions, from violence, to control, to complete evolution far away from anything resembling 'the human condition.' Additional experiments, mental thought 'ideals,' is one of many attempts to hopefully encapsulate and apply the full potential and hope embedded within the emerging issues. These 'ideals' provide one possible path of imagining, and hence pursuing and constructing preferred futures of these emerging issues.

This conclusion is unsatisfactory, as it does not lead a path towards a preferred future. However, accepting unsatisfactory ambiguity in possible futures demands a recognition of the doubt inherent in human evolution. The path towards the preferred will in part be created by the continued generation of images of the future that help plot a path towards the preferred through a comprehension of the greatest desires, the dramatic fears, and the achievably possible.

The hybrid of scenario generation presented here facilitates the continual generation of future images. By combining stories from descriptive analysis, and numerical relationships from statistical models, quantitative and qualitative perceptions

can be creatively fused to visually manifest the consequences of policy makers and analyst's underlying assumptions. By combining different sensory inputs to produce alternative possible futures, the consequences of social relationships can be seen on numerous levels both qualitatively and quantitatively. These images do not represent *the* future, but are rather a playground to anticipate and articulate probable relationships that evolve to create possible futures. As these possible scenarios approach the limits of imagination, analysts are able to anticipate potential consequences of emerging issues and apply these lessons to policy making and path-creating processes.

Chapter 7: Futures Possibilities for Social Science Research

In Asimov's Foundation series, Hari Seldon develops a science of predicting future human trends, called "Psychohistory."⁴⁷¹ Using a series of mathematical equations applied to a large enough population over a vast period of time, long term trends could be predicted for human society. While inaccurate for individuals, the projections correctly reflected the general 'drift' of social action. Additionally, for the predictions to be accurate, general masses of people had to be ignorant of the 'behind-the-scenes' machinations of statistical models, ensuring individual action was irrelevant in shaping the future.

The view of the future presented in this dissertation rejects the possibility of psychohistory. Human action, no matter for how many people, cannot be predicted by statistical models, regardless of their sophistication. Furthermore, individuals attempt to 'peer' into the future ensures they will constantly try to shape the future to benefit themselves and their associates. However, Psychohistory provides an aspiration; melding quantitative modeling with possibilities revealed through aesthetic images to help create visions of the future,

The social sciences, from economics to sociology, use theory, data, and practice to generate inferences about the human world. Inferences facilitate an understanding of the past and present, though are rarely integrated in an overarching philosophic-political framework to anticipate future possibilities. The inclusion of emerging issues into the analysis of social phenomena recognizes the impact of a changing environment on human processes, providing insights that increase the effectiveness of trend analysis.⁴⁷² Encouraging futures focused research benefits the social sciences by providing a mechanism for policy makers and interested individuals to tailor their inferences towards procuring a preferred future.

Section one begins by using Charles Peirce's pragmatic maxim and his universal categories to create a heuristic framework that creates boundaries between areas of social

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⁴⁷¹ Isaac Asimov, Foundation (New York: Bantam Spectra, 2004).

⁴⁷² For a foundational work in the field of emerging issues analysis, see Graham T. T. Molitor, "How to Anticipate Public-Policy Changes," *Advanced Management Journal* 42 no. 3 (1977): 4-14. See also Jim Dator, "Trend Analysis vs Emerging Issues Analysis," research note published on the web July 2009, <http://www.futures.hawaii.edu/publications/futures-theories-methods/TrendVsEIA2009.pdf>.

research to identify fruitful avenues for cross disciplinary analysis. Section two extends Peirce's framework by operationalizing his categories into a scheme to construct a futures focused research paradigm. Section three explains how each section of this dissertation fits within this futures framework. Section four summarizes the main findings of the dissertation, outlining faults, problems, and areas for additional research, concluding by discussing how branches of the social sciences can be connected to facilitate futures thinking.

Section 1: Peirce's Pragmatism and the Universal Categories

Peirce is most famous for being the founder of philosophical pragmatism.⁴⁷³ Pragmatism, in perhaps its simplest form, identifies the highest level of thought as facilitating human action. In conceiving of human thought, Peirce argued:

Consider what effects, that might conceivably have practical bearings, we conceive the object of our conception to have. Then, our conception of these effects is the whole of our conception of the object.⁴⁷⁴

When Peirce is discussing conceptions, he is identifying how humans think, human thoughts. For Peirce, "The whole function of thought is to produce habits of action;" Peirce's pragmatism can be interpreted as identifying the significance of thoughts through their effect on human behavior.⁴⁷⁵ Peirce's great contribution to empiricism is to that in clarifying ones thoughts, one must approach thoughts from a subjective perspective, identifying our ability to act in relation to the thought. Concurrently, thoughts must be conceived from their objective characteristic, namely that observable

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⁴⁷³ Pierce's pragmatism is broad and untamed, leading to numerous potential insights that have spilled over into such oppositional ideas as logical positivism as well as post-modernism. The approach taken here is to distill from Pierce particular ideas that are suited towards making ideas regarding futures analysis 'more clear.' For recent additional discussions of Peirce, see Katrin Amian, Rethinking Postmodernisms(s): Charles S. Peirce and the Pragmatist Negotiations of Thomas Pynchon, Toni Morrison, and Jonathan Safran Foer (The Netherlands, Rodopi B.V.: 2008). See also Cornelis de Waal, Peirce: A Guide for the Perplexed (Bloomsbury: Continuum, 2013), and Christopher Hookway, The Pragmatic Maxim: Essays on Peirce and Pragmatism (New York: Oxford University Press, 2013). For a specific application of Peirce's Pragmatism to postmodernism see Pragmatism: From Progressivism to Postmodernism, Robert Hollinger and David Depew eds., (Westport, CT: Prager Publishers, 1995).

⁴⁷⁴ Arthur W. Burks, ed. The Collected Papers of Charles Sanders Peirce: Volume 5 (Cambridge: Harvard University Press, 1934-35):402.

⁴⁷⁵ Burks, 1934-35, 400, cited in Thomas M. Olszewsky, "Peirce's Pragmatic Maxim," *Transactions of the Charles S. Peirce Society* 19, no. 2 (1983): 199-210.

facts or objects separate from the thought help confirm the thoughts existence.⁴⁷⁶ The meaning of a thought comes from its ability to affect “habits of mind,” the actions of those subscribing to, or acting from, a belief.⁴⁷⁷

Taken literally, Peirce’s pragmatism identifies only immediate experiences as justifying the significance of thoughts; indeed his early writings on pragmatism intimate as such.⁴⁷⁸ However, his later writings move from the indicative conditional (If I eat too much I *will* get fat), to subjunctive conditionals (If I were to eat too much then I would get fat). This broadens pragmatism to accept probabilistic formulations of the consequences of actions. Here Peirce makes a distinction between ‘real’ and ‘idea’ experience. Real experiences come from common scientific experiments, the actual testing of hypothesis in a laboratory environment. Ideal experiences occur through diagrammatic or other formal expressions of possibility, “allow[ing] any flight of imagination provided this imagination ultimately alights upon a possible practical effect.”⁴⁷⁹ The purpose of Peircian pragmatism is ultimately a forcing upon to infer or deduce possible repercussions of thoughts and beliefs on the habits of mind, thoughts generated from scientific empiricism to philosophical discussion.

Pierce also went to great lengths to *prove* the usefulness of the pragmatic maxim in clarifying thoughts towards the purpose of action.⁴⁸⁰ Ultimately, his defense rested on belief. Ideas help people think about something else, for the purpose of inspiring or creating human action. Ideas are the result of a particular belief that the concept itself accurately reflects the ideas manifested in the concept. This process is successful when doubt is lacking, which occurs when previous actions were successful in achieving their goals.⁴⁸¹ Belief consists of an appreciation that our thoughts evolve over time, based on human experience, and that these thoughts become more refined, and ‘correct’ in the

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⁴⁷⁶ W. B. Gallie, Peirce and Pragmatism (New York: Dover Publications, 1966): 157.

⁴⁷⁷ Gallie, 1966, 15.

⁴⁷⁸ “C.S. Peirce’s Pragmatism,” *internet encyclopedia of Philosophy*, Accessed August 7, 2013 at <http://www.iep.utm.edu/peircepr/#H3>.

⁴⁷⁹ N. Houser and C. Kloesal eds., The Essential Peirce: Volume 2 (Bloomington In: Indiana University Press, 1992-1994): 235.

⁴⁸⁰ Patricia Ann Turrissi, ed., Pragmatism as a Principle and Method of Right Thinking: The 1903 Harvard Lectures on Pragmatism (New York: State University of New York Press, 1997): 116. See also Christopher Hookway, “The Pragmatist Maxim and the Proof of Pragmatism,” *Cognitio* 6 no. 1 (2005): 25-42.

⁴⁸¹ Olshewsky, 1983, 201. See also Turrissi, 1997, 116-117.

sense that the cultivation of beliefs with the intention of pursuing action leads to the acquiring of goals.

To further help clarify the meaning of thoughts, Peirce created what he called the “Universal Categories.” Peirce most clearly stated his universal categories in his Harvard lectures of 1903.⁴⁸² Explaining Peirce’s categories is a difficult objective, as he continued to discuss their meaning throughout his career. Additionally, the nature of universal categories itself demands a level of vagueness that resists precise definitions. Peirce is attempting to distill human thought into its core categorical essences:⁴⁸³

Ideas so broad that they may be looked at rather as moods or tones of thought than as definite notions....they are indeed thin skeletons of thought....they are intended to go down to the very essence of things.⁴⁸⁴

The universal categories are present in any phenomenon; any idea humans are capable of thinking.⁴⁸⁵ Initial expositions of the universal categories continue along the following lines. Firstness identifies an idea in its isolation, separate from all others: the possibility of an idea, its indeterminacy. Secondness is the idea in relation to an ‘other,’ the struggle, or reaction that occurs when an idea is placed within an observable context; i.e., reality. Thirdness identifies thought itself, where firstness, the idea in isolation, and secondness, the idea in relation to another, are mediated, where understanding of an idea leads to action, predicated on faith; actions are ‘true’ or ‘correct’ insofar as they are based on the logical relationship between firstness and secondness where thirdness is the likely action occurring due to knowledge gained from firstness and secondness. The purpose of the universal categories is they facilitate a way of thinking, providing heuristic tools to facilitate constructive thoughts.

Digging a little deeper, the universal categories have additional meanings. Firstness is Peirce’s first universal category, and attempts to capture the possibility of an idea, the raw essence or quality of a feeling:

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⁴⁸² W. B. Gallie, *Peirce and Pragmatism* (New York: Dover Publications, 1966): 181.

⁴⁸³ William L. Rosensohn, *The Phenomenology of Charles S. Peirce: From the Doctrine of Categories to Phaneroscopy* (Amsterdam: B. R. Grüner, 1974): 74.

⁴⁸⁴ Rosensohn, 1974, 74.

⁴⁸⁵ Patricia A. Turrise, “Peirce’s Logic of Discovery: Abduction and the Universal Categories,” *Transactions of the Charles S. Peirce Society*, 26 no. 4 (1990): 465-498. 490. The following discussion is a summary of Turrise, 480.

A Firstness is exemplified in every quality of a total feeling...the word *possibility* fits it, except that possibility implies a relation to what exists, while universal firstness is the mode of being of itself.⁴⁸⁶

Later, Peirce defined 'mode of being' as "that which is such as it is, positively and without reference to anything else."⁴⁸⁷ Peirce is trying to capture the raw 'quality of feeling' that exists within all things and all ideas.⁴⁸⁸ The purpose of firstness, as articulated by Gallie, is to:

Accept infinite (potential) variety as something ultimate, something that itself admits of no possible explanation, but which we must somehow do justice to in all explanations of phenomena that we attempt.⁴⁸⁹

In the spirit of pragmatism, firstness could be described as the pursuit of theory, the mental process of imagining the possibilities of life, its infinite probabilities, as potentials experienced through human action.

If firstness is an attempt to capture the possibility of things, secondness depicts the fact of their existence.⁴⁹⁰ Secondness is, moving beyond mere thought, reflects the instances of occurrence:

We find Secondness in occurrence, because an occurrence is something whose existence consists in our knocking up against it. A hard fact is something of the same sort; that is to say, it is something which is there, and which I cannot think away, but am forced to acknowledge as an object, or second beside myself...and which forms material for the exercise of my will.⁴⁹¹

Secondness is the confrontation that occurs when people rummage through reality, running into objects, and must attempt to define and understand the external world's, in relation to oneself, meaning.

If firstness can be identified as the potential idea of things, and secondness as the actual fact of things, thirdness attempts to capture influence, the attempt by one subject to act and change another. In this sense, thirdness forces firstness and secondness to

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⁴⁸⁶ Charles Peirce, Lowell Lectures, CP 1.531, 1903. Accessed August 7, 2013 at <http://www.helsinki.fi/science/commens/terms/firstness.html>

⁴⁸⁷ Charles Peirce, "A Letter to Lady Welby" in Arthur W. Burks, ed. The Collected Papers of Charles Sanders Peirce: Volume 8 (Cambridge: Harvard University Press, 1934-35): 328.

⁴⁸⁸ Rosensohn, 1974, 81.

⁴⁸⁹ Gallie, 1966, 191.

⁴⁹⁰ Rosensohn, 1974, 86.

⁴⁹¹ Charles Peirce as cited in Gallie, 1966.

confront each other, mediating their relationship.⁴⁹² Thirdness is interpretation, where all possibilities of thoughts, and the actual realities identified through experience are clarified regarding their consequences on human action.⁴⁹³ Table 7.1 extracts several adjectives in order to help facilitate an understanding of Peirce’s universal categories.⁴⁹⁴

Table 7.1: Adjectives to Facilitate Comprehension of the Universal Categories	
Category	Ideas Perceived/Described as:
Firstness	Esthetics, Chance, Possibility, Indeterminacy, Perception,
Secondness	Fact, Reality
Thirdness	Laws, Conduct, Expectations, Interpretation, Mediation

Section 2: Towards a Futures Focused Research Paradigm⁴⁹⁵

Peirce’s focus on the impact of thought on human action dominates his thinking. If one perceives the future as *the* realm of human action, a Peircian framework has significant affinity.⁴⁹⁶ In evaluating all the realms of analytical inquiry (i.e., social

⁴⁹² Gallie, 1966, 198.

⁴⁹³ Rosensohn, 1974, 97. See also Eugene Freeman, The Categories of Charles Peirce (Chicago: The Open Court Publishing Company, 1934): 19.

⁴⁹⁴ This is not a complete listing of the total possibilities for these categories. Rather, they are refined to facilitate the following section’s discussion of a futures research framework. I.E: They reflect an attempt to apply the pragmatic maxim on the universal categories in the spirit of constructing an actionable framework of analysis to facilitate clarification and fruitful realms of cross disciplinary analysis. Words chosen were from Eugene Freeman, The Categories of Charles Peirce (Chicago: The Open Court Publishing Company, 1934): 57-58

⁴⁹⁵ The following section attempts to connect the concepts of Peirce with paradigms of political science discussed in Richard Chadwick, “Reframing the Meaning of Democracy: The Globalization of Democratic Development, Viewed through the Paradigms of Political Science, Political Practice, and Political Philosophy,” Paper presented to the International Political Science Association Conference in Fukuoka, 2006. Accessed August 7, 2013 at http://www.hawaii.edu/intlrel/fukuoka2006_paper_97.pdf. Any misunderstandings in translation are mine. An alternative, though similar viewpoint is expressed in Johan Galtung, “Empiricism, Criticism, Constructivism: Three Approaches to Scientific Activity,” *Synthese* 24 no. 3/4 (1972): 343-372.

⁴⁹⁶ One example of seeing the future as a realm of action is Ann Mische, “Projects and Possibilities: Researching Futures in Action,” *Sociological Forum* 24 no. 3 (2009): 694-704. Another that directly

sciences, hard sciences, philosophy, etc.), people recognize these forms of inquiry in terms of the products they create; literally, the ‘action’ of the discourse. All these forms of inquiry, whether stated or not, ultimately produce different types of models; models defined as linguistic or mathematical constructions that attempt to highlight elements of the world in which humans might, actually or should exist within.

From this construction, there are three types of models: models of the possible, models of the real, and models of the preferred. Each type of model corresponds to the overarching concept of Theory, Data, and Culture, respectively. The relationship between these concepts is visually shown in Figure 7.1.

The three paradigms of theory, data, and culture are subsumed by the overarching concept of analytical inquiry; i.e., people ask and answer questions regarding the state of human existence through the modes of thought generated in each of the three underlying categories. Similar to Peirce’s focus on belief, the operative logic catalyzing the

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discusses the relation between the future and action is T. Stevenson, “Anticipatory Action Learning: Conversations about the Future,” *Futures* 34 (2006): 417-425.

paradigms purpose is faith: faith in methods of inquiry, faith in the results of the inquiry, and faith that those results can and should be used to instigate and inspire action. Faith is not directly connected to the three paradigms; rather, it is the operative logic that gives the structure its purpose, but does not directly contribute to the analytical process.

Similar to Peirce's firstness, theory is about probabilities and possibilities in pursuing an understanding of humanity. Unrestricted by measuring or testing arguments, hypotheses, or concepts, theory is the fertile playground of the mind. The purpose of theory is to imagine possible models of how humanity could be, in all its possible variations and potentials. Science fiction, literature, and philosophical debates are all spaces where the possible state of humanity are debated and discussed. Theory is inspiration, attempting to construct general understandings of the world to inspire others to create that world or to warn others of potential dangers and pitfalls. Often qualitative in its expression, theory asks questions about how the world may actually be, the world humanity might live in, what humanity could be, what is possible for humanity to become.

Alternatively, similar to secondness, data is about constructing models attempting to reflect and replicate reality. Restricted by human senses, biological or technological, measurement and tactile feedback are required in order to render the world 'knowable.' Models of the real must be carefully understood, as they are not actual reality, which is in constant flux, but rather forthright attempts to recreate and understand what analysts *think* are real. Data is dominated by questions such as what is, are my findings valid, generalizable to other similar entities, and precise in their estimation. Quantitative modeling, either in the hard sciences or economics, frequently revolves around the data paradigm.

Culture is an attempt to confront what humanity *should be*, what is preferable, and influences the actions people are willing to take to shape the world in pursuit of those ideals. Culture generates models of the desirable, constructing a world in which humans *want* to live in. Like thirdness, culture mediates theory and data, becoming a realm of action, where decisions about the fate of humankind are implemented and acted upon. Culture is the realm of the politician, the social activist, a space where peoples ideals and beliefs are put into action in pursuit of their goals. Maneuvering between the paradigms

of theory, data, and culture are disciplines of action: science, philosophy, and practice. Science practitioners seek to combine models of the possible (theory) with models of the real (data), using theory as a tool to refine hypotheses which are constantly tested and validated through the scientific method. The aim is to produce ‘truth,’ statements backed by the consensus of science practitioners purported to represent what the world actually is. Practitioners continued refine theory and data in an attempt to understand the universe in which humans inhabit.

Practitioners in philosophy act in the realms of theory and culture, arguing and debating over the possible worlds in which humans could live, versus the worlds in which humans should live. Philosophy pursues transcendence: understanding the world in hopes of moving beyond the limitations of current human action. Philosophers generate alternatives to current problems, refusing to become embroiled in dead-end discussions, instead seeking out unexplored realities and perceptions to fuel innovative understandings of the now and may be.

People embroiled in the discipline of practice seek to bridge the gap between data and culture. Using knowledge of the ‘real’ combined with an understanding of what ‘should be’ to physical, by acting within governing institutions and passing laws, or outside of institutions through protest actions, attempting to create a world in which they want to live.

Each discipline takes for granted the assumptions of the other. Science, focused on the testing theories in the world of data, ignores the cultural environment in which it works and its implications on action. Philosophy, determined to construct new thoughts and their potential impact on action, ignores testing those thoughts in the real world. Finally, practitioners, attempting to use knowledge of data with the desire for cultural change, often ignoring the fundamental theoretical underpinnings of the actions they pursue. This creates dissonance between the disciplines, identifying prosperous areas of cross-discipline cooperation, but concurrently a barrier to further cooperation as each discipline attacks and questions the assumptions of the other.

The paradigms of theory, data, and culture, combined with the disciplines of science, philosophy, and practice, combine to create a framework for analytical inquiry. Each paradigm asks and investigates different questions, leading to different actions by

the disciplines, all in a faith-based effort to understand the realms that human society finds itself within. When each discipline begins to question their own assumptions and takes into account the studies of the other, each element of the model feeds off the other, constantly checking and reacting to each other's arguments.

Futures consequently occur as the result of the thoughts generated in the three paradigms, and the actions pursued by the separate disciplines. Yet, following the spirit of Peirce, a moment should be made to 'make the futures' clear. Peirce argued that every concept can be understood in terms of the universal categories, and the futures should be no different. The firstness of the futures is a space as enigma; a quality of feeling representing the unlimited possibility of what humanity could be, independent of any other. The secondness of the futures identifies a space of possibility in opposition to space as it is now; the future as a space where people will live. The thirdness of the future represents a mediation between the futures as possible spaces versus the world of humanity as it is now. Thirdness exhumes and places to the fore the futures as space of action, where humanity maneuvers and pursues a path from the world as it exists now to a place as the world could be; the future as constant creation.

If futures studies are perceived as the interdependence of thoughts and questions generated from theory, data, and culture, combined with the associated actions of philosophy, science, and practice, what benefits in producing thoughts that facilitate further action occur? Most importantly, the futures research framework encourages clarity of thought: clarity in, types, biases, and consequences of thoughts.

Separating thoughts into three paradigms and the associated disciplines that study them helps clarify the purposes of those thoughts: imagining possibilities, conceiving the real, and constructing and pursuing pathways for action towards the preferred. Identifying the boundaries between different types of thoughts creates an understanding of how those thoughts operate in isolation, as well as what alternative benefits accrue when analysts combine paradigms.

Whatever the final product one is trying to construct, specialized knowledge is gained when working within each paradigm, and an additional knowledge payoff occurs when the different paradigms are combined in the final output of the project. A clear

example of these payoffs can be understood when the whole of this dissertation is placed within this futures focused analytical framework.

Section 3: Benefits of the Futures Focused Research Framework

Each chapter in the dissertation provides examples of the benefits accrued from working within and between paradigms. Chapter one is a literature review, examining theoretical relationships of globalization, political stability, and income inequality. This examination is consequently used in chapters two and three, identifying the work of the scientific discipline: testing thoughts from theory with quantitative data in the pursuit of constructing models of the real world. Without the reliance of theory, chapters two and three would be incapable of generating testable models.

Chapters four and five demonstrate an alternative use of theory. Rather than as the fuel for generating testable models, theory here is instead used to produce relationships of possibility. Chapter four, while introducing a method of futures research, primarily exists to examine the potential impacts of emerging issues on globalization, inequality, and political stability. Chapter five furthers this theoretical examination by using stories from science fiction as thought experiments, generating possible consequences of the emerging issues.

Chapter six represents a combination of the real world relationships identified in chapters two and three, with the possibilities examined in chapters four and five. The theory of chapters four and five are opposed with the reality of chapters two and three, creating a path to construct scenarios of probability. In this sense, chapters two and three, along with four and five, are mediated by chapter six, identifying potential human societies that are the result of particular human actions. In Peirce's terminology, chapter six represents an 'ideal,' a thought experiment used to perceive the relationship between theory and reality as created by the possible human actions that occur in each scenario. Chapter six concludes with an assessment of how the analyzed emerging issues can be affected by policy changes, helping facilitate the imagining of a potential preferred future and grounds for future action.

The final product of the dissertation, the construction of scenarios, benefits from combining the three paradigms of theory, data, and practice. The possibilities represented by science fiction are made ‘real’ when anticipated consequences are constructed on the data trends of globalization, inequality, and political stability. Further, the science fiction identifies certain actions that lead to certain consequences, helping to clarify the specific consequences of the emerging issues on the data trends. From the possibilities offered in the different scenarios, observers are able to see how the emerging issues could develop in different ways, seen qualitatively in the societies constructed, as well as quantitatively as far as how the data trends evolved.

Section 4: Futures as Actionable Art

Every individual, community, and institution cares and thinks about the future. Often times this thinking is unstructured and haphazard, suffering from numerous failings. Recent advances in studies of brain function identify four different types of failures regarding using mental simulations to anticipate potential futures.⁴⁹⁷ Future thoughts may be unrepresentative of the entirety of past experiences, ‘cherry picking’ past experienced to facilitate future action. Another error is that thoughts can be essentialized, distilling past experienced to what are perceived as the essential aspects, losing important details that affect potential consequences. People often make errors of abbreviation, focusing on the more near-time consequences of their actions, rather than a holistic perception. Finally, people often make errors of contextualization; when thinking of a preferred future, people do not take into account the different contexts the future may bring, and assume the context of the past will be the same as the context of the future.

This dissertation has structured several mechanisms to construct scenarios in hopes of avoiding , or at least reducing the impact of errors in futures thinking. By pursuing a multi-pronged approach of scenario construction, relying on the possibilities of theory, an assessment of reality, and the types of actions that lead to certain consequences, the hope is that the scenarios constructed will help encourage fruitful

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⁴⁹⁷ Daniel T. Gilbert and Timothy D. Wilson, “Prospection: Experiencing the Future,” *Science* 317 (2007): 1351- 1354.

discussions towards preferred futures. The dissertation will ultimately be judged by whether or not the ideas put forth assist others in their quest to comprehend and achieve their futures.

Several problems exist in the dissertation as currently structured. First, the quantitative modeling in chapters 2 and 3 does not reflect the totality of academic thoughts on the variables measured. By choosing to personally calculate the relationships, rather than applying other's work, the dissertation relies on a small sample of analysis that is not representative of all available analysis. However, the hope is that the calculations reflect an attempt to grapple with the difficulties of data analysis, while showing specifically how the data analysis can be applied to scenario construction. Relying on others work would make the connection more difficult, and much of the underlying data requirements are not often present in available papers. Over time, a growing consensus will hopefully emerge among econometric analysts such that the sum of their knowledge can be directly transferred into scenario construction.

Another problem exists in the implementation of the Trend Impact Analysis. The implementation currently used has a Monte Carlo simulation with only 100 simulations. The results, while providing a useful first glance, are only approximations that would become more precise, given the limitations of the framework, as more simulations are run. Currently, a Matlab implementation does exist, but will not be ready for the completion of the dissertation.

Additionally, the connection between the TIA simulations and the construction of preferred futures as well as implications of policy analysis is insufficient. The main contribution of the dissertation is providing an important connection between combining qualitative and quantitative forms of analysis in constructing interesting scenarios. Unfortunately, this method does not directly address the construction of preferred futures or policy implications. Rather, the hope is by helping people construct scenarios, they will have more choices from which to create their own preferred scenarios and the policy choices required to achieve them.

The great benefit of the method introduced in this dissertation is the attempt to analyze and measure the relationships between emerging issues and currently measurable variables. Quantitative analysis forces analysts to attempt to envision specifically how

variables interact and their possible consequences. The qualitative aspect creates a broad universe from which to identify possible directions in which emerging issues can affect society. The analysts need not be limited to science fiction, and can use any qualitative data which helps analysts visualize possibilities. Combining these elements of qualitative and quantitative analysis, within an overall futures research framework, hopefully can help make scenarios 'more clear' by specifically identifying the underlying relationships and causes that occur within the evolution of scenarios.

The futures are an enigma. Like the gap between thoughts in the mind and their manifestation on paper, a disconnection exists between futures images and futures reality. Closing that gap and making the image the real is the ultimate hope of futures studies.

Appendix A: Variables, Definitions, and Sources

Order is as variables appear in Dissertation

Variable	Definition	Sources
Assassinations	"Any politically motivated murder or attempted murder of a high government official or politician."	Banks and Wilson, 2013.
Strikes	"Any strike of 1,000 or more industrial or service workers that involves more than one employer and that is aimed at national government policies or authority."	Banks and Wilson, 2013.
Guerrilla War	"Any armed activity, sabotage, or bombings carried on by independent bands of citizens or irregular forces and aimed at the overthrow of the present regime."	Banks and Wilson, 2013.
Crises	"Any rapidly developing situation that threatens to bring the downfall of the present regime - excluding situations of revolt aimed at such overthrow."	Banks and Wilson, 2013.
Purges	"Any systematic elimination by jailing or execution of political opposition within the ranks of the regime or the opposition."	Banks and Wilson, 2013.
Riots	"Any violent demonstration or clash of more than 100 citizens involving the use of physical force."	Banks and Wilson, 2013.
Revolutions	"Any illegal or forced change in the top government elite, any attempt at such a change, or any successful or unsuccessful armed rebellion whose aim is independence from the central government."	Banks and Wilson, 2013.
Demonstrations	"Any peaceful public gathering of at least 100 people for the primary purpose of displaying or voicing their opposition to government policies or authority, excluding demonstrations of a distinctly anti-foreign nature."	Banks and Wilson, 2013.
Coups	"The number of extraconstitutional or forced changes in the top government elite and/or its effective control of the nation's power structure in a given year. The term "coup" includes, but is not exhausted by, the term "successful revolution". Unsuccessful coups are not counted."	Banks and Wilson, 2013.
Constitutional Changes	"The number of basic alterations in a state's constitutional structure, the extreme case being the adoption of a new constitution that significantly alters the prerogatives of the various branches of government."	Banks and Wilson, 2013.

Cabinet Changes	"The number of time in a year that a new premier is named and/or 50% of the cabinet posts are assumed by new ministers."	Banks and Wilson, 2013.
Chief Executive Changes	"The number of times in a year that effective control of executive power changes hands. Such a change requires that the new executive be independent of his predecessor."	Banks and Wilson, 2013.
Number of Elections	"The number of elections held for the lower house of a national legislature in a given year."	Banks and Wilson, 2013.
Regime Changes	Dummy variable where 1 identifies countries that have a score of 0 for the variable 'durable' in the polity IV dataset, identifying that a new regime has started or the country is in anarchy.	Marshall et al., 2013.
Years Largest Party Holds Majority in Government	Total years party of chief executive have been in power.	Beck et al., 2001.
Fractionalism	The probability that two deputies picked at random from among the government parties will be of different parties.	Beck et al., 2001.
Polarization	Maximum polarization between the executive party and the four principle parties of the legislature	Beck et al., 2001.
Veto Players	The percent of veto players that drop from the government given the senate does not change.	Beck et al., 2001.
Minor Conflicts	Dummy variable where a score of 1 identifies countries with conflicts having between 25 and 999 battle-related deaths in a given year.	Gleditsch et al., 2002.
Medium Conflicts	Dummy variable where a score of 1 identifies countries with conflicts having at least 1,000 battle related deaths in a given year.	Gleditsch et al., 2002.
Civil Wars	Dummy variable where a score of 1 identifies countries with conflicts having over 1,000 battle related deaths in a given year and violence is between a government of a state and one or more internal opposition groups without intervention from other states.	Gleditsch et al., 2002.
Violence Factor	Oblimin factor analysis of 21 variables corresponding with violence	Jong-A-Pin, 2009.
Regime Factor	Oblimin factor analysis of 21 variables corresponding with regime instability.	Jong-A-Pin, 2009.

Within Factor	Oblimin factor analysis of 21 variables corresponding with within regime instability.	Jong-A-Pin, 2009.
Protest Factor	Oblimin factor analysis of 21 variables corresponding with anti-government protests.	Jong-A-Pin, 2009.
Economic Globalization	Composite index of global economic factors.	Dreher et al., 2008
Social Globalization	Composite index of global social factors.	Dreher et al., 2008.
Political Globalization	Composite index of global political factors.	Dreher et al., 2008
GDP Per Capita	The natural log of gross domestic product per 100 people.	Feenstra et al., 2013.
Trademark Applications	Natural log of the total number of "applications to register a trademark with a national or regional Intellectual Property (IP) office."	World Bank, 2013.
Pre-Tax Redistribution Income Inequality	Gini coefficient calculated with pre-tax redistribution economic information.	Solt, 2009.
Post-Tax Redistribution Income Inequality	Gini coefficient calculated with post-tax redistribution economic information.	Solt, 2009.
Wage Inequality	The natural log of a theil index of wage inequality.	Galbraith, 2012.
Dictatorship	Dummy variable where a score of 1 identifies "countries that did not hold free and fair multiparty elections and were authoritarian in rule."	Galbraith, 2012.
Communism	Dummy variable where a score of 1 identifies countries that self-identify as communist.	Galbraith, 2012.
Islamic Republic	Dummy variable where a score of 1 identifies countries that self-identify as an Islamic Republic.	Galbraith, 2012.

Social Democracy	Dummy variable where a score of 1 identifies countries with "fair, multiparty elections over the 1960-2005, uninterrupted by other types of regimes," and had a significant social safety net.	Galbraith, 2012.
One Party Democracy	Dummy variable where a score of 1 identifies "regimes that held elections for candidates of one party alone."	Galbraith, 2012.
Recent Democracy	Dummy variable where a score of 1 indicates a country "adopted free, multiparty elections for some period after the data began in 1963."	Galbraith, 2012.
Sector Dualism	Absolute value of the % labor force involved in agriculture minus the % of GDP involved in agriculture	Mahutga et al, 2011.
Employment share in agriculture	Percent of total employment for a country of people who work for a "public or private employer and receive remuneration in wages, salary, commission, tips, piece rates, or pay in kind" for work in an agricultural sector.	World Bank, 2013.
Secondary School Enrollment	"Total enrollment in secondary education, regardless of age, expressed as a percentage of the population of official secondary education age."	World Bank, 2013.
Rate of Population Growth	Crude birth rate minus crude death rate	World Bank, 2013.
FDI Inflows (% GDP)	Inflows into a country of "investment to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor."	World Bank, 2013.
Mobile Cellular Subscriptions	The natural log of "Subscriptions to a public mobile telephone service using cellular technology" per 100 people.	World Bank, 2013.
Political Terror Scale	The level of political terror from 1 to 5 where 1 indicates rate levels of terror and a 5 indicates high levels of terror.	Reed and Gibney, 2010.
Legal System and Property Rights	Component index identifying the "protection of persons and their rightfully acquired property."	Gwartney et al., 2012.
Infant Mortality	Natural log of the "number of infants dying before reaching one year of age, per 1,000 live births in a given year."	World Bank, 2013.

Conflict Ridden Neighborhood	Dummy variable where a score of 1 identifies countries with four or more bordering states with major armed civil or ethnic conflict.	Goldstone et al., 2010.
State Led Discrimination	Political or economic discrimination based on the minorities at risk project.	Goldstone et al., 2010.
Clark C-P	Normalized core-periphery index calculated using bilateral trade flows from the IMF Direction of Trade statistics.	Clark, 2010, Borgatti and Everett, 1999, and IMF, 2012.
Sym C-P	Normalized core-periphery index calculated with symmetrical bilateral trade matrices.	Borgatti and Everett, 1999, and IMF, 2012.
Prew W-S	Freeman degree centrality coefficient calculated with bilateral trade flows.	Prew, 2010, and IMF, 2012.
Size of Government	Component index indicating "the extent to which countries rely on the political process to allocate resources and goods and services."	Gwartney et al., 2012.
Regulation	Component index indicating the extent to which "regulation restrict[s] entry into markets and interfere[s] with the freedom to engage in voluntary exchange."	Gwartney et al., 2012.
Gross Capital Formation	"Consists of outlays on additions to the fixed assets of the economy plus net changes in the level of inventories."	World Bank, 2013.
Labor Force Participation	"The proportion of the population ages 15 and older that is economically active."	World Bank, 2013.

Appendix B: Data Appendix for Variables Used in Quantitative Analysis

Order is as variables appear in Dissertation

Variable		Mean	Std. Dev.	Min	Max
Assassinations	overall	0.17	0.60	0.00	10.20
	between		0.28	0.00	2.10
	within		0.51	-1.93	8.27
Strikes	overall	0.11	0.31	0.00	3.00
	between		0.18	0.00	1.38
	within		0.24	-1.08	2.32
Guerrilla War	overall	0.18	0.45	0.00	7.40
	between		0.26	0.00	1.95
	within		0.37	-0.91	6.49
Crises	overall	0.17	0.33	0.00	3.20
	between		0.19	0.00	1.23
	within		0.27	-0.86	2.80
Purges	overall	0.13	0.40	0.00	7.00
	between		0.18	0.00	1.07
	within		0.35	-0.94	6.06
Riots	overall	0.41	1.22	0.00	27.00
	between		0.66	0.00	6.23
	within		0.98	-5.62	23.81
Revolutions	overall	0.18	0.35	0.00	2.80
	between		0.22	0.00	1.28
	within		0.28	-0.72	2.63
Demonstrations	overall	0.48	1.25	0.00	24.20
	between		0.66	0.00	5.85
	within		1.01	-5.37	18.83
Coups	overall	0.03	0.09	0.00	1.00
	between		0.04	0.00	0.30
	within		0.08	-0.27	0.73

Constitutional Changes	overall	0.10	0.19	0.00	1.25
	between		0.14	0.00	1.00
	within		0.17	-0.33	0.99
Cabinet Changes	overall	0.45	0.38	0.00	2.75
	between		0.22	0.02	1.31
	within		0.31	-0.46	2.44
Chief Executive Changes	overall	0.20	0.29	0.00	3.00
	between		0.21	0.00	2.00
	within		0.23	-0.67	2.36
Number of Elections	overall	0.22	0.16	0.00	1.00
	between		0.11	0.00	1.00
	within		0.14	-0.17	0.98
Regime Changes	overall	0.11	0.23	0.00	1.00
	between		0.13	0.00	1.00
	within		0.19	-0.51	1.02
Years Largest Party Holds Majority in Government	overall	11.62	13.25	1.00	102.00
	between		9.95	1.00	49.90
	within		8.56	-37.28	82.41
Fractionalism	overall	0.46	0.30	0.00	1.00
	between		0.25	0.00	1.00
	within		0.19	-0.20	1.13
Polarization	overall	0.34	0.67	0.00	2.00
	between		0.53	0.00	2.00
	within		0.39	-1.34	2.00
Veto Players	overall	0.11	0.13	0.00	1.00
	between		0.07	0.00	0.31
	within		0.11	-0.20	0.81
Minor Conflicts	overall	0.07	0.20	0.00	1.00
	between		0.14	0.00	0.98
	within		0.15	-0.62	0.88

Medium Conflicts	overall	0.07	0.23	0.00	1.00
	between		0.16	0.00	0.98
	within		0.16	-0.78	0.97
Civil Wars	overall	0.03	0.13	0.00	1.00
	between		0.07	0.00	0.55
	within		0.11	-0.52	0.93
Violence Factor	overall	0.00	1.00	-1.38	6.67
	between		0.81	-0.72	3.12
	within		0.58	-2.51	3.55
Regime Factor	overall	0.00	1.00	-2.45	5.64
	between		0.66	-0.92	3.18
	within		0.79	-2.62	4.80
Within Factor	overall	0.00	1.00	-2.46	3.19
	between		0.81	-1.58	1.90
	within		0.57	-2.73	2.60
Protest Factor	overall	0.00	1.00	-1.64	11.35
	between		0.65	-0.91	3.45
	within		0.74	-3.93	7.90
Economic Globalization	overall	49.65	19.17	9.57	97.88
	between		16.77	15.65	94.98
	within		8.91	26.66	77.71
Social Globalization	overall	39.77	20.95	6.16	92.44
	between		19.57	8.00	83.73
	within		7.09	12.45	66.46
Political Globalization	overall	50.71	23.78	1.55	97.90
	between		21.17	8.21	96.57
	within		10.81	17.47	88.87
GDP Per Capita (Natural Log)	overall	8.25	1.27	5.24	11.46
	between		1.20	5.85	11.00
	within		0.39	6.68	10.53
Trademark Applications (Natural Log)	overall	7.86	1.81	0.80	13.47
	between		1.80	1.60	11.74
	within		0.74	4.33	10.16

Pre-Tax Redistribution Income Inequality	overall	44.59	9.72	19.31	77.48
	between		8.44	27.30	66.86
	within		5.10	26.01	64.97
Post-Tax Redistribution Income Inequality	overall	37.94	10.60	16.68	68.03
	between		9.82	20.27	65.96
	within		3.80	21.30	53.97
Wage Inequality (Natural Log)	overall	-1.43	0.43	-3.00	-0.05
	between		0.41	-2.63	-0.07
	within		0.21	-2.28	-0.20
Dictatorship	overall	0.30	0.44	0.00	1.00
	between		0.35	0.00	1.00
	within		0.27	-0.54	1.16
Communism	overall	0.06	0.23	0.00	1.00
	between		0.21	0.00	1.00
	within		0.12	-0.77	0.74
Islamic Republic	overall	0.02	0.14	0.00	1.00
	between		0.12	0.00	1.00
	within		0.07	-0.80	0.86
Social Democracy	overall	0.14	0.34	0.00	1.00
	between		0.33	0.00	1.00
	within		0.05	-0.32	1.04
One Party Democracy	overall	0.05	0.21	0.00	1.00
	between		0.16	0.00	1.00
	within		0.14	-0.85	0.95
Recent Democracy	overall	0.30	0.45	0.00	1.00
	between		0.36	0.00	1.00
	within		0.29	-0.60	1.20
Sector Dualism	overall	11.81	14.45	-25.93	55.13
	between		15.78	-19.69	55.13
	within		5.12	-23.44	36.01

Employment share in Agriculture (% of total employment)	overall	24.43	22.32	0.00	92.20
	between		24.88	0.70	92.20
	within		5.51	-4.22	51.43
Secondary School Enrollment	overall	58.09	34.16	0.13	164.07
	between		31.74	3.94	141.42
	within		13.52	8.30	115.16
Rate of Population Growth	overall	19.04	10.50	-7.24	42.36
	between		9.61	-2.55	33.59
	within		4.72	-0.86	34.63
FDI Inflows (% GDP)	overall	3.75	16.06	-16.64	388.44
	between		10.24	-4.73	132.09
	within		11.62	-103.66	260.10
Mobile Cellular Subscriptions Per Capita (Natural Log)	overall	11.98	3.44	2.55	20.14
	between		2.01	5.55	16.67
	within		2.79	4.49	18.06
Political Terror Scale	overall	2.63	1.01	1.00	5.00
	between		0.86	1.00	4.63
	within		0.55	1.10	5.12
Legal System and Property Rights	overall	5.47	1.99	1.14	9.34
	between		1.67	1.72	8.54
	within		1.04	0.16	8.29
Regime Change	overall	2.70	1.51	1.00	5.00
	between		1.26	1.00	5.00
	within		0.79	-0.48	6.15
Infant Mortality (Natural Log)	overall	3.70	0.68	1.34	5.27
	between		0.49	2.79	4.50
	within		0.48	1.98	4.90
Conflict Ridden Neighborhood	overall	0.03	0.15	0.00	1.00
	between		0.09	0.00	0.79
	within		0.12	-0.76	0.84

State Led Discrimination	overall	0.40	0.47	0.00	1.00
	between		0.38	0.00	1.00
	within		0.28	-0.44	1.20
Clark C-P	overall	0.01	0.96	-2.22	2.72
	between		0.91	-1.70	2.16
	within		0.32	-1.73	1.43
Sym C-P	overall	0.01	1.01	-2.33	2.84
	between		0.95	-1.80	2.24
	within		0.33	-1.80	1.45
Prew W-S	overall	22.32	2.32	16.20	28.67
	between		2.08	17.45	27.32
	within		1.03	18.62	26.09
Size of Government	overall	5.58	1.64	0.94	10.00
	between		1.22	2.61	8.43
	within		1.10	1.57	9.38
Legal System	overall	5.47	1.99	1.14	9.34
	between		1.67	1.72	8.54
	within		1.04	0.16	8.29
Regulation	overall	5.84	1.33	1.08	8.78
	between		1.07	2.85	8.32
	within		0.73	3.41	9.02
Gross Capital Formation	overall	22.55	8.27	3.58	86.79
	between		5.92	10.32	42.14
	within		5.94	-7.56	73.31
Labor Force Participation	overall	68.04	10.24	41.84	90.76
	between		10.08	42.32	90.47
	within		1.96	55.21	77.91

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