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Introduction

More than half of humanity and the overwhelming majority of the world’s poor live and work in villages. Their production and consumption activities take place within small units, usually households. Yet these units do not behave in isolation from one another. Interactions among village households in factor and commodity markets create local income linkages and general-equilibrium feedbacks. Village institutions shape these interactions. Economic linkages and feedbacks alter the impacts of policy, market, and environmental changes on rural economies quantitatively, and they may shape them qualitatively as well.

In the past, the study of village economies and institutions was primarily the domain of anthropologists. Ethnographic research has provided a window into the structure and workings of village economic, social, and cultural institutions. For the most part, however, these insights have not made their way into quantitative economic modeling.

This book is motivated by our conviction that modeling village economies in diverse economic, social, and cultural settings is critical for understanding the likely impacts of rural development policies. Policymakers and researchers concerned about economic welfare and rural and urban economic growth need to recognize the central role of villages in economic development and in alleviating poverty. Quantitative models of village economic activity are required to analyze the complex impacts of government policies and other exogenous influences on production, incomes, poverty, and inequality in LDC (less developed country) rural areas.
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Agriculture and development

When we started work on village economic modeling, there was a growing awareness in development economics that governments should pay close attention to the rural sector of LDCs when designing development policies. The 1980s and 1990s witnessed an appreciation among researchers and policymakers of the multifaceted role that agriculture plays in economic development. Agriculture’s major contributions to development have been recognized for some time (Johnston and Mellor, 1961). Increasing productivity in the food and other primary-goods sectors is critical in order to avoid bottlenecks in national development (Morris and Adelman, 1988; Timmer, 1988; Johnston and Mellor, 1961). The need for agricultural development became acute in the 1980s, as binding foreign exchange constraints put a premium on promoting agro exports while limiting LDCs’ ability to rely on imports as substitutes for improving agricultural productivity and increasing marketed surplus. Squatter problems and unemployment, fed by accelerating migration into urban areas, created a mandate to expand productive employment in the countryside (Todaro, 1980). As the most labor-intensive sector of LDC economies, agriculture was a prime candidate to play this employment-generating role. Furthermore, development economists recognized the potential for rural consumption demand to create a mass market for domestically produced goods, both agricultural and manufactured (Mellor, 1976; Adelman, 1984).

Econometric analysis based on household expenditure surveys has demonstrated repeatedly that rural expenditure patterns favor domestically produced goods over imports, goods with a high labor content over capital-intensive goods, and goods whose production relies on domestic inputs rather than imported inputs (e.g., Haggblade, Hazell, and Brown, 1988). These considerations, together with the sheer numbers of people living in rural areas, make a strong case for agricultural-development-led industrialization (Adelman, 1984). Recent research suggests that there is a more fundamental symbiotic relationship between agriculture and other sectors, to such an extent that when agriculture does well, so does the rest of the economy, and vice versa (Timmer, 1988). Promoting agricultural development appears to be a prerequisite to promoting national economic development.

How to promote agricultural development, however, is a subject of debate in the development economics literature and among development practitioners. The often disastrous performance of centrally planned economies and inward-looking development strategies, and the success of export-led growth strategies making selective use of markets (and controls) in the “Asian Tiger” economies turned the focus of development economists away from planning and toward markets in the 1980s (e.g., World Bank, 1986). The effectiveness of markets in allocating resources, however, depends critically on the existence of these markets, on the ability of markets to convey
information to producers and consumers, and on the costs of using markets for everyday transactions.

Understanding the likely impacts of policy, market, and environmental changes on rural incomes requires understanding microresponses in household-farms, the complex linkages among household-farms within villages, and the linkages between villages and the outside world.

From household-farm to villagewide models

Most recent economic research on the impacts of policy changes on rural economies has followed one of two paths: microeconomic household-farm modeling and a nascent effort to develop village social accounting matrix (SAM) multiplier models. The models in this book represent a further advance over village SAM multiplier models in exploring village or local economywide impacts of policy and market changes.

We propose a village (or micro) computable general-equilibrium (CGE) approach. Micro-CGE models occupy a middle ground between household-farm models and aggregate (national) CGE models for policy analysis. Like household-farm models, they are rooted in the microeconomy and constructed “from the bottom up” using household-farm survey data. However, in the micro-CGE approach, models of household-farm activity are incorporated into a local general-equilibrium framework. This makes it possible to capture the complex linkages and general-equilibrium feedbacks among household-farms that shape the effects of exogenous shocks on local economies. Simulations using villagewide models are unique in their ground-level view of the likely impacts of exogenous policy and market changes on local economies, a view critical for designing rural development policies.

To understand the usefulness of this new generation of economic models, it is helpful first to consider the contributions of the household-farm and village SAM approaches.

The extensive literature on household-farm modeling (e.g., Barnum and Squire, 1979; Singh, Squire, and Strauss, 1986) reflects a concern for how agricultural price policies affect the marketed surplus of food available for urban areas. The first-round impacts of policy changes on rural economies are usually found in agricultural households. Household-farm models examine these first-round impacts and elucidate the dual character of agricultural households as producers and consumers interacting with regional markets for outputs, inputs, and consumption. These models explain the sometimes paradoxical responses of small farmers to price policies. For example, they advance the theoretical possibility of a positive own-price demand elasticity (upward-sloping demand curve) for food in farm households. Empirical findings reveal that this theoretical possibility often is borne out in the real world and has an important effect on marketed surplus. Variations of agricultural
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household models have been used to explore the impacts of market imperfections on household-farm behavior (de Janvry, Fafchamps, and Sadoulet, 1991; Singh, Squire, and Strauss, 1986).

By treating the household as a small economy and incorporating both production and consumption into the same modeling framework, agricultural household models are, in reality, very small economywide models. This is most apparent in the case of household-farm models with missing markets, in which the family strikes an internal equilibrium between its supply and demand for nontradables. In the case of a missing market for labor, the agricultural household faces the internal general-equilibrium constraint that the sum of leisure and work demands for family time equals the family’s fixed time endowment. In the case of a missing market for staples, the household’s consumption equals its own output (plus stocks minus storage). Net marketed surplus (transactions with markets) ensures that all markets for tradables clear within the household. Both quantities and “virtual” or “shadow” prices (which reflect the family’s subjective valuation of nontradables, like time or subsistence crops) adjust to ensure that the household economy is in equilibrium when markets for commodities or factors are missing.

Applications of agricultural household models confirm that the household needs to be treated as a whole microeconomy if there is any hope of understanding the complex impacts of exogenous policy and market shocks on household-farm economies.

The shortcoming of microeconomic household-farm models is that they do not examine interactions among households. Because of this, an analysis that treats individual households as whole economies is incomplete: Where economic linkages among households are important, microeconomic household (or household-farm) models may produce misleading findings, including biased estimates of the impacts of policy and market changes on the rural economy.

Consider a simple example. Suppose that a 10 percent price support stimulates a 6.1 percent increase in staple production in village households. Higher profits from staple production raise staple-producing households’ incomes and their demand for normal goods, including staples. The result is a 6.6 percent increase in the marketed surplus of staples. (These production and marketed surplus changes correspond to elasticities for Malaysia presented in Barnum and Squire, 1979.) The policy analyst, who is no doubt concerned with securing food supplies for urban consumers, concludes that the price policy is an effective tool for increasing the marketed surplus of staples.

However, income linkages and local general-equilibrium feedbacks within the local economy may alter the impact of the price change on marketed surplus. Most likely, they will dampen the marketed surplus effect, and they
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may reverse it. Staple producers purchase inputs (e.g., labor) from other households in the village. Their increased consumption expenditures usually include a demand for goods produced in the village, including local nontradables. Increased demand drives up the price of nontradable goods and factors. If the affected goods or factors are inputs in staple production, the higher prices will dampen the staple-supply response. In the extreme case, where some village factors are fixed and there are no substitutes for these factors in the staple-production function, the supply response may be nil. Nevertheless, the higher staple-price increases farm profits from existing (baseline) production and is likely to stimulate a flow of value-added into nonstaple-producing households.

Staples are usually a normal good for village households. Increased income in nonstaple-producing households boosts the village demand for staples. The combination of a smaller output elasticity and an increase in local staple demand reduces the availability of staples for consumers outside the village. It may even create a backward-bending village marketed surplus response, akin to the well-known backward-bending labor supply curve in microeconomics.

Microeconomic household-farm models do not capture the income linkages and the general-equilibrium effects that can profoundly influence the outcomes of policy changes, as in the preceding example. Village SAM multiplier models have demonstrated that linkages within villages are important in shaping the effects of policies and other exogenous changes on production and incomes (Adelman, Taylor, and Vogel, 1988; Subramanian and Sadoulet, 1990; Lewis and Thorbecke, 1992; Parikh and Thorbecke, 1994; Ralston, 1992; Golan, 1990). Exogenous changes that do not directly affect marketed surplus or agricultural production may have indirect effects as their impacts work their way through the village. Migrant remittances, particularly in the presence of imperfect or missing markets, are a case in point (Taylor, 1995).

Another shortcoming of household-farm models is that the household as basic unit of economic decision making is not universal and fixed; it must sometimes be recast from one village context to another, and production and consumption decisions may take place in different economic units (e.g., households and compounds) within the same village. Anthropological debates about households point to the complexity and flexibility of household arrangements and structures, to alternatives to households as basic units of production and consumption in some villages, and to the diversity of village institutions that influence interhousehold relationships (e.g., Yanagisako, 1979).

Taking rural income linkages and general-equilibrium feedbacks into account requires studying microeconomic household-farms as part of a rural economic community and explicitly modeling their unique institutions and interactions. It is entirely possible that the most important impacts of a policy
change on production, marketed surplus, or incomes will not be found within the households seemingly most affected by the policy, but in the ways that one household transfers the impacts of policy changes to another. Ignoring villagewide economic effects may give a quantitatively if not qualitatively distorted view of policy outcomes.

**Village SAMs and SAM multiplier models**

The SAM approach is ideal for analyzing village economies in diverse social and cultural settings. Village SAMs provide a snapshot of the structure of village economies, village institutions, and village interactions with the outside world. They also provide an accounting framework that can serve as a basis for modeling village production activities and institutions in response to changes in economic, policy, and environmental variables. The village and village-town applications in Chapters 3 through 7 of this book illustrate the flexibility of the SAM framework in distinct economic, social, and cultural settings as well as the diversity of analytical uses to which SAMs neatly lend themselves.

SAM-based village models are restrictive, however. The linearity of SAM multipliers, their assumption of a Keynesian, demand-driven village economy without resource constraints, and their absence of prices limit their usefulness for many types of policy analysis. Creative efforts have been made to overcome some of these limitations by modifying SAM models (see Chapter 2). However, the basic structure of SAM multipliers limits the extent to which these problems can be addressed within the SAM framework.

**Village CGEs**

In this book, we propose and develop a CGE framework that combines the strengths of microeconomic household-farm models with those of SAM-based, villagewide models. At the heart of the village CGE is the household-farm, which is both producer and consumer. The CGE links household-farms together into a village general-equilibrium model, incorporating resource constraints on household-farm decisions, nonlinearities, and price effects and capturing economic linkages among household-farms within the village as well as between the village and the outside world. It takes into account general-equilibrium feedbacks of household-farm responses to policy, market, and environmental changes in markets where villages are cut off from the outside world or where local markets do not exist (e.g., family labor).

Our policy experiments using villagewide economic models based on CGE methods explore the impacts of price policies, technological change, ecological decline, income transfers, factor market changes, and macrovariables on production, incomes, employment, migration, and demand linkages...
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inside and outside four villages and a village-town. Our findings offer insights into the workings of village economies that sometimes defy conventional economic wisdom, and they suggest explanations for development policy paradoxes: Why are policies to increase food supplies through price incentives effective in some cases but ineffective in others? Why are attempts to raise rural incomes and alleviate poverty through income programs often unsuccessful and even counterproductive, and why do they sometimes trigger more migration, not less? Why does economic research reveal such contrasting findings about the impact of migration on development in migrant-sending economies? What are the implications of environmental degradation for incomes, poverty, and inequality in developing countries, and why are the economic incentives to preserve environments so small?

Organization of this book

The primary goal of this book is to provide readers with theoretical and empirical insights into the structure of village economies. A second objective is to compare the impacts of changes in government policies, commodity and factor markets, and environmental variables on villages in different economic, social, and cultural milieux. Along the way, we provide readers with examples of how to design and construct village-wide models. The study of villages requires a combination of economic and anthropological research tools, as is demonstrated by the variety of village institutions and economic structures portrayed in Chapters 3 through 7.

The book is organized as follows. Chapter 2 introduces the village SAM, which is the analytical and empirical starting point for village-wide modeling. Chapters 3 through 7 present contextual information and estimated SAMs for villages in the Peanut Basin of Senegal, a cotton-producing zone in Maharashtra in Western India, and a migrant-sending region in central Mexico; for a market-oriented village in West Java, Indonesia; and for a village-town in the Kutus region of Kenya. Surveys of these villages and village-town were originally designed to address an array of policy questions: land tenure in Senegal, agricultural production constraints in India, migration in Mexico, rural–urban linkages in Kenya, and calorie intake in Indonesia. With the exception of the India model, all of the data for these models were collected by the contributors of Chapters 3 through 7. In the India case, supplemental fieldwork was carried out to complement existing survey data.

The five village SAMs are the basis for designing and estimating village general-equilibrium models. The basic structure of the village CGE models is presented in Chapter 8, together with a comparison of model parameters across villages and a description of the computer program we developed to estimate the models and conduct our policy experiments. In Chapter 9, we use the five estimated village models to analyze village-wide effects of exogenous
Village economies changes in policy, market, and environmental variables. Our policy simulations illustrate differences in villagewide responses to change, and they offer a basis for designing policy interventions to accomplish objectives related to production, incomes, poverty, and environmental sustainability in diverse LDC rural settings. Chapter 10 presents our conclusions.
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Modeling village economies

Villages in less developed countries often are very complex in their social, cultural, and political structures, yet the structure of their economic activities can be reasonably simple. Agricultural production forms the core of economic activity for the villages in this book. Some of this production is consumed by the production units themselves, and thus does not enter the exchange economy inside or outside the village. Many of the inputs used in production are supplied by the same production units, in the form of family factors (labor, draft animal power) or intermediate inputs produced by the household (e.g., saved seeds). Nevertheless, as Chapters 3 through 7 illustrate, economic activity varies strikingly among villages, often in ways that reflect villages’ integration with outside markets.

Village economic linkages and market development

If all agricultural households were self-sufficient and supplied their own inputs – that is, if all goods were household nontradbales – production and expenditure linkages among village households would be nonexistent. At the other extreme, if all households were perfectly integrated with goods and factor markets outside the village and all goods and factors were village tradables (i.e., in a perfectly neoclassical world), production and expenditure linkages among village households would again be nonexistent. All input and output prices would be exogenous, fixed by markets outside the village. An increase in a village household’s demand for goods produced in the village would simply decrease the availability of these goods for sale outside the village (i.e., village-marketed surplus).

There would be little rationale for village economic models in either of
these extremes. In a world of nontradedables, there would be little scope for policy intervention (except perhaps for market development to promote trade). In a perfectly neoclassical world, a villagewide economic model would not be needed to understand the impacts of exogenous policy on village production, consumption, or marketed surplus to outside markets. Microeconomic household-farm models, estimated separately for different household-farm groups (e.g., net-surplus-producer and net-purchaser households), would suffice.

Most villages are not characterized by either of these extremes. Typically, some goods are household nontradedables, supplied and demanded by the same production-consumption unit. Others are village nontradedables, exchanged among households within the village but not between the village and the outside world. Still others are village tradables, for which all households and the village as a whole are price takers.

In short, market interactions among village households at different levels of market integration between households and the outside world are characterized by a U-shaped relationship. They are weakest in subsistence agricultural household economies and also when the village economy is perfectly integrated with outside product and factor markets. They are strongest when all goods are village nontradedables.

Figures 2.1 through 2.3 illustrate economic linkages in villages at different levels of market development. The broken lines in these figures denote nonmarket interactions (household nontradedables); the solid lines denote market transactions. Market transactions may involve either village tradables or village nontradedables.

*Subsistence village economies*

Figure 2.1 illustrates the extreme of an isolated, closed household economy. Agricultural households supply all of their inputs and consume all of their...