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Decentralization and the design of low-income housing strategies in developing countries

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University of Hawaii, 1991
DECENTRALIZATION AND THE DESIGN OF LOW-INCOME HOUSING STRATEGIES IN DEVELOPING COUNTRIES

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To My Family And All Those Who Inspire Me In My Quest For Knowledge
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ABSTRACT

The role and the structure of governments in fostering growth and development continue to be a central issue in a recurring debate among economists. This research seeks to clarify some of the pertinent issues in the debate and develops a conceptual framework for specifying the nature and degree of government involvement in the efficient provision of public goods and services. Low-income housing in developing countries, particularly in the Philippines, is used to illustrate the essence of the research problem.

Spillover effects and the uncontrolled pace of urbanization mainly account for the severe underprovision of housing through the formal residential markets in many developing countries. This situation has given rise to the proliferation of slums and squatter settlements in Third World cities since the 1960s. In response, countries have adopted different strategies with varying degrees of government involvement and decentralization to address the low-income housing problem. How can economic theory assist governments and international lending agencies in evaluating these housing approaches and strategies? How can economic theory contribute to the choice and design of efficient low-income housing strategies?

A framework that integrates the relevant aspects of public sector economics, agency theory, and housing
economics is introduced in this research as the preliminary step in the development of a normative theory in economics for the choice and design of low-income housing strategies. The framework represents a pioneering effort to apply the comparative institutional approach used by Eswaran and Kotwal in the field of agricultural contracts to the field of public goods administration. A computer-simulated model that demonstrates how economic factors and other environmental factors affect the welfare losses and inefficiencies associated with operating alternative low-income housing strategies, given both the consumption and coordination externalities they generate, is presented to illustrate the promising nature of the framework adopted.
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INTRODUCTION

The role and the structure of governments in fostering and managing growth and development continue to be the central issues in a recurring debate among economists. The debate is typically promoted in the literature within a centralization versus decentralization controversy. In conventional public finance theory, market failures in the forms of externalities, public goods, and natural monopolies constitute the rationale for government intervention (e.g., Samuelson, 1954; Tiebout, 1956; Musgrave, 1959; Tullock, 1969). In the classical development economics literature, the centralized provision of goods and services is typically invoked due to the perceived weakness of the private sector in many developing countries (e.g., Wallich, 1952; Meier, 1953; Rostow, 1956).

Emerging theories on public enterprise behavior, nonetheless, indicate that government and bureaucratic failures may exist as well. Without the appropriate incentives, the budget-, income-, and prestige-maximizing public employee deviates from the objective of maximizing social welfare. More recently, therefore, critics of public sector inefficiencies and unjustifiably "big" governments have urged for "privatization" and "decentralization" in response to the problems of
government and bureaucratic failures (Oates, 1972; Niskanen, 1975; Loeb and Magat, 1979; and more recently, Nelson, 1987; Park, 1987; Poole and Fixler, 1987).

However, this centralization versus decentralization focus in the controversy is misleading. Given the existence of externalities, public goods, and natural monopolies, all manifestations of failures in the price market mechanism, there remains a legitimate role for the public sector in the allocation and distribution of resources in the economy. This essentially rules out the completely privatized or decentralized systems of provision for these types of goods and services. On the other hand, with the increasing government and bureaucratic failures, completely centralized systems also appear unsustainable. It would seem, therefore, that the more relevant question is not whether to centralize nor to decentralize but how to specify the nature and degree of centralization or decentralization to achieve efficiency in the economy. Particularly, in the face of failing markets due to externalities and public goods, the task at hand is to specify the nature and the appropriate role of governments in the provision of these goods.

The provision of low-income housing in developing countries can be used to illustrate the essence of this problem. Externalities compounded by the uncontrolled pace
of urbanization mainly account for the severe underprovision of housing through the formal residential markets in many developing countries (Grimes, 1976; Payne, 1977; Wegelin, 1978; Swan, Wegelin and Panchee, 1983). This situation has given rise to the proliferation of slums and squatter settlements in Third World cities since the 1960s. However, government intervention through centralized solutions such as slum clearance followed by urban renewal programs and conventional public housing have succeeded only in few countries, notably Singapore and Hong Kong. In other countries, centralized public housing, though initially well-intended have justly been criticized for being too limited in volume, exorbitant in costs, and inefficient in administration. Consequently, many developing countries in the 1970s shifted to more decentralized and nonconventional forms of housing strategies.

Foremost of these strategies were slum upgrading and sites and services development, both classified in the literature as "self-help housing." In the 1960s, the emphasis was on new, fully-built, low-cost housing systems. However, as widespread disillusionment with this type of housing grew in the 1970s, self-help projects emerged ushering an era of innovative and nonconventional low-income housing strategies (Schon, 1987). Laquian (1983) provides a comprehensive discussion of the concepts and principles employed in both slum upgrading and sites and services development.
planning and implementation of these self-help housing projects, some governments still floundered, causing critics to advocate for more decentralization, more privatization. One is led to conclude, therefore, that some developing countries are limited in their ability to choose efficient low-income housing strategies.

In retrospect, what these countries failed to distinguish is that decentralized or centralized low-income housing strategies applicable to one environment may actually fail in another environment; that the unique economic, political, and socio-cultural situations in a given country should govern the choice of the strategy. Even among international agencies like the World Bank, only recently has the view been officially articulated that housing must be provided from an "institutional perspective," a departure from their slogan in the 1970s which stoutly advocated for the adoption of decentralized self-help housing strategies in developing countries. This institutionalization must be interpreted as taking into account the specific environmental conditions of a given country.

In economics, there is no normative theory that can assist governments in their choice of more efficient low-income housing strategies. There is likewise no theory that can assist international lending agencies in the task of
implementing housing programs and strategies from an "institutional perspective." Primarily, the objective of this research is to develop the conceptual framework that will provide the cornerstone for a normative theory on the design and choice of low-income housing strategies in developing countries. In building this framework, environmental factors unique to a given country should play the pivotal role. The conceptual framework, basically the first step in the development of the normative theory should also shed light on some documented trends and patterns in the actual choice of low-income housing strategies.

More specifically, this research will address some critical questions confronting the housing policymakers: (a) what factors guarantee the successful implementation of a centralized, conventional public housing program as in Singapore, (b) why do some decentralized self-help housing projects fail and why do some succeed, (c) in the face of many governments' growing budgetary constraints, which type of housing programs and strategy will be more efficient, (d) given the rapid and often uncontrolled rates of population and urbanization growth in developing countries, should governments pursue centralized, privatized, or self-help housing projects, and (e) how does one go about specifying the nature and the loci of government control and private sector participation in the provision of low-income housing.
In a sense, this research aspires to take the first step in making concrete and operational from the economics point of view what the World Bank meant when it stated that the provision of low-income housing should now be undertaken from an "institutional perspective" (Payne, 1984, van der Linden, 1986).

A comparative institutions approach integrating agency theory and public sector economics will be the principal investigative tool used in this research. To date, applications of the comparative institutions framework have focused on the effects of economic variables and environmental factors on the optimal choice of agricultural contracts and industrial organizations (e.g., Jensen and Meckling, 1976; Eswaran and Kotwal, 1985; Roumasset and Uy, 1987; Otsuka and Hayami, 1988). This research attempts to apply the comparative institutional framework to the more complicated field of public administration. Will a methodology similarly patterned after the work of Eswaran and Kotwal (1985) prove promising for the area of public goods administration such as

2 Introduced in 1937 by Ronald Coase, the comparative institutions perspective focuses on the study of various forms of transaction and moral hazard costs as they affect the efficiency of alternative forms of economic institutions.

3 The agency theory as discussed by Jensen and Meckling (1976) represents an approach that is affiliated with the comparative institutions framework.
in the provision of low-income housing? Will this type of methodology be useful in analyzing the extent to which low-income housing strategies should be decentralized, given the environmental factors specific to a country? Eswaran and Kotwal's methodology focused on the application of a computer simulated approach to capture how the environment affected both labor and managerial shirking and consequently, the choice of the efficient agricultural contract. The conceptual framework that will be developed in this research will build on Eswaran and Kotwal's approach but will take into consideration additional factors that may be affected by the environment in choosing efficient modes of providing low-income housing in developing countries.

Chapter 2 essentially reviews the public sector, agency theory, and housing economics literature relevant to this research. Low-income housing strategies that have evolved in reaction to a range of housing policy issues in the developing world are defined and evaluated. Traditional principles of public sector economics are then applied to analyze how in a first-best world that abstracts from transaction and information costs, the task of providing low-income housing can be efficiently and equitably undertaken. The Lindahl equilibrium is presented as the Pareto-efficient solution and the solution that will successfully lower rent-seeking. It is emphasized that in a
first-best zero transaction costs world, as long as the Lindahl solution is successfully enforced, it can be argued that the low-income housing strategy selected will not matter, efficiency and equity will always be achieved simultaneously. All incentives for rent-seeking will also be eliminated.

In Chapter 3, the assumptions are modified to introduce a world of positive transaction and information costs. This allows for the use of the comparative institutional approach using the agency theory. Agency costs are defined and specifically applied to develop a conceptual framework that defines the cornerstone of the proposed normative theory of low-income housing strategies. The framework also provides a mechanism for analyzing and explaining the choice of diverse low-income housing strategies within and among countries in the developing world.

This framework is formally modelled in Chapter 4 to produce some basic results that can assist in the choice of efficient low-income housing strategies in developing countries. A mathematical model that explicitly derives the determinants of agency costs for decentralized, centralized, and self-help housing strategies is introduced. Using a computer-simulated approach, the computation and comparison of minimum agency costs for each
type of strategy, given certain assumptions about the environment, is illustrated.

Chapter 5 extends the basic model presented in Chapter 4 to allow for comparative static results assuming certain changes in the assumptions about the environment. In the spirit of Eswaran and Kotwal (1985), simulations are used to explain the nature and consequences of adopting decentralized, centralized, and self-help low-income housing strategies in a particular country or locality. These simulation results are then summarized and analyzed in the light of documented patterns and trends in the actual choice of low-income housing strategies within and among developing countries.

Given the limitations of the study, tentative conclusions and policy implications from this research are discussed in Chapter 6. A preliminary agenda for future research on the design and choice of low-income housing strategies and the ways and means by which the model formulated through this research can be extended are also explored.
CHAPTER 2

ECONOMIC THEORIES AND THE LOW-INCOME HOUSING PROBLEM

The first chapter summarized the primary objectives of this research and presented an overview of the tasks involved to accomplish the stated objectives. Fundamental to the study of decentralization and the choice of low-income housing strategies in developing countries is a basic understanding of the low-income housing problems and housing policy issues and how conventional first-best economic theories can be applied to cope with these problem and resolve some of the policy issues.

In this chapter, low-income housing strategies that have actually evolved in the developing world, in varying forms of decentralization or centralization, in reaction to a range of housing policy issues will be described. Traditional microeconomic principles will then be used to discuss the dynamics of the urban residential markets in developing countries. The principles of public sector economics will also be applied to intuitively analyze how in a first-best world that abstracts from transaction and information costs, the task of providing low-income housing can efficiently undertaken. The Lindahl equilibrium will be derived and presented as the Pareto-efficient solution that
lowers rent-seeking activities. And as long as this Lindahl solution is successfully enforced, it is argued in this chapter, that the low-income housing strategy will not matter, efficiency and equity will simultaneously be achieved.

2.1 HOUSING POLICY ISSUES AND PROBLEMS

The last two decades have witnessed a proliferation in the literature that call attention to the acute housing shortages in the developing world. To fully understand the myriad of housing policy problems and issues, it is crucial to be able to comprehend the dynamics governing the urban residential sector in most developing countries.

In the last twenty-five years, rapid growth in the urban populations of Asia, Africa, and Latin America has occurred as a result of natural urban population growth and large scale rural-to-urban migration (Orville, 1974; McAuslan, 1985). Taylor and Williams (1982) explain the dramatic increase in the natural rate of growth in the urban populations of these developing countries. Underlying the widely publicized growth in total population within these countries is the fundamental factor of improved public health measures throughout the world which have caused significant reductions in mortality rates. Thus, while mortality has declined and life expectancy has increased, there has been no corresponding decline in
fertility rates. The result is a widening of the gap between mortality and fertility rates which continues to sustain or even augment the natural rates of growth in these countries.

Payne (1977) discusses the role of migration in the rapid rate of urbanization among developing countries. Central to his analysis is a major aspect of the widely known "push and pull" conceptual framework which characterizes the migration patterns in Third World countries. Higher natural rates of population growth overcrowd the rural areas which have become less capable of absorbing large additional increases in population; consequently, people are "pushed" into the urban areas regardless of the uncertainty of their economic prospects in these areas. Other studies (Yap, 1974; McAuslan, 1985), nonetheless, tend to indicate that the "pull" factors provide a far more powerful argument for why migration from rural to urban areas occurs. The rural poor are "pulled" into the cities primarily because of the perceived greater variety of employment and income opportunities in the urban areas.

Five stylized facts of urbanization in the developing world have been described by Cheema (1987). First, the rate of urbanization growth has been extremely high in the past. This pace is likely to continue in the future. Second,
rapid urbanization has been accompanied by an alarming increase in the prevalence of urban poverty. Third, several types of housing for the urban poor have emerged. Fourth, the growth process of these housing units have not necessarily been the same as those of middle- and high-income settlements. Finally, due to the biases in the public delivery system, there have been sharp deficiencies in the availability of infrastructure and basic urban services to the urban poor. These facts combine to suggest that perhaps, a number of cities in the developing world may have already reached the state of "overurbanization"; a stage which indicates that in these cities, higher degrees of urbanization exist relative to the rates warranted by their degrees of industrialization (Payne, 1977).

This "overurbanization" may in fact be the prime determinant of the phenomenon known in housing as "urban residential crowding." As Renaud (1984) observed, urban residential crowding is manifested in developing countries by the flexibility and diversity of housing arrangements encountered: (1) room renting, (2) leasehold arrangements for complete units, (3) ownership of structure built on a site over which the household has no legal control (i.e., squatting), (4) ownership of structure with no lease on the site, (5) ownership of both the structure and the land while subletting portions of the structure, and (6)
owner-occupied housing. Of these, squatting has become the most politicized and therefore has attracted the most attention and concern from the public sector.

Housing studies conducted by international lending agencies in the 1970s depicted urban residential markets in most developing countries to be extremely imperfect with wide divergences between the private and social costs of production. Furthermore, the scarcity of well-located land and the high durability of housing itself led to a relatively inelastic housing supply. Meanwhile, the consequences of rapid urbanization tended to produce large shifts in demand which frequently outstripped the supply response. The result was a market rationing process through the formal residential markets which allocated the limited stock of housing to the highest bidders.

More recent housing studies (e.g., Renaud, 1984; Jimenez, 1985) acknowledge a pattern of market segmentation. This pattern of market segmentation is best understood within the framework of Renaud's three-tier residential housing market structure in developing countries: (1) a high-to-middle income legal private sector, represented by households able to afford housing of high quality in fully developed neighborhoods that constitute a large proportion of the residential land in the cities; (2) a heavily-subsidized mostly middle-income public
sector, representing a relatively narrow strata of middle income households mainly using specialized housing financial packages particularly through public institutions; and (3) a large and rapidly growing low-income informal private sector, the numerically largest group, consisting of low-income households procuring their housing services through the private sector, oftentimes in a clandestine and illegal fashion.

2.2 LOW-INCOME HOUSING STRATEGIES IN THE DEVELOPING WORLD

The effective demand for housing derived from each household's willingness to pay for housing can be described, in static terms, as a function of income levels and the price of housing and other goods. However, over time, demand is also determined by increases in family income, changes in the distribution of income, and the rate of household formation, which in turn depend upon factors such as population growth, urbanization patterns, and the size of the households (Grimes, 1976).

Uncontrolled urbanization in many developing countries has resulted in a situation where continuous shifts in the effective demand for low-income housing frequently outstrip the supply response. The offshoot of this is urban residential crowding most visibly manifested by housing markets failure and the growth of urban slums and squatter settlements. In the 1960s, centralized institutions like
housing ministries and agencies in these countries responded to the problems of slum formation and squatting through clearance followed by redevelopment of the areas and resettlement of the dislocated residents (Angeles, 1985; Cheema, 1987). Moreover, to alleviate the housing shortage, conventional public housing was also constructed. In Singapore and in Hong Kong, this approach was successfully and viably implemented (Yeh and Laquian, 1979).

In many of the less developed countries like the Philippines, Thailand, and Indonesia, these highly centralized solutions, however, have been constrained by the relatively high standards and accordingly high costs of the shelter units actually provided. Since these costs typically exceeded the affordable limits of the targeted residents, excessive subsidies were resorted to thus reinforcing the image of public housing and urban renewal programs as mere "diversions of productive capital to welfare" (see Rodwin and Sanyal, 1987).

In addition, the inherently high subsidies in these centralized solutions seemed to breed rent-seeking from

\[\text{footnote}{\text{4 Conventional public housing is used in the housing literature to describe an approach that provides developed lots and fully-built houses. See, for example, Grimes (1976) for a discussion of conventional public housing in contrast to other approaches to housing.}}\]
politicians, bureaucrats, and special interest groups (e.g., contractors, community organizations, housing associations). Government housing bureaucrats worked to maximize their influence, their prestige, and their income causing unnecessary adherence to relatively high design standards as well as significant delays in project implementation schedules. In the process, developers received noncompetitive contracts which were loosely audited thus enabling them to maintain high profit margins. Politicians, meanwhile, increased their power through donations from contractors and the patronage of constituents receiving housing benefits. Finally, squatter organizations and other beneficiaries in resigned acceptance of the excess demand for low-income housing tolerated substandard construction and land development work as they lobbied for higher subsidies and lower penalty costs for irregular payment or nonpayment of their housing amortization (Moavenzadeh, 1987; Roumasset, 1988).

In reaction, more decentralized, nonconventional, self-help low-income housing strategies surfaced in the

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5 Traditionally, government agencies have set unrealistically high standards for building materials and construction designs. Many of these regulations were either imported from developed countries or formulated by people who have been educated in the Western education. For a more detailed discussion of housing standards as an institutional and political problem, see Moavenzadeh (1987).
1970s, foremost of which were slum upgrading and sites and services development (Ward, 1976; Laquian, 1983; Prakash, 1983). Both approaches were rooted in the recognition by the public sector that the private sector, including the intended beneficiaries, can and should contribute resources: land, labor, capital, and managerial inputs, to the more efficient and equitable provision of low-income housing in developing countries.

Slum upgrading and sites and services projects, in sharp contrast to conventional public housing which is premised on fully-built shelter and land development, were designed based on a model of progressive development or incrementally-built housing at the pace afforded by the beneficiaries (Keare and Jimenez, 1983; Renaud, 1984; Mayo, 1987; Schon, 1987). In the sites and services development approach, the government acquired vacant and contiguous pieces of land from one or several landowners and redistributed such land to eligible beneficiaries after its development and subdivision into plots. The residents then build their house on the lots with help from contract private construction firms.6

6 Sites and services projects are usually designed without fully-built houses. This is premised on the "progressive investment scheme" which predicts that beneficiaries given the property rights to developed parcels of land would in time invest their own resources or other resources obtained from the formal or informal sectors to
In upgrading, basic infrastructure services such as the water system, drainage and sewerage, roads, and sanitation facilities were constructed in situ at slum and squatter communities by the government. No new land and shelter were required as the principles of maximum retention and minimum relocation\(^7\) of structures in the area were applied. Land property rights were also legalized by the government to grant security to the residents and motivate them to further invest in shelter.

Central to both strategies was the notion of "self-help": households, with their own resources, should be involved in the delivery of affordable housing (Grimes, 1976; Ward, 1982). Thus, governments provide what individual households could not supply themselves (generally, technical services and infrastructure) and the residents contributed labor and capital usually obtained fully construct the houses. Thus, depending on the beneficiaries' current affordable limits, a range of on-plot development options are provided. These options may include service utility connections, sanitary cores, the roof, walls, and doors to the houses. A limited building material loan may then be awarded to the beneficiary to complete the "core house" that was provided.

\(^7\) Maximum retention and minimum relocation of structures constitute the basic principles governing the technical process of "reblocking" in an upgrading project. Reblocking calls for the realignment of existing structures in a squatter or slum area to provide alleys and pathways connecting the interior to the major roads and for the subdivision of the area into individual homelots (Reforma, 1983).
from the informal sector. Affordability and cost recovery were the principles underscored in the design and implementation of slum upgrading and sites and services development projects. Hence, the key features of incrementally-built and self-help housing tried to ensure that projects were planned on the basis of what low-income families would be willing and be able to pay for shelter and services (i.e., their effective demand) rather than on the basis of what the government thought they would need (i.e., their notional demand).

2.3 ORGANIZING FOR LOW-INCOME HOUSING DELIVERY

The provision of low-income housing in developing countries has evolved into a complex task requiring the performance of a multitude of functions through a variety of policy instruments.

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8 In evaluating the upgrading of Tondo, the largest squatter colony in the Philippines, Reforma (1983) noted, for instance, that financing from private financial institutions accounted for only 10% of the funds required to complete or improve the housing structures. The rest of the funding came from "informal sources": the families' own savings, gifts from relatives and friends, as well as loans coming from relatives and friends.

9 The World Bank (1975) discusses more fully the conceptual differences between effective and notional demands for housing.

10 The list of policy instruments available for implementation of these housing functions is fairly extensive: zoning regulations, building standards, pricing policies, land tenure options, land acquisition modes, land tax schemes, and financial procedures and innovations. One way of dealing with
For simplicity, the delivery of low-income housing may be defined in terms of four basic functions: (1) the acquisition and subdivision of land into plots, (2) the design and construction of infrastructure services, including the core or fully-built house, (3) the redistribution of these developed plots to low-income households thereby granting them security of tenure to encourage further housing improvements, and (4) the recovery of the costs incurred in effecting the delivery of this type of housing. Given these housing functions, it is now possible to demonstrate how alternative low-income housing strategies in terms of varying degrees of centralization and decentralization can be organized. Figure 1 presents a spectrum of low-income housing strategies with varying degrees of centralization or decentralization. The least centralized is the completely privatized housing strategy. For the purpose of this research, the completely privatized housing strategy will be characterized as one where all the housing functions are performed through the private sector (i.e. both business firms and households). Conventional public housing, on the

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these instruments is to group them in accordance with the production, finance, and regulatory framework adopted in the Philippines (Laquian, 1975; World Bank, 1982; Angeles, 1985; Rodwin and Sanyal, 1987).
Figure 1

A Spectrum of Low-Income Housing Strategies

Notes: Figure 1 presents a spectrum of low-income housing strategies with varying degrees of centralization or decentralization. The least centralized is the completely privatized housing characterized as one where all the housing functions are performed through the private sector. The other polar extreme is the conventional public housing strategy which is described as one where all the housing functions of housing are produced by the national government. Self-help housing strategies typify the intermediate cases. They refer to approaches that combine the efforts of both the government and the private sector in producing low-income housing services.
other hand, represents the most extreme form of centralization. In this latter approach, all the housing functions, particularly the production of fully-built housing units, are produced by the government at the national level. Self-help housing strategies typify the intermediate cases. In private sites and services development, the government's role is limited to technical and financial assistance to the private sector in the fulfillment of all four major housing functions. Under the slum upgrading approach, the role of the government is expanded to providing the basic physical amenities in the project, the redistribution of subdivided plots, land acquisition, and recovery of land development costs. Finally, the public sites and services strategy, nearest the conventional public housing in the spectrum, can be described as one where all the functions of housing are performed by the government except that in this case, core houses instead of fully-built houses are constructed.

2.4 DECENTRALIZATION IN LOW-INCOME HOUSING

In a study conducted for the World Bank, Rondineli and Cheema (1985) introduced four categories of decentralization: (1) delegation, (2) deconcentration, (3) devolution, and (4) privatization. In delegation, some of the functions and responsibilities assigned to the central government are reassigned to government line agencies and
bureaus that are viewed as more specialized in the implementation of these functions and responsibilities. Deconcentration attempts to reassign some functions and responsibilities to government units that are specifically and temporarily created by the government. When the government attempts to transfer some functions and responsibilities to the local government, this type of decentralization falls under the category of devolution. And finally in privatization the government divests itself of all functions and responsibilities and allows the private sector to assume all these functions and responsibilities.

In the provision of low-income housing, attempts to decentralize in response to the failures of centralized housing have taken on various forms. Sites and services development, for instance which in the late 1970s used to be administered purely from the central government level under a delegated structure is now partly implemented through a privatized structure. In this type of administrative structure, a private voluntary organization or private developer undertakes the sites and services development. The government provides some financial and technical assistance but chiefly regulates the planning and implementation of the housing projects in accordance with predetermined standards and guidelines.
Slum upgrading, on the other hand, has typically been implemented from the central government level under a deconcentrated or a delegated structure. The late 1980s, however, saw developing countries experiment with local government devolved forms of slum upgrading.\textsuperscript{11}

Despite these moves toward greater degrees of decentralization, experience shows that not all low-income housing projects successfully implemented in one country or locality could easily be replicated in another country. This reinforces the need to develop a framework that will specify the nature and degree of decentralization that a country must pursue in its choice of low-income housing strategies.

2.5 LINDAHL EQUILIBRIUM AND THE FIRST-BEST THEORY OF LOW-INCOME HOUSING STRATEGIES

A prerequisite to the design and choice of appropriately centralized or decentralized low-income housing strategies is to examine the nature of the good being provided and to articulate why government intervention is legitimate to the problem of low-income housing provision, in the first place. This approach makes possible a full discussion of the first-best solution to the problem

\textsuperscript{11} For a discussion on privatization of sites and services and the devolution of slum upgrading as two promising forms of decentralization in low-income housing, see Roumasset (1988).
of organizing for low-income housing. This first-best solution is the key to making operational for this research problem the comparative institutional approach using the agency theory.\textsuperscript{12} The following sections examine the nature of the publicness of low-income housing and derive the first-best solution to the problem of low-income housing.

2.5.1 The Publicness of Housing

Problems and policy issues chronicled for developing countries indicate failure on the part of the private markets to competitively supply the quantity of housing services demanded by individuals and households (Grimes, 1974; McAuslan, 1985). Among housing officials and policymakers, this has been the main justification for government intervention.

The most frequently encountered argument in the economic literature, however, concerns the regulation of externalities in the housing consumption (Staffad, 1977; Rosen, 1987). The first type of externality

\textsuperscript{12} Jensen and Meckling (1976) define agency costs as the "costs of structuring, monitoring, and bonding a set of contracts with conflicting interests plus a residual loss incurred because the costs of full enforcement of contracts exceed the benefits." Following Newbery and Stiglitz (1979) and Roumasset and Uy (1987), this definition can be interpreted to mean the difference between "constrained" and "unconstrained" Pareto-optimality. Since "unconstrained Pareto-optimality" is used to refer to solutions that abstract from transaction costs (i.e., solutions in a first-best world), the computation of agency costs requires, foremost, the specification of a first-best solution.
involves the interdependence or jointness of the housing consumption functions of individuals residing within a community. For example, when an individual improves his property, the improvements increase the values of his neighbor's property. However, the individual's decision to improve his house takes into account only the private effect of his decisions on his investment. Economic theory indicates that in this case, despite the marginal social benefit of the improvement exceeding the private marginal costs, the "rational" individual or household will continue to invest in less than the socially efficient amount.

A more relevant type of externality is referred to in the literature as the "social costs of slums." This notion argues that poor housing does more than merely lower the neighborhood's property values. Accordingly, slums and squatter communities also breed crime, delinquency, fires, disease, mental illness, and even illiteracy (Weicher, 1979). Therefore, it is in the interest of the richer members of society to ensure decent and affordable housing to low-income families.

A related justification that is sometimes treated separately is premised on "commodity egalitarianism," defined in the literature as the notion that society...
cares not only about the distribution of income per se but also about the distribution of certain "necessary" and "basic" commodities or merit goods. The Philippine Government, for example, has a constitutional mandate to "establish, maintain, and ensure adequate social services in the field of housing ... to guarantee enjoyment by the people of a decent standard of living" (Angeles, 1985).

Finally, there is another type of externality generated through low-income housing that is often ignored in the economics literature. Decisions concerning what type of housing is to be constructed, where the housing will be located, and the design features of the infrastructure affect traffic, zoning, and other urban factors contributing to the city's growth and development. The more highly coordinated the housing decisions, the lesser the congestion in the city and the more aesthetically pleasing the results will be. The less coordinated the housing efforts are, the more congested the city becomes, with inadequately planned facilities and chaotic traffic conditions. These type of externalities will be referred to in this research as coordination externalities.
2.5.2 The First-Best Theory of Low-Income Housing

Strategies

The preceding section discussed several types of externalities generated through the provision of low-income housing and established the publicness of low-income housing. For the purpose of this research, most of these externalities will be categorized as either a form of consumption externality or coordination externality and will be integrated in the analysis. Pecuniary externalities which refer to the increased land values of the sites adjacent to the housing project will be accounted for in the analysis only when the land market performs inefficiently and allows various forms of rent-seeking activities to occur. Consumption externalities, in this research, will mainly focus on the argument that housing is a merit good, that society cares and wants to provide suitable and affordable housing to low-income families. Coordination externalities, on the other hand, will focus on how housing decisions affect the level of congestion, traffic conditions, and other aspects of life in the city.

In public sector economics and welfare theory, the presence of these externalities indicate that given a world that abstracts from transaction costs, the
first-best solution will be governed by the following condition:

$$\sum \text{MRS}_i = \text{MRT}$$

where \(\text{MRS}_i\) is the marginal rate of substitution for the \(i\)th consumer; \(\text{MRT}\), the marginal rate of transformation, is the absolute slope of the production possibility frontier between the two types of goods; and there are \(n\) consumers in the economy (Samuelson, 1955).\(^{13}\)

Consider an economy with only two individuals, one "rich" and one "poor" (R and P), and two goods, bread and houses (B and H) where H measures the quality units of housing. Suppose the rich man is concerned about the quality of the poor man's house, that is, his utility function is represented by \(U_R = U_R(B_R, H_R, H_R)\) while the poor man's preferences are based solely on his own consumption. The first-best solution then requires that

\[(\text{MRS}_P B P)P + (\text{MRS}_P B R)^R + (\text{MRS}_R B R)^R = \text{MRT}_{HB}\]

that is, the sum of the marginal rates of substitution for bread and housing by the "poor" and the "rich"

\(^{13}\) This is simply the public good variant of the first-best Pareto condition for the case of private goods which requires the equality between the marginal rates of substitution and the marginal rates of transformation.
must be equal to the marginal rate of transformation between bread and housing.

This first-best solution can be made operational through the Lindahl equilibrium, premised on the more quantifiable "willingness-to-pay-approach." This approach allows for the unique determination of the optimal quantity of low-income housing (Lindahl, 1919; Johansen, 1963; Segal, 1977; Cornwall, 1984). In an economy where citizens have a willingness-to-pay for improved low-income housing, the Lindahl equilibrium can be represented by the vertical summation of the demand curve of the poor ($D_p$) and the pseudo-demand curve ($D_R$) of the rich (i.e., their marginal willingness to pay for better housing consumed by the poor) because of both consumption and coordination externalities to form a total demand curve ($D_T$). Lindahl equilibrium is then defined as that point where the total demand curve intersects with the marginal costs ($S_h$) of providing housing services. Figure 2 presents a diagrammatic exposition of the Lindahl equilibrium to low-income housing provision for the case of a poor household and a rich household.

The Lindahl equilibrium as demonstrated allows each of the consumer to choose an amount which equates his marginal rate of substitution between low-income
The Lindahl Solution To Low-Income Housing

Notes: \( D^o \) represents the direct beneficiaries' demand for low-income housing; \( D^i \), the vertically summed demand from the indirect beneficiaries who are willing to subsidize low-income housing because of both consumption and coordination externalities. \( D^T \), vertically sums \( D^o \) and \( D^i \) into a total demand curve. The Lindahl solution, \( H^* \), is shown as the point of intersection between total demand, \( D^T \), and the supply of housing, \( S^H \).
housing and all other goods (i.e., his own valuation of benefits at the margin versus all other goods) with his marginal rate of transformation (i.e., his own income foregone or taxes). For society as a whole, the amount of low-income housing is determined by equating the sum of the individual marginal rates of substitution to the social marginal rate of transformation, defined as the costs to society of transforming scarce resources into outputs of low-income housing. Hence, the Lindahl equilibrium is not only Pareto-optimal for each individual; it is also efficient for the economy. In addition, the Lindahl equilibrium ensures equity since it allows for the redistribution of income from rich households to the poor households in a manner that is politically acceptable to all concerned. And if the Lindahl solution which has already been described as efficient is also politically acceptable to all the parties concerned, then all the incentives for rent-seeking are eliminated. Thus, the Lindahl equilibrium offers not only an efficient solution; it also provides a

14 Much of the support in the text for the Lindahl solution comes from those who couch it in terms of political acceptability. Wicksell (1896), for instance, wrote quite lengthily and convincingly on how a politically acceptable solution can lead to the social welfare optimum.
mechanism for eliminating rent-seeking in the design and the implementation of the low-income housing project.

In the provision of low-income housing, the Lindahl solution may be implemented through a completely privatized approach via a voucher scheme (Smolensky, 1968; Olsen, 1971; Roumasset, 1971). In Figure 2, this would entail the sale to the poor family of a voucher with a face value of \( V = PH^* \), where \( H^* \) is the Lindahl equilibrium quantity. Beneficiaries, however, would only be charged \( V - S \), where \( S \) is the per unit subsidy equal to \( PR \), for the purchase of the voucher.

Thus, the Lindahl equilibrium not only offers an efficient and equitable solution for the centralized or decentralized provision of low-income housing. It also offers a mechanism by which the cost invested in the project can be recovered in a way that is politically acceptable.

In a completely decentralized provision, the amount of the Lindahl vouchers would be determined and sold to low-income households through a private mechanism. The rich households would be asked to donate contributions to the private organization simply in accordance with their "willingness-to-pay"
functions. In a completely centralized provision, the government would produce the housing units and sell these vouchers directly to the low-income families. The corresponding amount for the subsidy would be collected from the rich households in the form of taxes from the rich households. In either case, efficiency and equity would be achieved as long as the Lindahl solution governs the determination of the face value of the vouchers.

Centralized and decentralized provisions of low-income housing are thus equivalent, in this case, where the transactions costs of obtaining the "willingness-to-pay" functions of each individual and of operating each strategy in an efficient manner to approximate the Lindahl equilibrium are assumed to be zero.

In the next chapter, the concept of the Lindahl solution as discussed in this section and how it is derived will be used to clarify the definition of agency costs in a privatized, centralized, and self-help housing strategy.
CHAPTER 3
AGENCY COSTS AND THE CHOICE OF LOW-INCOME HOUSING STRATEGIES: THE CONCEPTUAL FRAMEWORK

In this chapter, a conceptual framework that defines the cornerstone of the proposed normative theory of low-income housing strategies will be developed. The thrust is to be able to define some of the parameters that should govern the efficient choice of low-income housing strategies in developing countries, given the presence of information and agency costs. The framework also hopes to provide a mechanism for analyzing and explaining the diversity in the actual choice of low-income housing strategies within and among countries in the developing world. 15

3.1 AGENCY COSTS AND LOW-INCOME HOUSING STRATEGIES

In a first-best world that abstracts from transaction and information costs, it has been shown that the Lindahl equilibrium can serve as the nucleus for the design of alternative strategies to ensure the efficiency in the 15 Countries in the developing world seem to have adopted diverse strategies for coping with the low-income housing problem. Singapore, Hongkong, and to a lesser extent, Malaysia, and South Korea adhere to the strategy of conventional public housing. Other countries like the Philippines, Thailand, Indonesia, and India now seem to favor more decentralized self-help strategies like slum upgrading and sites and services development (Swan et.al., 1983; Yeh and Laquian, 1983).
provision of low-income housing services. An equivalence proposition ala Coase (1960)\(^{16}\) can in fact be stated for the case of low-income housing strategies:

In a first-best world of zero transactions cost and perfect information, the structure of low-income housing strategies (e.g., market or non-market, decentralized or centralized) will not matter. As long as the Lindahl equilibrium governs the underlying allocation of the low-income housing services to the economy, both efficiency and equity will be assured.

However, in a second-best world of positive transactions cost and imperfect information, this equivalence proposition loses its significance. The actual choice among alternative institutions then becomes a matter of comparative institutions (Coase, 1960; Demsetz, 1977) which equates the most efficient approach with the organization form that minimizes agency costs. Agency costs are defined in positive agency theory\(^{17}\) to include

\(^{16}\) In 1960, R. H. Coase explored institutional and legal arrangements for enabling private agreements to be concluded. His results are summarized in the Coase Theorem which basically states that "if costless negotiation is possible, rights are well-specified, and redistribution does not affect marginal values, then the allocation of resources will be identical, whatever the allocation of legal rights."

\(^{17}\) Two agency literatures that share the comparative institutions perspective have been distinguished by Jensen (1983). The "principal-agency theory" (e.g., Harris and Raviv, 1978; Lewis, 1980) provides a mathematical formulation of the effects of preferences, uncertainty, and informational structure on contracts between parties interacting as principal-agent in hierarchical fashion. The "positive-agency" theory (e.g., Coase, 1937; Alchian and Demsetz, 1972; Fama and Jensen, 1983) concentrates on nonmathematical
the "costs of structuring, monitoring, and bonding a set of contracts with conflicting interests plus a residual loss incurred because the costs of full enforcement of the contracts exceed the benefits" (Jensen and Meckling, 1976).

Monitoring costs arise because the principal needs to regulate the agent's conduct. Bonding expenditures are incurred by the agent to help assure that the agent will avoid actions which can damage the principal or will indemnify the principal if the prescribed actions for the agent are not undertaken. In other words, monitoring and bonding costs are the out-of-pocket costs of structuring, administering, and enforcing contracts.

The residual loss component of agency costs is the value of the loss from decisions made by the agent which deviate from decisions which would have been made by the principal given the same information as the agent. Since it is profitable to invest in policing contracts only to the point where the reduction in the loss from non-compliance equals the incremental costs of enforcement, the residual loss is also the opportunity cost when contracts are optimally, but incompletely enforced.

Agency costs have been shown to emerge in agricultural firms due to the notion that land, labor, and even modelling and places emphasis on explaining actual patterns that characterize industrial organizations.
managerial inputs can be shirked in certain environments. Eswaran and Kotwal (1985), for example, illustrate how the quality of labor supervision can become increasingly important in the choice of agricultural contracts when the quality of effort applied cannot be easily ascertained until after the work has been completed. Roumasset and Uy (1987) discuss how monitoring activities can reduce the possibilities of "mining the land" in environments described as vulnerable to land shirking.¹⁸

Thus, in a second-best world, the efficient choice of agricultural contracts becomes a function of the level of information and monitoring costs associated with each input use plus the residual loss incurred from the failure to fully enforce the contracts, i.e., the level of agency costs associated with each agricultural contracts.

In the provision of low-income housing, it may be argued that agency costs will arise due to the need for information and enforcement activities to approximate the Lindahl equilibrium. To be more specific, agency costs in the provision of low-income housing can be defined as the administrative costs of operating a housing strategy in a manner that best approximates the Lindahl solution plus the

¹⁸ As Roumasset and Uy (1987) postulated, in a fixed lease contract the tenant may "mine the land" in period 1 by engaging in activities that deplete its productivity and then abandoning the farm in period 2.
residual losses that can be measured from the failure to completely enforce the Lindahl solution. The following sections make more explicit this definition of agency costs for completely privatized housing, conventional public housing, and self-help housing strategies.

3.2 AGENCY COSTS IN COMPLETELY PRIVATIZED HOUSING

Earlier, a completely privatized housing strategy was defined as one where all the housing functions are produced through the private sector which includes both low-income families and private development firms. Following conventional microeconomic theory, these profit maximizing firms and utility maximizing households should provide and receive housing services up to the point where the marginal revenue derived from the production of housing equals the marginal costs of its production. Or to put it simply, the optimal level of production for the firms and the households in this case should be at the point where demand for housing equals the supply of housing.

Diagrammatically, this is shown in Figure 3 as $Q^p$, the point where private demand for low-income housing, $D^p$, intersects with the supply of housing, $S^h$.

$Q^p$, however, tends to be less than the Lindahl equilibrium which as previously discussed in Chapter 2 is the optimal and first-best solution that should be approximated by any strategy, given the publicness of and
Welfare Losses Due To Externalities In Privatized Housing

Notes: $D^P$ represents the direct beneficiaries' demand for low-income housing; $D^R$, the vertically summed demand from the indirect beneficiaries who are willing to subsidize low-income housing because of both consumption and coordination externalities; $D^L$, vertically sums $D^P$ and $D^R$ into a total demand curve. The welfare loss from the failure to enforce the Lindahl solution, $Q^{L*}$, and deciding to produce at $Q^{P*}$ is represented by triangle ABC. As administrative costs are incurred in operating a privatized housing voucher system in order to approximate the Lindahl solution, $D^P$ shifts upward to $D^L$, resulting in the gradual elimination of the welfare loss.
the externalities generated by housing. In Figure 3, the Lindahl equilibrium $Q^*_{L}$ is derived by vertically summing $D^p$ and $D^o$, which represents the positive consumption and coordination externalities received by those other than the direct beneficiaries of low-income housing. A total demand curve, $D^t$, results; and the Lindahl equilibrium $Q^*_{L}$ is defined as the level of housing production that equates $D^t$ with $S^o$.

Under a completely privatized low-income housing strategy, therefore, the form of inefficiency that is generated from the failure to enforce the Lindahl equilibrium is equivalent to the value of the welfare loss that can be associated with the private sector's underproduction of low-income housing. This underproduction is due to the failure to capture both consumption and coordination externalities. The welfare loss, $W^w$, is represented in Figure 3 by the triangle ABC. 19

In a privatized housing strategy, how can an administrative structure be designed and organized in order to approximate the Lindahl solution and minimize this welfare loss? Consider an administrative structure where a

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19 $W^w$, the welfare loss generated through a completely privatized low-income housing strategy due to externalities, should be distinguished from another type of welfare loss, $W^p$, generated through the adoption of centralized, conventional public housing. This latter type of welfare loss will be discussed further in the next section.
private voluntary organization is organized to administer a housing voucher system. The voucher covers the price of the house that the beneficiary intends to purchase. However, the net price charged to the beneficiary excludes a subsidy portion that comes from international donor agencies, the government, and the rich families. These groups derive utility and satisfaction from knowing and seeing that housing is appropriately provided to low-income families, i.e., consumption externalities.

This voucher system enables low-income families to secure adequate housing services at a price they can afford. Since the vouchers are paid directly to the low-income families, they are given the purchasing power to enter the market for decent and affordable housing. The low-income families are also given considerable freedom to select the type, the location, and the quality of the house or the apartment they wish to live in. Finally, in a privatized housing voucher system, the families are not constrained to specially built subsidized housing.

Housing vouchers, thus, support the "merit good" argument for housing: housing is a form of consumption which society views as more important than allowed for by grouped and standardized choice patterns; each family should be entitled to decent and affordable housing (Friedman and Weinberg, 1988). Housing vouchers also take into account
the diversity in the low-income families; preferences and willingness-to-pay and allow those with altruistic motives to augment the families' income. Hence, a privatized housing voucher system effectively incorporates consumption externalities into the housing decision process.

But it should be pointed out that under this strategy, however, low-income families are also making individual decisions about location, quality, and design of the house. Hence, the benefits from more coordination in these activities will not be effectively addressed. Consequently, the privatized voucher system may encourage congestion, poorly planned communities, inadequate infrastructure services, and even some diseconomies of scale in construction.

This discussion points out that the privatized housing voucher system has some inherently strong points that allow it to deal with the inefficiencies that may arise due to consumption externalities. However, the voucher system also has some weak features that may aggravate the potential inefficiencies posed by the failure to capture positive coordination externalities. Furthermore, in operating the voucher system, inefficiencies may arise compounding the system's inherent inability to effectively capture both consumption and coordination externalities. Given these circumstances, to approximate the Lindahl solution and
minimize welfare loss, the private voluntary organization should invest in administrative control measures designed to mitigate the system's inefficiencies.

What are some of these potential inefficiencies? First, families ineligible for the program have the incentive to apply and avail themselves of the subsidy. Collusion may even arise with the administrators enabling some ineligible participants to enrol in the program. "Error rates" in the determination of the payment and subsidy levels to be given to low-income families may also occur. These "error rates" arise from the low-income families tendency to underdeclare their income in order to maximize the subsidy they will receive from the program. In part, these "error rates" will also be facilitated by the rent-seeking, pay-power-prestige maximizing behavior of some of the employees of the private voluntary organization.

Administrative controls to counter these inefficiencies could range from extensive face-to-face interviews, verification of income and household size declarations using third party sources, employing selective cases of reverifications, requiring interagency exchanges of information on clients, to the conduct of internal as well as external audits of the private voluntary organization.

Second, serious defaults and delays in the recovery of the difference between the voucher and the subsidy may have
to be dealt with because of the low levels of the potential beneficiaries' income. Visualizing the administrative controls to reduce these inefficiencies yields a number of possibilities: the installation of the appropriate accounting and auditing system, imposition of sanctions and penalties against those who default or who delay in their payments, and the implementation of counselling and direct intervention programs for those families desiring to increase their income levels.

The third type of inefficiencies concerns the low-income families' strong incentive to rent or construct their housing units in locations that are highly accessible to their place of employment. There may, in fact, be a lot of trade-offs that occur indicating preference for accessible location to quality of the housing units to be constructed or rented. Particularly, in developing countries where this is commonly observed, this housing decision pattern exacerbates the congestion problems in the cities, worsens the traffic situation, and contribute to the rapid deterioration of the basic infrastructure services available to low-income families.

Administrative control measures for these inefficiencies may take on alternative forms. Minimum or basic standards governing the units to be constructed by the families could be specified and strictly enforced.
Activities to determine whether an enrollee's housing unit meets the program standards could involve different procedures or a combination of procedures for inspecting the units: through professional code inspectors, through one of the trained staff, and perhaps even through the program participant themselves who will be motivated to ensure that a prospective co-participant will comply with the program standards.

The more complicated techniques for dealing with inefficiencies from the failure to capture coordination externalities in the privatized housing voucher system may include adjusting the amount of the vouchers according to the level of congestion in the locality selected, combining the voucher system with existing traffic policies, or even organizing a transport facilities network to make less attractive localities more accessible. However, these latter techniques indicate the increasingly prohibitive costs associated with operating the privatized housing voucher system in a manner that best minimizes the inefficiencies from the failure to take advantage of coordination externalities.

Against this background, a more precise definition of agency costs can now be formulated. Agency costs arise in a privatized housing voucher structure as a mechanism for reducing the welfare loss, \( W^e \). To reduce \( W^e \), the private
voluntary organization invests in various administrative activities that attempt to capture both consumption and coordination externalities. Due to the highly individualized decision-making among the low-income families with respect to quality, location, and other features of the low-income housing, most of these activities will be focused on reducing the inefficiencies caused by the failure to capture coordination externalities. Graphically, this attempt by the private organization to capture and incorporate the gains mostly from coordination externalities into its private demand curve is illustrated in Figure 3 through the continuously outward shifting of $D^p$ towards $D'$. 

In a completely privatized low-income housing voucher strategy, agency costs can thus be defined as the sum of the administrative costs private organizations incur to reduce the inefficiencies largely caused by coordination in the provision of low-income housing plus any residual welfare losses from the failure to fully enforce the first-best Lindahl solution. Figure 4 graphically illustrates the essence of this definition. OM shows the linearly increasing administrative costs incurred by the private firms to capture both consumption and coordination externalities. Mainly, however, these administrative costs would be focused on the reduction or elimination of the inefficiencies caused by coordination externalities as
Figure 4

Minimizing Agency Costs In Privatized Housing

Notes: OM represents the linearly increasing administrative costs of reducing welfare losses or inefficiencies in the privatized housing voucher system. WE measures the declining residual welfare loss or inefficiencies associated with each level of administrative activity. AC(P) is the agency cost derived for a privatized housing voucher system; it is simply the vertical sum of OM and WE. AC(P) is minimized at MAC(P).
low-income housing services are produced.\textsuperscript{19} WE measures the residual welfare losses and inefficiencies associated with each level of administrative costs. It has a negative slope because as administrative costs increase to incorporate externalities into the private demand for housing, the welfare losses or inefficiencies due to the failure to implement the Lindahl solution decrease. WE's relative flatness, however, indicates that the degree of welfare losses, essentially from the inefficiencies caused by coordination externalities, is not highly responsive to the level of administrative activities. Or to put it differently, the costs of the administrative activities required to fully minimize the inefficiencies due to coordination externalities will be prohibitive.\textsuperscript{20}

In Figure 4, agency costs, AC\textsuperscript{p}, are derived by vertically summing OM and WE for each level of administrative activities. Hence, the firm implementing the privatized housing voucher strategy should invest in

\textsuperscript{19} It must be pointed out that a critical assumption here is that each point in OM results from an optimizing behavior by the private voluntary organization, i.e., for a given budget, the private organization consistently selects the optimal combination of administrative activities that will reduce inefficiencies and the welfare loss.

\textsuperscript{20} This is due to the increasingly prohibitive cost of installing and operating the combination of administrative control measures that will eliminate inefficiencies in the privatized housing voucher system due to coordination externalities.
administrative activities to incorporate both consumption and coordination externalities into its private demand only up to the point MAC(P), where AC^c is minimized. Otherwise, the additional benefits received from the reduction in the welfare loss will be more than completely offset by the costs of operating the voucher system in a manner that is closest to the Lindahl solution.

3.3 AGENCY COSTS IN CENTRALIZED PUBLIC HOUSING

In the public finance literature, the presence of externalities has always constituted a fundamental argument for state or government intervention. To housing analysts in the 1960s, externalities generated through housing and the seeming "publicness" of low income-housing were sufficient arguments for the government to introduce centralized, conventional public housing. To housing policymakers, the government, with its coercive powers of taxation and enforcement appeared to be in the best position to provide low-income housing units.

Under a centralized, conventional public housing strategy, all the housing functions particularly the production of fully-built housing units are produced by the government at the national level. The government decides on the number of units to be produced, the type, the location, what facilities will be provided, and who among the
low-income families will qualify as participants in the housing program.

King (1984) cites that the most commonly claimed disadvantage of centralized provision is that national governments will most likely fail to produce services where quality and quantity vary from area to area in accordance with varying tastes of citizens in different areas. This is empirically confirmed from the observed pattern in developing countries where the national governments tend to create uniform provision partly for administrative convenience, and partly, also because they have no explicit methods of ascertaining the extent to which tastes vary from area to area.\(^\text{21}\)

This behavior of national governments suggests that centralized housing is severely handicapped in its ability to deal with the problems posed by consumption externalities. When the central government provides uniformly, then the type of low-income housing that is made available ignores the diversity in the low-income families' preferences and willingness to pay. The low-income families' choice is constrained to the specially built, subsidized housing units which oftentimes are poorly

\(^{21}\) Another reason may be because governments impose taxes at uniform rates in all areas and therefore feel obliged to maintain visibly equal levels of provision in each area.
constructed and unaffordable. Consequently, centralized housing is usually considered highly inequitable because they served only a small fraction of the population eligible for housing assistance. They were also usually valued by the recipients as worth less the costs to the government.

On the other hand, since the government makes all the fundamental decisions about the housing units: the type, the location, and the package of facilities to be provided; the benefits from coordination externalities can potentially be fully realized. With sufficient planning and coordination by the government, the provision of housing through a centralized strategy can thus be integrated into the other activities affecting the urban city's growth and development pattern. In particular, government planners can take into consideration the effect of the entire project on the traffic, the health, and the productivity of those indirectly affected by the project, and essentially on the standard of living of the whole society.

The conventional, centralized public housing strategy, therefore, has some inherently strong features that enhance the indirect benefits and economies of scale that could be realized from coordination. However, the conventional public housing strategy also suffers from serious limitations in its ability to cope with the problems associated with consumption externalities.
Following Oates (1972) who argued that economic efficiency is attained by providing the combination of output that best reflects the preferences of individuals in different subsets of the population, Figure 5 demonstrates how the Lindahl equilibrium may differ from one locality to another locality. In this illustration $Q^{*}_{A}$, the Lindahl equilibrium in Locality A, is greater than $Q^{*}_{B}$, the Lindahl equilibrium in Locality B. Individuals in Locality A obviously have a higher marginal valuation for low-income housing than individuals in Locality B. Centralized and uniform provision by the government at level $Q^{G}$ which implies a perceived level of demand $D^{G}$ would result in welfare losses. In Locality A, $Q^{G}$ falls short of $Q^{*}_{A}$; there is underprovision of housing by the government. Welfare loss in Locality A, $\tilde{W}^{A}$, will be equal to the triangle DEF. But in Locality B, the same level of provision $Q^{G}$ is greater than $Q^{*}_{B}$; there is overprovision of housing in this case. The welfare loss in Locality B, $\tilde{W}^{B}$, will be equal to triangle GHI.\(^{22}\) The total welfare loss, $\tilde{W}^{P}$, generated by a centralized public housing strategy

\(^{22}\) The welfare loss in Locality A represents the potential net gain or consumer surplus that could accrue to the government if it produces $Q^{*}_{A}$ instead of $Q^{G}$. The welfare loss in Locality B has a different nature. It represents the net cost incurred by the government as a result of overproduction.
mainly due to consumption inefficiencies, in this case, is simply the sum of $W^A$ and $W^B$.

In this setting, agency costs emerge to reduce the welfare losses and inefficiencies generated from the inability of the government to capture both consumption and coordination externalities in providing the low-income housing in each locality. To reduce the total welfare loss, $W^p$, the national government can invest in the appropriate administrative activities so that the particular tastes and preferences of each locality for low-income housing could be approximated. Furthermore, these administrative activities should also take full advantage of the benefits from coordination and economies of scale. Consequently, the first objective should be for the central government to be more attuned to the housing needs and preferences of specific subsets in the economy. Activities to support this objective include manpower training for soliciting community information, liaison between the government personnel and the community's representatives, surveys and other local research costs, familiarization with the local bureaucracy, and community organization development costs (Yeh and Laquian, 1983; Rodwin and Sanyal, 1987).

The second objective requires that the central government takes full advantage of the benefits from coordination and economies of scale. Here, however, many
rent-seeking activities could also occur in the construction and implementation of the housing projects as well as in the selection of the project beneficiaries. Consequently, the appropriate administrative control measures should be installed such as adequate accounting and monitoring, external and internal audits, periodic project inspections, inventory management, and production scheduling. Personnel training and development in management and housing technology may also be included.

In Figure 5, this attempt by the national government to ascertain each locality's total demand for low-income housing and the effort to capture coordination externalities and economies of scale is depicted by the outward or inward shifting of $D^0$ towards $D'^A$ or $D'^B$. And as $D^0$ moves towards $D'^A$ or $D'^B$, $Q^0$ begins to approach $Q'^A$ or $Q'^B$; hence, the underprovision or overprovision of low-income housing which is generating the welfare loss is gradually corrected.

In a centralized, conventional public housing strategy, therefore, agency costs can be defined more specifically as the sum of the administrative costs the government incurs to ascertain the particular levels of demand for each locality in an effort to realize the benefits from consumption and coordination externalities to approximate the Lindahl solutions in each locality, plus the residual losses that result from the failure to fully implement.
LOCALITY A: The case of Underprovision in Low-Income Housing

LOCALITY B: The case of Overprovision in Low-Income Housing

Figure 5

Welfare Losses Due To Externalities In Conventional, Public Housing

Notes: $D^*_A$ or $D^*_B$ represents the vertically summed demand for low-income housing from both direct and indirect beneficiaries in Localities A and B, respectively. $D^G$ indicates the government's perception of the level of demand which constitutes the basis for the uniform provision $Q^G$ regardless of the specific Lindahl solution in a locality. The welfare losses from the failure of the government to perceive accurately the Lindahl solution are represented by triangles DEF and GHI. As administrative costs are incurred in operating the centralized strategy, $D^G$ shifts toward $D^*_A$ or $D^*_B$ resulting in the gradual elimination of welfare losses.
solutions in each locality plus the residual welfare losses that result from the failure to fully implement the Lindahl equilibrium in each locality.

Figure 6 presents a diagrammatical exposition of agency costs in conventional public housing. OB shows the positively increasing costs that the government has to incur to determine the particular levels of demand for housing in each locality and to implement the strategy in a manner that best minimizes inefficiencies. WP indicates the measure of the welfare loss associated with each level of administrative costs. Like WE in the privatized housing voucher housing strategy, it is downward sloping. However, it is drawn more steeply to suggest that WP, the welfare losses mainly due to consumption externalities in conventional public housing, is relatively more responsive to administrative costs than WE, the welfare loss from a privatized housing voucher strategy mainly due to coordination externalities.\textsuperscript{23}

Thus, agency costs, $AC_e$, is measured by the vertical sum of OB and WP for each level of administrative activities. Governments should invest in administrative

\textsuperscript{23} This is a preliminary assumption which will be modified in the comparative static exercises that will be conducted in this research.
Notes: OB shows the linearly increasing administrative costs of reducing welfare losses mainly due to consumption externalities in the centralized public housing strategy. As in the privatized housing voucher scheme, each point in OB represents the optimal combination of activities that can be achieved given a particular budget. AC(C) is the agency cost derived for a centralized public housing strategy; it vertically sums OB and WP. AC(C) in this case is minimized at MAC(C).
activities to approximate the Lindahl equilibrium in each community up to the point where $AC_e$ is minimized.

3.4 AGENCY COSTS IN SELF-HELP HOUSING STRATEGIES

Three types of self-help housing strategies were introduced in the preceding chapter. In the private sites and services development, the government's role is minimized to lending technical and financial assistance to the private sector in the fulfillment of the housing functions. The government with its coercive power of taxation and its ability to subsidize is called upon to provide the appropriate incentives in bridging the gap between the private sector's production of housing and the Lindahl equilibrium. Under the slum upgrading approach, the government's role is expanded to provide basic physical infrastructure to the project, land acquisition, subdivision and redistribution of the subdivided plots, and the recovery of the land development costs. The remaining functions to complete the housing project is left to the discretion of the private sector. Finally, in the public sites and services strategy, nearest the conventional public housing in institutional design, all the housing functions are performed by the government with the exception of the construction of the houses for which core or shell houses are substituted.

Clearly, in all these self-help low-income housing strategies, the efforts of both the government and the
private sector are combined in some proportion to achieve a certain degree of efficiency. In fact, from the literature, what can be inferred is that self-help housing strategies reduce both types of welfare losses that result from the failure to capture coordination and consumption externalities in the privatized housing voucher and conventional public housing strategies, i.e., $W^e$ and $W^p$, respectively.

In self-help housing, how can an administrative structure be designed and organized to operate closely to the Lindahl solutions and minimize even further the welfare losses generated from both consumption and coordination externalities? Consider an administrative structure where the national government is tasked with the implementation of a public sites and services development program. Through this specific program, low-income families are provided with the serviced lots, i.e., lots are awarded to eligible low-income families and these lots are equipped by the national government with the basic physical infrastructure. The government also constructs the core or shell houses and provides the project with the relevant communal facilities. The core or shell houses are then completed by the project beneficiaries with the technical assistance and limited financial support of the government. Low-income families are charged for the project components that directly benefit
them. The rest of the components are treated as the government's subsidy to the project.

A self-help public sites and services development strategy such as this means that the central or national government decides on the project or site location and the manner by which the physical amenities, the core or shell houses, and the community facilities are designed and constructed. Thus, in a public sites and services strategy, low-income families exercise limited freedom in choosing the location of the houses given to them and the type of amenities available to them. However, they have relatively more freedom in the task of completing the core houses awarded to them. Also, the central government plans and implements the sites and services projects on the basis of its own perception of the low-income families' willingness to pay for the housing services. Hence, this approach has certain limitations in addressing the diversity of preferences and willingness to pay among the low-income families.

Based on this discussion, one can argue that self-help public sites and services appears is superior to the centralized public housing approach in dealing with the problems and potential inefficiencies posed by consumption externalities. However, with its highly individualized approach, the privatized housing voucher strategy remains
the most efficient in performing the task of incorporating consumption externalities into the housing decision process.

But in a self-help public sites and services development strategy, the project sites are also selected by the central government. This means that if the selection task is properly implemented, the self-help public sites and services could be effective at reducing some of the inefficiencies from coordination externalities such as congestion and traffic in the cities. In addition, various forms of economies of scale in construction may result from the implementation of sites and services projects in a centralized manner. However, since the low-income families are also making individual decisions about how and when to complete the core houses, some negative coordination externalities resulting from improperly designed and constructed units may continue to remain.

Based on the foregoing, self-help emerges as potentially more efficient than the privatized housing voucher system in coping with the complexities resulting from coordination externalities. The privatized housing voucher approach, however, remains inherently superior to the conventional public housing approach in dealing with the problems posed by consumption externalities.

On the other hand, self-help housing is relatively more efficient than the centralized, conventional public housing
strategy in managing consumption externalities. Meanwhile, centralized, conventional public housing meanwhile performs more creditably in the task of incorporating coordination externalities into the housing decision process.

In operating the public sites and services strategy, what types of problems and inefficiencies can still occur and what administrative control measures can the central government enforce to reduce these problems and inefficiencies?

Inefficiencies may occur in the areas of site and beneficiary selection. Lobbying from low-income groups and politicians and rent-seeking by some government bureaucrats could result in the choice of project sites that are inaccessible or infeasible in some ways. Planners and developers trying to capture rent from the project may impose excessively high standards on the infrastructure and core houses. This leads to unaffordable housing services to the low-income families. Another way by which developers and contractors may try to capture rent from the projects is to use substandard materials; pay-power-prestige maximizing government officials may allow and even facilitate the use of these substandard materials.

Inefficiencies and ambiguities in the delineation of roles and responsibilities regarding project maintenance are also possible. And finally, although one beauty of the
sites and services approach is that there is an automatic mechanism for collecting the major portion of the housing cost from the beneficiaries since they themselves pay directly for the cost of completing the housing unit, there may still be defaults and delays in the recovery of the government's portion of the investment.

Administrative control measures that could be installed by the government to mitigate these inefficiencies include the establishment of an appropriate set of criteria for the selection of the project sites and beneficiaries, the conduct of periodic internal and external audits, specification and enforcement of the minimum and maximum physical standards acceptable to the project, design and implementation of a project accounting system, and the regular survey of targeted families' household income and expenditure patterns. To counter the tendency to use substandard materials, the project should also be regularly inspected by qualified and independent professionals. And finally, although a major portion of the housing units' cost is financed directly by the beneficiaries in a public sites and services project, the government still has to install the appropriate accounting and auditing system to collect its investment from the beneficiaries. Sanctions and penalties against those who default or who delay in their payments must be imposed. Support activities and counseling
for those families needing to augment their income and means of livelihood should be offered.

The centrally administered sites and services development strategy with its comparative advantages in dealing with both consumption and coordination externalities can thus be designed to operate as close as possible to the Lindahl solutions. Figure 7 illustrates how \( W^e \), the welfare losses primarily due to coordination externalities, is reduced through a self-help housing strategy. The profit maximizing private sector produces at \( Q^p^* \) where private demand for housing \( D^p \) intersects with the supply of housing \( S^h \). But the central government which performs some of the housing functions subsidizes the production of housing up to \( Q^s^* \) and ends up making decisions on site selection and the type and quality of the physical amenities and cores houses that will be provided. Low-income families, therefore, face certain restrictions in their housing decisions in this type of low-income housing strategy but remain relatively free in their decisions about how to complete the cores houses. This basically implies that \( D^p \) has been shifted to \( D^h \). At \( Q^s^* \), \( W^e \) originally measured by the triangle ABC is reduced to the smaller area measured by the inner triangle WYC.

But since the government works jointly with the private sector and the private sector, on the other hand, is more
Figure 7

Welfare Losses Due To Coordination Externalities In Self-Help Housing

Notes: $D^T$, as in the previous graphs, vertically sums $D^P$, the direct beneficiaries demand for low-income housing, and $D^S$, the vertically summed demand from indirect beneficiaries who are willing to subsidize low-income housing. In a public sites and services strategy, welfare losses due to coordination externalities which is originally represented by triangle ABC is reduced to the smaller triangle YWC. This occurs because of the shift of $D^P$ to $D^S$ which depicts the subsidy portion and the centralized nature of the activities contributed by the government. By investing in the appropriate administrative control measures to reduce the inefficiencies resulting mainly from coordination externalities, $D^S$ can be made to shift toward $D^T$. This means that the Lindahl solution is eventually approximated and the welfare loss due to externalities gradually eliminated.
attuned to the housing needs and preferences within each locality, the welfare loss mainly due to consumption inefficiencies is also reduced. In Figure 8, the private sector, by communicating with the government about its housing needs and preferences and by completing the core houses according to the families' individual needs and preferences, shifts $D^6$ towards $D^*_A$ and $D^*_B$, thus moving $Q^6$ closer to $Q^{*A}$ and $Q^{*B}$. Consequently, the welfare losses in Localities A and B are reduced, as shown by the much smaller triangle WYF and GST.

Evidently, the agency costs in a self-help sites and services housing strategy will simply be the administrative costs required to operate the projects in a manner that minimizes both $W^e$ and $W^p$ to approximate the Lindahl first-best solutions.

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24 Fama and Jensen (1976) noted, for instance that the benefit of "separate management" (i.e., decentralized management) is the greater degree of specialization that it affords. Hence, private firms possess the flexibility to conduct their operations separately in keeping with the client's needs and preferences. On the other hand, centralized structures lose the ability to specialize and thus, tend to provide uniformly.

25 Fama and Jensen (1976) noted, for instance that the benefit of "separate management" (i.e., decentralized management) is the greater degree of specialization that it affords. Hence, private firms possess the flexibility to conduct their operations separately in keeping with the client's needs and preferences. On the other hand, centralized structures lose the ability to specialize and thus, tend to provide uniformly.
Notes: In a self-help public sites and services development strategy, welfare losses from consumption inefficiencies originally shown in centralized, conventional public housing as the sum of triangles DEF and GHI, are reduced through the shifts of $D^G$ toward $D^H_A$ and $D^H_B$ because of the planning inputs from the private sector. Welfare losses mainly due to consumption externalities are thus graphically depicted here for the case of self-help housing by the smaller triangles WYF and GST. By investing further in administrative controls, the public sites and services development strategy can be made to approximate the Lindahl solutions in each locality. This, gradually eliminates the inefficiencies from consumption externalities.
3.5 LOW-INCOME HOUSING STRATEGIES, AGENCY COSTS, AND THE COMPARATIVE INSTITUTIONAL FRAMEWORK

Having defined the components of agency costs in the privatized housing voucher, decentralized self-help sites and services strategy, and conventional, public housing strategies, an approach that can be used to make operational the comparative institutional framework to determine the most efficient low-income housing institutional framework to determine the efficient low-income housing strategy, given a specific environment, can now be outlined.

First, the total agency costs, $A^T$, for each type of strategy is derived by adding the agency costs incurred to reduce the inefficiencies from coordination externalities, $A^E$, and the agency costs required to reduce consumption inefficiencies, $A^p$. Then, the type of low-income housing strategy for which the lowest $A^T$ is computed should be chosen to ensure that the efficient approach has been selected.

Figure 9 captures this comparative institutional framework graphically. The degree of decentralization or centralization inherent in each type of strategy is zero, the degree of centralization is zero and the privatized housing voucher strategy becomes relevant.
Figure 9

Minimizing Agency Costs in Low-Income Housing

Notes: Points indicated in this graph represent the agency costs due to coordination and consumption externalities for three distinct low-income housing strategies with varying degrees of centralization, i.e., $A^i = A^* + A^p$ where $i$ represents the privatized, centralized, and self-help housing strategies. One can envision a quasi-envelope curve that connects $A^i$ instead of these three distinct points, by expanding $i$ and allowing it to represent all the mixed combination of the strategies in a given country.
The degree of centralization inherent in each type of strategy is represented by $\alpha$ in the horizontal axis of the graph. When $\alpha$ is zero, the degree of centralization is zero and the privatized housing voucher strategy becomes relevant. Furthermore, at $\alpha$ equals zero, $A_p^p$, the agency costs due to consumption inefficiencies given a privatized housing voucher strategy is assumed to be zero. This follows from an earlier assumption that the private sector has the comparative advantage in planning housing projects since it is more attuned to the needs and preferences of each locality.\(^{26}\) Since the level of agency costs due to consumption externalities for a completely privatized $A_p^p$ is zero, the total agency costs for this type of strategy is equal to $A_p^E$, the total agency costs due to coordination externalities, i.e., $A_p^I = A_p^E$. When $\alpha$ is equal to one, the degree of centralization is maximized and here, the centralized, conventional public housing strategy becomes relevant. At $\alpha$ equals one, $A_c^E$, which pertains to the agency costs mainly due to coordination externalities in a centralized strategy is assumed to be zero.\(^{27}\)

\(^{26}\) This is, of course, a simplifying assumption that can be modified to accommodate the residual inefficiencies of the private sector in capturing consumption externalities.

\(^{27}\) Again, this is an attempt at simplification. This assumption can be modified to incorporate inefficiencies by the central government in fully capturing the gains from coordination externalities. For instance, agency costs may
other hand, the magnitude of agency costs due to consumption inefficiencies by the government is indicated in Figure 9 as $A_p^G$. Since $A_e^p$ is zero, the total agency costs, in this case, is equal to $A_p^G$, the total agency costs due to consumption externalities, i.e., $A_p^T = A_p^G$. When $\alpha$ is between zero and one, the self-help sites and services housing strategy becomes appropriate. In Figure 9, $A_s^e$, the agency costs due to coordination externalities in a self-help housing approach is lower than $A_p^e$, to signify that with self-help, the government is able to capture part of the inefficiencies due to coordination externalities. $A_p^s$, the agency costs in self-help housing from incorporating consumption externalities in the provision of low-income housing, is lower than $A_p^G$, to indicate that with the joint efforts of the private sector and the central government, inefficiencies from consumption externalities are reduced.

A comparison of $A_p^T$, $A_p^G$, $A_p^S$ shows that given certain assumptions about the environment, the self-help public sites and services development strategy can emerge as the efficient low-income housing strategy to adopt.

also be generated from the conflicting and overlapping roles of the many government agencies in providing the various components of low-income housing.
This illustration thus demonstrates how the comparative institutional framework can be applied to the task of choosing the efficient low-income housing strategy as environments are varied. In this particular case, it was shown how self-help housing could become efficient in a given environment. However, to develop the framework for a normative theory of low-income housing strategies, a mechanism for the more precise computation of agency costs for each strategy and how they vary in response to changes in the environment should be formulated. In the next chapter, the conceptual framework outlined here will be formally modelled for a more quantified approach to the computation and comparison of agency costs for the privatized, centralized, and self-help low-income housing strategies.
AGENCY COSTS AND THE CHOICE OF LOW-INCOME HOUSING STRATEGIES: A MATHEMATICAL APPROACH

From Chapter 3, agency costs for the privatized housing voucher, completely centralized, and self-help public sites and services development strategies were discussed. To introduce the formal modelling approach that will be adopted in this chapter, agency costs for each type of low-income housing strategy will now be defined more precisely.

In a completely privatized housing strategy, agency costs will be used to refer to the sum of the administrative costs private firms incur to reduce the inefficiencies largely caused by coordination externalities in the provision of low-income housing plus any residual welfare losses from the failure of these firms to fully enforce the first-best Lindahl solution. Inefficiencies from coordination externalities here stem from the highly individualized decision-making among the low-income families with respect to quality, location, and other features of the low-income housing.

In a centralized and conventional public housing strategy, agency costs will be primarily composed of the administrative costs incurred by the government to reduce
the inefficiencies caused by consumption externalities in
the provision of low-income housing plus any remaining
welfare losses due to the failure by the government to
completely enforce the Pareto-efficient Lindahl solutions.
In this case, inefficiencies from consumption externalities
can be explained by the higher standards and uniform
approach adopted by the government in planning and
implementing public housing projects. Thus, the government
has to reallocate its resources to the task of determining
the particular levels of demand in specific localities.

And finally, in the public sites and services
development strategy, agency costs will include the
administrative costs both the government and the private
sector could incur in minimizing the residual inefficiencies
and welfare losses caused by both consumption and
coordination externalities even as the government and the
private sector, as well as the low-income families, combine
their efforts to provide the low-income housing. In this
self-help housing strategy, some inefficiencies from
coordination externalities though substantially reduced
through the government's centralized site selection and
development planning activities, tend to persist. This
persistence is due to the ultimately responsibility given to
the low-income families to complete the actual housing units
in the projects. Also, while inefficiencies from
consumption externalities are greatly reduced by this individualized completion of the housing units in the project, some inefficiencies remain due to the fact that the government retains decision-making in choosing the location and other development aspects of the projects.

In the following sections, for each type of low-income housing strategy, agency costs will be mathematically derived and formulated. Furthermore, using a computer-simulated approach, the computation and comparison of minimum agency costs for each type of strategy, given certain assumptions about the environment, will be illustrated.

4.1 Agency Costs in a Privatized Housing Voucher System

4.1.1 Agency Costs in a Privatized Strategy: Mathematical Derivation

The first task in mathematically deriving the agency costs in a completely privatized low-income housing strategy is to specify the demand and supply functions that determine both the private and the Lindahl equilibrium solutions. Let the private demand for low-income housing\(^{28}\), \(D^p\), be represented by

\(^{28}\) For ease of vertical summation which is the required approach in determining the Lindahl equilibrium, demand and supply functions are specified using the mathematical convention of identifying the variable in the y-axis as the dependent variable, i.e., price is specified as a function of quantity supplied or demanded.
Externalities generated through low-income housing can be captured by the following equation:

\[(2) P_{DR} = \alpha_R - \beta_R \ Q,\]

which represents the vertically summed demands of people other than the direct beneficiaries of low-income housing, i.e., the indirect beneficiaries.

Let the housing supply function, \(S^h\), be represented by

\[(3) P_s = \delta + \sigma \ Q.\]

The total demand curve for housing, \(D'\), is derived by the vertical sum of (1) and (2). Hence, \(D'\), is simply,

\[(4) P_{DR} = (\alpha_p + \alpha_h) - (\beta_p + \beta_R) \ Q,\]

for all values of \(Q \leq \alpha_h/\beta_R\).

The market clearing solution, \(Q^p^*\), is determined by solving for the value of \(Q\) that ensures the equality of the private demand for housing, \(D^p\), with the supply of housing, \(S^h\). From (1) and (3), this results in
(5) \( \alpha_p - \beta_{n0} - \delta + \sigma Q. \)

Solving for \( Q \) in (5) yields

\[
(6) \quad Q^* = \frac{\alpha_p - \delta}{\sigma + \beta_p},
\]

the market clearing solution.

Next, to find the Lindahl solution, \( Q^{L*} \), the point of intersection between the total demand curve, \( D^T \), and the supply of housing function, \( S^H \), is determined. From (3) and (4), the equilibrium condition becomes

\[
(7) \quad (\alpha_p + \alpha_R) - (\beta_p + \beta_R)Q - \delta + \sigma Q.
\]

Solving for \( Q \) in (7) results in (8) which defines the unconstrained Lindahl first-best solution for this strategy:

\[
(8) \quad Q^{L*} = \frac{(\alpha_p + \alpha_R) - \delta}{(\beta_p + \beta_R) + \sigma}.
\]

At this point, \( W^* \), the welfare loss due to the inefficiencies from the failure to fully capture consumption and coordination externalities in a privatized low-income housing strategy will be introduced. \( W^* \) is technically the net benefit that could have been achieved by the economy in the
aggregate had $Q^i$ been produced instead of $Q^o$. Mathematically, this net benefit is equivalent to

$$
J \int_{Q^i}^{Q^o} D^T(Q) \, dQ - \int_{Q^i}^{Q^o} S^H(Q) \, dQ.
$$

By substitution, from (3) and (4), (9) can be rewritten more specifically as

$$
W^o = \int_{Q^i}^{Q^o} [\alpha_p + \alpha_R - (\beta_p + \beta_R) Q] \, dQ - \int_{Q^i}^{Q^o} (\delta + \sigma Q) \, dQ.
$$

With this background, agency costs in a completely privatized low-income housing strategy can now be more explicitly discussed. In Chapter 3, agency costs were seen as arising in a privatized low-income housing voucher strategy as a mechanism for reducing $W^o$. To reduce $W^o$, the voluntary private organization invests in various administrative activities that capture both consumption and coordination externalities in a manner that best approximates the Lindahl solution.
Graphically, this attempt by the private voluntary organization to capture primarily the coordination externalities generated by low-income housing was depicted in Chapter 3 by the continuous outward shifting of $D^p$ toward $D^T$. With each level of administrative costs, $D^p$ shifted closer to $D^T$, $Q^p$ also began to move in the direction of $Q^l$, and as this occurred, $W^e$ was gradually reduced and eliminated.

In this mathematical version of the model, the gradual reduction in $W^e$ can be shown by introducing a demand for housing that is written as a function of the monitoring and bonding costs incurred by the private firm to capture the externalities and incorporate them into the private demand for housing.

Let this demand for housing, $D^M$, be represented by

$$D^M = D^P + h(M) (D^T - D^P)$$

where $0 \leq h(M) \leq 1$; $h' > 0$, such that when administrative costs, $M$, is zero, $h(M)$ is also zero and $D^M$ reduces to $D^P$. When $M$ is at some maximum point, however, $h(M)$ is equal to one and $D^M$ becomes equivalent to $D^T$.

By substitution, (11) can be rewritten as

$$

(12) \quad P_{DM} = \left[ \alpha_p - (\beta_p + \beta_R) \right] \Omega + \beta_p \Omega \ h(M) + (\alpha_p - \beta_p \Omega).

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To find the constrained equilibrium solutions given administrative costs, the demand for housing $D^M$, is equated with the supply of housing, $S^H$. By the appropriate substitution and by rearranging the terms in the equilibrium condition, the following equation results:

\[(13) \alpha_R h(M) - (\beta_R + \beta_S) h(M) Q + \beta_D h(M) Q + \alpha_p - \beta_p Q = \delta + \sigma Q.\]

Solving for $Q$ in (13), the constrained equilibrium solution given $M$, becomes

\[(14) Q_{M*} = \frac{\alpha_R h(M) + \alpha_p - \delta}{\beta_R h(M) + \beta_D + \sigma}.\]

Notice in (14) that when $h(M)$ is zero, $Q_{M*}$ reduces to $Q_{P*}$, i.e. when $h(M)$ is zero, (6) and (14) become equal\(^{30}\). When $h(M)$, however, is equal to one, $Q_{M*}$ becomes equivalent to $Q_{L*}$, the Lindahl solution\(^{31}\).

Given (14) which indicates the varying constrained equilibrium solutions as $M$ increases, $W^e$ can thus be

\(^{30}\) If $Q_{M*}$ and $Q_{P*}$ are equal, this implies that given $S^H$, $D^M$ and $D^D$ are also equal. This is precisely what was stipulated in (11) (i.e., when $M$ is zero, $h(M)$ is also zero, therefore, $D^M$ reduces to $D^D$).

\(^{31}\) Similarly, if $Q_{M*}$ and $Q_{L*}$ are equal, this implies that given $S^H$, $D^M$ and $D^D$ are also equal. This is what was meant in (11) (i.e., when $M$ is at some maximum point, $h(M)$ becomes one and $D^M$ becomes equal to $D^D$).
redefined for each level of administrative costs, $M$, in the following manner:

$$W^o = \int_{Q^*}^{Q^*} (\alpha_p + \alpha_r) - (\beta_p + \beta_r) Q dQ - \int_{Q^*}^{Q^*} (\delta Q + \sigma) dQ,$$

such that when $M$ is zero, $Q^M$ is equal to $Q^P$.

Hence, agency costs in a completely privatized low-income housing strategy simply refer to the sum of the administrative costs, $M$, plus the residual $W^o$ at any particular level of $M$.

4.1.2 Agency Costs In a Privatized Strategy: A Computer Simulated Approach

In the preceding section, agency costs in a privatized low-income housing voucher strategy were derived mathematically. In this section, an attempt will be made to illustrate the computation of agency costs in a privatized strategy using a computer-simulated approach based on the mathematical results just derived.

For the purpose of this simulation, hypothetical values are assigned to the results obtained in the previous section to compute for $Q^i$, $Q^p$, $Q^m$ and the residual amounts of $W^o$ given varying levels of administrative costs, $M$. 

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From equations (6), (8), (14) and (15), in the foregoing section, $Q^P$, the private solution, $Q^L$, the Lindahl unconstrained solution, $Q^M$, the constrained equilibrium solution for each level of $M$, and $W$, the welfare loss due to externalities resulting from the failure to completely enforce the Lindahl solution, are calculated using the following definitions:

(1) $Q^P = \frac{\alpha + \delta}{\sigma + \beta}$

(2) $Q^L = \frac{(\alpha + \alpha_p) - \delta}{(\beta_p + \beta_p) + \sigma}$

(3) $Q^M = \frac{\alpha + h(M) + \alpha_p - \delta}{(\beta_p + \beta_p) + \sigma}$

(4) $W = \int_{Q^M}^{Q^L} (\alpha_p + \alpha) - (\beta_p + \beta_p) Q dQ - \int_{Q^M}^{Q^L} (\delta + \sigma) dQ.$

In assigning the hypothetical values to the parameters affecting the housing demand and supply functions (i.e. $\alpha^P$, $\alpha^R$, $\beta^P$, $\beta^R$, $\delta$, and $\sigma$) careful research was undertaken to ensure that representative demand and supply functions were used in the
simulation\textsuperscript{32}. When published data were not available, observations from the field research conducted in the Philippines guided the choice of the parameter values.

In addition, the $h(M)$ function, for simplicity, was assumed to be linear\textsuperscript{33} following the form

$$(5) \quad h(M) = k + vM.$$ 

The $h(M)$ function reflects the degree by which administrative costs are successful in capturing consumption and coordination externalities. But as stipulated in (11) in the preceding section, when $M$ is zero, $h(M)$ must also be zero. This implies that in (5), $k$ must of necessity also be zero. Therefore (5) can be reduced to the form

\textsuperscript{32} For instance, in a detailed study conducted by Malpezzi, Mayo, and Gross (1983) for the World Bank, demand for housing in developing countries were found to be inelastic. Specifically, for selected Asian countries which included the Philippines, the price elasticity of demand for housing ranges from .4 to .8. On the other hand, a study conducted by Grimes (1976) showed that the supply of housing always tended to be more inelastic than the demand for housing. The hypothetical values used for the simulation in this chapter reflect these results by Mayo, et. al, and Grimes.

\textsuperscript{33} A nonlinear relationship was also assumed and tested for this simulation exercise. However, the results obtained essentially approximated the results derived from assuming a linear relationship.
The hypothetical value assigned to \( v \) in this simulation exercise reflects the relative inefficiency of the private voluntary organization in capturing much of the coordination externalities generated by housing\(^34\). This is in keeping with the observation that in the privatized low-income housing voucher strategy, low-income families are making individualized decisions about the location, quality, and design of the houses.

Table 1 summarizes the results of the simulation exercise completed using the hypothetical parameter values listed below the data set generated. As administrative costs \( M \) is raised, the unconstrained first-best Lindahl solution (column 2) remains fixed at 261,000 housing units. The relative success of each level of \( M \) in capturing both consumption and

\(^34\) As discussed in Chapter 3, the private voluntary organization tasked with the implementation of the privatized housing voucher strategy could invest in various administrative costs to counter the inefficiencies largely caused by coordination externalities. However, as more complicated techniques are employed, it becomes increasingly prohibitive to operate the privatized housing voucher system in a manner that best approximates the Lindahl solution.
Table 1. Agency Costs in a Privatized Housing Voucher Strategy: Simulation Results

<table>
<thead>
<tr>
<th>Administrative Costs (in $M)</th>
<th>Lindahl Solution (Q^*) (in thousands)</th>
<th>Administrative Cost (h(M))</th>
<th>Private/Constrained Solutions (Q^*, Q^{**}) (in thousands)</th>
<th>Welfare Loss (U^*) (in $M)</th>
<th>Agency Cost (AC^*) (in $M)</th>
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<td>1.00</td>
<td>261.11</td>
<td>0.0000</td>
<td>50.0000</td>
</tr>
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</table>

(Parameter Values: \( \alpha_P = 13.5, \beta_P = .0125, \alpha_R = 4.25, \alpha_P = .0125, \delta = 6.0, \sigma = .02, \nu = .02 \)).

Note: The minimum agency cost for privatized housing strategy in this simulation exercise is $20.5586 M (see column 6).
Figure 10
Agency Costs in a Privatized Strategy: Simulation Results
coordination externalities in privatized low-income housing is shown by $h(M)$ (column 3). Notice that as $M$ is increased, $h(M)$ approaches one; and as this occurs, the private and constrained equilibrium solutions, $Q^p$ and $Q^c$, respectively, move closer from 230,000 million to the Lindahl equilibrium solution. With each movement of the $Q^c$ closer to $Q^p$, $w^e$ (column 5) decreases. And as previously discussed, agency cost in a completely privatized strategy (column 6) is simply the sum of the administrative costs ($M$) plus $w^e$ at each level of $M$. Given the parameter values used for this simulation exercise, agency cost in a privatized low-income housing voucher strategy is minimized at $20.6$ million. Figure 10 presents these results graphically.

4.2 AGENCY COSTS IN CENTRALIZED PUBLIC HOUSING

4.2.1 Agency Costs In Centralized Housing: Mathematical Derivation

Agency costs in centralized housing were defined in Chapter 3 to be the sum of the administrative costs the government incurs to ascertain the particular levels of demand for each locality plus any residual welfare losses resulting from the failure to implement
the Lindahl equilibrium solutions in specific localities.

In deriving these agency costs mathematically, the approach that will be taken in this research is to specify the demand and supply functions that determine the Lindahl equilibrium solutions in two hypothetical localities. Given these Lindahl equilibrium solutions, the uniform level of government provision based on the average of the two Lindahl equilibrium solutions will then be derived. The total welfare loss, \( W^\theta \), generated by a centralized public housing strategy due to externalities arising from the failure to reduce consumption inefficiencies, is then calculated as the sum of the welfare losses in each locality due to the overprovision or underprovision of the low-income housing services. For illustrative purposes, the case of overprovision and underprovision of low-income housing services will both be discussed.

For each specific locality in a hypothetical economy, let the private demand for low-income housing, \( D^\theta_i \), be represented by the following generalized equation:
where \( i = A, B \).

Externalities generated through low-income housing and the supply of housing will be depicted by

\[
(2) \quad P_{DH}^i = \alpha^i_H - \beta^i_H Q.
\]

and

\[
(3) \quad P_{D}^i = \delta^i + \sigma^i Q.
\]

respectively.

The total demand curve for housing in each locality, \( D_i \), can be derived by vertically adding (1) and (2), as in

\[
(4) \quad P_{DT}^i = (\alpha^i_H + \alpha^i) - (\beta^i_H + \beta^i) Q.
\]
for all values of \( Q \leq \frac{\alpha^i}{\beta^i_R}. \)

To solve for the Lindahl solution in each locality, \( Q^*_i, \) the total demand curve for housing in each locality, \( D^T_i, \) and the supply of housing, \( P^s_i \), are equated. From (3) and (4), the following equilibrium condition, therefore, results:

\[
(5) \quad (\alpha^i_P + \alpha^i_R) - (\beta^i_P + \beta^i_R) Q - \delta^i + \sigma^i Q.
\]

Solving for \( Q \) in (5) results in the following general expression for each Lindahl equilibrium solution:

\[
(6) \quad Q^*_i = \frac{(\alpha^i_P + \alpha^i_R) - \delta^i}{(\beta^i_P + \beta^i_R) + \sigma^i}.
\]

The next task is to compute for the uniform level of provision for each locality based on a level of demand perceived by the government from the national level. Let this perceived level of demand be represented by the average of the total demand for each locality. From (4), the average total demand can be written as

\[
(7) \quad P^C_{DT} = \frac{(\alpha^A_P + \alpha^B_P + \alpha^A_R + \alpha^B_R) - (\beta^A_P + \beta^B_P + \beta^A_R + \beta^B_R)}{2}.
\]
To solve for $Q^G$, the perceived level of demand by the government must be equated to the supply of housing for each locality. Assuming that the housing supply functions for each locality are equal, then this results in the following equilibrium condition:

$$\frac{(\alpha_P^i + \alpha_P^B + \alpha_R^A + \alpha_R^B)}{2} - \frac{(\beta_P^A + \beta_P^B + \beta_R^A + \beta_R^B)}{2} - \delta^i + \sigma^i Q,$$

where $i = A, B$. From (8), the uniform level of government provision, is derived:

$$Q^G = \frac{\alpha_P^A + \alpha_P^B + \alpha_R^A + \alpha_R^B - 2\delta^i}{\beta_P^A + \beta_P^B + \beta_R^A + \beta_R^B + 2\sigma^i}. \tag{9}$$

Given this background, agency costs in centralized public housing due to the need to reduce welfare losses from the inefficiencies of the government can be better explained. Again from Chapter 3, the total welfare loss in centralized public housing is equal to the welfare loss in Locality A, $W^A$, plus the welfare loss in Locality B, $W^B$.

If as in Chapter 3, the Lindahl equilibrium in Locality A is greater than in Locality B, then the centralized and uniform provision by the government at level $Q^G$ would fall short of $Q^*_{A}$; there is
underprovision of housing by the government. $W^A$ can then be defined as

$$W^A = \int_{Q^A} D^A(Q) dQ - \int_{Q^A} S^A(Q) dQ.$$  

In the second locality, $Q^G$ is greater than $Q^L$. There is overprovision of housing. Thus, $W^S$, which in this case represents the net cost incurred by the government as a result of the overproduction will be

$$W^S = \int_{Q^S} S^S(Q) dQ - \int_{Q^S} D^S(Q) dQ.$$  

To reduce $W^p$, the total welfare loss due to planning inefficiencies in a centralized public housing strategy, it follows that both $W^A$ and $W^S$ must be reduced. The national government can do this by investing in the appropriate administrative activities with the primary objective of becoming more attuned to the housing needs and preferences of specific subsets in the economy.
Graphically, this attempt by the government to inquire into the true nature of the demand for housing in each locality to capture mainly consumption externalities was illustrated in Chapter 3 by the outward or inward shifting of $D^g$ toward $D^I$. And as $D^g$ moved toward $D^I_A$ or $D^I_B$, $Q^g$ began to approach $Q^{I^*}_A$ or $Q^{I^*}_B$, thus, gradually correcting the underprovision or overprovision of the low-income housing services.

Mathematically, the gradual reduction in $W^A$ can be shown by adopting the same approach used in the privatized low-income housing voucher strategy. First, a demand for housing written as a function of the administrative costs incurred by the government will be introduced:

\[
D' = D^g + g(M') [D^I_A - D^g] \quad \text{where } 0 \leq g(M') \leq 1; \quad g' > 0,
\]

such that when the administrative costs $M'$ is zero, $g(M')$ is also zero and $D'_{A}$ reduces to $D^g$. However, when $M'$ is at some maximum point, $g(M')$ is equal to one, and at this point $D'_{A}$ becomes equivalent to $D^I_A$.

By substitution from (4) and (7), $D'_{A}$ can be rewritten as
To find the constrained equilibrium level in locality A given administrative costs, (13) is equated with the supply of housing; solving for Q then yields

\[ D_{A}^{M'} = \left[ \frac{(\alpha_{P}^{A} + \alpha_{R}^{A} + \alpha_{P}^{R} + \alpha_{R}^{R})}{2} - \frac{\beta_{P}^{A} + \beta_{P}^{R} + \beta_{R}^{A} + \beta_{R}^{R}}{2} \right] Q + g(M') \left( \frac{2\alpha_{P}^{A} + 2\alpha_{R}^{A} - \alpha_{P}^{R} - \alpha_{R}^{R}}{2} \right) - g(M') \left( \frac{2\beta_{P}^{A} + 2\beta_{R}^{A} - \beta_{P}^{R} - \beta_{R}^{R}}{2} \right) Q. \]

Hence, when \( g(M') \) is zero, \( Q_{A}^{M'} \) reduces to \( Q_{A}^{\delta} \), i.e. when \( g(M') \) is zero, (9) and (14) become equal. In addition, when \( g(M') \) is one, \( Q_{A}^{M'} \) and \( Q_{A}^{1*} \) are equivalent.

\( W_{A}^{\delta} \) can thus be rewritten in the following form:

\[ W_{A}^{\delta} = \int_{Q}^{Q_{A}^{1*}} (\alpha_{P}^{A} + \alpha_{R}^{A}) - (\beta_{P}^{A} + \beta_{R}^{A}) Q dQ - \int_{Q_{A}^{1*}}^{Q_{A}^{M'}} \delta_{A}^{\delta} + \sigma \Delta Q dQ. \]
On the other hand, the gradual reduction in $W^B$ is depicted mathematically using a slightly modified approach. The demand for housing written as a function of the administrative costs, this being a case of overprovision of housing services, can be rewritten as

\[(16) D^B = D - k(M')(D - D^*) \text{ where } 0 \leq k(M') \leq 1; k' > 0,\]

such that when the administrative costs $M'$ is zero, $k(M')$ is also zero and $D^B$ reduces to $D^*$. 

Given (16) and equating it with the supply of housing (3), the constrained equilibrium level given administrative costs is derived by solving for $Q$ which results in

\[(18) \frac{Q^D}{\delta} - \frac{\alpha^A + \alpha^B + \alpha^R - 2\delta}{2\alpha^A + \beta^A + \beta^B + \beta^R} + \frac{k(M')(\alpha^A + \alpha^B + \alpha^R - 2\alpha^A - 2\alpha^B)}{k(M')(\beta^A + \beta^B + \beta^R - 2\beta^A - 2\beta^B)}.\]

$W^B$ is thus more specifically defined as

\[(19) W^B = \int \delta^B \cdot Q \, dQ - \int (\alpha^A + \alpha^B) - (\beta^A + \beta^B) \cdot Q \, dQ.\]

Hence, agency costs in a centralized public housing strategy refer to the sum of the administrative costs, $M'$, plus the total welfare losses equivalent to $W^A$ and $W^B$ at any given level of $M'$. 

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4.2.2 Agency Costs In Centralized Housing: A Computer-Simulated Approach

In this chapter, what has been illustrated so far is the computation of agency costs in a privatized housing strategy using a computer-simulated approach. This section will attempt to show how the same approach can be used to make more precise the mathematical results derived for the computation of agency costs in centralized housing.

Following the approach used earlier, hypothetical values are assigned to compute for $Q^*_A$, $Q^*_B$, $Q^*$, $Q^M_A$, $Q^M_B$ and the varying levels of administrative costs, $M'$, incurred by the government. The following definitions, derived from the previous section, are relevant to the exercise:

\[
(1) \quad Q^*_i = \frac{(\alpha^A_i + \alpha^B_i) - \delta_i}{(\beta^A_i + \beta^B_i) + \sigma_i},
\]

where $i = A, B$.

\[
(2) \quad Q^* = \frac{\alpha^A + \alpha^B + \alpha^R + \alpha^N - 2\delta_i}{\beta^A + \beta^B + \beta^R + \beta^N + \delta_i + 2\sigma_i},
\]
In choosing the hypothetical values to be assigned to the parameters affecting the housing demand and supply functions in this simulation exercise, the same guidelines used in computing agency costs for the privatized low-income housing voucher were observed. However, in this case, since two localities are involved and the model assumed that $Q^*_A$ is greater than $Q^*_B$, an added restriction imposed in the choice of the hypothetical values is that the sum of $Q^*_A$ and $Q^*_B$ should be equal to the original value of $Q^*$ in the first simulation exercise involving the privatized housing strategy.
The $g(M')$ and $k(M')$ functions which reflect the ability of the government to reduce welfare losses in Localities A and B, respectively, through administrative activities, as in the previous simulation exercise, are assumed to be linear, i.e.,

$$g(M') = wM'$$

and

$$k(M') = rM'.$$

The hypothetical values assigned to $r$ and $w$ for this exercise are relatively higher than the value assigned to $v$ in the $h(M)$ function for the simulation exercise on the privatized housing voucher system. This just reflects one major assumption used so far in this basic model: that the government is relatively more effective at reducing welfare losses from the inefficiencies caused by coordination externalities than the private sector, at reducing welfare losses mainly due to consumption externalities.

Table 2 presents a summary of the results of the simulation exercise conducted to compute agency costs in centralized public housing. The parameter values used in the exercise are summarized at the end of the data set generated. For Locality A, as the administrative costs $M'$ (column 1) is increased, the unconstrained first-best solution (column 2) remains unchanged at 190,000 housing
Table 2. Agency Costs in Centralized Public Housing: Simulation Results, by Locality

<table>
<thead>
<tr>
<th>Locality</th>
<th>Administrative Costs</th>
<th>Lindahl Solution Costs</th>
<th>Administrative Solution Costs</th>
<th>Public/Constrained Solution Costs</th>
<th>Welfare Loss Due to Consumption Inefficiencies</th>
<th>Agency Cost (AC')</th>
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<th>Welfare Loss Due to Consumption Inefficiencies</th>
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( Parameter Values: $\alpha_P^A = 6.00$, $\beta_P^A = 0.10$, $\alpha_R^A = 2.00$ $\beta_R^A = 0.0063$, $\delta^i = 3.00$, $\sigma^i = 0.01$, $w = 0.15$, $r = 0.15$ $\alpha_P^B = 2.87$, $\beta_P^B = 0.10$, $\alpha_R^B = 2.00$, $\beta_R^B = 0.0063$)

Note: The minimum agency costs in centralized housing for Localities A and B in this simulation exercise are $56,456$ $\text{in SM}$ and $56,949$ $\text{in SM}$, respectively (see column 6).
units. From the simulation results, what can be observed is that as $M'$ is increased, the underprovision of housing services is gradually corrected. Notice that the government constrained equilibrium solutions increase and approach 190,000, the Lindahl equilibrium solution for Locality A, as $M'$ increase. With this movement of $Q''_A$ toward $Q'^*_A$, $W^A$ decreases until it becomes zero. Agency cost in providing housing in Locality A under a centralized strategy is therefore equal to the sum of $M'$ plus $W^A$ at each level of $M'$ (see column 6).

For Locality B, as the administrative costs $M'$ (column 1) are increased, the Lindahl solution remains unchanged at 71,000 housing units\(^{35}\) (column 2). From the $k(M')$ function (column 3), it will be seen that the overprovision of housing services in this case is also gradually corrected. The government or constrained equilibrium solutions, $Q'^*_B$ from a high of 124,000 units slowly reduce to 71,000 units, the Lindahl solution in Locality B, $Q'^*_B$. And as this occurs, $W^B$ decreases until it reaches zero. The agency cost of providing housing in Locality B under a centralized

\(^{35}\) Note that $Q'^*_A = 190$ million units of housing plus $Q'^*_B = 71$ million units is equal to $Q'^* = 261$ million units in the privatized housing strategy. This facilitates comparison of the two strategies in a comparative institutional framework.
strategy (column 6) is therefore equal to the sum of M' plus \( w^3 \) at each level of M'.

The total agency cost which represents the sum of the agency costs in Localities A and B under a centralized strategy can be summarized to show that given the parameter values used for this simulation exercise, the agency cost in this case will be minimized at $13.46 million. In Locality A, agency cost is minimized at $6.46 million. In Locality B, agency cost is minimized at $6.99 million.

Figures 11 and 12 present graphical illustrations of the results obtained from this simulation exercise to compute for agency costs in Localities A and B under a centralized public housing strategy. Agency cost for each locality is minimized at roughly the same level as indicated by the simulation results.

4.3 AGENCY COSTS IN SELF-HELP HOUSING

4.3.1 Agency Costs in Self-Help Housing: Mathematical Derivation

In Chapter 3, several self-help housing strategies were discussed to highlight the fact that through this housing approach, the efforts of both the government and the private sector can be combined in some proportion to achieve a certain degree of efficiency. In public sites and services development, the government
Figure 11
Agency Costs in Centralized Public Housing Strategy:
Simulation Results for Locality A

Notes: As administrative costs are increased, the welfare loss mainly due to consumption externalities in Locality A gradually declines. Agency cost is derived by vertically summing administrative costs and the residual welfare loss in Locality A. At the point where the agency cost curve is at its lowest, agency cost is minimized.
As administrative costs are increased, the welfare loss mainly due to consumption externalities in Locality B gradually declines. Agency cost is derived by vertically summing administrative costs and the residual welfare loss in Locality B. At the point where the agency cost curve is at its lowest, agency cost is minimized.
with its comparative advantage in taxing the indirect beneficiaries of housing and in subsidizing a portion of the gap between private production and the Lindahl equilibrium can minimize $W^e$, the welfare loss mainly due to coordination externalities. The private sector, on the other hand, which is more attuned to the housing needs and preferences within each locality and therefore has the comparative advantage in planning housing projects is endowed with the capability to reduce $W^p$, the welfare loss mainly due to consumption externalities. Conceptually, these lead to the definition of agency costs in self-help housing as the costs required for the government and the private sector to minimize both $W^e$, the welfare loss mainly due to coordination externalities, and $W^p$, the welfare loss mainly due to consumption externalities, to approximate the Lindahl first-best solutions. Mathematically, therefore, agency cost in self-help public sites and services development can be derived through some form of a framework that integrates the agency costs used to reduce both $W^e$ and $W^p$ from the privatized housing voucher and centralized low-income housing strategies, respectively.
First, the mechanism by which $W^*$, the welfare loss mainly due to coordination externalities, is reduced in sites and services development will be discussed.

Recall that in a privatized low-income housing voucher strategy, profit maximizing firms produce at $Q^p$, where the private demand for housing $D^p$ intersected with the supply of housing $S^p$. But through the self-help sites and services development strategy, the central government is able to perform some of the housing functions by subsidizing the production of housing up to $Q^s$. Graphically, this essentially means that $D^p$ has been shifted to $D^h$ to capture some of the externalities generated through the low-income housing production process. At $Q^s$, $W^*$ originally represented by a bigger triangle in Figure 7 of Chapter 3 will be reduced to an area that corresponds to a smaller triangle.

Earlier, agency costs in a privatized low-income housing voucher strategy were discussed in this chapter. The following demand and supply functions relevant to analyzing the agency costs in self-help housing were specified:
which represented the demand for housing;

\[ P_{PD} = \alpha_p - \beta_p Q, \]

the demand function capturing externalities in housing; and

\[ P_{DR} = \alpha_R - \beta_R Q, \]

the supply of housing.

Given (1) and (2), the aggregate demand for low-income housing, \( D^l \), was defined by the vertical summation of these two demand functions, such that

\[ P_{DT} = (\alpha_p + \alpha_R) - (\beta + \beta_R) Q. \]

From (1) to (4), \( Q^{p*} \) and \( Q^{l*} \) were also derived and defined as follows:

\[ Q^{p*} = \frac{\alpha_p - \delta}{\sigmalobp}, \]

\[ Q^{l*} = \frac{(\alpha_p + \alpha_R) - \delta}{(\beta_p + \beta_R) + \sigma}. \]
Mathematically, the shift in demand from $D^p$ to $D^h$ causing the level of production to increase from $Q^p*$ to $Q^h*$ can be shown by defining $D^s$ to be equal to:

\[(7) \quad P_{DH} = P_{DF} + \phi P_{DR^p}\]

where the variable $\phi$ pertains to the proportion of the subsidy effectively provided by the government. Hence, when the proportion of subsidy $\phi$ is equal to zero, $D^h$ is simply equal to $D^p$ which results in $Q^p*$. When $\phi$, however, is maximized at one, $D^h$ becomes equivalent to the aggregate demand for low-income housing, $D^l$, and of course, at this point, the Lindahl equilibrium, $Q^l*$ is achieved and $W^*$ completely eliminated.

In self-help sites and services development, what is argued, however, is that the government subsidizes only a portion of the gap between private production and the Lindahl first-best solution. The low-income families, by completing the core houses, finances a major portion of the housing investment. Following this argument, by substitution, from (1) and (2), (7) can be rewritten as
Equating (8) with the supply of housing yields $Q^S*$; i.e.,

$$\begin{align*}
(8) \quad & P_{DS} = (\alpha_P + \phi \alpha_R) - (\beta_P + \phi \beta_R) Q. \\
\end{align*}$$

results in:

$$\begin{align*}
(9) \quad & (\alpha_P + \phi \alpha_R) - (\beta_P + \beta_R) Q = \delta + \sigma Q, \\
\end{align*}$$

$$\begin{align*}
(10) \quad & Q^S* = \frac{(\alpha_P + \phi \alpha_R) - \delta}{(\beta_P + \phi \beta_R) + \sigma}.
\end{align*}$$

$Q^S*$, thus represents the level of housing production that is augmented by the government's subsidy and decision-making. And if $Q^S*$ is indeed greater than $Q^P*$, as guaranteed by the subsidy, then $W^*$ has in fact been reduced as graphically demonstrated earlier. The expression that denotes this reduced welfare loss mainly due to coordination externalities can be written as
(11) \[ W^e' = \int_{Q^L}^{Q^S} D^T(Q) \, dQ - \int_{Q^L}^{Q^S} S^H(Q) \, dQ. \]

Agency costs in self-help sites and services development, thus, arise in part due to the need to reduce \( W^e' \) as defined in (11). Primarily, the government and the private sector should engage in the appropriate administrative activities to fully capture the coordination and consumption externalities in the implementation of the Lindahl first-best solution.

Hence, as administrative costs \( M^36 \) is increased, \( D^H \) shifts slowly toward \( D^f \); and as this occurs, \( Q^S^* \) moves toward \( Q^L^* \) gradually eliminating \( W^e' \). Mathematically, this can be illustrated by writing a demand equation that is a function of \( M^* \).

By substitution, from (4) and (8), (12) can be rewritten as

\[ 36 \text{ M}^* \text{ is used in this case to distinguish this type of administrative activities by both the private sector and the government in a self-help sites and services development strategy from the administrative activities, M, undertaken only by the private sector in a completely privatized housing voucher strategy. One would expect M}^* \text{ to be more efficient at capturing externalities than M since the former involves the government which possesses coercive powers.} \]
To solve for $Q^M$, the constrained equilibrium solution with respect to $M^*$, (13) is equated to the supply of housing function. Solving for $Q$ then results in

$$Q^M = \frac{\alpha_P + \phi \alpha_R - \delta + j(M^*) (\alpha_R - \phi \alpha_R)}{\beta_P + \phi \beta_R + \sigma + j(M^*) (\beta_R - \phi \beta_R)}.$$

From (14), it can be seen that when $j(M^*)$ is equal to zero, which is at the point when $M^*$ is zero, $Q^M$ reduces to $Q^S$. In other words, without administrative activities $M^*$, the level of production in low-income housing will simply equal the level of production that is augmented by government subsidy. However, when $j(M^*)$ is one, which is at the point when $M^*$ is maximized, $Q^M$ is equal to $Q^L$ which means that the Lindahl solution has been reached.

For each level of $M^*$, therefore, a reduced level of $W$ can be computed depending on the varying levels of $Q^M$. Hence, $W$ can be more generally represented by

$$W = \int_{Q^L}^{Q^M} D^T(Q) dQ - \int_{Q^L}^{Q^M} S^H(Q) dQ.$$
Agency costs in sites and services development that arise from the need to reduce welfare losses due to externalities is thus just equal to the sum of the administrative costs $M^*$ and the residual amount of $W^*$ as computed in (15) for each level of $M^*$.

Nonetheless, there remains another source of agency cost for self-help housing strategies. It is the agency cost that arises due to the need to reduce the welfare loss largely due to the failure to fully capture the consumption externalities. In Chapter 3, it was noted that the government tended to provide uniformly for each locality regardless of the particular needs and preferences of the constituents in each locality. But in self-help sites and services development, an advantage is that the private sector joins the government in producing some of the housing services. Thus, the private sector by communicating with the government about its housing needs and

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37 This is a tendency that is observed among governments which centrally provide for low-income housing. In the Philippines, as in other developing countries, for example, technical plans for low-income housing are usually standardized at the central government level. Without the appropriate inputs from the local governments and the intended beneficiaries, this result in costly redesign and overruns for some projects.
preferences and by completing the core houses according to its effective demand is able to reduce $w^p$, the welfare loss principally from consumption externalities. Graphically, this was depicted in Figure 8 as a shift in $D^g$, the perceived level by the government of demand for housing to $D^h_A$ and $D^h_B$, the new levels of demand as a result of the consultation with the private sector. This moves $Q^g$, the level of government production to $Q^s_A$ and $Q^s_B$ closer to $Q^l_A$ and $Q^l_B$; consequently, $w^p$ is reduced. This reduction in $w^p$ is represented by the much smaller triangles in Figure 8.

The mathematical derivation of the welfare losses due to planning inefficiencies in each locality to precisely define agency costs in self-help housing will involve once again the following demand and supply functions which were used to specify agency costs for centralized public housing:

\begin{equation}
\left(1\right) P_{DP}^i - \alpha_P^i - \beta_P^i Q,
\end{equation}

where $i = \text{Locality A, B}$.

Recall that (1) represented the private demand for housing in Localities A and B.
(2) \( P_{DP}^i = \alpha^i_R - \beta^i_R Q \).

(2) represented the vertical sum of the demand functions capturing the externalities generated by low-income housing.

(3) \( P^i_S = \delta^i + \sigma^i Q \).

(3) represented the housing supply functions relevant to each locality.

Given (1) and (2), the aggregate demand curve for low-income housing in each locality, \( D^i_T \), was derived by vertically adding the two demand functions for each locality, such that

\[
(4) \quad P^i_{DT} = (\alpha^i_P + \alpha^i_R) - (\beta^i_P + \beta^i_R) Q.
\]

From (1) and (4), recall the following solutions derived in a centralized public housing strategy:

\[
(5) \quad Q^L_{i*} = \frac{(\alpha^i_P + \alpha^i_R) - \delta^i}{(\beta^i_P + \beta^i_R) + \sigma^i},
\]
$Q^{L*}$ defines the Lindahl first-best solution in each locality; $Q^{G}$ specifies the uniform level of housing provided by the government in each locality.

To define the agency costs in self-help housing due to the need to reduce welfare losses from consumption inefficiencies, the change in $W'$ as a result of the movement of $D^G$ to $D_A^H$ or $D_B^H$, causing the increase in production from $Q^G$ to $Q^*_{A}$ or $Q^*_{B}$ must be computed.

Let $D_A^H$ be represented by

\begin{equation}
(7) \quad D_A^H = D^G + Z_A (D_A^I - D^G) ; \text{ where } 0 < Z_A < 1.
\end{equation}

$Z_A$ is a fraction that indicates the increase in efficiency due to the inputs from the private sector about the housing needs in Locality A. When this fraction is zero, $D_A^H$ is equal to $D^G$, i.e., when there is no increase in efficiency due to the participation of the private sector, the government's perceived level of demand in Locality A will be used as the basis for
housing production. When $Z_A$ is one, $D_A^H$ is equal to $D_A^T$, consequently, the Lindahl equilibrium is achieved.

In self-help sites and services development, however, what can be inferred from the literature and what was observed for the case of the Philippines is that $Z_A$ is between zero and one. This implies that in self-help sites and services development, $W^A$ will not be as high as the level indicated for conventional public housing; however, at the same time, $W^A$ will not be totally eliminated since the central government is still generating welfare losses due to consumption externalities.

By the appropriate substitution and equating $D_A^H$ with $S_i^H$, and then solving for $Q$, $Q_A^{S*}$ can be defined as follows:

\[
Q_A^{S*} = \frac{\alpha^A + \alpha_P^A + \alpha_R^A + \alpha_P^B + \alpha_R^B - 2\delta^A + Z_A (2\alpha^A + 2\alpha_R^A - \alpha_P^A - \alpha_R^B - \alpha_R^A - \alpha_P^B)}{2\sigma^A + \beta_P^A + \beta_P^B + \beta_R^A + \beta_R^B + Z_A (2\beta_P^A + 2\beta_R^A - \beta_P^A - \beta_R^B - \beta_P^A - \beta_R^A)}.
\]

Comparing (5), (6) and (8), notice that when $Z_A$ is zero, $Q_A^{S*}$ reduces to (6), the government solution to low-income housing. When $Z_A$ is one, however, $Q_A^{H*}$ can be simplified to yield $Q_A^{T*}$, (5). But since $Z_A$ is assumed to be between zero and one in self-help
housing, \(Q^*_A\) must be between \(Q^6\) and \(Q^{l^*}_A\). If this is indeed the case, \(W^A\) in self-help sites and services development will be lower than \(W^A\) in centralized public housing. Let the reduced \(W^A\) in self-help housing be designated by \(W^{A'}\):

\[
(9) \quad W^{A'} = \int_{Q^{l^*}_A}^{Q^*_A} D^T_A(Q) \, dQ - \int_{Q^{l^*}_A}^{Q^*_A} S^H_A(Q) \, dQ.
\]

The government and the private sector can then further invest in the appropriate administrative activities, \(M^\phi\), to gradually reduce \(W^{A'}\) such that \(Q^{l^*}_A\) is finally achieved. At each level of \(M^\phi\), a constrained equilibrium solution, \(Q^{M^\phi}_A\) is achieved that enables the gradual movement of \(D^H_A\) toward \(Q^{l^*}_A\). As this occurs, \(W^{A'}\) is further reduced until it is eliminated.

Mathematically, this can be shown by introducing as usual a demand for low-income housing in Locality A that is expressed as a function of \(M^\phi\). Let \(D^{M^\phi}_A\) be defined as:

\[
(10) \quad D^{M^\phi}_A = D^H_A + \phi(M^\phi) \left( D^T_A - D^H_A \right) \text{ where } 0 \leq \phi(M^\phi) \leq 1;
\]
such that when \( f(M^\theta) \) is zero \( D^H_A \) is simply equal to \( D^H_A \).
Substituting (4) and (7) in (10), equating the resulting expression with \( S^H_A \), and solving for \( Q \) generates the constrained equilibrium solution for each level of \( M^\theta \):

\[
(11) Q^M^\theta_A = \frac{\alpha^A_P + \alpha^A_R - \alpha^B_A - \alpha^B_P}{\beta^A_P + \beta^A_R - \beta^B_A - \beta^B_P} \frac{A^1 - f(M^\theta)A^2 - f(M^\theta)}{A^1 A^2 Z_A}
\]

where

\[
A^1 = 2\alpha^A_P + 2\alpha^A_R - \alpha^B_A - \alpha^B_P
\]

and

\[
A^2 = 2\beta^A_P + 2\beta^A_R - \beta^B_A - \beta^B_P
\]

Thus to find the residual welfare loss in Locality A due to consumption inefficiencies as \( M^\theta \) is varied, (9) can be rewritten as

\[
(12) W^A = \int_{Q^L}^{Q^M^\theta_A} (\alpha^A_P + \alpha^A_R) - (\beta^A_P + \beta^A_R) Q dQ - \int_{Q^L}^{Q^M^\theta_A} \delta^A + \sigma^A Q dQ
\]

For Locality B, the approach is somewhat varied, since this is being illustrated as a case where the government overprovides.

Let \( D^H_B \), in this case, be represented by
(13) $D_B^H - D_B^G - Z_B (D_B^G - D_{TB})$ where $0 < Z_B < 1$.

$Z_B$, like $Z_A$, is the fraction that indicates the increase in efficiency due to the inputs from the private sector about the housing preferences of the constituents in Locality B.

By substituting the appropriate equations and finding the quantity that ensures the demand and supply of housing equilibrium, i.e. when $D_B^H = S_B^H$, $Q_{B}^{**}$ is derived and defined as follows:

$$Q_{B}^{**} = \frac{\alpha_P^A + \alpha_P^B + \alpha_R^A + \alpha_R^B - 2 \delta - Z_B (\alpha_P^A + \alpha_P^B + \alpha_R^A + \alpha_R^B - 2 \alpha_P^B - 2 \alpha_R^B)}{2 \sigma + \beta_P^A + \beta_P^B + \beta_R^A + \beta_R^B - Z_B (\beta_P^A + \beta_P^B + \beta_R^A + \beta_R^B - 2 \beta_P^B - 2 \beta_R^B)}$$

Comparing (5), (6) and (14) shows that when $Z_B$ is zero, $Q_{B}^{**}$ reduces to (6), the government's solution to low-income housing. When $Z_B$ is one, however, $Q_{B}^{**}$ is simplified to $Q_{B}^{*}$, (5). If $Z_B$ is argued to be between zero and one, then $Q_{B}^{**}$ must then be greater than $Q_B^*$ but less than $Q_{B}^{*}$. This means that $W_B$ in self-help sites and services development is also lower than $W_B$ in centralized public housing. Let the reduced $W_B$ in self-help sites and services development be designated by $W_B^*$.
(15) \( W^H = \int_{Q_s^H}^{Q_s^L} D_B^T(Q) dQ - \int_{Q_s^L}^{Q_s^R} S_B^H(Q) dQ. \)

Once again, a demand for low-income housing written as a function of administrative costs, \( M^p \), can be specified to denote that \( W^H \) can be further reduced:

\[
(16) \quad D_B^{H_p} - D_B^H - k(M^p) (D_B^H - D_B^T) \text{ where } 0 \leq k(M^p) \leq 1 ;
\]

such that when \( k(M^p) \) is zero, \( D_B^{H_p} \) is just equivalent to \( D_B^H \). When \( k(M^p) \) reaches one, however, at some point where \( M^p \) is at a maximum, \( D_B^{H_p} \) becomes equivalent to \( D_B^T \) and this signifies that the Lindahl solution in Locality B has been reached and the overprovision corrected.

Substituting (4) and (13) in (16), equating the resulting expression with \( S_B^H \) and solving for \( Q \) yields the constrained equilibrium solution in Locality B for each level of \( M^p \):
where

\[ B^1 = \alpha^A_p + \alpha^B_p + \alpha^A_R + \alpha^B_R - 2\delta^B - Z_B \]

and

\[ B^2 = \beta^A_p + \beta^B_p + \beta^A_R + \beta^B_R - 2\beta^B_p - 2\beta^B_R. \]

Hence, the residual welfare loss in Locality B due to consumption inefficiencies as \( M^b \) is varied can be defined as:

\[
W^{B'} = \int_{Q^L}^{Q^U} \left( \alpha^B_p + \alpha^B_R \right) - \left( \beta^B_p + \beta^B_R \right) Q\ dQ - \int_{Q^L}^{Q^U} \delta^B + \sigma^B Q\ dQ.
\]

Given all these mathematical derivations, agency costs in self-help sites and services development can thus be more precisely defined as the sum of the
administrative costs $M^*$ and $M^*$ plus the residual welfare
losses for each level of administrative costs.

4.3.2 Agency Costs In Self-Help Housing: Simulation

Results

In this section, the results of the simulation exercise
carried out using the mathematical definitions derived for the
computation of agency costs in self-help sites and services
development will be presented.

Given the approach adopted in the simulation exercises
for both the privatized and centralized housing strategies,
less the same hypothetical values with a few
exception that will be cited later were assigned to compute
for $Q^{L*}$, $Q^{L*}_A$, $Q^{L*}_B$, $Q^G$, $Q^{S*}$, $Q^{W*}$, $Q^{S*}_A$, $Q^{S*}_B$, $Q^M$, $W^t$, $W^t'$, and $W^t''$
given varying levels of the appropriate administrative
costs. The following definitions were used in computing for
specific values during the simulation exercise:

\[
(1) \quad Q^{L*} = \frac{(\alpha_P + \alpha_R) - \delta}{(\beta_P + \beta_R) + \sigma},
\]

\[
(2) \quad Q^{S*} = \frac{(\alpha_P + \phi \alpha_R) - \delta}{(\beta_P + \phi \beta_R) + \sigma},
\]
(1) \[ Q^L* = \frac{(\alpha_P + \alpha_R) - \delta}{(\beta_P + \beta_R) + \sigma}, \]

(2) \[ Q^S* = \frac{(\alpha_P + \phi \alpha_R) - \delta}{(\beta_P + \phi \beta_R) + \sigma}, \]

(3) \[ Q^{M*} = \frac{(\alpha_P + \phi \alpha_R) - \delta + j(M^*)(\alpha_R + \phi \alpha_R)}{(\beta_P + \phi \beta_R) + \sigma + j(M^*)(\beta_R - \phi \beta_R)}, \]

(4) \[ Q^{L*}_i = \frac{(\alpha_P^i + \alpha_R^i) - \delta^i}{(\beta_P^i + \phi \beta_R^i) + \sigma^i}, \]

(5) \[ Q^G = \frac{\alpha_P^A + \alpha_P^B + \alpha_R^A + \alpha_R^B - 2\delta^i}{2\sigma^i + \beta_P^A + \beta_R^A + \beta_P^B + \beta_R^B}, \]

(6) \[ Q^{S*}_A = \frac{\alpha_P^A + \alpha_P^B + \alpha_R^A + \alpha_R^B - 2\delta^A + Z_A(2\alpha_P^A + 2\alpha_R^A - \alpha_P^A - \alpha_R^A)}{2\sigma^A + \beta_P^A + \beta_R^A + \beta_P^B + \beta_R^B + Z_A(2\beta_P^A + 2\beta_R^A - \beta_P^A - \beta_R^A)}, \]

(7) \[ Q^{M*}_A = \frac{\alpha_P^A + \alpha_P^B + \alpha_R^A + \alpha_R^B - 2\delta^A + Z_A A^1 + f(M^B) A^1 + f(M^A) A^1 A^1 Z_A}{\beta_P^A + \beta_R^A + \beta_P^B + \beta_R^B + 2\sigma^A + Z_A A^2 + f(M^B) A^2 + f(M^A) A^2 A^2 Z_A}, \]

(8) \[ Q^{S*}_B = \frac{\alpha_P^A + \alpha_P^B + \alpha_R^A + \alpha_R^B - 2\delta^B - Z_B(2\alpha_P^A + 2\alpha_R^A - \alpha_P^A - \alpha_R^A)}{2\sigma^B + \beta_P^A + \beta_R^A + \beta_P^B + \beta_R^B - Z_B(\beta_P^A + \beta_R^A + \beta_P^B + \beta_R^B - 2\beta_P^A - 2\beta_R^A)}, \]

124
\[ (9) \quad Q_{B}^{M^a} = \frac{\alpha_{P}^{A} + \alpha_{R}^{A} + \alpha_{P}^{B} + \alpha_{R}^{B} - 2 \delta^{B} - Z_{B}B^{1} - k(M^6)B^{1} + k(M^6)B^{1}Z_{B}}{\beta_{P}^{A} + \beta_{R}^{A} + \beta_{P}^{B} + \beta_{R}^{B} + 2 \sigma^{B} - Z_{B}B^{2} - k(M^6)B^{2} + k(M^6)B^{2}Z_{B}}, \]

\[ (10) \quad W_{A}' = \int_{Q^{A}}^{Q^{A}'} (\alpha_{P}^{A} + \alpha_{R}^{A}) - (\beta_{P}^{A} + \beta_{R}^{A})QdQ - \int_{Q^{A}}^{Q^{A}'} \delta + \sigma QdQ, \]

\[ (11) \quad W_{A}' = \int_{Q^{A}}^{Q^{A}'} (\alpha_{P}^{A} + \alpha_{R}^{A}) - \beta_{P}^{A} + \beta_{R}^{A}QdQ - \int_{Q^{A}}^{Q^{A}'} \delta^{A} + \sigma^{A}QdQ. \]

\[ (12) \quad W_{B}' = \int_{Q^{B}}^{Q^{B}'} (\alpha_{P}^{B} + \alpha_{R}^{B}) - \beta_{P}^{B} + \beta_{R}^{B}QdQ - \int_{Q^{B}}^{Q^{B}'} \delta^{B} + \sigma^{B}QdQ. \]

The \( j(M^a) \), \( f(M^a) \), and \( k(M^a) \) functions were as usual assumed to be linear for simplicity, i.e.,

\[ (13) \quad j(M^a) = s M^a, \]

\[ (14) \quad f(M^a) = t M^a, \]

and

\[ (15) \quad k(M^a) = d M^a. \]
However, the hypothetical values assigned to $s$, $t$, and $d$ are comparatively higher than the values assigned to $v$, $w$, and $r$ for both privatized and centralized housing strategies. This is in keeping with the assertion that by combining the efforts of both the government and the private sector, self-help housing strategies become more effective at capturing externalities and at minimizing inefficiencies and welfare losses.

Tables 3-5 summarize the results of the simulation exercise; parameter values used are listed at the end of the data set generated. Table 3 shows that the self-help sites and services solution $Q^S*$ at 245 million units is indeed greater than $Q^P*$, the private solution, at zero administrative costs. Since $W^e$, the welfare loss due to externalities in self-help sites and services development, in Table 3 is also lower than $W^e$, the welfare loss due to externalities in privatized strategy, in Table 1, and $j(M^*)$ more effective than $h(M)$, it follows that the agency cost due to externalities in a self-help sites and services development strategy will be minimized at a much lower level. This is confirmed by the results of the simulation: the minimum agency cost in self-help sites and services development due to externalities which is computed at $2.71$ million given the parameter values used for the exercise is
Table 3. Agency Costs in Sites and Services Housing: Simulation Results on Agency Costs Due To Coordination Externalities

<table>
<thead>
<tr>
<th>Administrative Costs (in $M) (1)</th>
<th>Lindahl Solution (a) (in thousands) (2)</th>
<th>Administrative Costs (b) (in thousands) (3)</th>
<th>Private/Constrained Solutions (c, d) (in thousands) (4)</th>
<th>Welfare Loss Due Externalities (V^2) (in $M) (5)</th>
<th>Agency Cost (ACP) (6)</th>
</tr>
</thead>
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<tr>
<td>0.0</td>
<td>261.0</td>
<td>0.00</td>
<td>245.33</td>
<td>5.6011</td>
<td>5.6011</td>
</tr>
<tr>
<td>0.2</td>
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<td>0.10</td>
<td>247.17</td>
<td>4.3721</td>
<td>4.7021</td>
</tr>
<tr>
<td>0.7</td>
<td>261.0</td>
<td>0.20</td>
<td>248.97</td>
<td>3.3190</td>
<td>3.9840</td>
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<tr>
<td>1.0</td>
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<td>250.69</td>
<td>2.4426</td>
<td>3.4426</td>
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<td>1.3</td>
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<td>0.40</td>
<td>252.28</td>
<td>1.7545</td>
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<td>2.7144</td>
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<td>256.90</td>
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<td>1.00</td>
<td>261.06</td>
<td>0.0001</td>
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(Parameter Values: \( \alpha_p = 13.5, \beta_p = .0125, \alpha_R = 4.25, \alpha_p = .0125, \delta = 6.0, \sigma = .02, \phi = .40, s = .30 \).)

Notes: The minimum agency cost due to externalities in self-help sites and services development in this simulation exercise is $ 2.7144 M.
indeed lower than the minimum agency cost due to externalities for the case of the privatized housing voucher strategy which was shown in Table 1 to be $20.6 million.

Table 4 presents the simulation results of computing for agency cost due to the consumption externalities in a self-help sites and services development strategy. In Locality A, agency cost is minimized at $3.76 million; in Locality B, it is minimized at $4.00 million. Given the parameter values used in the simulation, the total minimum agency cost in self-help sites and services development due to consumption externalities is thus equal to $7.76 million. Again, the computed total minimum agency cost in self-help sites and services development due to consumption externalities ($7.76 million) is lower than the computed minimum agency cost in centralized public housing due to consumption inefficiencies ($13.6 million as previously shown in Table 2).

Table 5 provides a summary of the agency costs in self-help sites and services development (column 5), i.e., the agency cost due to coordination externalities plus the agency cost due to consumption externalities. The total agency cost in self-help sites and services development is minimized at $10.4 million. Figures 12-15 present
Table 4. Agency Costs in Sites and Services Development: Simulation Results Due to Consumption Externalities, By Locality

<table>
<thead>
<tr>
<th>Locality A</th>
<th>Administrative Costs (in SM)</th>
<th>Lindahl Solution (g(M)) (in thousands)</th>
<th>Administrative Solution (g(M)) (in thousands)</th>
<th>Public/Constrained Costs (in SM)</th>
<th>Welfare Loss Due Consumption Inefficiencies (in SM)</th>
<th>Agency Costs (AC&quot;&quot;)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
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<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
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<tr>
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<td>190</td>
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<td>161.55</td>
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<table>
<thead>
<tr>
<th>Locality B</th>
<th>Administrative Costs (in SM)</th>
<th>Lindahl Solution (g(M)) (in thousands)</th>
<th>Administrative Solution (g(M)) (in thousands)</th>
<th>Public/Constrained Costs (in SM)</th>
<th>Welfare Loss Due Consumption Inefficiencies (in SM)</th>
<th>Agency Costs (AC&quot;&quot;)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
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<td>(3)</td>
<td>(4)</td>
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<td>(6)</td>
</tr>
<tr>
<td>0.4</td>
<td>71</td>
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<td>103.24</td>
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<tr>
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<td>74.67</td>
<td>8.3160</td>
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</tbody>
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(Parameter Values: \( \alpha_p^A = 6.00, \beta_p^A = .01, \alpha_r^A = 2.00 \)

\( \beta_r^A = .0063, \delta = 3.00, \sigma_i = .01, w = .15, r = .15 \)

\( \alpha_p^B = 2.87, \beta_p^B = .01, \alpha_r^B = 2.00, \beta_r^B = .0063, \)

\( Z_A = .40, t = .25, Z_B = .40, d = .25 \).

Notes: The minimum agency costs in self-help sites and services development for Localities A and B in this simulation exercise are $3.7676 M and $4.000 M, respectively (see column 6).
Table 5. Agency Costs in Self-Help Sites and Services Development: Simulation Results - SUMMARY

<table>
<thead>
<tr>
<th>Locality</th>
<th>Administrative Costs (in $W)</th>
<th>Welfare Loss due to Coordination Externalities</th>
<th>Agency Costs due to Coordination Externalities</th>
<th>Administrative Costs (in $W)</th>
<th>Welfare Loss due to Consumption Externalities</th>
<th>Agency Costs due to Consumption Externalities</th>
<th>Total Agency Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>3.6000</td>
<td>0.1676</td>
<td></td>
<td>2.0000</td>
<td></td>
<td></td>
<td>2.7144</td>
</tr>
<tr>
<td>B</td>
<td>0.1676</td>
<td>0.0000</td>
<td></td>
<td>0.0000</td>
<td></td>
<td></td>
<td>0.7144</td>
</tr>
<tr>
<td>Total</td>
<td>3.6000</td>
<td>0.1676</td>
<td></td>
<td>2.0000</td>
<td>0.1676</td>
<td>0.0000</td>
<td>7.7676</td>
</tr>
</tbody>
</table>
Figure 13
Agency Costs in Self-Help Sites and Services: Simulation Results Due To Coordination Externalities

Notes: As administrative costs are increased, the welfare loss mainly due to coordination externalities in self-help sites and services development declines. Agency cost is derived by vertically summing administrative costs and the residual welfare loss. At the point where the agency cost curve is at its lowest, agency cost is minimized.
Figure 14
Agency Costs In Self-Help Sites and Services: Simulation Results
Due to Consumption Externalities, LOCALITY A

Notes: As administrative costs are increased, the welfare loss mainly due to consumption externalities in sites and services development gradually declines. Agency cost here is derived by vertically summing administrative costs and the residual welfare loss in Locality A. At the point where the agency cost curve is at its lowest, agency cost is minimized.
Notes: As administrative costs are increased, the welfare loss mainly due to consumption externalities in sites and services development gradually declines. Agency cost here is derived by vertically summing administrative costs and the residual welfare loss in Locality B. At the point where the agency cost curve is at its lowest, agency cost is minimized.
4.4 LOW COST HOUSING STRATEGIES, AGENCY COSTS, AND THE COMPARATIVE INSTITUTIONAL FRAMEWORK: SIMULATION RESULTS

Using the comparative institutional framework introduced in Chapter 3, the simulation results for completely privatized housing voucher, centralized public housing, and self-help sites and services development strategies can now be analyzed.

For a privatized housing voucher strategy, the minimum agency cost was calculated to be $20.6 million; for centralized public housing, $13.6 million; and for self-help sites and services development, $10.4 million. Clearly, in this case, the self-help sites and services development strategy with the lowest minimum agency cost should be adopted. At this point, however, it must be emphasized that these results are valid only as long as the assumptions underlying the choice of the hypothetical parameter values used in the simulation remain descriptive of the environment where the low-income housing strategy is being prescribed. The next chapter will discuss how changes in the hypothetical parameter values currently assumed can affect the efficiency of low-income housing strategies.
Figure 16 presents a graphical summary of the results of the simulation exercises conducted in this chapter. The graph adopts the comparative institutional format used in a previous diagram presented in Figure 9 of Chapter 3.
Figure 16

Minimizing Agency Costs in Low-Income Housing: Plotting The Simulation Results of Various Strategies

Notes: $A_T^P$, $A_T^S$, $A_T^G$ represent the total agency costs in a privatized housing voucher, self-help sites and services development, and centralized strategies. $A_T^S$ and $A_T^S$ refer to agency costs in a self-help housing strategy due to consumption and coordination externalities respectively. In this hypothetical illustration, self-help housing will have the lowest total agency costs. Hence it is the efficient strategy to adopt in this environmental setting.

(Computed Values: $A_T^P = 0.0$; $A_T^P = 20.6$; $A_T^P = A_T^P + A_T^P = 20.6$; $A_T^S = 0.0$; $A_T^S = 13.4$; $A_T^G = A_T^G + A_T^G = 13.4$.)
CHAPTER 5

AGENCY COSTS AND THE CHOICE OF
LOW INCOME HOUSING STRATEGIES:

COMPARATIVE STATIC RESULTS

In Chapter 4, a mathematical model that allowed for the choice of efficient low-income housing strategies in a given environmental setting was presented. Specifically, for each type of low-income housing strategy, the determinants of the relevant administrative costs plus any residual welfare losses from the failure to capture both consumption and coordination externalities and to enforce the Lindahl solution were derived in order to define agency costs. Moreover, with the use of a computer-simulated approach, the computation and comparison of minimum agency costs, in a given environment, for each type of strategy was illustrated. Using the hypothetical parameter values initially assigned to the mathematical results obtained from the model, Chapter 4 also demonstrated why and how some developing countries should choose to adopt the self-help sites and services development strategy.

In this chapter, the comparative static results generated from carrying out a series of parametric variations on the basic model will be summarized. These comparative results will also be analyzed in the light of
documented patterns and trends in the choice of low-income housing strategies by developing countries.

Essentially, the hypothetical parameter values used in the comparative exercises conducted in this chapter were chosen to facilitate the clear exposition of some of the more significant determinants of low-income housing strategies. The ensuing sections of this chapter will summarize and analyze the impact of the following on the computed agency costs of the privatized housing voucher, self-help sites and services development, and centralized, conventional low-income housing strategies: (a) changes in the relative advantage of the government over the private sector and vice-versa in reducing welfare losses through administrative costs, (b) changes in the ability of the government to subsidize housing, and (c) changes in the demand for low-income housing.

5.1 AGENCY COSTS AND CHANGES IN THE RELATIVE ABILITY OF THE PRIVATE SECTOR TO REDUCE WELFARE LOSS

From the previous chapters, agency costs were seen as arising due to the need to reduce two types of welfare losses: \( W^a \), the welfare loss mainly due to coordination externalities and \( W^c \), the welfare loss mainly due to consumption externalities.
In Chapter 4, it was shown that \( W^e \) will result when there is a failure on the part of the private sector to fully capture the potential benefits from coordination and economies of scale. Graphically, this was indicated by the gap between the private solution, \( Q^p* \), and the Lindahl solution, \( Q^l* \). Under the privatized low-income housing voucher strategy, this gap caused by externalities could be reduced if investments in the appropriate administrative activities, \( M \), are undertaken. As \( M \) is increased, private demand for low-income housing \( D^p \) is gradually shifted until it reaches the total demand for housing \( D^r \). As this occurs, the private solution \( Q^p* \) slowly moves toward \( Q^l* \), and \( W^e \), the welfare loss mainly due to coordination externalities is consequently reduced. Agency costs, in this case, is defined as the sum of the administrative costs \( M \) to reduce the inefficiencies from the failure to capture the benefits from coordination externalities and economies of scale and the residual welfare losses at each level of \( M \) due to the failure to completely enforce the Lindahl solution.

Recall that in the mathematical model developed in Chapter 4, the ability of the private organization to capture most of the coordination externalities and economies of scale generated from low-income housing, under the privatized low-income housing voucher strategy, was
specified through an $h(M)$ function. Then to find $Q^{M^*}$, the varying solutions constrained by different levels of administrative costs $M$, a demand for housing written as a function of $M$ was introduced:

$$D^h = D^p + h(M) [D^r - D^p] \text{ where } 0 \leq h(M) \leq 1; h' > 0$$

such that when administrative costs, $M$, was zero, $h(M)$ was also zero. In this case, $D^h$ reduced to $D^p$ and production is at $Q^{p^*}$. When $M$ was at some maximum point, on the other hand, $h(M)$ became equal to one and $D^h$ became equivalent to $D^r$. This in turn produced the Lindahl solution, $Q^{L^*}$.

The $h(M)$ function in (1) was further specified and was assumed to be linear of the form

$$h(M) = vM.$$ 

In the initial computer-simulated exercise conducted in Chapter 4, the hypothetical values assigned to $v$ in (2) reflected the ability of the private voluntary organization to reduce the inefficiencies mainly from the coordination externalities generated in the production of housing. The higher the values assigned to $v$, the greater the ability of the private organization to incorporate externalities into the private demand for housing through increasing levels of administrative costs. And the greater the ability of the private organization to capture these externalities and
economies of scale and incorporate them into the private demand for housing, the greater the reduction in welfare losses. Consequently, this led to lower minimum agency costs computed for the privatized housing voucher strategy. Hence, as the values assigned to v increase, holding other things constant, one would expect the privatized housing voucher strategy to dominate as the most efficient low-income housing strategy that should be adopted.

Table 6 confirms this to be the case when increasing values are assigned to v. At very low values of v, holding the other parameter values used in Chapter 4 constant, the self-help sites and services development strategy appears to be the most efficient to adopt. But as v increases from .05 to .10, the minimum agency cost computed for the privatized housing voucher strategy becomes lower than the computed minimum agency costs for self-help sites and services development. Thus as v increases, the

40 As shown in Chapter 4, the derivation of the minimum agency costs for self-help sites and services development involved the definition of a \( j(M') \) function. The \( j(M') \) functions reflected the ability of combined efforts by the private and the public sectors to reduce inefficiencies from consumption and coordination externalities. In the basic model presented in Chapter 4, it was assumed that \( s \) in the \( j(M') \) function for the sites and services strategy is greater than \( v \) in the \( h(M) \) function in the privatized housing voucher strategy. Since the government has coercive powers to deal with coordination externalities more efficiently and to tax indirect beneficiaries to partly subsidize the gap between private production and the Lindahl solution, this assumption that \( s \) is greater than \( v \) by some fixed proportion is
Table 6. Changes in The Private Organization's Ability To Reduce Welfare Losses (v) and the Choice of Low-Income Housing Strategies

<table>
<thead>
<tr>
<th>Parametric Variations in v</th>
<th>Minimum Agency Costs (In SM)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Privatized Housing</td>
</tr>
<tr>
<td>.00</td>
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</tr>
<tr>
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</tr>
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<tr>
<td>.80</td>
<td>1.24*</td>
</tr>
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</table>

(Parameter Values: Same as those listed below Tables 1, 2, and 4 in Chapter 4 except for the parametric variations in v as indicated in this table.)

Notes: Using the comparative institutional framework, figures marked with asterisks represent the minimum agency cost of the most efficient low-income housing strategy. At low levels of v, i.e., when the private organization has limited ability in capturing the benefits from coordination and economies of scale, self-help sites and services development is the efficient strategy yielding the lowest minimum agency costs. As v is increased to .10 and above, the privatized housing voucher strategy starts to generate the lowest minimum agency costs allowing this strategy to become the efficient choice.

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maintained for the purpose of the comparative static exercises in this Chapter.
privatized housing voucher strategy becomes more efficient than the self-help sites and services development strategy. Graphically, this switching phenomenon is illustrated in Figure 17. At any value of v, what should be chosen as the most efficient low-income housing strategy to adopt should be the strategy that yields the lowest minimum agency cost. Obviously, in this case, as v is increased and the private sector becomes highly effective at reducing inefficiencies mainly from coordination externalities through administrative activities, the privatized housing voucher strategy minimizes agency costs and becomes the most efficient.

5.2 AGENCY COSTS AND CHANGES IN THE RELATIVE ABILITY OF THE GOVERNMENT TO REDUCE WELFARE LOSS

So far, this discussion has focused on changes in the relative ability of the private voluntary organization to reduce welfare losses mainly due to coordination externalities. But for a clearer exposition of the dynamics involved in the choice of efficient low-income housing strategies, changes in the relative ability of the central government to reduce welfare losses from consumption inefficiencies should also be considered. In the previous chapters, \( w^p \), the welfare loss mainly due to inefficiencies from consumption externalities was shown to be the result of the central government's inability to
Figure 17
Effects of Changes In The Private Sector's
Ability To Reduce Welfare Loss On The
Choice of Low-Income Housing Strategies

Notes: This graphically confirms the results summarized in Table 7. At low levels of v, i.e., when the private voluntary organization tasked with the administration of a privatized housing voucher strategy is fairly limited in its ability to reduce the inefficiencies from both consumption and coordination externalities, the sites and services development strategy yields the lowest minimum agency costs and should be chosen as the efficient low-income housing strategy. However, as v is increased, a switch occurs from sites and services development to the privatized low-income housing voucher strategy as the efficient strategy.
accurately ascertain the housing needs and preferences of specific subsets in the economy. In general, it has been shown that central governments have the tendency to provide low-income housing uniformly thus failing to implement the Lindahl equilibrium solutions in specific localities. This uniform provision by the government result in the overprovision or underprovision of housing that does not take into account the consumption externalities in specific localities. This overprovision or underprovision, in turn, generated welfare losses.

However, the central government can still reduce these welfare losses by investing in administrative costs, \( M' \), that essentially attempt to inquire into the true nature of the demand for housing in each locality. As \( M' \) is increased, the central government is able to understand more accurately the housing needs and preferences in each locality; the government's perceived level of demand for housing in each locality, \( D^G_i \), gradually shifts until it reaches the total demand for housing in each locality, \( D'^i \). As these occur, consumption externalities are gradually incorporated in the low-income housing production process while \( Q^G_i \), moves toward \( Q'^i \). For a centralized public housing strategy, agency costs are then defined as the sum of the administrative costs \( M' \) and the residual welfare losses at each level of \( M' \).
In Chapter 4, the ability of the government to inquire through administrative activities into the true nature of the demand for housing in each locality, in centralized public housing strategy, was mathematically specified through the $g(M')$ and the $k(M')$ functions. Recall that to find $Q^M_A$, the varying solutions constrained by differing levels of administrative costs in Locality A, a demand for housing defined as a function of administrative costs $M'$ was introduced:

\[ DJ_A^D - D^G + g(M') [ D_A^T - D^G ] \text{ where } 0 \leq g(M') \leq 1; g > 0, \]

such that when $M'$ was zero, the $g(M')$ function was also zero. This meant that when $D_A^{M''}$ was equal to $D^G$, the underprovision which was assumed for Locality A was not being corrected. This contributed substantially to welfare losses. However, as $M'$ increased, $D_A^{M''}$ slowly approached $D_A^T$ as $g(M')$ neared one. Therefore as $M'$ increased, the underprovision of housing in Locality A was gradually eliminated. This also resulted in the gradual elimination of $W^A$, the welfare loss in Locality A due to the inefficiencies of the central government in incorporating consumption externalities.

For Locality B which was an illustration of the case of overprovision in housing, the specification of the $k(M')$ function took on a slightly different form. Recall that to
find $Q_{B}^{M'}$, the varying solutions constrained by administrative costs in Locality B, a demand for housing written as a function of $M'$ was specified as follows:

\[
D'^B - D'^G - k(M') \left[ D'^G - D'^T \right] \quad \text{where } 0 \leq k(M') \leq 1 ; \quad k' > 0.
\]

Thus when $M'$ in (5) was assigned a value of zero, the $k(M')$ function became zero. $D'^B_B$ became equal to $D'^G$, the overprovision which was assumed for Locality B was not corrected. This generated considerable welfare losses. But as $M'$ increased, $D'^B_B$ was gradually reduced to $D'^T_B$ as $k(M')$ approached one. Hence, as $M'$ increased, the overprovision of housing in Locality B was slowly corrected resulting in the gradual elimination of $W'^B$, the welfare loss in Locality B due to the inefficiencies of the central government in dealing mainly with consumption externalities.

For the simulation exercises conducted, to demonstrate the computation of agency costs under a centralized public housing strategy, the $g(M')$ and the $k(M')$ functions were assumed to be linear of the forms

\[
(6) \quad g(M') = wM',
\]

and

\[
(7) \quad k(M') = rM'.
\]
Furthermore, for simplicity w and r were assumed to be equal, that is, the rate by which the government can effectively translate the administrative activities M' into a more accurate perception of the nature of the housing needs and preferences in each locality were assumed to be equal.

The hypothetical values assigned to w and r are therefore reflective of the ability of the central or national government to shift \( D^g \) toward \( D^f_A \) or \( D^f_B \), consequently, narrowing the gap between \( Q^g \) and \( Q^*_A \) or \( Q^*_B \). Hence, the higher the values assigned to w and r, the greater the government's ability to deal mainly with consumption externalities thus reducing welfare losses. Consequently, as the values assigned w and r continue to increase, holding the values of the other parameters constant, the expectation would be for centralized public housing strategy to yield the lowest minimum agency costs. This makes it the most efficient low-income housing strategy to adopt.

Table 7 confirms that when increasing values are assigned to w and r, the centralized public housing strategy emerges as the most efficient low-income housing strategy. For very low values of w and r, holding the other parameter values constant, the privatized housing voucher or self-help sites and services development
Table 7. Changes in the Government's Ability to Reduce Welfare Losses and The Choice of Low-Income Housing Strategies

<table>
<thead>
<tr>
<th>Parametric Variations</th>
<th>MINIMUM AGENCY COSTS (in $M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>In w, r</td>
<td>Privatized Housing</td>
</tr>
<tr>
<td></td>
<td>Centralized Housing</td>
</tr>
<tr>
<td></td>
<td>Self-Help Housing</td>
</tr>
<tr>
<td>.05</td>
<td>20.6*</td>
</tr>
<tr>
<td>.10</td>
<td>20.6</td>
</tr>
<tr>
<td>.15</td>
<td>20.6</td>
</tr>
<tr>
<td>.20</td>
<td>20.6</td>
</tr>
<tr>
<td>.30</td>
<td>20.6</td>
</tr>
<tr>
<td>.40</td>
<td>20.6</td>
</tr>
<tr>
<td>.50</td>
<td>20.6</td>
</tr>
<tr>
<td>.60</td>
<td>20.6</td>
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<td>.70</td>
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<tr>
<td>.80</td>
<td>20.6</td>
</tr>
<tr>
<td>.90</td>
<td>20.6</td>
</tr>
</tbody>
</table>

*(Parameter values: Same as those listed in Tables 1, 2, and 4 in Chapter 4 except for the indicated parametric variations in w and r in this table.)

Notes: Figures with asterisks represent the lowest minimum agency cost indicating the most viable low-income housing strategy, using the comparative institutional approach. Parameter values w and r refer to the ability of the central government to reduce welfare losses mainly from consumption externalities in Localities A and B, respectively, by investing in the appropriate administrative activities. For the purpose of these comparative static exercises, w and r assumed to be equal. At very low values of w and r, the privatized housing voucher strategy generates the lowest minimum agency cost, hence it will be the most efficient. At moderate values of w and r, self-help sites and services development strategy becomes the most efficient. At very high values of w and r, centralized housing results in the lowest minimum agency cost, thus, proving to be the most efficient.
dominates the centralized public housing strategy. However, when \( w \) and \( r \) increase from 0.05 to 0.10, the most efficient strategy switches from privatized housing voucher to self-help sites and services development. In other words, if the government is relatively unable to reduce welfare losses due to consumption externalities despite the administrative costs incurred, the private sector on its own will be more efficient at producing low-income housing. The privatized housing voucher strategy will thus result in the lowest minimum agency costs. Nonetheless, as the government starts building its capability to reduce welfare losses from consumption externalities, it becomes more efficient for them to join the private sector in producing low-income housing. Hence, for values of \( w \) and \( r \) ranging from 0.10 to 0.30, self-help sites and services, where the efforts of both the private and public sectors are combined in some proportion, begins to generate the lowest minimum agency cost.\(^41\)

\(^{41}\)In Chapter 4, the derivation of the minimum agency costs for self-help housing also involved the definition of the \( f(M^0) \) and the \( k(M^0) \) functions. These functions reflect the combined abilities of the private sector and the government to determine more accurately the specific housing needs and preferences of the constituents in each locality. Since the private sector has the inherent ability to obtain these information, the assumption in Chapter 4 that \( t \) and \( d \) in the \( f(M^0) \) and the \( k(M^0) \) functions, respectively, are greater than \( w \) and \( r \) in the \( g(M') \) and the \( k(M') \) functions, has likewise been maintained for the purpose of these comparative static exercises.
But as $w$ and $r$ increase further from .30 to .40, another switch from self-help sites and services development to centralized public housing as the most efficient strategy occurs. From here on, increasing the value of $w$ or $r$ simply confirms that if the government is highly efficient at reducing welfare losses due to consumption externalities, it will be better off on its own at producing the low-income housing. Figure 18 graphically demonstrates the switching from the privatized strategy to self-help sites and services development then to the centralized public housing again as the most efficient low-income housing strategy while $w$ and $r$ are increased.

Finally, for a comprehensive analysis of the impact of the changes in the relative abilities of the government and the private sector to reduce welfare losses on the minimum agency costs and consequently, on the choice of the most efficient low-income housing strategy, a series of parametric variations on $w$ and $r$ holding $v$ constant; and on $v$, holding $w$ constant, were conducted.

Figure 19 summarizes the results of these parametric variations; it illustrates the partitioning of the relative ability to reduce welfare loss space according to the low-income housing strategy that prevails for the parameter values of $v$, $w$ and $r$ indicated.
Notes: This graph demonstrates the switching that occurs from the privatized housing voucher strategy to sites and services development then centralized public housing as the government become more adept at implementing the appropriate administrative activities to reduce the inefficiencies caused mainly by consumption externalities. At low values of w and r which represent the government's ability to reduce welfare losses from consumption externalities, privatized housing voucher is the most efficient when it generates the lowest minimum agency cost. At moderate values of w and r, a switch to sites and services development occurs. Finally, at very high values of w and r, centralized public housing emerges as the most efficient strategy.
Figure 19
Fragmentation of Relative Ability of Private Sector/Government To Reduce Welfare Loss Parameters Space
According To The Most Efficient Low-Income Housing Strategy

Notes: This graph illustrates the partitioning of the relative ability to reduce welfare loss space according to the low-income housing strategy that prevails for the parameter values of v, w, and r indicated. For low values of w, v, and r; i.e., both the private sector and the government are relatively inefficient at coping with consumption and coordination externalities, the privatized housing voucher strategy should be chosen. For moderate values of w and r; i.e., the central government is relatively efficient at coping with the inefficiencies generated by the externalities caused by low-income housing, sites and services development results in the lowest minimum agency cost. Lastly, for high values of w and r, given even moderate values of v, centralized housing becomes the most efficient strategy.
For low values of \( v \) and \( w \), i.e., when both the government and the private sector are inefficient at coping with consumption and coordination externalities, the privatized housing voucher strategy will be the most efficient. This sheds light on the experience of the Philippine national government during its early stages of implementing self-help sites and services development projects. With very limited exposure and understanding of the real housing needs and preferences of the low-income families squatting and living in slum areas in the Metro Manila Area, its biggest and most populated urban center, the government in the 1960s up to the early 1970s embarked heavily on a program of slum clearance and relocation. Slum areas were cleared and squatters relocated to government resettlement projects. But these low-income families, although provided with individual plots, security of tenure and basic physical amenities, ended up abandoning the resettlement areas. The government, in its haste to contain the growth of slums and squatter settlements in the cities, failed to recognize one crucial aspect of the effective demand for low-income housing: that the project site must be near or accessible to employment centers.

In Grimes (1976), the Sapang Palay Resettlement Project in the Philippines is cited as an example of how early self-help sites and services projects in developing
countries failed. Sapang Palay was located more than seventy miles from the nearest urban center. Families which were resettled to Sapang Palay found themselves far from the urban center; worse, they encountered formidable access problems in commuting to and from their jobs in the city to their new homes. Among those who opted to work nearer their new dwellings, only a handful were offered jobs. The predictable result of all these was that 40% of the original resettled population returned a year and a half later to squat in Metro Manila. Clearly, in this case, self-help housing as an approach to the low-income housing problem was not sustainable. 42

At very low values of r and w, i.e., when the government and the private sector are very inefficient at coping with consumption and coordination externalities, Figure 19 also shows that the centralized public housing strategy will not be efficient. This explains, in part, why in developing countries like the Philippines and Thailand, the earlier attempts to provide low-income housing

42Choosing lands too far from the jobs and services naturally provided by the city was the most common pitfall among governments implementing resettlement programs (Yeh and Laquian, 1979). In the Philippines, the Sapang Palay was not an isolated case. Other major resettlement projects launched by the government and which suffered from the same drawback were the Carmona Resettlement Project, San Pedro Resettlement Project, and to a lesser extent the Dasmarinas Bagong Bayan (Dasmarinas New Town) Project.
through traditional and fully-built houses could not be launched on a massive scale. Traditional and fully-built houses were based on architectural and engineering standards that were excessively high compared to the actual needs and affordability levels of the low-income families. These standards unnecessarily inflated the costs of housing and rendered the constructed units unaffordable to the targeted beneficiaries. Oftentimes, the accommodations were eventually occupied by middle-income families.\(^4\) Hence, again, the lack of understanding on the part of the government about the need to design and implement housing projects based on the affordable limits of the targeted beneficiaries made centralized public housing the less efficient approach.

Figure 19 can also be used to explain the increasing popularity of self-help housing among developing countries in recent years. Williams (1984) cite that the World Bank, which typically funded approximately 45% of self-help housing projects in developing countries, since it made its first loan for an urban shelter project in 1972, has subsequently approved at least 50 bank loans to about 35 countries. The total amount lent by the World Bank for

\(^4\)For a discussion of excessively high architectural and engineering standards and their impact on the cost of providing low-income housing, see Swan, Wegelin and Panchee (1983) and Rodwin and Sanyal (1987).
shelter projects from 1972 to 1981 has been estimated at US$1200 million with an average loan amount of about US$ 31 million per project. This obviously demonstrates the growing support for self-help housing as a low-income housing strategy.

For moderate values of \( r \) and \( w \), i.e., when the government and the private sector becomes relatively efficient at dealing with the inefficiencies posed by both consumption and coordination externalities self-help sites and services development, will in fact emerge as the most efficient strategy to adopt. Earlier, it has been discussed that governments initially embarking on sites and services housing projects and which did not fully understand the nature of the demand for low-income housing usually met with failures. But as Yeh and Laquian (1979) observed, many countries simply persisted and learned from their failures. Thus, as specific problems were identified, partial solutions were formulated. With all the innovations that resulted, many governments learned the hard way that community participation in the planning and implementation process is the key element to the sustainable provision of low-income housing. With this
realization, governments found their self-help housing projects becoming more feasible and popular.\textsuperscript{44}

In the Philippines, lessons learned from the initial experience of upgrading Tondo Foreshore, once described as the biggest squatter colony in Asia, were documented and integrated into the planning and implementation of subsequent self-help housing projects.\textsuperscript{45} Table 8 confirms how this process of capturing the lessons from previous experiences has made self-help housing more acceptable as a low-income housing strategy in the Philippines. From 1976-86, during the first ten years of operation of the National Housing Authority which is the prime government agency tasked with planning and implementing low-income housing projects, a total of 150,154 housing units were produced. Of these, 66\% were serviced plots from sites and services projects and 29\% were upgraded homelots.\textsuperscript{46}


\textsuperscript{45}See, for example, Reforma (1983).

\textsuperscript{46}The housing production by the National Housing Authority of the Philippines should be distinguished from the housing production of other government units that used to operate under the now defunct Ministry of Human Settlements (MHS). NHA's projects directly cater to low-income groups; i.e., they are referred to as social housing; the rest of the housing production through MHS catered mainly to middle-income groups; i.e., they are referred to as economic housing.
# Low-Income Housing Production in the Philippines: 1976 - 1986

## Table 8. Housing Production (in units)

<table>
<thead>
<tr>
<th>Housing Strategy</th>
<th>76 - 78</th>
<th>79 - 81</th>
<th>82 - 84</th>
<th>85 - 86</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public Housing/Construction of New Units</td>
<td>1,252</td>
<td>3,507</td>
<td>2,778</td>
<td>371</td>
<td>7,908</td>
</tr>
<tr>
<td>% TO TOTAL</td>
<td>8.4</td>
<td>6.9</td>
<td>5.1</td>
<td>1.2</td>
<td>5.2</td>
</tr>
<tr>
<td>Slum Upgrading</td>
<td>2,427</td>
<td>18,696</td>
<td>16,956</td>
<td>5,335</td>
<td>43,214</td>
</tr>
<tr>
<td>% TO TOTAL</td>
<td>16.3</td>
<td>36.7</td>
<td>31.4</td>
<td>17.3</td>
<td>28.8</td>
</tr>
<tr>
<td>Sites and Services</td>
<td>11,207</td>
<td>28,374</td>
<td>34,305</td>
<td>25,146</td>
<td>99,032</td>
</tr>
<tr>
<td>% TO TOTAL</td>
<td>75.3</td>
<td>56.4</td>
<td>63.5</td>
<td>81.5</td>
<td>66.0</td>
</tr>
<tr>
<td>TOTAL</td>
<td>14,886</td>
<td>50,377</td>
<td>54,039</td>
<td>30,852</td>
<td>150,154</td>
</tr>
</tbody>
</table>

Source: National Housing Authority, PRIMER.
Lastly, Figure 19 indicates that for very high values of \( w, r \) and for moderate values of \( v \), i.e., when the national governments become capable at reducing inefficiencies caused by both consumption and coordination externalities, centralized housing will prevail as the most efficient low-income housing strategy. This now explains the much publicized success of Singapore in implementing a centralized public housing approach to its low-income housing problem. Table 9 shows that in Singapore, the government has been responsible for providing housing to the overwhelming majority of the population; the private sector has concentrated its efforts on catering to the housing needs of the upper income groups. Of the total number of residential buildings completed during the period 1966-1972, Table 10 reveals that the government has been responsible for over 86 per cent of the constructed units. This trend apparently has persisted through the 1980s since Singapore, along with Hong Kong, continue to be cited as the most notable exemptions to government failures in solving the low-income housing problem (Grimes, 1976; Yeh and Laquian, 1979; Swan, et. al., 1983; Payne, 1984).

In analyzing the experience of Singapore, Yeh and Laquian (1979) emphasized the importance of considerable "technical know-how" in the public sector. The efficiency
### Table 9. Residential Buildings Completed in Singapore: 1966-1972

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Public Sector</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flats</td>
<td>23,650</td>
<td>26,189</td>
<td>30,115</td>
<td>22,574</td>
<td>102,528</td>
</tr>
<tr>
<td>Shophouses</td>
<td>792</td>
<td>796</td>
<td>779</td>
<td>356</td>
<td>2,723</td>
</tr>
<tr>
<td>Others</td>
<td>159</td>
<td>289</td>
<td>20</td>
<td>8</td>
<td>476</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>24,601</td>
<td>27,274</td>
<td>30,914</td>
<td>22,938</td>
<td>105,727</td>
</tr>
<tr>
<td>% TO TOTAL</td>
<td>80.2</td>
<td>84.3</td>
<td>90.2</td>
<td>93.3</td>
<td>86.7</td>
</tr>
<tr>
<td><strong>Private Sector</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bungalows</td>
<td>437</td>
<td>292</td>
<td>397</td>
<td>279</td>
<td></td>
</tr>
<tr>
<td>Semi-Detached</td>
<td>1,844</td>
<td>1,531</td>
<td>575</td>
<td>428</td>
<td></td>
</tr>
<tr>
<td>Terrace</td>
<td>1,749</td>
<td>1,791</td>
<td>1,266</td>
<td>337</td>
<td></td>
</tr>
<tr>
<td>Flats</td>
<td>1,993</td>
<td>1,465</td>
<td>1,073</td>
<td>597</td>
<td></td>
</tr>
<tr>
<td>Shophouses</td>
<td>45</td>
<td>-</td>
<td>27</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>6</td>
<td>8</td>
<td>3</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>6,074</td>
<td>5,087</td>
<td>3,341</td>
<td>1,642</td>
<td>16,144</td>
</tr>
<tr>
<td>% TO TOTAL</td>
<td>19.8</td>
<td>15.7</td>
<td>9.8</td>
<td>6.7</td>
<td>13.3</td>
</tr>
<tr>
<td><strong>TOTAL NUMBER OF UNITS</strong></td>
<td>30,675</td>
<td>32,361</td>
<td>34,255</td>
<td>24,580</td>
<td>121,871</td>
</tr>
</tbody>
</table>

and expertise of the Housing and Development Board (HDB) in Singapore reflect the substantial amount of resources that has been allocated to the housing sector in order to upgrade HDB's public employees from colonial administrators to development administrators. Housing officials in Singapore adhere to the belief that sufficient land and funding alone could not guarantee success. Wide ranging expertise and effective administration in housing institutions were also seen as critical ingredients to the successful implementation of centralized public housing.

5.3 AGENCY COSTS AND CHARGES IN THE ABILITY OF THE GOVERNMENT TO SUBSIDIZE HOUSING

From the foregoing section, it is quite evident that considerable financial resources should be available to the government to make centralized public housing an efficient low-income housing strategy. Not only should the resources be available to allow the heavier subsidy required to construct fully-built housing units, the resources should likewise be allocated to train and maintain the quality of the government personnel responsible for the projects. These resources, unfortunately, are oftentimes severely limited.\footnote{Hong Kong and Singapore's notable sources in public housing are often dismissed as irrelevant to other countries precisely for this reason. But clearly, there are still some valuable lessons that could be learned from the higher}
choice of efficient low-income housing strategies, when from the onset, financial constraints on the part of the government render centralized public housing infeasible?

Tables 10-13 present the results of the comparative static exercises conducted to address the question of what happens to the choice low-income housing strategies when governments find themselves financially constrained. Table 10 shows that when the proportion of government subsidy is reduced, the minimum agency cost computed for self-help sites and services development increases, assuming that the parameter values assigned in Chapter 4 are held constant. This is due to the fact that when the government subsidy is reduced, the welfare losses due to externalities increase, and this more than offsets the benefits gained from coordination and economies of scale. As the government's ability to reduce welfare losses due to consumption externalities represented by w in the model, is increased however, Table 11 indicates that the minimum agency costs computed for self-help sites and services development decrease thus making it the more efficient low-income housing strategy.

systematized way by which these two countries have upgraded their government's managerial skills and expertise in low-income housing.
Table 10. Effects of Changes in the Ability of the Government to Subsidize Housing: Simulation Results at \( v = .02; w = .15 \)

<table>
<thead>
<tr>
<th>Parametric Variations in ( \phi )</th>
<th>Privatized Housing Costs (in SM)</th>
<th>Self-Help Housing Costs (in SM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>.00</td>
<td>20.57</td>
<td>10.56</td>
</tr>
<tr>
<td>.10</td>
<td>10.57</td>
<td>10.57</td>
</tr>
<tr>
<td>.20</td>
<td>10.60</td>
<td>10.48</td>
</tr>
<tr>
<td>.30</td>
<td>10.25</td>
<td>9.84</td>
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<tr>
<td>.40</td>
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<td>9.05</td>
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<tr>
<td>.50</td>
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<td>8.43</td>
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<td>.60</td>
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<td>8.11</td>
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<tr>
<td>.80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>.90</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Parameter values: \( v = .02; w = .15 \); the rest of the values are the same as listed earlier in Chapter 4 except for indicated parametric variations in \( \phi \).

Notes: For low values of \( v \) and \( w \), i.e., when the government and the private sector are fairly inefficient at reducing the inefficiencies caused by both consumption and coordination externalities, as the government's ability to subsidize low-income housing increases, the minimum agency costs computed for sites and services development declines. The minimum agency cost for a privatized housing voucher remains constant. Sites and services development dominates the privatized housing voucher as the most efficient low-income housing strategy.
Table 11. Effects of Changes in the Ability of the Government To Subsidize Housing: Simulation Results at $v = .02; w = .40$

<table>
<thead>
<tr>
<th>Parametric Variations In $\phi$</th>
<th>MINIMUM AGENCY COSTS (in $\text{SW}$)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Privatized Housing</td>
</tr>
<tr>
<td>.00</td>
<td>20.57</td>
</tr>
<tr>
<td>.10</td>
<td>5.92</td>
</tr>
<tr>
<td>.20</td>
<td>5.71</td>
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<tr>
<td>.30</td>
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<tr>
<td>.40</td>
<td>3.48</td>
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<tr>
<td>.50</td>
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<tr>
<td>.60</td>
<td></td>
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<tr>
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<tr>
<td>.80</td>
<td></td>
</tr>
<tr>
<td>.90</td>
<td></td>
</tr>
</tbody>
</table>

Parameter values: $v = .02; w = .40$; the rest of the values are the same as those listed in Chapter 4 except for the parametric variations in $\phi$ indicated in this table.

Notes: For low values of $v$ and moderate values of $w$, i.e., when the government is relatively more efficient than the private sector at reducing the inefficiencies due to consumption and coordination externalities, as the government's ability to subsidize increases, the minimum agency costs computed for sites and services development declines even further. The minimum agency computed for a privatized housing voucher remains constant. Sites and services development still dominates the privatized housing voucher as the more efficient low-income housing strategy.
These results can be used to explain why many developing countries which resorted to self-help sites and services development in the 1970s primarily as a result of budgetary constraints initially found themselves unable to produce serviced homelots at the pace warranted by the growth of demand for low-income housing. Without sufficient knowledge and experience in planning and implementing these types of self-help housing projects, many governments understandably and predictably encountered difficulties.

In India, Sundaram (1987) wrote of the many impediments that prevented poor families from acquiring affordable shelter. Public agencies have just started to realize the importance of security of tenure in shelter programs for the poor, be they serviced sites or improved slums. In addition, technical standards relating to land use, floor space, and other specifications of the house had to be reduced to bring down the cost of the housing units to within the affordable limits of the low-income families. The land policy in India has also led to unintended consequences of freezing large tracts of vacant land and the curtailment of authorized private activity, and of driving the poor to squat illegally or live in overcrowded conditions or in areas far from their place of work. Clearly, to be able to confront the growing magnitude of
the low-income housing problem in India given the budgetary constraints, the public sector had to develop the capability to plan and implement self-help housing projects much more efficiently. Tables 12-13 summarize the results of the comparative static exercises conducted by varying the proportion of government subsidy $\phi$ as $v$, the private sector's ability to reduce welfare losses due to coordination externalities, was increased. In Table 13, the effects of changes in the ability of the government to subsidize housing, assuming that $v$, the private sector's ability to reduce externalities, is .20 and $w$, the government's ability to reduce inefficiencies from consumption externalities, is .15, are presented. What becomes evident from the figures shown is that when the private sector's ability to capture externalities and consequently, its ability to reduce welfare losses due to externalities increase, the privatized housing voucher strategy becomes the most efficient low-income housing strategy. This, of course, assumes that the government's ability to reduce inefficiencies from consumption externalities remains low.

In Table 13, while $v$ is held constant at .20, $w$ is increased to .40. Under this setting, the results demonstrate that self-help sites and services development
Table 12. Effects of Changes in The Ability of the Government To Subsidize Housing: Simulation Results at $v = .20; w = .15$

<table>
<thead>
<tr>
<th>Parametric Variations in $\phi$</th>
<th>MINIMUM AGENCY COSTS (in $\text{M}$)</th>
<th>Privatized Housing</th>
<th>Self-Help Housing</th>
</tr>
</thead>
<tbody>
<tr>
<td>.00</td>
<td>5.0</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>.60</td>
<td></td>
<td>8.20</td>
<td></td>
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<tr>
<td>.70</td>
<td></td>
<td>8.21</td>
<td></td>
</tr>
<tr>
<td>.80</td>
<td></td>
<td>8.22</td>
<td></td>
</tr>
<tr>
<td>.90</td>
<td></td>
<td>8.11</td>
<td></td>
</tr>
</tbody>
</table>

(Parametric Values: $v = .20; w = .15$; the rest of the values are the same as those listed in Chapter 4 except for the parametric variations in $\phi$ indicated in this table).

Notes: For moderate values of $v$ and low values of $w$, i.e., when the private sector is relatively more efficient than the government at reducing externalities, as the government's ability to subsidize increases, the minimum agency costs computed for sites and services development increases. The minimum agency costs computed for a privatized housing voucher remains constant but dominates the sites and services development strategy as the more efficient approach to low-income housing.
Table 13. Effects of Changes In The Ability of the Government To Subsidize Housing:
Simulation Results at $v = .20; \mu = .40$

<table>
<thead>
<tr>
<th>Parametric Variations in $\phi$</th>
<th>MINIMUM AGENCY COSTS (in $\text{SH}$)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Privatized Housing</td>
</tr>
<tr>
<td>.00</td>
<td>5.00</td>
</tr>
<tr>
<td>.10</td>
<td></td>
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<tr>
<td>.20</td>
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<tr>
<td>.80</td>
<td></td>
</tr>
<tr>
<td>.90</td>
<td></td>
</tr>
</tbody>
</table>

(Parameter values: $v = .20; \mu = .40$; the rest of the values are the same as those listed in Chapter 4 except for the parametric variations in $\phi$ indicated in this table.)

Notes: For moderate values of $v$ and $\mu$, i.e., when both the private sector and the government become relatively efficient at reducing inefficiencies caused by consumption and coordination externalities, as the government's ability to subsidize increases, the minimum agency costs computed for sites and services development decreases. On the other hand, the minimum agency costs computed for a privatized housing voucher remains constant. This allows the sites and services development strategy to dominate privatized housing as the more efficient approach to low-income housing.
projects that operate on lesser government subsidy tend to become more efficient. Thus, when the private sector's ability to reduce welfare losses due to coordination externalities is improved and the government's ability to reduce welfare losses due to consumption externalities is increased, self-help housing that relies on lower government subsidy becomes the more efficient low-income housing strategy.

These results help explain the relative success with which the Philippine government has been able to launch its Community Mortgage Program since 1988. Reeling from the impact of acute budgetary constraints stemming from the severely deteriorated economic and political conditions of the country since 1983, the National Housing Authority found itself unable to finance and/or subsidize the production of serviced home lots to meet the growing demand for low-income housing in the Philippines. By this time, however, the National Housing Authority has developed a creditable track record in planning and implementing self-help housing projects. The government in a strategic move then resorted to providing technical assistance to private landowners and tenants of blighted areas in packaging their loan proposal for submission to the National Home Mortgage Finance Corporation's Community Mortgage Program. Under the newly introduced Community
Mortgage Program, the tenants and landowners were provided with secured financing at low interest rates to allow them to subdivide the land where they lived and consequently improve or construct their houses in accordance with their own tastes and preferences at sites/locations approved by the government. Hence, in this case, through the National Housing Authority with its increased ability to plan and implement self-help housing projects and the National Home Mortgage Financial Corporation which provided the private sector with interest subsidies and other forms of incentives, the Philippine government, under acute budgetary constraints, continued to be able to cope the problem of housing the low-income families. Currently, the National Housing Authority is assisting in the technical packaging for at least 46 low-income housing projects requiring financing from the Community Mortgage Program.

5.4 AGENCY COSTS AND CHANGES IN THE DEMAND FOR HOUSING

Earlier, in Chapter 2, the factors influencing the demand for housing were defined and discussed. The effective demand for housing derived from each household's willingness to pay for housing was described, in static terms, as a function of income levels and the price of housing and other goods. However, over time, demand was also determined by increases in family income, changes in
the distribution of income, and the rate of household formation, which in turn depended upon population growth, urbanization patterns, and the size of the households.

Over the years, urban residential housing markets, particularly in developing countries, have had to confront the problems posed by continuing shifts in the demand for housing which frequently outstripped the changes in the supply of housing. Without the appropriate and adequate response from the private sector and the government, more families than necessary found themselves unable to afford suitable housing: the result has been the proliferation of slums and squatters in these countries. In the face of large increases in the formation of urban households and the progression and changing distribution of income among these households, how then should the choice of an efficient low-income housing strategy be conducted?

Tables 14-15 summarize the results of the comparative static exercises conducted in this study to focus on how changes in the demand for low-income housing can affect the efficiency of the privatized housing voucher, centralized public housing, and self-help sites and services development strategies. Table 14, for instance, shows that when the demand for housing shifts as demonstrated by increases in \( \alpha_p \), the minimum agency costs computed for both the privatized housing voucher and self-help sites and services
Table 14. Effects of Changes In The Demand for Housing:
Simulation Results at $v = .02; w = .15$

<table>
<thead>
<tr>
<th>Parametric Variations in $q_p$</th>
<th>Privatized Housing</th>
<th>Centralized Housing</th>
<th>Self-Help Housing</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.5</td>
<td>23.88</td>
<td>13.17</td>
<td>10.49*</td>
</tr>
<tr>
<td>12.5</td>
<td>22.19</td>
<td>13.31</td>
<td>10.50*</td>
</tr>
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<td>13.5</td>
<td>20.57</td>
<td>13.46</td>
<td>10.48*</td>
</tr>
<tr>
<td>14.5</td>
<td>18.67</td>
<td>13.62</td>
<td>10.43*</td>
</tr>
<tr>
<td>15.5</td>
<td>16.69</td>
<td>13.81</td>
<td>10.39*</td>
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<td>14.85</td>
<td>13.96</td>
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<td>13.11</td>
<td>14.09</td>
<td>10.28*</td>
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<td>11.48</td>
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</tr>
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<td>19.5</td>
<td>9.56</td>
<td>14.38</td>
<td>10.12</td>
</tr>
<tr>
<td>20.5</td>
<td>8.91</td>
<td>14.52</td>
<td>9.98</td>
</tr>
</tbody>
</table>

(Parameter values: $v = .02; w = .15$; the rest of the values are the same as those listed in Chapter 4 except for the parametric variations in $q_p$ indicated in this table.)

Notes: For relatively low values of $v$ and $w$, i.e., when both the private sector and the government are relatively inefficient at capturing inefficiencies caused by externalities through the appropriate administrative control measures, when demand for housing increases, the minimum agency costs computed for both the privatized housing voucher and self-help housing tend to decrease. The minimum agency cost for centralized housing, on the other hand, tends to move upward in the opposite direction. For various strategies marked by asterisks indicate those with lowest minimum agency costs and consequently would be the most efficient low-income housing strategy to adopt.
development tend to decrease. The minimum agency costs for centralized housing, on the other hand, tend to move in the upward direction. In this case, as demand for housing shifted upward, the welfare losses due to inefficiencies from consumption externalities dominates any reduction in the welfare losses due to coordination externalities as the government undertakes the provision of low-income housing. Table 16, on the other hand, reveals that when the ability of the government to plan low-income housing projects improved, i.e., \( w \) is increased from .15 to .40, the minimum agency costs calculated for centralized housing become the lowest, thus making this particular strategy the most efficient.

Once again, these results from the parametric variations in the demand for low-income housing, \( \alpha_p \), as \( w \) is varied, provide a framework for analyzing the rise in the popularity of self-help sites and services development among countries that are experiencing or have experienced rapid and uncontrolled rates of population growth and urbanization. Studies conducted in Indonesia, for instance, has made it clear that population growth and urbanization were the primary sources of the country's urban housing needs. Despite the continuous decline in fertility in urban areas and a slowing of the average rate of urban
Table 15. Effects of Changes In The Demand
For Housing: Simulation Results at v = .02; w = .40

<table>
<thead>
<tr>
<th>Parametric Variations in $a_p$</th>
<th>Privatized Housing</th>
<th>Centralized Housing</th>
<th>Self-Help Housing</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.5</td>
<td>25.20</td>
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</tr>
<tr>
<td>12.5</td>
<td>22.19</td>
<td>5.00*</td>
<td>5.75</td>
</tr>
<tr>
<td>13.5</td>
<td>20.57</td>
<td>5.00*</td>
<td>5.71</td>
</tr>
<tr>
<td>14.5</td>
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<td>17.5</td>
<td>13.11</td>
<td>5.00*</td>
<td>5.45</td>
</tr>
<tr>
<td>18.5</td>
<td>11.48</td>
<td>5.00*</td>
<td>5.29</td>
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<tr>
<td>19.5</td>
<td>9.56</td>
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</tr>
<tr>
<td>21.5</td>
<td>7.63</td>
<td>5.00</td>
<td>4.82*</td>
</tr>
<tr>
<td>22.5</td>
<td>6.82</td>
<td>5.00</td>
<td>4.63*</td>
</tr>
</tbody>
</table>

(Paramter values: v = .02; w = .40; the rest of the values are the same as those listed in Chapter 4 except for the parametric variations in $a_p$ indicated in this table.)

Notes: When the private sector is relatively more inefficient at reducing the welfare losses caused by consumption and coordination externalities than the government, i.e., when v is relatively low compared to w, as demand for low-income housing increases, the minimum agency cost for the privatized housing voucher and self-help sites and services development tend to decline. The minimum agency cost for the centralized housing, on the other hand, remains constant. At low levels of demand, centralized housing emerges as the more efficient low-income housing strategy. At higher levels of demand for housing, however, a switch to the self-help sites and services development as the more efficient strategy occurs.
growth, the urban population has been projected to double from approximately 47 million in 1987 to 95 million in 2002 as the result of natural growth and migration. Under the existing approach of the government which emphasized the construction of new units under a centralized public housing strategy, what became evident was that the task of meeting the country's growing housing needs would be beyond the country's grasp in the future. This assessment was largely prompted by the projections of heavier subsidies required if the government were to retain its conventional approach in dealing with Indonesia's low-income housing problems. The resolution of this problem in Indonesia has been to move in the direction of self-help housing, through the technical and financial assistance of the World Bank. To date, Indonesia is often cited for its Kampung Improvement Program (KIP) considered by many to be a model of upgrading program that is effective in providing benefits to households with income below the 20th percentile of the country's household income distribution (Struyk, Hoffman and Katsura, 1990).

On the other hand, the success of Singapore with the centralized public housing strategy can also be partly explained using the results summarized in Table 15. Singapore is a small island comprising 586 square kilometers and inhabited by approximately 2.5 million people. Due to its
strategic geographical location coupled with its fine natural deep water harbor, Singapore, over the years, has been transformed into a major international trading center. In the 1950s, the spiraling of rents due to the Rent Control Act of 1947 aggravated the deterioration of buildings at the heart of Singapore. In a land scarce nation, the government soon realized that it was extremely paradoxical to have the heart of the city predominantly occupied by slums. Hence, in 1966, the government inaugurated the Urban Renewal Programme which since then has cleared and systematically redeveloped more than 121 hectares of land in the City Centre. Through Singapore's Urban Renewal Programme, families living in slums composed of dilapidated buildings were resettled to public housing estates constructed and managed by the Housing and Development Board (Choe, 1975).

What has been evident so far from the earlier discussion is that the success of Singapore in its public housing program can be traced to the efficiency and the highly developed capability of its public sector to plan and implement low-income housing projects. The other major reason, one that is clarified in this section, is that because of the relative smallness of the demand for housing in Singapore, mainly due to its limited land area, the ability of the public sector to understand and ascertain
the nature of the demand for housing in the country and hence, to capture the benefits of consumption externalities more fully is greatly facilitated.

Undoubtedly, the comparative static exercises conducted in this chapter assist in explaining the actual trends and patterns in the choice of low-income housing strategies in the developing world. The results of this entire research will prove more valuable, however, if the additional steps to make this research more operational are undertaken. This research then will prove valuable to housing policymakers and international lending institutions in the task of building suitable shelter for low-income housing families across varying environments. Chapter 6 summarizes the principal findings of this study and attempts to identify some of the major housing policy implications following from this research.
CHAPTER 6
CONCLUSIONS AND POLICY IMPLICATIONS

This research is a preliminary attempt to apply the comparative institutions framework to the field of public administration. Given alternative strategies that can be used to provide a good that exhibits publicness such as low-income housing, a methodology similar to the work of Eswaran and Kotwal (1985) for the choice of efficient agricultural contracts was developed.

Eswaran and Kotwal's methodology focused on the use of a computer-simulated model to capture how environmental factors affected both labor shirking and managerial shirking costs in agricultural contracts. These costs were then incorporated into the profit maximizing objective functions of the agricultural landlords.

The methodology formulated for this research basically followed a parallel approach. A simulation model was used to demonstrate how environmental factors affected the welfare losses and inefficiencies associated with the consumption and coordination externalities generated by low-income housing. These welfare losses and inefficiencies, as well as the administrative costs incurred to reduce or eliminate them constituted the agency costs associated with each low-income housing strategy.
The simulation model developed showed how a three-stage cost minimizing behavior on the part of the housing agents eventually resulted in the choice of an efficient low-income housing strategy. In the first stage, the optimal combination of administrative activities given a limited budget was identified to minimize the welfare losses and inefficiencies caused by consumption and coordination externalities and to approximate the Lindahl solution. In the second stage, the costs incurred to enforce these administrative activities were added to the costs of residual welfare losses and inefficiencies to compute for agency costs. The agency costs for each low-income housing strategy were thus minimized at the point where the sum of the administrative costs and the residual welfare losses became lowest. In the third stage, the simulation model demonstrated how changes in environmental factors affected the computation of agency costs for each low-income housing strategy. Hence, in this stage, given a specific environment, the low-income housing strategy that produced the lowest minimum agency cost became the efficient choice.

In this chapter, the final steps to conclude the research will be taken. First, the major contributions and principal findings regarding the parameters that affect the choice of an efficient low-income housing strategy in a given environment will be discussed. Next, the policy
implications of these principal findings will be addressed. Finally, some agenda for future research on low-income housing strategies, the limitations of the current model, and the ways and means by which the current model can be extended will be explored.

6.1 SUMMARY AND PRINCIPAL FINDINGS

Externalities compounded by the uncontrolled pace of urbanization in many developing countries have given rise to the proliferation of slums and settlements in urban cities since the 1960s. Typically, governments responded through the centralized public housing approach by clearing the slums and launching urban renewal programs designed to reconstruct the houses that were demolished. Nonetheless, with the exception of Singapore and Hong Kong and to a lesser extent, Malaysia, the centralized public housing approach seems to have failed in many developing countries. Conventional public housing programs, though initially well-intended, have constantly been criticized in many less developed countries for producing too few units that were ironically unaffordable to the low-income housing families being targeted.

Confronted by these failures on the part of governments to properly and efficiently implement centralized public housing programs, calls for decentralization in its various forms in the provision of low-income housing gradually
mounted. In response, many developing countries in the 1970s shifted to more decentralized low-income housing strategies, foremost of which were slum upgrading and sites and services development, both classified in the literature as "self-help housing." But even in the implementation of self-help housing projects, some governments still floundered causing critics to further advocate more decentralization and more privatization.

The primary motivation for this research stemmed from the desire to respond and evaluate these calls for decentralization and to lay the groundwork for the development of a normative theory in economics that will assist government in specifying the degree and the nature of decentralization in their choice of low-income housing strategies. Low-income housing experiences in many developing countries indicate failure on the part of the governments to acknowledge that centralized low-income housing strategies applicable to one environment may not succeed in another environment. These governments, it would appear, have been unable to recognize that the economic, political, and socio-cultural factors unique to the country should govern the choice of a low-income housing strategy and the degree of decentralization or centralization inherent in such a strategy.
Even among international lending agencies like the World Bank, whose financial and technical inputs to low-income housing programs in developing countries are massive, only recently has the view that housing must be delivered from an "institutional perspective" been articulated. And yet, even at this point, this "institutionalization" only arbitrarily asserts the specific environmental conditions that should be taken into account when advising governments about their choice of low-income housing strategies.

The conceptual framework outlined and discussed in this research is the first step in a series of activities required to develop a normative theory for the choice of low-income housing strategies. The simulation model and the comparative static results derived from the model should at best be viewed as tentative and indicative of the promising nature of a modified Eswaran and Kotwal approach to the field of public goods administration. The results from this research, however, should not be interpreted as final numbers from which practicable housing policies could be directly deduced.

Chapter 2 of this research essentially reviewed the public sector, agency theory, and housing economics literature relevant to the study. Low-income housing strategies in varying forms of decentralization or centralization which have evolved in reaction to a range of
housing policy issues in the developing world were described and evaluated. The Lindahl equilibrium was presented as the first-best Pareto-efficient and equitable solution, minimizing rent-seeking in the process.

In Chapter 3, a world of positive transaction and information costs that allowed for the use of the comparative institutional approach based on the agency theory was introduced. Agency costs were then defined for the completely privatized housing voucher strategy, self-help sites and services development, and centralized public housing as the sum of administrative costs and the residual welfare losses and inefficiencies that resulted from both consumption and coordination externalities for each low-income housing strategy. A conceptual framework that introduced the three-stage cost minimization approach was formulated to define the cornerstone of the proposed normative theory of low-income housing strategies.

This conceptual framework was made more explicit in Chapter 4 with the formal specification of a mathematical model. Furthermore, based on this mathematical approach, a computer-simulated model was developed to illustrate the computation and comparison of minimum agency costs for each type of low-income housing strategy, given certain assumptions about the environment.
And finally, in Chapter 5, a series of parametric variations or sensitivity analyses on the computer-simulated model described in Chapter 4 were conducted to generate comparative static results. The objective was to demonstrate how certain changes in the existing assumptions about the environment affected the minimum agency costs and consequently the choice of the low-income housing strategy. These comparative static results were then used as the basis for analyzing and explaining the variations that exist among countries and within countries over time, specifically in Asia, in their choice of a low-income housing strategy.

Specifically, in Chapter 5, comparative static exercises were conducted involving a series of parametric variations to determine the impact of the following on the computed agency costs of the privatized housing voucher, self-help sites and services development and the centralized, conventional low-income public housing strategies: (a) changes in the relative advantage of the government over the private sector and vice-versa in reducing welfare losses and inefficiencies; (b) changes in the ability of the government to subsidize housing; and (c) changes in the demand for low-income housing.

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On Changes In the Relative Advantage of the Government/Private Sector to Reduce Welfare Losses. When the government is relatively inefficient at reducing welfare losses from consumption and coordination inefficiencies through the appropriate administrative control measures, i.e., when \( w \) and \( r \) are assigned low values in the simulation exercises, the results point out that the privatized housing voucher strategy will dominate the centralized and self-help sites and services housing strategies. In other words, in this case, the privatized housing voucher strategy would yield the lowest minimum agency costs.

However, as the government gained moderate capability to reduce welfare losses from consumption externalities, i.e., when \( w \) and \( r \) began to increase as governments got more attuned and responsive to the tastes and preferences and effective demand of the specific subsets in the population, it became more efficient for the government and the private sector to combine their efforts and opt for the self-help sites and services development strategy.

But as \( w \) and \( r \) were further increased, i.e., when governments became highly efficient at reducing welfare losses due to consumption externalities by enforcing the appropriate administrative control measures, the centralized public housing strategy emerged as the most efficient approach to the low-income housing problem.
On the other hand, as the private sector became more efficient at reducing the welfare losses and inefficiencies due to coordination externalities, i.e., as \( v \) was increased relative to \( w \) and \( r \), the minimum agency cost computed for the privatized housing voucher strategy was greatly reduced. Thus, as \( v \) increased, the privatized housing voucher strategy became more efficient than the self-help sites and services and centralized public housing strategies.

Empirical observations made on patterns and trends in the choice of low-income housing strategies appear to be consistent with these results. For instance, the notable success of the centralized public housing in Singapore has been traced to the considerable technical and management know-how of its public housing sector bureaucrats. In this case, the government has a relatively high ability to reduce inefficiencies mainly from consumption externalities. Several countries failed when they initially launched self-help housing projects. Poor location, inaccessibility, lack of employment opportunities: these were the usual problems that plagued the sites and services projects in many developing countries in the late 1960s. Here, the government's ability to reduce welfare losses due to consumption inefficiencies was extremely low; hence, the
more privatized housing voucher approach inevitably resulted in the efficient strategy.

**On Changes in The Ability of the Government To Subsidize Housing.** What happens to the choice of an efficient low-income housing strategy when from the onset, financial constraints on the part of the governments rendered centralized public housing unfeasible? Based on the results of the comparative static exercises conducted to address this particular question, when the proportion of government subsidy $\phi$ was reduced, the minimum agency cost computed for self-help housing tended to increase. This was attributed to the fact that when the government's subsidy was reduced, inefficiencies from coordination externalities tended to increase and this more than offset any of the gains made from the reduction in welfare losses from consumption inefficiencies. In other words, when government inputs to the low-income housing process were reduced and the households allowed to make individual decisions about the size, quality, location, and other attributes of the housing units, inefficiencies would result mainly from the failure to capture the benefits of coordination and economies of scale. More congestion, worsened traffic conditions, deteriorated physical amenities, and the growth of slum populations in the cities could be expected as
low-income households make the painful choice to live in substandard but highly accessible housing units.

As the government's ability to reduce welfare losses due to consumption externalities improved, however, the gains from a better understanding of the tastes, preferences, and ability to pay of the low-income households allow self-help housing to emerge as the most efficient low-income housing strategy. In this particular situation, governments, despite their limited financial resources are able to reach more low-income housing families who are also given the motivation to contribute more of their resources into the housing production process.

These results were used to explain why many of the developing countries which resorted to and implemented self-help housing for the first time in the 1970s primarily because of budgetary constraints could not launch self-help housing on a massive scale at the pace warranted by the growth of demand for low-income housing. Without the adequate experience and sufficient knowledge in planning and implementing these types of self-help housing projects, many of these governments predictably encountered consumption inefficiencies.

Comparative static exercises were also conducted by varying the proportion of government subsidy $\phi$ as $v$, the private sector's ability to reduce welfare losses due to
coordination externalities was increased. The results generated from the exercises pointed out that when \( v \) was increased to a certain level as the proportion of government subsidy \( \phi \) was gradually varied, that is, if the private sector was organized and able to maximize the gains from coordination and economies of scale, the privatized housing voucher strategy will emerge as the most efficient low-income housing strategy that should be adopted.

However, as the government's ability to reduce welfare losses due to consumption inefficiencies was also improved, i.e., when governments are more able to plan and implement low-income housing in accordance with the low-income families' specific needs, preferences, and ability to pay, the results showed that self-help housing projects operating on minimum government subsidy tended to become the most efficient strategy. These results helped explain the relative success with which the Philippine government was able to launch its Community Mortgage Program, a housing program which relied less on government subsidy and more on the technical capability which has been achieved by the government in planning and implementing self-help housing projects through community organizations.

**On Changes in the Demand for Low-Income Housing.** In the face of large increases in the formation of urban households and the progression and changing distribution of
income among these households, how should the choice of an efficient low-income housing strategy be undertaken? This was the emphasis of the last series of comparative static exercises conducted through this research. The results showed that when the demand for housing increased, all other parameter values held constant, the minimum agency costs computed for both privatized and self-help housing tended to decrease. On the other hand, the minimum agency costs for centralized housing escalated. In this case, as the demand for housing shifted upward, the welfare losses due to the failure of the government to capture consumption externalities and to plan adequately in accordance with the low-income families' needs and ability to pay dominated any reduction in the welfare losses due to the gains from coordination and economies of scale.

The results from these comparative static exercises likewise revealed that when the ability of the government to reduce consumption inefficiencies was improved, i.e., when governments developed the ability to plan in accordance with low-income households' needs, tastes, and ability to pay, the minimum agency costs calculated for relatively lower levels of demand became the lowest, thus making this particular strategy the more efficient approach to adopt.

These findings were used to analyze the rise in the popularity of self-help housing in the 1970s among
countries that were experiencing or have experienced rapid and uncontrolled rates of urbanization. The experience of Indonesia as it attempted to deal unsuccessfully at first with its growing problem of housing due to rapid population growth and urbanization through centralized, conventional public housing was cited as an illustrative example. This was contrasted with the case of Singapore where centralized public housing worked. Because of the relative smallness of the demand for housing in Singapore, mainly due to its limited land area, the ability of the public sector to understand more fully the nature of the housing needs and preferences of its low-income families was greatly facilitated.

6.2 POLICY IMPLICATIONS FOR LOW-INCOME HOUSING

The results of this study have so far proven extremely valuable in explaining the actual trends and patterns in the choice of low-income housing strategies among countries in the developing world. But what is more crucial at this point is to highlight the main theoretical contribution of the study: this study has demonstrated that a modified Eswaran and Kotwal modelling approach is a promising framework for the purpose of analyzing and evaluating alternative institutional structures for the administration of public goods.
Specifically, the modified Eswaran and Kotwal framework adopted in this study generated meaningful comparative static results. These results contribute significantly to a deeper understanding of the efficiency issues involved in the choice of strategies for the provision of low-income housing. Furthermore, the comparative static results derived from this study confirm many of the policy recommendations that are currently prescribed by housing policymakers and practitioners to developing countries.

The comparative static results and insights derived from this study can thus be used to produce some preliminary and tentative normative guidelines for the choice and design of low-income housing strategies in the developing world.

When does a country opt for a centralized, conventional public housing strategy? The results of the comparative static exercises conducted in this research identified two critical factors that must sufficiently be satisfied in order for centralized public housing to be efficiently and successfully implemented as in the case of Singapore. First, the public housing sector must possess considerable technical and managerial know-how in planning and implementing the housing projects in such a way that the administrative costs and welfare losses due to the failure to capture coordination and consumption externalities are minimized. The public housing sector should be able to
maximize the gains from coordinating the housing activities. These gains should be translated into well-located housing projects that are fully integrated into the urban development plans for the cities. Whenever possible, the public housing sector must also identify the activities where benefits from economies of scale could be realized. Construction materials could be produced and stockpiled at larger volumes to avoid the inefficiencies of ordering and procuring at smaller batches. In addition, the public housing sector must be able to realistically assess and address the effective needs, tastes, preferences, and ability to pay of the targeted low-income housing beneficiaries. Housing designs could then fully take these into account and could, in the process, minimize consumption inefficiencies. The affordability of the housing units is the pivotal element. In a country like Singapore where income levels are sufficiently high, centralized, conventional public housing that offers completely built units would be acceptable as an efficient manner of addressing the low-income housing problem.

**When does a country opt for self-help housing strategies?** The key to the choice of a low-income housing strategy lies in the ability of the strategy to minimize agency costs. Agency costs emerge due to the administrative costs of operating the strategy and the
failure of the strategy to completely eliminate the inefficiencies from consumption and coordination externalities.

Countries facing acute budgetary constraints are not in a position to allocate substantial resources to the housing sector. Under these circumstances, the choice of a centralized, conventional public housing strategy would heighten the inefficiencies due to consumption externalities. The inefficiencies due to coordination externalities would escalate as well, forcing agency costs to increase. In particular, the lack of financial resources in low-income housing would generally reduce coordination among the government agencies involved, inhibit the introduction and the implementation of revisions in traditional administrative procedures, deter the installation of appropriate monitoring and control devices, and prevent effective communication and dialogues between the central government and the prospective low-income housing beneficiaries. In many developing countries, this typically resulted in the limited volume of housing units available, the prohibitive costs of the housing units, and consequently, the unaffordability of the housing units.

Governments with financial constraints should tend to rely more on self-help housing projects. Self-help housing projects effectively allocate the financial burden of
providing low-income housing between the government and the private sector that includes the low-income housing beneficiaries. At the onset, self-help housing projects that rely more on the government should gain from the benefits of coordination and economies of scale. But to sustain the implementation of this type of projects and minimize agency costs, the central government has to build up the capacity to plan and manage the projects in a manner that satisfies the effective needs, preferences, and ability to pay of the beneficiaries.

With very meager financial resources, however, countries like the Philippines must inevitably explore other types of self-help housing projects that rely more on the technical know-how of the public sector and less on government subsidies. A prototype of this kind of self-help housing project is the Private Sites and Services Development Program launched in the Philippines in the early 1980s. In this program, government contribution was limited to the areas of development financing (for the initial development costs of the projects and technical assistance to the private developers). Private resources were tapped by introducing the incentives that would motivate the landowners and the private developers to provide serviced lots with core houses. The gains from coordination were maximized because the government retained the right to
approve or disapprove the location of project sites.
Private developers and landowners were asked to construct
access roads and to ensure the availability of transport
vehicles to and from the project sites. Linkages with other
government agencies that could contribute utility services
to the project were established through the housing agency
tasked with the implementation of the program. Core houses
were designed and built in accordance with the basic needs
and preferences and the ability to pay of the low-income
households. Inefficiencies from consumption externalities
were reduced by allowing the low-income housing families to
complete the core houses based on their specific tastes and
preferences at the pace and in the amount they can afford.

What about the roles of urbanization, population
growth, and other economic development policies? Countries
experiencing rapid and uncontrolled population and
urbanization growth patterns and which must deal with
continuously upward shifting demand for low-income housing,
as indicated by the results of the comparative static
exercises, should rely more on self-help housing strategies.
As population, urbanization, and consequently, the demand
for low-income housing increase, agency costs will be
minimized if the potential inefficiencies from both
consumption and coordination externalities will be
addressed through the joint efforts of both the government
and the private sector. The government with its coercive and enforcement powers could maximize the gains from coordination and economies of scale despite the increased complexities in low-income housing provision as population and urbanization rise. Furthermore, the participation of the private sector, including the low-income housing families, in the housing process ensures that more effective dialogues and planning will take place. This, obviously, reduces the inefficiencies from consumption externalities as the needs, tastes, preferences, and ability to pay of the targeted beneficiaries are accounted for, given the rise in population and urbanization. In this scenario, the insistence on providing conventional, fully-built housing in accordance with the "construct big, beautiful, and forever" slogan will have to be abandoned if it proves to be inconsistent with the beneficiaries' ability to pay.

It must be pointed out that economic development policies adopted by the government can either reduce or increase further the inherent inefficiencies from coordination and consumption externalities. Policies that encourage regional development will help combat the influx of migrants into cities that are already congested in the first place. This reduces the administrative costs required to deal with the inefficiencies from coordination externalities and relieve the government of the heightened
need to cope with slum formation problems in the cities. On the other hand, protectionism and trade policies that promote the use of high-cost construction materials in low-income housing increase the agency costs from consumption inefficiencies. The preference for domestically processed materials with high import content over local and indigenous materials usually results in the prohibitive cost of housing that consequently exceed affordable limits.

**How can the private sector be encouraged to contribute?**

In countries confronted by financial and budgetary constraints as well as rapidly growing demand for housing, the private sector must be motivated to mobilize their resources and combine their efforts with the public sector. Adequate incentives must be provided to allow the private sector to build low-income housing units that are consistent with the tastes, preferences, and ability to pay of the prospective beneficiaries. Moreover, where benefits from economies of scale in private production are possible, such as in the case where private volunteer groups organize to stockpile and sell building materials to the low-income housing families at lower costs, governments should support all activities and initiatives taken by the private sector in this direction.

**How can the government decentralize low-income housing?**

With the assistance of international lending agencies, some
countries have tried but failed to decentralize self-help housing programs through the devolution of planning and implementation responsibilities to the local governments. Decentralization in self-help housing through devolution can be theoretically justified in accordance with the comparative institutional framework adopted in this study by invoking the efficiency gains from consumption externalities that are supposed to materialize with the involvement of local governments in the housing process. Hence, in devolved self-help housing programs, the central government participates in maximizing the gains from coordination externalities and economies of scale while the local governments and proposed beneficiaries ensure that the benefits from consumption externalities are fully realized. The end result, theoretically, should in this case be a reduction in the agency costs in self-help housing. But what has gone wrong which could explain the failure of some of the governments' previous attempts to devolve self-help housing? In the Philippines, the failure of efforts to devolve self-help housing by the central government can be traced to the lack of administrative personnel and financial resources in the local governments to carry out the tasks of planning and implementing the projects in consultation with the intended beneficiaries. Hence, in the absence of qualified personnel and adequate financial resources, the
gains in efficiency from positive coordination externalities at the central government level may be negated by the increase in inefficiencies in consumption as the breakdown in planning and the lack of communication occurs to bring the implementation of the housing projects to a standstill.

6.3 PRELIMINARY NOTES ON A FUTURE RESEARCH AGENDA

This research has formally modelled the idea that the efficiency of low-income housing strategies depend on certain factors that could vary across environments. The model used extends the application of the Eswaran and Kotwal framework into the area of public goods administration, particularly for the case of low-income housing. A computer simulated model was developed to generate comparative static results that yielded meaningful insights and contributed to a deeper understanding of the efficiency issues in the choice and design of low-income housing strategies. This understanding paves the way for analyzing and exploring how and why countries decide to adopt low-income housing strategies that are different from the efficient choice. In this setting, the roles of political and other socio-cultural factors unique to a country in the choice of low-income housing strategies could be further investigated.

All these, however, should be viewed as the preliminary step in the development of a normative theory for the choice and design of low-income housing strategies. At best, the
framework presented in this study should be described as a crude prototype of the model that could eventually be developed and applied by housing policymakers and international lenders.

There are a number of research and methodology issues that emerge from this study. The first set of issues pertains to the selection of the parameter values. In this study, the choice of the hypothetical parameter values used for the simulation was based mainly on observations gathered from the field research conducted in the Philippines. Will the choice of a different group of parameter values based on observations of low-income housing activities in another developing country fundamentally alter the results of this study? Clearly, there is a need to systematize the link that should exist between the field observations and the choice of parameters.

Still on the choice of parameter values, one of the lingering problems in the current simulation model may be that the results are not unit-free. If the unit by which the parameters are measured is changed, will different answers result from the simulation exercises? In this regard, there is a need to analyze whether the use of elasticities would improve the existing simulation model.
As answers to these questions are found, extensions of the model may be developed to account for the impact of political and socio-cultural factors on the choice of low-income housing strategies. The effects of rent-seeking behavior and political motivations and ideologies on agency costs could be explored to probe even deeper into the extra-efficiency issues affecting the design and choice of strategies.

There is likewise the need to develop a comprehensive low-income housing database that would facilitate the analysis and the choice of parameter values in the simulation model. The experience of developing countries in the implementation of decentralized low-income housing strategies and projects should be documented to facilitate the identification of the stylized facts in the choice of low-income housing strategies.

There is a lot that needs to be done. This study has taken the one step towards realization of housing as the "ideal dream" for millions of low-income families in the developing world. International donor agencies and lending agencies can underwrite the next step by sponsoring research that makes optimal administrative design a reality for specific locations.
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