Human Capital: Migration and Rural Population Change

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Abstract: The movement of labor out of agriculture is a universal concomitant of economic modernization and growth. Traditional migration models overlook many potential interactions between migration and development. Given imperfect markets characterizing most migrant-sending areas, migration and remittances can have far-reaching impacts, both positive and negative, on incomes and production in agricultural households. Linkages through product and factor markets transmit impacts of migration from migrant-sending households to others inside and outside the rural economy. Recent theoretical and empirical studies reveal the complexity of migration determinants and impacts in rural economies, and they point to new arenas for policy intervention.

Chapter for *Handbook of Agricultural Economics*, Bruce L. Gardner and Gordan C. Rausser, eds., to be published by Elsevier Science, New York.

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Acknowledgements:
Various components of this research were supported by the William and Flora Hewlett Foundation, the Rosenberg Foundation, the Giannini Foundation of Agricultural Economics, the Kellogg Foundation, and by a USDA National Research Initiative grant. We are indebted to Sheila Desai, Mimako Kobayashi, Pauline Griego, and two anonymous referees.

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The migration of labor geographically, out of rural areas, and occupationally, out of farm jobs, is one of the most pervasive features of agricultural transformations and economic growth. This is true both historically in developed countries (DCs) and currently in less-developed countries (LDCs). Among nations, the share of rural population declines sharply as per-capita incomes increase (Figure 1), from 70 to 80 percent in countries with the lowest per-capita GNPs to less than 15 percent in the highest-income countries. The share of the national workforce in agriculture plunges even more sharply (Figure 2), from 90 percent or higher in low-income countries to less than 10 percent in high-income countries. Developing countries from Mexico to India have experienced dramatic declines in their rural population shares over the past 3 decades, despite significantly higher rates of natural population growth in rural than in urban areas.

As internal migration redistributes populations and workforces from rural to urban areas, many countries--including those with the world's most dynamic fruit, vegetable, and horticultural crop production--turn to foreign-born migrants, frequently of rural origin, for labor. In the United States, for example, an estimated 69 percent of the 1996 seasonal agricultural service (SAS) workforce was foreign-born (Mines, Gabbard, and Steirman, 1997), and in California, far and away the nation's largest agricultural producer, more than 90 percent of the SAS workforce was foreign-born. The majority (65 percent) of these migrant farmworkers originated from households in rural Mexico.

The world's great migrations out of rural areas are accelerating, making internal and international migration potentially one of the most important development and policy issues of the 21st Century. The most populous countries also are among the most rural (Figure 1). The greatest migration potential is in China, where 71 percent of the population is rural and an estimated one-third of the rural labor force of 450 million is either unemployed or underemployed. Despite barriers to labor mobility imposed by China's household registration (hukou bu) system, China currently has more migration than anywhere else, with between 50 and 100 million rural-to-urban migrants (Roberts, 1997). Meanwhile, in high-income countries, farmers, with their reliance on foreign-born migrant workforces, find themselves at odds with an increasingly restrictionist public and policy stance towards immigration.

The determinants of migration and migrants' impacts, both on migrant-sending areas and on the rural communities that receive them, have been the subject of a prolific and growing literature in agricultural and development economics, a centerpiece of public-policy debates, and a source of sharpening controversy and anxiety in migrant "host" countries and communities. The determinants of out-migration from rural areas and the impacts of this migration on rural areas are the focus of this chapter.

Part I presents a critical synthesis of theories of the determinants of migration out of rural areas, with a focus throughout on the implications of these theories for empirical analysis of migrant labor supply. It starts out with the (mostly implicit) role of migration in classical, two-sector models, in which the rural sector is characterized as having redundant or surplus labor, then presents

neoclassical and expected-income models, human-capital models, and the "new economics of labor migration (NELM)." For the most part, economic theories of migration were developed in the context of developing countries. However, virtually all economic models of rural out-migration and farm labor migration in developed countries are rooted in the migration theories presented here.

Part II presents modeling techniques that have been used to test the theories presented above. Part III reviews key findings of empirical farm-labor migration research and reassesses migration theories based on these findings.

A significant theoretical and empirical literature addresses welfare effects of migration on migrant-sending economies. A nascent literature deals with impacts of migration on rural, migrant-receiving areas, e.g., the many small rural communities throughout the United States that are being transformed by immigrants working in agriculture or agricultural processing industries. There is also fledgling research on impacts of rural-to-rural migration within LDCs, with a focus on the environment. Part IV assesses this rural migration-impacts research, linking it to the migration models and findings presented in Parts I through III. The impacts of migration are intimately tied to migration determinants, including the incentives to migrate and the selectivity of migration.

Most countries do not explicitly attempt to control rural out-migration (China is the significant exception). However, they do hold immigration-policy levers, and there are some policy efforts to influence internal migration indirectly, e.g., via interventions in labor markets or by altering the availability of public services for migrants. High-income countries, especially the United States, have a long history of implementing policies aimed at restricting the inflow of foreign-born (mostly unauthorized) farmworkers without creating labor shortages on farms. These policies include fines for employers who knowingly hire unauthorized immigrants, farmworker legalization, restriction of public services to immigrants and their families, and guest worker programs. In many cases, these immigration policy changes have had unintended consequences for farmers and rural communities. Part V concludes with a discussion of policy implications of migration research. In particular, what economic justifications, if any, are there for designing policies to influence the supply or demand of migrant labor?

I
THEORIES OF RURAL OUT-MIGRATION

The Classical Two-Sector Model

Social scientists have studied the movement of labor out of rural areas for a long time. Migration is addressed by Adam Smith in The Wealth of Nations (1776). In industrial revolution England, Ravenstein (1885) and Redford (1926, 1968) argued that a combination of Malthusian forces, land scarcity, and enclosure—that is, "supply push" variables—drove rural-to-urban migration. Others pointed to "demand-pull" variables, including the rapid development of manufacturing that fed population growth and urban poverty in Manchester during the early

nineteenth century (e.g., Engels, 1845). Johnson (1948) recognized rural out-migration as solution to surplus labor and low incomes in agriculture.

The modern economics literature on migration often is traced to Lewis' (1954) seminal work on economic development with unlimited supplies of labor. Lewis does not propose an explicit migration model. His contribution is to explain the mechanisms by which an unlimited supply of labor in traditional sectors of less developed countries (LDCs) might be absorbed through capital accumulation and savings in an expanding modern sector. Nevertheless, migration plays an important role in the Lewis model. Ranis and Fei's (1961) formalization and extension of the Lewis model was the precursor to a generation of neoclassical and "neo-neoclassical" two-sector models which dominated the migration literature through the 1980s. Although originally designed to examine the reallocation of labor between rural and urban areas, it is potentially applicable to international migration. A Lewis-type model may offer some insights into rural out-migrations associated with very high wage elasticities, as appears to be the case for internal migration in some less developed countries (LDCs) and possibly also for foreign migrant-labor supply to some developed countries (e.g., Mexican migration to fill U.S. agricultural jobs)--that is, migration that is largely demand-driven.[1]

The Lewis dual economy consists of a "capitalist" sector and a "noncapitalist" sector. Although Lewis did not intend this, in practice the capitalist sector has generally become identified with the urban economy and the noncapitalist sector with agriculture or the rural economy. The capitalist sector hires labor and sells output for a profit, while the noncapitalist (or subsistence) sector does not use reproducible capital and does not hire labor for a profit. Initially, labor is concentrated in the noncapitalist sector. As the capitalist sector expands, it draws labor from the noncapitalist sector. If the capitalist economy is concentrated in the urban economy, labor transfer implies geographic movement, i.e., rural-to-urban migration.

In theory, migration implies an opportunity cost for the rural economy, which loses the product of the individuals who migrate. However, the centerpiece of the Lewis model (and essence of the classical approach) is the assumption that labor is available to the industrial sector in unlimited quantities at a fixed real wage, measured in agricultural goods. In the limiting case, this implies that there is surplus or redundant labor in rural areas, such that the marginal product of rural labor is zero, and labor thus may be withdrawn from rural areas and employed in the urban sector without sacrificing any loss in agricultural output. That is, the opportunity cost or "shadow price" of rural labor to fill urban jobs is zero. (Various institutional arrangements ensure that consumption by members of the farm workforce is roughly equal to the average product of farm output, even if their marginal product is below this average.) Lewis argued that at least a quarter of the agricultural population in India was "surplus to requirements."

[1] In the classical model, migration is demand-driven in the sense that the supply of farm labor to nonfarm jobs is perfectly elastic (i.e., the supply curve is horizontal). Therefore, the movement of workers from farm to nonfarm jobs results solely from outward shifts in the nonfarm labor-demand curve.

More generally, the supply of labor from the subsistence sector is unlimited if the supply of labor is infinitely elastic at the ruling capitalist-sector wage. A zero marginal product of labor in the noncapitalist sector is not a precondition for this. However, in the Lewis model, earnings at the prevailing capitalist-sector wage must exceed the noncapitalist-sector earnings of individuals willing to migrate, i.e., the average product of labor in the traditional sector. Moreover, any tendency for earnings per head to rise in the noncapitalist sector must be offset by increases in the labor force there (e.g., through population growth, female labor-force participation, or immigration).

A key testable hypothesis of the Lewis model is that rural out-migration is not accompanied by a decrease in agricultural production nor by a rise in either rural or urban wages. The Lewis assumption of general surplus labor in LDCs has been questioned, especially by Schultz (1964). (Also see Jorgenson, 1967, and the exchange between Robinson, 1969, and Gardner, 1970.)

Neoclassical Two-sector Models

In Ranis and Fei's (1961) interpretation of the Lewis model, the perfectly elastic labor supply to the capitalist sector ends once the redundant labor in the rural sector disappears and a relative shortage of agricultural goods emerges, turning the terms of trade against the modern or capitalist sector. Through migration, the marginal value products of labor are equated between the two sectors; the Lewis classical world ends and the analysis becomes neoclassical. The dual economies merge into a single economy in which wages are equalized across space. Rural-to-urban migration exerts upward pressure on wages and on the marginal value product of labor in rural areas, while putting downward pressure on urban wages, assuming that wages adjust to ensure that both rural and urban labor markets clear. Empirically, in addition to the convergence of wages across sectors, one should observe an inverse relationship between rural out-migration and farm wages, on one hand, and agricultural production, on the other (other things (including technology) being equal). In addition, assuming full employment of labor in both rural and urban sectors and minimal transactions costs, inter-sectoral wage differentials should be the primary factors driving rural out-migration (Jorgenson, 1967; Ranis and Fei, 1961).

Internal and international migration are modeled according to this perfect-markets neoclassical specification in virtually all computable general equilibrium models, both national (e.g., Adelman and Taylor, 1991; Levy and Wijnberger, 1992) and international (e.g., the NAFTA models of Robinson et al., 1991). In contrast, most microeconomic models of rural out-migration are grounded on Todaro's seminal work, which incorporates labor-market imperfections, including urban unemployment, into a migration model (see the following section).

Despite its popularity for some modeling purposes, wage-driven neoclassical analysis of rural out-migration has largely been discredited for a number of reasons. These reasons include the empirical observation that urban formal-sector wages are "sticky," and migration tends to persist and even accelerate in the face of high and rising urban unemployment in LDCs (Todaro, 1969 and 1980); documented persistent differences in wage rates for comparable agricultural tasks across geographical areas (e.g., Rosenzweig, 1978); and unskilled urban manufacturing wage rates that have remained 1.5 to 2 times agricultural wages over long periods of time (Squire, 1981), despite

significant rural-to-urban migration. Such differences in the returns to homogeneous labor across sectors are not consistent with the predictions of neoclassical migration models. They are evidence of market imperfections--although, significantly (see the new economics of labor migration, below), not necessarily of imperfections in labor markets.

The continuation of migration despite high and increasing urban unemployment is the primary motivation for Todaro's (1969) expected income model of migration in the presence of labor-market imperfections, and imperfections in other markets—including markets for capital and risk—are a focus of the new economics of labor migration.

The Todaro Model

Todaro (1969) proposed a modification of the neoclassical migration model in which each potential rural-to-urban migrant decides whether or not to move to the city based on an expected-income maximization objective. Expected urban income at a given locale is the product of the wage (the sole determinant of migration in the neoclassical models described above), and the probability that a prospective migrant will succeed in obtaining an urban job. Expected rural income is calculated analogously. Individuals are assumed to migrate if their discounted future stream of urban-rural expected income differentials exceeds migration costs; i.e., if

$$\Delta = \int_0^T e^{\delta t}\left[p_u(t)\, y_u - y_r(t)\right]dt - c \qquad (1)$$

is positive, where $p_u(t)$ is the probability of urban employment at time t, y_u denotes urban earnings given employment, $y_r(t)$ represents expected rural earnings at time t, c is migration costs, and δ is the discount rate. Otherwise, they remain in the rural labor market. Note that this is not a model of risk and uncertainty; in the Todaro specification, individuals are assumed to be risk-neutral. For example, a mean-preserving increase in the variability of urban income leaves the migration propensity unchanged. As a result, utility maximization is tantamount to expected income maximization. The perfect-markets or wage-driven neoclassical model may be viewed as a special case of the Todaro model, in which the probability of employment at migrant destination (and origin) equals one.

The power of the Todaro model is its ability to explain the continuation and, frequently, acceleration of rural-to-urban migration in the face of high and rising urban unemployment. Its salient departure from perfect-markets neoclassical models is that it does not assume the existence of full employment; hence, a higher wage or income in the urban sector than in the rural sector is not a sufficient, or even necessary, condition for migration. In an environment of high unemployment, this wage or income is conditional upon the migrant's success at securing a job. A high (e.g., institutionally-set) urban wage coupled with a low probability of obtaining a job at that wage may result in an expected wage that is lower in urban than in rural areas where the conditional wage is

low but the likelihood of employment is high. Conversely, high rural unemployment will make a given expected urban wage more conducive to promoting migration. Increases in urban employment (e.g., resulting from government-sponsored jobs programs) may increase urban unemployment rates through migration, and a rise in the urban minimum wage may reduce output in both the urban and rural sectors while increasing urban unemployment (Harris and Todaro, 1970).

Because this is characterized as a dynamic problem, migrants may perceive a low probability of urban employment initially (and queue for urban jobs; see Fields, 1975) but anticipate an increase in this probability over time, e.g., as they broaden their urban contacts. Contacts with family or friends in urban areas prior to migration (i.e., migration networks) may stimulate migration by shortening--or perhaps eliminating--the initial queuing period.

Although originally cast in the context of rural-to-urban migration, the Todaro model is also applicable to international migration (e.g., see Todaro and Maruszko, 1987).

Despite what has proven to be a seminal contribution to understanding determinants and impacts of rural out-migration, the Todaro model makes a number of restrictive assumptions. Some of these have been a focus of considerable subsequent research. They include: (1) the assumption that urban job allocation follows a simple lottery mechanism; (2) neglect of the competitive informal sector, which acts as a sponge for surplus labor; (3) the assumption of a rigid urban-sector wage; (4) the (perhaps unreasonable) time horizons and discount rates required to equate the present values of expected urban and rural incomes (e.g., see Cole and Sanders, 1985, p. 485); and (5) the omission of influences, besides expected income, that shape potential migrants' decisions and also their potential impacts on rural economies (Williamson, 1988). It has been observed that, in LDCs, while nominal urban wages are typically 50 to 100 percent higher than nominal rural agricultural wages, urban unemployment rates typically are less than 10 percent. Thus, the rate of urban unemployment does not appear to reconcile the urban-rural wage differential; i.e., migration does not appear to equilibrate expected incomes across sectors (Rosenzweig, 1988). In addition to overstating urban unemployment rates, the Todaro model certainly overstates the costs of migration for rural, migrant-sending areas. Neither this nor more traditional neoclassical migration models can explain temporary migration or the substantial flow of income remittances from migrants to their places of origin.

Assumption (5) is arguably the most restrictive and far-reaching of the assumptions and the one upon which much of the most recent research on migration and rural population has focussed. It is the focus of the most recent wave of literature on migration determinants and impacts, which has become known as the new economics of labor migration (see below).

Human Capital Theory and Migration

The essentially macro perspective embodied in both the classical and neoclassical migration models presented earlier leaves a fundamental question unanswered: Why do some individuals migrate while others do not? More critical from a rural welfare point of view, what distinguishes the

labor "lost" to migration from that which remains in the rural sector? Differences in wage rates and in the returns to migration may be explained largely by differences in skill-related attributes across workers, including experience and schooling.

As presented above, the classical and neoclassical migration models offer few insights into the question of migrant selectivity. In a Lewis world, when capital accumulation in the modern sector shifts the marginal value product curve outward, increasing the quantity of labor demanded at the prevailing urban wage, some reserve labor from rural areas is assumed to migrate to the modern sector and fill this excess demand. However, we do not know who these migrants are, or what distinguishes them from those who do not migrate. In the demand-driven, classical world of infinite labor supply, urban jobs must be rationed among redundant members of the rural population according to some rule that is left unclear in the Lewis model. Migrants presumably are individuals possessing specific characteristics on the basis of which modern-sector jobs are rationed out. For example, if urban construction jobs in Mexico City or farm jobs in California hire only agile, strong young men, only this demographic group will respond to new labor demands by migrating. Nevertheless, the supply of labor, even for this specific group, is assumed to be infinite at the prevailing wage in a Lewis-type model. In this way, a Lewis demand-driven migration model almost invariably begs the question of migrant selectivity.

The same problem potentially arises in an aggregate, wage-driven neoclassical model and in the Todaro expected-income model. Presumably, the individuals who migrate are those for whom the urban-rural wage (or expected earnings) differential is largest and/or for whom migration costs are lowest.

A well-developed literature addresses the question of migrant selectivity in the neoclassical and Todaro worlds by merging migration theories with human capital theory, arising from the early work of Mincer (1974), Becker (1975), and others. Human capital models of migration represent an effort to provide the migration theories presented above with a micro grounding, permitting tests of a far richer set of migration determinants and impacts.

In the perfect-markets neoclassical version of the human-capital migration model (e.g., Sjaastad, 1962), wages at prospective migrant origins and destinations are assumed to be a function of individuals' skills affecting their productivity in the two sectors. In a Todaro model, human capital characteristics of individuals may influence both their wages and their likelihood of obtaining a job once they migrate. In both types of model, characteristics of individuals may also affect migration costs (and the rate at which future urban-rural earnings differentials are discounted).

The human capital view of migration has the key implication that the types of individuals selected into migration are those for whom, over time, the discounted income (or expected-income) differential between migration and nonmigration is greatest and/or migration costs are lowest. As Todaro (1980) pointed out:

> "Migrants typically do not represent a random sample of the overall population. On the contrary, they tend to be disproportionately young, better educated, less risk-

averse, and more achievement oriented and to have better personal contacts in destination areas than the general population in the region of out-migration."

Human capital migration theory produces a number of testable hypotheses. First, because this is a dynamic model, the young should be more mobile than the old, inasmuch as they stand to reap returns from migration over a longer period of time. Second, migration between locales should be negatively related to migration costs. This has been interpreted by many researchers as implying a negative association between migration flows and distance. However, considerations besides distance (especially access to information) may make distance less of a deterrent for some individuals (e.g., better-educated individuals or those with "migration networks," contacts with family or friends at prospective migrant destinations). Third, as Rosenzweig (1988) points out, neutral productivity growth in an economy--e.g., equal rates of growth in the rural and urban sectors--will increase migration from low-income (e.g., rural) to high-income (e.g., urban) sectors or areas. Fourth, specific human capital variables that yield a higher return in region A than in region B should be positively associated with migration from B to A. In addition to these predictions, human capital theory implies that income (or, in the Todaro case, expected income) differentials between rural and urban areas are eliminated by migration over time.

The New Economics of Migration

Continuing interactions between migrants and rural households suggest that a joint-household model would be more appropriate than an individual-level model of migration decisions. However, a joint-household model has difficulty explaining why the entire family does not move if expected incomes are higher in the urban sector, why higher-income migrants would remit income to lower-income relatives at the place of origin, or why--as has been found in some national studies--migrant remittances, while positively related to migrant earnings in urban areas, are not negatively related to the pre-transfer income of the rural household of origin. One is also left with the puzzle of why geographically extended families are prevalent in LDCs but less so in high-income countries (Rosenzweig, 1988), and the troubling assumption that households can be characterized by a single utility function and budget constraint.

The fundamental view of the new economics of labor migration is presented in Stark (1991) and Stark and Bloom (1985). Rather than being entirely the domain of individuals, migration decisions are viewed as taking place within a larger context—typically the household, which potentially consists of individuals with diverse preferences and differential access to income and is influenced by its social milieu. The perspective that migration decisions are not taken by isolated actors but by larger units of related people, typically households or families, is a trademark of the NELM. So is the contention that people act collectively not only to maximize income, but also to minimize risks and loosen constraints created by a variety of market failures, including missing or incomplete capital, insurance, and labor markets. Finally, the effect of income on utility may not be the same for a given actor across socioeconomic settings, which motivates the relative deprivation theory of migration discussed below.

Stark (1982, 1978) argues that an implicit contractual arrangement exists between migrant and household. An LDC farm household wishing to invest in a new technology or make the transition from familial to commercial production lacks access to both credit and income insurance. By placing a family member in a migrant labor market, such a household can create a new financial intermediary in the form of the migrant. Rural households incur the costs of supporting migrants initially. In turn, once migrants become established in their destination labor market, they provide their households with liquidity (in the form of remittances) and with insurance (because of a low correlation between incomes in migrant labor markets and farm production; indeed, the correlation between remittances and farm production may be negative, as when migrants respond to crop failure by increasing the share of earnings they remit). Mutual altruism reinforces this implicit contract, as do inheritance motives (i.e., nonremitting migrants stand to loose their rural inheritance) and migrants' own aversion to risk, which encourages them to uphold their end of the contract in order to be supported by the rural household should they experience an income shock (e.g., unemployment) or other misfortune in the future. Anthropological research (e.g., Fletcher, 1997; Rouse, 1991) points to the importance of rural households-of-origin as refuges for migrants who fall ill or suffer other sorts of misfortune (e.g., trouble with the law, substance dependence, etc.) that prevent them from working or residing at the migrant destination for extended periods of time.

Migration, while enabling families to spread their labor across sectors, may promote rural population growth by creating fertility incentives, as well. The role of grown children as migrants adds a new benefit to having children in rural areas; i.e., the future role of migrant children in facilitating production transformation, reducing family income risk, etc. No empirical research has attempted to test this migration-fertility link. However, Rosenzweig and Evenson's (1977) finding that children's wages significantly increased fertility in rural India suggests that a positive effect of migration on children's future earnings would have a similar effect.

NELM motives for migration, together with the post-migration resource transfers they imply, are likely to be of greater importance in less developed countries than in developed economies. The lack of a modern communications infrastructure in LDC rural areas makes information sparse and its acquisition costly. Asset markets that function relatively well in modern economies may be completely lacking in LDCs (futures markets and crop insurance are striking examples, but rural credit markets often are missing or incomplete, as well). Because of this, NELM research on rural out-migration has focused almost exclusively on LDCs.

Stark (1982) expounds migration's role as an intermediate investment that facilitates the transition from familial to commercial production. It performs this role by providing rural households with capital and a means to reduce risk by diversifying income sources. Lacking access to credit and income insurance outside the household, households self-finance new production methods and self-insure against perceived risks to household income by investing in the migration of one or more family members. That is, market imperfections in rural areas--not the distortions in labor markets emphasized by Todaro (1969)--are hypothesized to be a primary motivation for migration.

Stark and Levhari (1982) use a graphical presentation to argue that migration is a means to spread risk, rather than being a manifestation of risk-taking behavior on the part of migrants. Stark and Katz (1986) formalize the argument that rural-urban migration, a labor-market phenomenon, is caused by imperfections in capital markets.

The spectrum of factors influencing migration decisions extends beyond the household. A household's income position vis-a-vis its reference group (e.g., the village) also influences its behavior, including migration. Stark (1984) and Stark and Yitzhaki (1988) present a relative deprivation model of migration, in which the household's objective is to maximize utility which, in turn, is a negative function of relative deprivation, or the bundles of goods of which the household is deprived within its reference group. In this model, a given expected income gain from migration does not have the same effect on the probability of migration for households situated at different points in the rural income distribution, or in communities with different income distributions. From a broader perspective, mean-preserving increases in rural income inequalities, to which migration would be completely immune in a Todaro model, may stimulate migration by increasing relative deprivation. By operationalizing the relative deprivation concept, Stark and Taylor (1989, 1991) test the importance of relative versus absolute income considerations in internal and international migration decisions by rural Mexican households (see Part III).

Because skill-related attributes of individual family members influence the costs and benefits of migration for households, as well as for individuals, human capital theory has been incorporated into NELM models. However, the household perspective implies critical interactions between individual and household variables, including assets and the human capital of household members other than the migrants. These variables influence the marginal cost of migration for households (including the marginal effect of migration on farm production), as well as the impacts of remittances and the income insurance provided by migrants on the expected utility of the household as a whole.

The NELM perspective leads to significantly broader arenas for potential impacts of migration upon rural economies, for policy interventions to influence migration, and for the potential list of variables influencing migration decisions. A number of key implications of NELM models differ sharply from those of neoclassical migration models. First, contrary to both classical and neoclassical theories, the loss of labor to migration may increase (rather than decreasing or, in the case of Lewis, leaving unchanged) production in rural economies, by enabling households to overcome credit and risk constraints on production. Second, a positive income (or expected income) differential between urban and rural areas is not a necessary condition for migration. Migration in the presence of a negative urban-rural income differential is consistent with the NELM (provided that the variance of urban incomes and/or income covariance between the two sectors is sufficiently low). Third, the individuals who migrate are not necessarily those whom a traditional human capital model would predict; the impact of an individual's out-migration on the productivity of other family members also matters. Moreover, while constituting a motivation for migration, imperfections in capital and insurance markets also may constrain migration, resulting in the seeming paradox that increases in rural incomes (which enable households to self-finance migration costs and self-insure against migration risks) may promote, rather than impede, migration (e.g., see Schiff, 1996). Fourth,

equal expected income gains from migration across individuals or households does not imply equal propensities to migrate, as predicted by a Todaro model, when risk and/or relative income considerations also influence migration decisions. From a migration policy point of view, the NELM shifts the focus of migration policy from intervention in rural or urban labor markets to intervention in other (most notably, rural capital and risk) markets, in which an underlying motivation for migration is found.

The progression of migration theory from the relatively simple, perfect-markets neoclassical model to NELM models involves both increasing complexity and more generality in how we think about migration determinants and impacts. Just as the wage-driven neoclassical model is a special case of the Todaro model, both may be viewed as special cases of NELM models, in which some or all market constraints that influence migration are nonbinding (e.g., households are risk-neutral or have access to efficient insurance markets), relative income considerations do not affect utility, and the effect of household variables on migration are negligible.

II
THE ANALYSIS OF MIGRATION DETERMINANTS

Each of the migration theories outlined above implies a different objective function underlying migration decisions, a different set of potential variables shaping these decisions, and a distinct set of possible outcomes of migration for the rural economy. The most fundamental distinction concerns the unit of analysis. The classical and neoclassical (including Todaro) models treat migration as the result of an individual decision-making process. The objective function varies, but in all cases the individual is both decisionmaker and actor. On a micro level, this genre of migration research treats migration as a discrete choice (although potentially it could be represented as a continuous but limited variable, ranging from zero--no migration--to T--the maximum amount of time the individual has available for migration and nonmigration activities). In aggregate-level analyses, which represent the majority of empirical applications, the decisions of individuals are summed up into migration flows across space, and the migration (dependent) variable then becomes continuous.

In contrast to classical and perfect-markets neoclassical models, NELM models consider the family or household as the unit of analysis; family members are assumed to act collectively to maximize expected income and also to loosen constraints associated with missing credit, insurance, and other markets. Because of this, the NELM perspective fits neatly with the literature on agricultural household models, both neoclassical (e.g., Barnum and Squire, 1979; Singh, Squire and Strauss, 1986) and in the context of missing or incomplete markets (Strauss, 1986; de Janvry, Fafchamps, and Sadoulet, 1991). Methodologically, the NELM approach, with its focus on risk and market imperfections, requires the use of nonrecursive, rather than recursive, farm household models to analyze both the determinants and impacts of rural out-migration. Nash-bargained household models (e.g., McElroy and Horney, 1981) also are potentially useful to analyze the implicit contractual relationship between migrants and family members who do not migrate. The NELM

posits a role for variables hitherto ignored in the migration literature--especially relative-income considerations--as influencing household utility and thus migration decisions.

Migration decisions are inherently dynamic, shaped by a future stream of expected costs and benefits (appropriately discounted). Individuals or households may rationally choose to participate in migration even if the short-run expected utility gain from doing so is negative, provided that the discounted future gains are positive and sufficiently large. Few studies explicitly model migration as a dynamic phenomenon (for an exception, using aggregate country data, see Larson and Mundlak, 1997); usually, the problem is treated as static. The theoretical complexity of introducing dynamics without oversimplifying the objective function or constraint set confronting migration decision makers, together with the paucity of longitudinal data, have discouraged the development of truly dynamic migration models.

At either the individual or household level of analysis, the most general objective considered in the migration-decision literature is to maximize a Von Neuman-type expected utility function of the form:

$$EU = E[U(W, Z)] \tag{2}$$

where W denotes a vector of end-of-period consumption goods, Z is a vector of other variables posited to influence family utility, and E is the expectation operator. The utility function $U(\cdot)$ is defined for an individual in the case of the Todaro or straight neoclassical migration models. In a NELM model, it represents family utility, involving some kind of weighting of utilities of individual family members, including migrants and nonmigrants. In every NELM application to date, it has been assumed that family preferences can be represented by a single utility function, and income is pooled within households to define a single family or household budget constraint, as in a standard agricultural household model.

Expected utility is maximized subject to a set of constraints. In all models these include a budget constraint; in most, the primary or sole influence of migration on individuals or households operates through this constraint. Other constraints include an individual or family time constraint, and, in NELM models, production technologies and market (e.g., subsistence) constraints. In models where end-of-period income is not known but consumption decisions may be altered ex post, the vector of consumption goods in the utility function is often replaced by income or wealth, as in most of the risk and uncertainty literature. Such a simplification is usually not appropriate, however, when one or more markets are missing--for example, when perfect hired-labor substitutes are not available to compensate for family leisure demand, or when the household faces a subsistence constraint resulting from a missing staple market, so that consumption decisions cannot be altered contingent upon income outcomes.

Each of the broad theoretical approaches presented earlier may be considered as a special case of this general expected-utility maximization model. David (1974) takes the individual as the

unit of observation, represents utility as a function of wealth alone, and then approximates equation [1] by its second-order Taylor series expansion around mean wealth. This yields the following expression for (approximate) expected utility of income associated with migration:

$$EU_m \approx U(\overline{W_m}) + .5U'' E(W_m - \overline{W_m})^2 \quad (2)$$

where U" is the second derivative of utility with respect to wealth (significantly, the numerator in the Arrow-Pratt index of absolute risk aversion). Assuming that the nonincome component of end-of-period wealth is known with certainty, the squared term in parentheses can be replaced by the income variance, s^2. Letting EU_r (similarly approximated) denote expected utility of wealth if the individual does not migrate (i.e., remains in the rural sector), migration is observed if $EU_m > EU_r$.

Both the Todaro model and the standard neoclassical migration model can be viewed as special cases of the expected utility-maximization problem just presented. If one assumes that individuals are risk neutral (or, equivalently, that income variance is zero), the decision rule implied by equation [2] collapses to the familiar Todaro migration rule, in which migration is observed if:

$$p_m w_m > E[Y_r] \quad (3)$$

where w_m denotes the urban-sector wage and p_m is the probability that a prospective migrant will obtain a job at this wage.

At full employment, $p_m = 1$, and the migration rule in [3] reduces further to the simple neoclassical rule: Migrate if

$$w_m > w_r \quad (4)$$

where w_r denotes the rural wage. Both Todaro and neoclassical migration rules usually recognize that there are migration costs and include a term (e.g., d) to reflect this.

Expression [4] represents the migration probability equation underlying much of the econometric research on rural out-migration and farm labor migration in both LDCS and high income countries. For example, it is the foundation for Perloff, Lynch, and Gabbard's (1998) and Emerson's (1984) studies of seasonal agricultural worker migration in the United States. It is also the starting point for all 12 studies of internal migration in LDCs examined in Yap's (1977) review and a large number of subsequent tests of the Todaro expected-income hypothesis (e.g., Knowles and Anker, 1975; House and Rempel, 1976; Hay, 1974; Schultz, 1975; Carvajal and Geithman, 1974).

NELM Models

NELM variants of the general migration model take many forms, depending on the focus of the analysis. In most studies, the underlying objective function is implied rather than explicitly spelled out. A household variant of David's model, in which families allocate individual members' time to migration and nonmigration work in a series of discrete choices, appears in Taylor (1986). Household portfolio models of migration also appear, explicitly or implicitly, in Rosenzweig and Stark (1989); Stark and Katz (1986); and Levhari and Stark (1982).

A fundamental difference between individual and household migration models is that, in the household approach, individual family members' labor time is allocated between migration and nonmigration work so as to maximize household expected utility, which may be a function of both the expected value and variance of end-of-period household wealth (and, in the relative deprivation approach, a function of the incomes of other households, as well). Thus, household variables shaping both the first and higher moments of income--including the human capital characteristics of all family members and family assets--figure prominently in the migration decision, together with the human capital of the prospective migrants, themselves. In this approach, as in any portfolio-allocation model, maximizing expected income does not necessarily imply allocating each family member's labor time to the market or activity in which her expected earnings or contributions to household income are highest. Risk also matters.

In an agricultural household model, the opportunity cost of migration is the loss of net income from production resulting from the allocation of a marginal unit of family time to migration. Here, migrant selectivity clearly matters to household welfare; the human capital embodied in migrants is likely to complement other family resources in production. Assuming decreasing returns to labor in farm production, the opportunity cost of migration increases with the amount of family time allocated to migration. However, the loss of highly productive family labor to migration may shift the marginal labor product curve leftward, lowering the opportunity cost of migration for the remaining family members. If, on the other hand, migrants act as financial intermediaries for the household, over time they may promote investments that shift the marginal labor product curve back to the right, discouraging future migration. The interplay of lost labor and investment effects of migration is the focus of some of the empirical NELM research presented in Part III.

Because maximizing utility of expected income is analogous with maximizing expected income, itself (given monotonicity of the utility function), household migration models that do not explicitly address risk are treated as expected income-maximization models. Such is the case in Taylor (1987). A model of household expected-income maximization subject to both labor and liquidity constraints is implied by Lucas' (1987) study of migration to South African mines and Taylor's (1992) and Taylor and Wyatt's (1996) studies of marginal income and distributional effects of migration and remittances in rural Mexico. In these models, migration (or, in Lucas (1987), wage work including migration) appears as a continuous variable--family labor time allocated to migration work. Migration and remittances, in turn, produce feedback on the rural economy, both negative (through lost-labor effects) and positive (through loosening of liquidity constraints on farm

investments). These models highlight the importance of rural market imperfections in shaping both the motivations for migration and the impacts of migration on rural economies.

As indicated earlier, treating migration as a (limited) continuous variable is not necessarily outside the domain of individual-choice migration models; even for an individual, migration may be like the incomplete adoption of a new technology (in this case, a labor-market technology), with an individual spending part of the year as a labor migrant and the rest of the year on the farm. Nor must one necessarily take a household-level approach to examine feedback of migration on farm production. An individual farmer may find it optimal to engage in migration for part of the year (or, in a dynamic model, for one or more time periods) in order to obtain liquidity needed to invest in farm production (creating a new future stream of farm income). Such models would represent a new twist on NELM.

In practice, the association of NELM effects with household models of migration is motivated by the observation that families in LDC rural areas typically engage in migration by sending one or more members off as migrants (frequently, sons and daughters of the household head) who then share part of their earnings with the rural household, through remittances. While some family members migrate, others stay on the farm.

This observation raises the question of why migrants remit. Classical or neoclassical models of migration behavior do not explain the remitting of a (frequently large) share of migrant earnings back to the rural place of origin. However, remittances are a cornerstone of the NELM, representing one of the most important mechanisms through which determinants and consequences of migration are linked.

The NELM view that migration entails an implicit contract between migrant and households suggests a venue for collective models of household behavior (e.g., Bourguignon and Chiappori, 1992), including game theoretic approaches, and the role of altruism in shaping both migration and remittance behavior. In a Nash-bargained rural household (e.g., McElroy and Horney, 1981) containing migrants, household utility might be represented by the product of net utility gains deriving from household membership for migrants and other household members. Migrants' utility as nonmembers of the household -- that is, the utility they would enjoy by severing their ties with the household -- represents the threat point in this game. The more insecure migrants perceive their future prospects outside the household, the smaller this threat point, the less likely migrants will sever ties with the household, and the more income migrants will remit, other things (including migrant earnings) being equal. While a model of pure altruism would predict a negative association between migrant earnings and rural-household wealth, a game-theoretic model would predict just the opposite, particularly if the migrant stands to inherit all or part of this wealth. In short, the greater the migrants' threat point, the greater the likelihood that migrants sever their ties with their rural households and the lower remittances are likely to be. The lower the migrants' threat point (i.e., the stronger the relative bargaining position of the nonmigrant family members), the lower the probability of migrants severing ties with their rural households, and the higher remittances are likely to be. This type of game theoretic perspective underlies Lucas and Stark's (1985) analyses of remittance behavior in Botswana (see Part III of this chapter) and a Nash-bargained household

model appears explicitly in Hoddinott's (1994) study of rural out-migration in western Kenya. Contrast these with the overlapping utility function used by Funkhouser (1995) and the more conventional, homogeneous household-farm models underlying Taylor (1992 and 1986), which do not imply a game-theoretic dynamic between migrant and household. A model of reciprocal altruism between generations underlies Tcha's (1996) novel and provocative work on rural-to-urban migration in Korea and the United States.

Estimation of Migration Models

Techniques used to estimate models of migration have evolved considerably over the last two decades, due as much to the development of new econometric methods as to advances in migration theory. All of the studies covered by Yap's (1977) then-exhaustive review of the migration literature and all but two of the studies referenced in Todaro (1980) used a basic, aggregate migration function of the following form:

$$M_{ij} = f(Y_i,\ Y_j,\ U_i,\ U_j,\ Z_i,\ Z_j,\ d_{ij},\ C_{ij}) \qquad (5)$$

the variables in which are defined as follows:

M_{ij}	Total migration flow from place i to place j (sometimes expressed as a net flow or a share of population at place i)
Y_i (Y_j)	Average wage or income level at place i (at place j)
U_i (U_j)	Unemployment rate at place i (at place j)
Z_i (Z_j)	Degree of urbanization of the population at place i (at place j)
d_{ij}	Distance between place i and place j
C_{ij}	Friends and relatives of residents of i at destination j (a migration network variable)

Populations at places i and j were often included as explanatory variables, as well.

Studies based on Equation 6 take either of two general forms: symmetrical and asymmetrical In symmetrical models, explanatory variables appear as differences or ratios between regions; e.g., the income variable is Y_i/Y_j, or Y_i-Y_j. This constrains the effect on migration to be the same for changes in origin-region variables as for changes in destination-region variables. Implicitly, this approach appears to make some rather valiant assumptions, including perfect information in labor markets such that migrants are just as responsive to changes in labor markets at

distant destinations as in the origin labor markets they presumably know well. In a less restrictive approach, explanatory variables for the two regions are included separately; e.g., both Y_i and Y_j appear as right-hand-side variables in the migration regression equation. This permits explanatory variables' effects on migration to be asymmetric between regions. Fields (1979) tests the sensitivity of findings on interregional migration in Columbia to the use of a symmetric versus an asymmetric model specification.

The aggregate specification above has the advantage of being easily estimated using ordinary least squares and aggregate census data available in many countries. However, it has a number of limitations that seriously limit its usefulness for prediction and for policy analysis (some of these are spelled out in Stark, 1982). In general, the estimated coefficients of aggregate migration regressions do not represent estimates of the structural relationships implied by micro, human capital models. The exception is when a population is homogeneous, in which case average income measures the income an individual would receive in each region. This assumption usually is untenable; indeed, much of the richness of both the findings and policy implications of recent microeconometric migration research (Part III, below) results from the heterogeneity among individuals -- both migrants and nonmigrants -- within regions. Another complication, which follows directly from Todaro's theoretical model, is that employment rates, while posited to influence migration, are, in turn, affected by migration. Endogeneity bias in the unemployment variables raises serious questions about the validity of most aggregate studies' findings. Very few researchers either consider or attempt to correct for this problem. Notable exceptions include Fields, 1979, who resorts to a reduced-form migration equation, and Hunt and Greenwood (1984), who explicitly control for feedback of U.S. interstate migration to local labor markets.

The availability of new, micro data on individuals and households containing information on migration, together with advances in econometric techniques to analyze these data, opened up vastly improved avenues for empirical migration studies. As Stark and Bloom (1985) point out, the econometric techniques that have most profoundly influenced migration research include methods to estimate limited dependent variable models, methods to correct for sample selection bias, and techniques to analyze longitudinal and pseudo-longitudinal data.

At the level of the individual, migration usually entails a discrete, dichotomous or polychotomous choice. At the household level, time allocated to migration is a continuous variable; however, it is censored at zero (and also upward, at the family's total time endowment). Analyses based on the estimation rules presented earlier requires either a reduced-form approach, in which income or expected-income terms are replaced by a vector of exogenous (i.e., human-capital) variables, or else direct estimation of structural income variables. The reduced-form approach has been used in a number of studies utilizing probit or logit estimation techniques (e.g., see Taylor, 1986, and Emerson, 1984). These studies test important hypotheses concerning rural migration behavior. However, they have the drawback that structural income variables do not appear in the estimated migration equation, seriously limiting the usefulness of the model for policy analysis.

Estimation of structural income terms is complicated by the fact that individuals and households select themselves into and out of migration, presumably according to their comparative

advantage in these activities. Data on migrant earnings or remittances are censored because they are observed only for those who migrate. Similarly, nonmigrant earnings are generally not available for those who are selected into migration. Because the migration selection process is endogenous, shaped by many of the same characteristics that determine earnings in each regime, average migrant earnings may not reflect what nonmigrants would earn if they migrated, and nonmigrant earnings may be a poor indicator of what migrants would earn if they did not migrate. This sample selectivity problem is identical to selectivity problems frequently encountered in the labor literature (e.g., Lee, 1978; Heckman, 1974; Willis and Rosen, 1979; Dickens and Lang, 1985; a useful review of estimation techniques for models involving selectivity is available in Maddala, 1983).

Multinomial logit, probit, tobit, two-stage (Heckman) and various maximum-likelihood techniques for estimating discrete-continuous models, not available or accessible two decades ago, today are widely used to estimate migration-decision models at a micro (individual or household) level. Recent examples include Perloff et al. (1998), Emerson (1989), Taylor (1987, 1992), Stark and Taylor (1989, 1991), Lucas and Stark (1985), and Barham and Boucher (1998).

Human Capital Variables in Migration Models

Human capital variables are incorporated into the analysis of individual migration decisions by expressing earnings and expected earnings in [2] through [5] as functions of individuals' socio-demographic characteristics. The models may then be estimated either in reduced form, by expressing migration probabilities as a function of exogenous individual (and household) characteristics, or else in their structural form, by obtaining estimates of relevant income and risk variables and subsequently including these in the migration equation. The second approach is considerably more complicated from a modeling point of view. However, it has the advantage that structural variables shaping migration decisions often are of greater analytical and policy interest than are the exogenous variables appearing in the reduced-form equation. Moreover, these exogenous variables may also appear in the structural equation, making it possible to isolate direct from indirect (through the income and risk variables) of these variables on migration using the structural approach.

Data Limitations and Rural Wages

Largely because of data limitations, explicit analysis of the role of uncertainty in shaping migration decisions (as in expression [3]) is not found in the literature. At the level of the individual, longitudinal data on migrants' wages and employment at their destination for estimating variances of migrant earnings are generally unavailable. Data on employment and wages in rural areas for individuals across time are also rare. Contemporaneous income variances may be estimated using cross-sectional data, e.g., by employing the approaches for estimating production risk proposed by Just and Pope (1977), Antle (1983), and others, provided that income outcomes are available for both migrants and nonmigrants and measures are taken to correct for potential sample-selection bias. The migration decision may then be treated as analogous to the choice of production technique in

which returns under alternative technologies are modeled following a Just-Pope specification (Taylor, 1986).

Conceptual difficulties with modeling rural wages further complicate the analysis. Much of the rural workforce, including many prospective migrants, do not receive a wage income, but rather, are involved in some sort of agricultural-household production. In these cases, the rural wage in the models above must be replaced by a "shadow" wage, as in farm-household models with missing labor markets (e.g., de Janvry, Fafchamps, and Sadoulet, 1991; Singh, Squire and Strauss, 1986), or by expected earnings imputed from this shadow wage. For an individual, earnings imputed at the shadow wage represent the net income from rural production foregone by migrating out of the rural sector. For a household, it is the net loss in income from rural production suffered as a result of the out-migration of a family member. The observed wage of rural wage earners may not accurately reflect this income loss unless hired and family labor are perfect substitutes. (For a discussion of the substitutability of family and hired labor see Bardhan, 1988.) Despite this limitation, the rural wage, multiplied by days worked on the family farm, is generally used as a proxy for the opportunity cost of migration in studies where individuals are the unit of observation. In household models, an approach involving estimation of income functions with and without migration is used, correcting for selectivity of migration (Barham and Boucher, 1998; Taylor, 1992; Taylor and Wyatt, 1996).

The use of rural wages is not likely to pose a problem in studies of rural labor migration in developed countries, where few labor migrants are engaged in household-farm production prior to migration. For example, in studies of U.S. farm labor migration, observed earnings of migrants and nonmigrants are used (e.g., Perloff et al., 1998, and Emerson, 1989). Nevertheless, because individuals are not randomly selected into these two groups, these, like studies of rural out-migration in LDCs, must test and correct for potential sample selection bias.

III
RURAL OUT-MIGRATION: EMPIRICAL EVIDENCE AND EVALUATION OF MIGRATION THEORIES

The empirical literature on determinants of rural out-migration is vast and spans a broad range of disciplines. Few studies, however, offer a basis to reliably test central hypotheses derived from the migration theories presented in Parts I and II, above. Empirical research is hampered by high levels of aggregation, the absence of appropriate controls, a lack of micro data sets containing information on the array of variables required to estimate neoclassical and especially NELM migration models, and unreliable survey designs. Remarkably, information on migration and remittances is absent from nearly all household-farm surveys, making it impossible to estimate even the simplest migration decision model. Given advances in migration theory and in econometric estimation techniques over the past two decades, data limitations currently are the major constraint on empirical migration research. Only in relatively few cases have advances in migration theory informed the collection of new household-farm data. As a result, tests of some of the most important and far-reaching propositions concerning migration and rural economies rest on a rather thin body of empirical literature.

Despite the potential richness of micro-level econometric analysis based on the migration decision rules presented earlier, most applied research has involved the estimation of aggregate migration functions of the general form of equation [6]. Wages and employment rates are included as regressors, but rarely is the Todaro expected-income term (the product of these two variables) included, and in even fewer cases is both a Todaro expected income term and a wage term included as a basis for testing the central hypothesis of a Todaro, versus a traditional neoclassical, model.

Results of econometric analyses of aggregate migration flows from LDC rural areas generally support both neoclassical and Todaro expected-income migration theories. (E.g., see reviews by Yap, 1977, and Todaro, 1980; Fields, 1979; Schultz, 1982.) That is, in most cases, differentials in average wages or incomes between regions are significant in explaining migration flows, in the expected direction. When differences in unemployment rates, the Todaro proxy for job probability, are also included, they typically have independent explanatory power. In the few studies reporting direct tests of the Todaro expected income hypothesis, i.e., by including both an expected wage variable and wages as regressors, the expected wage term comes out to be significant (e.g., see Barnum and Sabot (1975) for Tanzania, Levy and Wadycki (1974) for Venezuela, House and Rempel (1976) for Kenya, and Fields (1979) for Colombia).

During the 1960s, there was an average of one million rural-urban migrants in the United States each year, and migrants and their children were involved in disturbances associated with civil rights protests in major US cities. Many leading agricultural economists set out to examine the determinants and effects of rural-urban migration. The 1960s witnessed an explosion of aggregate-level research on farm labor migration and rural-urban labor-market linkages, perhaps best exemplified by the studies in Bishop (1967) and in the report to the President's National Advisory Commission on Rural Poverty (1967). The sharp divergence in incomes between the farm and nonfarm sectors was attributed to "the failure of the labor market to transfer sufficient quantities of

manpower from farms (Bishop, 1967)." This view motivated research aimed at estimating, and designing policies to increase, the elasticity of labor supply from farms to the nonfarm sector, while recognizing social costs associated with rural out-migration, particularly for rural areas.

Schuh (1962), in a pioneering study that anticipated Todaro (1969), found econometric evidence that increases in expected nonfarm income, either through a reduction in unemployment or an increase in wages, resulted in large shifts in farm labor supply to the left. He also found that farm incomes could be raised, although not greatly, by price support programs and that education positively affected farm incomes, both by accelerating migration and by raising the productivity of the labor force remaining in agriculture.

Echoing Lewis while also suggesting impediments to mobility out of agriculture, Jones and Christian (1965) argued that "the redundant supply of labor in agriculture...is perpetuated by a lack of opportunity in alternative occupations. Agricultural labor is 'trapped' in the 'other America." Others (e.g., Presidents National Advisory Commission, 1967; also see papers in Heady, 1961) suggested that the rate of rural out-migration may have been excessive. The movement of people out of agriculture potentially creates social costs. Maddox (1960) classifies the costs of rural out-migration into three categories: those falling on the migrants, themselves; those borne by the communities from which migrants move; and those affecting the communities to which migrants relocate. Maddox concluded that public action was warranted to offset negative externalities associated with out-migration from rural communities, particularly those related to human capital losses. Johnson (1960) cautions that one cannot say with certainty whether a reduction in farm labor will reduce total farm output; if it is associated with a move toward equilibrium, output may increase, while average earnings per farmworker may rise.

The President's National Advisory Commission on Rural Poverty (1967) concluded that "the mass exodus from low income rural areas...has meant that those left behind are often worse off than before." This conclusion reflects a partial-equilibrium view, i.e., that population decline creates a factor-market disequilibrium, reducing the incomes and welfare of those left behind. It ignores the equally plausible role of migration as an ameliorator of disequilibria (e.g., correcting a state of "too many farmers"). Gardner (1974), based on a two-stage least squares analysis of U.S. census data, found that, during the 1960s, the rate of states' farm population loss was positively associated with the rate of growth of average rural-farm family income, and it had no adverse effect on rural nonfarm incomes. If off-farm migration created disequlibria and transitory income losses, it would appear that "the people left behind" were sufficiently mobile to adjust over the ten-year period covered by Gardner's study.

Carrying Schuh's analysis forward, Barkley (1990) found that economic growth resulting in rising returns to nonfarm relative to farm labor significantly explained the occupational migration of labor out of agriculture between 1940 and 1985. The elasticity of out-migration with respect to the ratio of nonfarm/farm average labor products (a proxy for wages) was estimated at 4.5. In contrast to Schuh (1962), however, controlling for this labor returns variable, urban unemployment did not deter labor migration, and the effect of agricultural policies (government payments to agriculture as a share of farm income) on labor migration from agriculture was insignificant. The decreasing effect

of these unemployment and agricultural policy variables that were a focus of U.S. migration research in the 1960s probably reflects both that rural-to-urban migration had largely run its course by the end of the period considered by Barkley (1990), and that the principal source of labor for U.S. agriculture had shifted from domestic to foreign.

Migration elasticities were also key inputs into some research on measuring the economic returns to labor-displacing agricultural research. Because many labor-saving agricultural innovations are developed with public funds at public institutions, the rural-urban migration induced by publicly-funded research became an issue in the United States several times during the 20th century. By releasing labor from agriculture, publicly-supported research "saved" inputs. Schultz (1953) pioneered studies of the value of inputs saved as a result of agricultural research, generating very high estimates of the rate of return to public research investments. Input savings of $10 billion in 1950 exceeded the cumulative $7 billion expenditures on agricultural research between 1910 and 1950 (in 1950 dollars).

However, if those displaced from agriculture are not re-employed in the higher wage nonfarm sector, and if the costs of these individuals' persisting unemployment are taken into account, estimated returns to agricultural research can fall sharply. Schmitz and Seckler in 1970 used the value-of-inputs-saved approach to measure the return to research on processed tomato mechanization. Based on the value of the hours of labor saved, they estimated in 1983 that the "gross" return to research expenditures was 929 percent to 1282 percent when the opportunity cost of funds was 6 percent. However, if it is assumed that displaced workers receive compensation equivalent to 50 percent of their previous wages, the return to tomato harvester research falls to between 460 and 814 percent. Richard Day (1967) noted that, if those displaced from agriculture wind up in concentrated poverty in cities, then efforts to speed up the diffusion of labor saving innovations and hasten migration may simply transfer rural poverty to urban poverty .

Schmitz and Seckler noted that compensation could be paid to displaced workers who migrated from rural to urban areas, making public investment in labor-saving agricultural research highly desirable nonetheless. However, there was no displacement compensation available for most farmworkers, who were excluded from many of the programs developed in the 1930s to cushion the effects of labor market adjustments, including unemployment insurance. In the late 1970s, when the United Farmworkers' Union was at its peak strength, it sued the University of California over publicly-funded mechanization research that displaced workers. The suit was settled, but one result was that public funds spent on labor-saving research declined sharply (Martin and Olmstead, 1985).

In LDCs, the preponderance of aggregate studies found that the effects of employment-related variables generally equaled or exceeded those of wage-related variables (Massey et al., 1993 and 1994); Schultz (1982) is one of the few exceptions. For example, Maldonado (1976) found that differentials in both unemployment and wages significantly explained the volume of migration from Puerto Rico to the mainland United States, but the effect of the unemployment variable dominated that of the wage variable. Massey et al. (1994) re-estimated the Maldonado model, replacing the

wage ratio with the ratio of expected wages (wages times employment probabilities). They found that unemployment rates still dominated the expected wage ratio in predicting out-migration to the mainland. Ramos (1992) and Castillo-Freeman and Freeman (1992) argue that displacement resulting from structural changes drive migration more than fluctuations in wages. An alternative explanation for the importance of the employment variable is suggested by Hatton and Williamson's (1992) excellent historical analysis of migration to the United States. They conclude that wage differentials shape the underlying propensity to migrate and drive long-term trends, but unemployment rates determine the timing of migration and thus are more important than wages in explaining year-to-year fluctuations in migration rates. Evidence that employment effects dominate wage-rate effects is also provided by Straubhaar (1986) for migration from southern to northern Europe and Walsh (1974) for migration between Ireland and Britain.

The impacts of wage and employment-rate differentials on migration are not invariant across migration type. A body of econometric research on Mexico-to-U.S. migration flows lends support to the expected income migration model in explaining illegal and contracted-labor migration across borders. However, expected-income variables appear less effective at explaining legal migration. Most illegal-migrant and contracted (bracero) flows originate in rural Mexico. Jenkins (1977) modeled bracero and illegal migration (proxied by apprehensions) between Mexico and the United States between 1948 and 1972, finding that the Mexico-U.S. wage differential had a positive effect on both, as predicted by a neoclassical model. The wage effect was particularly strong when total (bracero plus illegal) migration was modeled. Blejer, Johnson, and Prozecanski (1978) extended this research by including legal migrants, as well. The explanatory variables included the ratios of Mexico/U.S. unemployment, industrial wages, and agricultural wages. They found that the unemployment ratio was significant and of the expected sign, and most of the explanatory power of this variable came from variation in the Mexican unemployment rate. Controlling for this unemployment effect, relative wages did not significantly affect migration. The model performed considerably better for illegal than for legal immigrants, however. White, Bean and Espenshade (1990) found strong econometric evidence that both unemployment and wage ratios explain illegal Mexico-to-U.S. migration (measured by the log of monthly apprehensions) from 1977 through 1988. In an imaginative econometric analysis of Mexico-to-U.S. migration and trade in winter vegetables, Torok and Huffman (1986) found that both U.S. wages and unemployment rates significantly affected the U.S. demand for illegal-immigrant workers (proxied by border apprehensions), while wages in Mexico significantly affected Mexico's supply of such workers.

Only two of the 18 studies reviewed by Todaro (1980) and Yap (1977) use micro-level, rather than aggregate, data. As indicated earlier in this chapter, the major difficulties in estimating micro-econometric models of rural out-migration stem not only from data deficiencies but also from potential problems arising from sample selectivity. The selection of individuals into and out of migration is endogenous, reflecting the comparative advantages of individuals and households in migration and nonmigration work (Taylor, 1987; Emerson, 1989). Econometric techniques are well developed and are accessible to correct for such selectivity bias (e.g., see Maddala, 1983 and Lee, 1978). To correct for selectivity bias, typically an inverse-Mills ratio, obtained from a first-stage, reduced-form probit regression, is included in income or earnings equations for migrants and nonmigrants, following Heckman's (1974) two-step estimator. This selectivity-correction procedure,

in addition to resolving selectivity bias, also yields insights into the relationship between expected returns from migration and individual or family migration decisions (e.g., see Emerson, 1989, and Taylor, 1987) and differences in remittance behavior between migrant populations (Funkhauser, 1995).

Unfortunately, few surveys provide the data on earnings (or household-income contributions) of both migrants and nonmigrants required to implement selectivity-correction techniques, and as a result, selectivity-corrected, structural models of migration decisions by individuals or households are rare. Notable exceptions are Emerson (1989), Robinson and Tomes (1982), Falaris (1987), Nakosteen and Zimmer (1980), Perloff et al. (1998), Taylor (1987). All of these studies employ a "mover-stayer" human-capital migration model that controls for sample selection bias when estimating the economic returns from migrating. In contrast to aggregate migration models, which generally follow a Todaro specification, micro-econometric studies fall either into the "neoclassical" or "Todaro" category. For example, the agricultural labor migration studies of Emerson (1989) and Perloff et al. (1998) utilize expected earnings, which are shaped by both wages and employment, as their income variable, while Robinson and Tomes (1982) and Falaris (1987) use only wages.

Emerson (1989) provides an excellent example, in the context of U.S. agricultural labor migration, of how human capital theory, combined with micro data and appropriate econometric techniques for limited dependent variables and selectivity correction, yield insights not available from aggregate migration models. Employing a mover-stayer model, he offers micro-level support for the expected income model in a study of migratory labor and agriculture in the United States (Florida). Emerson first estimates separate earnings equations for migratory and nonmigratory work, correcting for sample selection bias. The estimated earnings in the two regimes are then used in a structural probit regression for migration. The results indicate that workers migrate for seasonal work in response to an expected wage differential favoring migratory work. Expected earnings for nonmigrant workers exceed those for migrant workers, and migrants are found not to have an absolute advantage in migratory work. Nevertheless, Emerson shows that individuals specialize in the type of work in which they have a comparative advantage. Because farmworkers' expected earnings are a function of both wages and employment, Emerson's model falls squarely into the Todaro theoretical framework.

Perloff et al. (1998) follow a similar approach in their econometric study of seasonal agricultural worker migration in the United States, using data from the National Agricultural Workers Study (NAWS) for 1989 through 1991. A novelty of this study is that it decomposes expected earnings into wages and employment, making it possible to examine the factors influencing each. Their findings support Emerson's (1989) conclusion that migration responds to expected earnings differentials across locales; however, the expected-earnings effect is small: employers must offer large earnings premia to induce workers to move. Earnings increases from migration are found to be due primarily to wage differentials, not to hours worked. Forty-eight percent of all seasonal farmworkers were found to migrate at least 75 miles in a given year.

Robinson and Tomes (1982), like the remaining studies in the above list, do not focus on rural migration; however, their study of interprovince migration in Canada is one of the earliest applications of a mover-stayer model to interregional migration, and it is instructive in illustrating the importance of selectivity effects when estimating returns from migration. They found that returns to migration were overstated when selectivity was not taken into account. Individuals who moved from place A to place B earned more at place B than people who stayed at A would have earned at B. Taking into account selectivity, individual migration was found to depend significantly on potential wage gains. When selectivity was ignored, however, the wage effect became insignificant. Like most studies, Robinson and Tomes also found that, consistent with information theory, both language and education increased mobility of most groups. However, education reduced the mobility of Quebec francophones. The exclusion of employment variables limits this study's relevance for cases in which unemployment is a consideration at migration origins and/or destinations.

NELM Models

A large and growing body of research offers both circumstantial and direct evidence supporting the NELM view that migration decisions take place within a family or household context and are influenced by families' efforts to overcome poorly-functioning or missing risk and credit markets. Most of the NELM literature has been cast in the context of rural-to-urban migration. However, in light of relatively high wages available in developed countries (especially compared with LDC rural areas) and a low correlation between these wages and incomes in migrant-sending areas, international migration potentially represents a particularly effective strategy for minimizing family income risks and overcoming liquidity constraints. The importance of migrant, and especially foreign-migrant, income in the "income portfolios" of migrant sending households is documented in a diversity of settings (e.g., Massey et al., 1994; Stark, Taylor and Yitzhaki, 1986; Oberai and Singh, 1980; Knowles and Anker, 1981).

Taylor (1987) tests for the significance of expected household income variables in shaping international (Mexico-to-U.S.) migration from rural Mexico. Using data on contributions to household income by migrants and nonmigrants, a selectivity-corrected structural probit migration model is estimated for a sample of households in Michoacán, traditionally the largest source-region for Mexico-to-U.S. migration. Consistent with both a Todaro expected-income and NELM model, increases in expected income contributions from migration by individual family members are found to significantly and positively explain the allocation of these individuals to migration. However, controlling for this expected-income gain, several other individual and household variables also significantly explained migration, through their effect on migration costs or other NELM considerations. Anticipating Emerson's finding that comparative advantage considerations influence migration, this study found that individuals who migrated to the United States were not above-average contributors to rural Mexican household incomes, either as workers in Mexico or as migrants in the United States. However, family members with the highest expected contributions to rural Mexican households as nonmigrants were significantly less likely to migrate to the United States.

Family migration networks, or the presence of contacts at prospective migrant destinations, are consistently found to be among the most important variables driving migration (Greenwood, 1971; Nelson, 1976; Massey et al., 1987), particularly to destinations that are associated with high migration costs and risks and a scarcity of information (Taylor, 1986). In the case of rural Mexico-to-U.S. migration, assistance from family members already in the United States is often instrumental in financing new migration. These family contacts also lowered the psychic costs of living and working abroad and played an important role in providing information.

The NELM also hypothesizes that extra-household variables influence migration decisions. Building upon Taylor (1987), Stark and Taylor (1989) test the hypothesis that, controlling for expected absolute income gains from migration, a household's relative income position within its reference group (village) influences migration incentives. They include a measure of households' initial relative deprivation in a structural probit equation for migration. This variable has a positive and significant impact of the probability that rural Mexican households send migrants to the United States. The relative deprivation hypothesis turns on the stability of reference groups in the face of migration; both the migrant and the rest of the household must continue to view the village as the relevant reference group after migration occurs. This is more likely in the case of international migration, into a distinct cultural, social, and economic milieu, than for internal migration. In a subsequent study, Stark and Taylor (1991) find that relative deprivation significantly raises the probability of international (Mexico-to-U.S.) but not internal migration.

Tests of impacts of risk on migration decisions (and vice-versa) hypothesized by the NELM are scarce, largely because of data availability. Rosenzweig and Stark (1989), using unique longitudinal data from India, test the hypothesis that the "exchange" of individuals between households through marriage reflects efforts by households to mitigate risk and smooth consumption in a context of information costs and spatially covariant risks. They find that (a) marriage cum migration reduces variability in consumption, given the variability of income from crop production; and (b) households exposed to higher income risk are more likely to invest in long-distance migration-marriage arrangements. A unique feature of NELM risk models is the possibility of a positive relationship between distance and migration probabilities. In a Todaro model, distance represents a cost of migration and therefore discourages it.

A less direct test of NELM risk-and-migration hypothesis appears in Lucas and Stark (1985), the first attempt to test NELM predictions of migration and remittances. Using cross-sectional farm household data from Botswana for a drought year, a key implication of the NELM--that migrants function as insurance intermediaries--is explored. Families at greater risk of temporary income loss as a result of the drought are found to receive significantly greater remittances in the drought year. The study rejects a "pure altruism" model of remittance behavior, while finding evidence of an inheritance motive to remit.

Echoing Lucas and Stark, Hoddinott (1994) found evidence from west Kenya that wealthier parents, who can offer a greater (inheritance) reward for remittances, extracted a larger share of migrant earnings through remittances. He also found evidence that the credibility of the parental

threat to reduce future bequests had a positive effect on remittances, controlling for migrants' earnings.

The roles of family ties are central to Mincer's (1978) and Borjas' (1990) migration-probability models. Borjas (1990) models migration in the context of "dynastic households," positing the welfare of children as an important variable explaining migration decisions. Building upon these and the dynastic fertility model of Barro and Becker (1986), Tcha (1996) finds compelling evidence that reciprocal altruism between generations significantly affects rural-to-urban migration in Korea and in the United States. If migration decision makers' altruism toward their children is high, the weight attached to their own expected income gains from migration (the Todaro variable) may be low relative to the weight attached to the descendants' incomes. If the descendants' permanent incomes are sufficiently large in urban areas (and with urban schooling), migration may be optimal in the absence of a positive urban-rural expected income differential for the parents, provided that parents' altruism toward their children is high. These studies reflect the NELM's emphasis on intra-familial ties when modeling migration decisions; however, they depart from most NELM research by restricting migration to moves by entire households rather than treating migration as a mechanism to diversify family labor allocations across space.

Lucas (1987), Taylor (1992), and Taylor and Wyatt (1996) (see Part IV, below) offer findings consistent with the NELM hypothesis that families participate in migration in an effort to overcome liquidity constraints on local production.

Rosenzweig (1980) tested the hypothesis that capital market and information constraints restrict labor mobility within rural areas. He found that laborers with land are less mobile than the landless. Balan, Browning, and Jelin (1973) and Nabi (1984) find that rural to urban migrants from households owning land in rural areas are more likely to be temporary migrants. In these studies, the negative effect of land ownership on mobility (or duration of migration) is attributed to the difficulty of selling land holdings without suffering a capital loss. That is, mobility is reduced because of a capital-market imperfection: part of the capital accumulated by rural residents is not transportable.

More on the Selectivity Effects of Migration

The findings from studies presented earlier indicate that migrants are selected on key characteristics, including their expected earnings potential as migrants and nonmigrants. Individual human capital and household variables, in turn, affect individuals' and households' incomes with and without migration. Because of this, there is a "derived" selectivity of migration on specific individual and household characteristics, through the differential effects of these characteristics in migrant and nonmigrant labor markets. As human capital theory (Sjaastad, 1962) would predict, migrants tend to be younger than their counterparts who do not migrate. Household variables that influence individuals' income creation as migrants and/or nonmigrants (e.g., family migration networks or landholdings) often are found to significantly affect migration, as well. The effects of some human capital variables differ sharply across migrant destinations. For example, education typically promotes rural out-migration, but not to all potential migrant destinations. Individuals

significantly take their education to labor markets where they will reap the highest economic return to their schooling. In addition to a derived selectivity, through income, there also appear to be direct effects of schooling, age, and other individual and household variables on migration that are independent of expected income (e.g., Massey et al., 1994; Taylor, 1987).

There is evidence that migration is selective on extra-household variables, as well. Schultz (1988) and Rosenzweig and Wolpin (1984) found that migration in Colombia is selective of characteristics of regions (i.e., relative prices): households sorted themselves across localities with different relative prices. Selectivity of migration based on extra-household variables (e.g., local income disparities) is also documented by Stark and Taylor's (1989, 1991) studies of relative deprivation and migration, described above.

The selectivity of rural out-migration may differ not only across migrant destinations but over time, as well. For example, the Binational Study of Mexico-to-U.S. Migration (U.S. Commission on Immigration Reform, 1997) found that this migration is not only highly selective, reflecting differences in information and the costs and benefits of migration across individuals and households in Mexico, but also that this selectivity process has changed substantially in response to changing characteristics of migrant labor demand in the United States, migrant labor supply in Mexico, and the networks of contacts with family and friends that link prospective migrants with U.S. labor markets. Labor migrants from rural Mexico, once almost entirely solo men with limited schooling, are increasingly female, married, and better educated than those who stay behind. Key human capital variables like schooling may yield low returns in rural areas compared with urban areas, but there may be little reward for education in some migrant labor markets, as well--e.g., low-skill labor markets abroad in which unauthorized immigrants frequently are concentrated.

Taylor (1986) found that schooling had a positive effect on rural out-migration but a significant negative effect on migration to the United States from a sample of rural-Mexican households in 1983 (Taylor, 1986). Taylor (1987) found that, controlling for migration selectivity, the income returns to schooling for rural Mexican households were positive for internal migration but insignificant for Mexico-to-U.S. migration, which usually entailed work as illegal immigrants in low-skill activities. Because of this, schooling was negatively related to household income from international migration. However, using data from a more recent survey that included these same households, Taylor and Yunez-Naude (1998) find that, in 1993, the schooling effect on family income from Mexico-to-U.S. migration had turned significant and positive. This change may be attributable to Mexico's economic crisis of the mid-1980s and early 1990s, which dramatically reduced expected earnings for urban workers in Mexico.

Using aggregate data on migration between Puerto Rico and the U.S. mainland, Castillo-Freeman and Freeman (1992) and Ramos (1992) also find evidence of shifting migrant selectivity over time. There, however, migration selection increasingly favored the unemployed and individuals with little schooling, apparently because of an increase in the island's minimum wage that reduced employment in low-wage industries (Castillo-Freeman and Freeman, 1992).

IV
IMPACTS OF MIGRATION ON RURAL ECONOMIES

In both classical and neoclassical (including Todaro) migration models, the only avenue through which rural out-migration may impact the rural economy is through labor markets. Migration represents a loss of human resources for rural migrant-sending areas. If there is surplus rural labor, however, this labor loss has zero opportunity cost. In the theoretical world developed by Lewis (1954), for example, where the rural migrant-sending areas are characterized by a surplus of workers and a perfectly elastic labor supply, the loss of human resources through migration does not provoke a production decline, nor does it exert upward pressure on rural wages. The only potential welfare effect of out-migration on the rural economy is an increase in the average product of labor for the non-migrating rural population, assuming that rural households cease to support out-migrants once they leave, and vice-versa.

Graphically, this condition is depicted by a marginal product curve for labor in the rural sector that is no longer positive once the entire work force is employed. In Figure 3, any labor force size in excess of L_1 is "redundant" in the sense that it does not contribute positively to agricultural production. This condition means that an amount of labor equal to $L_T - L_1$ may be withdrawn from the rural workforce without inflicting a production loss. As this labor is withdrawn, the average product of labor--total production divided by the remaining rural workforce--increases (Ranis and Fei, 1961). Beyond this point, the opportunity cost of emigration for the sending economy becomes positive. Once the marginal product of rural labor exceeds the urban wage w_u, we leave the classical Lewis world and enter the Neoclassical world.

The validity of the Lewis surplus labor hypothesis has been challenged empirically by research showing that, even where surplus-labor conditions prevail most of the year, seasonal bottlenecks may produce a marginal product of labor that is positive (see Gregory, 1986, for example). In this circumstance, the opportunity cost of rural out-migration is not zero, since the loss of workers yields production declines in seasonal activities.

Lewis (1954) actually pays considerable attention to the interaction between rural development and migration. However, the Lewis model (and especially its interpretations) has been criticized for implicitly treating the rural sector as a black box from which surplus labor is drawn for use in an expanding modern sector. As such, most treatments of this model offer limited insights into the interactions between migration and rural development.

The Todaro model produces a richer set of rural welfare and policy implications than either its classical or neoclassical predecessors, implicitly shifting the migration and unemployment policy focus from the urban to the rural (i.e., labor-supply) sector in two ways. First, a high migration elasticity with respect to urban jobs means that an urban employment-generation project may result is more, not less, urban unemployment. (Considerations of urban or rural unemployment lie outside the realm of the traditional neoclassical migration model.) Because higher urban employment increases the urban expected wage and triggers more migration, policies operating solely on the labor-demand (i.e., urban) side are not likely to

significantly reduce urban unemployment. Second, estimates of the shadow price of rural labor to the urban sector are likely to be biased downward if the migration elasticity is ignored. The lost agricultural product of the migrant who secures an urban job does not represent the full opportunity cost of rural out-migration if more than one rural worker is induced to migrate. The opportunity cost for the rural sector also includes the loss of agricultural production of others who migrate but are less fortunate in finding urban employment.

Theoretical economic research on the welfare costs of labor and capital lost to migration focuses principally on international migration. However, the findings of this research are equally relevant to rural out-migration, either to destinations domestic or abroad.

In a perfectly competitive, neoclassical world (without surplus labor or other market imperfections), a worker is paid the marginal value of what he or she produces prior to emigrating. Based on this assumption, early theoreticians argued that emigration should have a neutral effect on the economic welfare of nonmigrants: any decrease in local production attributable to the loss of labor through emigration should equal the wages that workers received prior to emigrating (Grubel and Scott, 1966). Although local production may decline by an amount equal to the marginal product of the migrant who has departed, the size of the economic pie available to those who do not migrate is exactly the same as before.

Consider an economy characterized by a production function that is homogeneous of degree one, i.e., $y = f(k)$, where y and k are the output-labor and capital-labor ratios, respectively, and $f'(k) > 0$. In this case, outmigration increases k and thus the income per head of those left behind. This basic conclusion does not change when migrants own capital but leave it behind, even if they continue to receive the income generated by their capital. (MacDougal (1960) and Kemp (1974) present a formally identical argument for the case of foreign investment.) The only case in which those left behind may be worse off is when the migrants own a lot of capital and take it with them.

In a Lewis (1954) world of surplus labor, emigration leaves total production unchanged, and the average product of labor for nonmigrants unambiguously increases. However, if migrants take capital with them, the marginal product of labor curve may shift downward, increasing the size of the "redundant" work force and setting the stage for new rounds of rural out-migration. In this scenario, migration may reduce the average product available for nonmigrants.

The migration of migrant-owned capital out of the rural economy is not considered by either Lewis or Todaro. However, both Johnson (1967) and Berry and Soligo (1969) argue that the effect of out-migration on economic welfare in sending areas depends critically on how emigration affects the local capital stock--that is, on how much capital migrants take with them. A loss of capital through migration has two implications. First, the capital supply curve shifts inward, driving up the local rental rate on capital and raising marginal profits. Second, the loss of capital through emigration reduces the productivity of complementary labor inputs. This effect could be illustrated by an inward shift of the labor demand curve, which would reduce the

wages of those who stay behind. Berry and Soligo (1969) show that, under general neoclassical assumptions, the out-migration of labor lowers the total income of non-migrants unless (a) emigrants own a disproportionately large share of capital and (b) they leave this capital behind when they emigrate. If these conditions hold, emigration increases the capital/labor ratio for those who do not emigrate, thereby raising labor productivity and wages.

The most obvious instance in which conditions (a) and (b) above do not hold is the emigration of human capital--i.e., people with education, skills, entrepreneurial spirit, and a willingness to take risks. By definition, human capital is attached to the migrant and necessarily leaves the rural sector when he or she does. If migrants are positively selected with respect to human capital characteristics, therefore, it will cause a "brain drain" from the rural economy, the effects of which are similar to those of capital flight, lowering the productivity, and hence the wages, of complementary labor in migrant-sending areas.

Thus, two clear lessons relevant to understanding welfare effects of migration on rural areas emerge from early theoretical research on welfare effects of out-migration. First, the effects of labor emigration depend critically on how this migration affects the capital-labor ratio among non-migrants. Second, the distributional effects of emigration are likely to be unequal across socioeconomic groups. Rivera-Batiz (1982), in a seminal piece, explored the theoretical implications of emigration for capital-rich and labor-rich individuals. He showed that if migrants take capital with them, then the real income of capital-rich individuals unambiguously increases, but the effect on labor-rich individuals is unclear. Other studies (Wong, 1983; Quibria, 1988; Davies and Wooton, 1992) offer theoretical support to the argument that emigration both is globally beneficial to those who do not migrate and reduces income inequality in migrant-sending areas, provided that it results in an overall increase in the capital-labor ratio within the migrant-sending economy.

Remittances and Welfare

Migration not only produces lost-labor, and possibly also lost-capital, effects on rural economies. It also represents a potentially important source of income and savings, through migrant remittances. Djajic (1986), in an extension of the neoclassical research cited earlier, concludes that nonmigrants benefit from emigration, even if they do not receive any of the remittances themselves, provided that the magnitude of migrants' remittances exceeds a critical threshold roughly equal to the value of the production they would have produced had they stayed behind.

Measuring remittances is difficult because migrants often enter developed countries outside of official channels and repatriate their earnings through informal means. Money may be returned in the form of goods purchased abroad or in the form of cash savings brought back by migrants or visiting family members, what Lozano Ascencio (1993) calls "pocket transfers."

Despite these difficulties, research indicates that migrant remittances, like other types of income transfers, contribute to rural migrant-sending economies in at least three ways: first, they increase income directly, by raising incomes of migrant-sending households; second, they may also raise local incomes indirectly by enabling families to overcome liquidity and risk constraints on local production (the NELM effects described above); and third, they create general-equilibrium effects inside and outside the rural economy.

A number of studies present econometric estimates of remittances in LDCs (e.g., Banerjee, 1984; Johnson and Whitelaw, 1974; Lucas and Stark, 1985; Rempel and Lobdell, 1978). Unfortunately, few take into consideration the self-selectivity of migration when estimating remittance functions. Exceptions include Hoddinott (1994) and Taylor (1987), which are discussed below.

NELM Impacts

Few researchers have attempted to test the implications of migration for rural incomes and welfare in a NELM framework. The few that do find evidence that migration unleashes an array of indirect effects on rural economies that are largely outside the realm of neoclassical migration models.

Lucas (1987) uses aggregate time-series data on migration to the Union of South Africa from five African sending nations. His econometric analysis finds that the opportunity cost of wage labor, which includes migration, is large: output in migrant-sending households falls as labor is withdrawn from farm production. However, he also finds a positive feedback of migrant remittances on production. Two possible explanations for the second finding are, first, that migrant remittances are invested in production at home, which loosens financial constraints on productivity-enhancing ventures and yields a higher output, and second, that migration diversifies income sources and encourages risk-averse households to undertake unproven, but potentially productive, investments.

Consistent with these predictions, Adams (1991b) finds that rural Egyptian households containing foreign migrants have a higher marginal propensity to invest than do their non-migrant counterparts. Migration thus has a positive effect on investment that is independent of its contribution to total household income. Policy biases against agriculture, however, discourage agricultural investments in favor of land purchases, yielding the remittance-use pattern frequently observed in community studies.

Taylor (1992) estimated the marginal effect of migrant remittances on farm income and asset accumulation using data from households interviewed at two points in time in rural Mexico. Initially (in 1982), the marginal effect of remittances on household income was less than unity--that is, a $1 increase in remittances produced less than a $1 increase in total income within remittance-receiving households--an effect that is consistent with the hypothesis that the marginal product of migrant labor is positive prior to migration.

In a later period (1988), however, the marginal impact of remittances on total income was greater than unity: a $1 increase in remittances brought a $1.85 increase in total household income. This finding is consistent with the view that remittances loosen constraints on local production, once migrants become established abroad. In the Mexican case, Taylor (1992) also found that remittances promoted the accumulation of livestock over time and increased the rate of return to livestock assets (through complimentary investments). Moreover, subsequent research using these data showed that, consistent with NELM theory, the marginal income effect of remittances was greatest in the most liquidity-constrained households (Taylor and Wyatt, 1996).

The micro impacts of migration and remittances on agricultural productivity are complex and have been little explored. Rozelle, Taylor and deBrauw (1999), using simultaneous-equation methods and a unique data set from China, found that the loss of labor to migration significantly reduced grain yields, reflecting an absence of on-farm labor markets. However, migrant remittances significantly increased yields, partially offsetting the negative lost-labor effect. Overall, Rozelle et al.'s findings suggest that constraints in the operation of on-farm labor and capital or insurance markets both provide households with a motivation to migrate and distort on-farm operations when labor leaves. Policies alleviating these market constraints could increase production efficiency while reducing the need to send migrants out into the labor force to finance on-farm activities and/or insure against income shocks.

These studies, while offering econometric evidence in support of the new economics of labor migration, also suggest that the relationship between migration and development is not invariant over time or across settings. Over time there appears to be a pattern first of negative and then of positive effects of migration on non-migration income in sending households. Across settings, the extent of the positive effect depends on the profitably of investments in new production activities, which in turn depend on other local conditions.

In the rural Mexican communities studied by Taylor, livestock production proved to be a viable income-generating activity because pasture land was available, transportation links were relatively well-developed, and marketing facilities were accessible. Once households were able to overcome the constraint of having limited resources to invest in livestock herds, the potential for economic growth and development was quite large. In other communities, however, profitable investment opportunities in cattle-raising were limited by environmental conditions, market constraints, and government policies that structured the terms of trade against agricultural production.

Thus, government policies represent a vital link between migration and development. Compared with the neoclassical model posited by Todaro and others, the new economics of labor migration developed by Stark and his successors leads to a radically different set of policy prescriptions to reduce emigration. Rather than intervening directly in labor markets, governments that wish to reduce out-migration should attempt to correct failures in local capital and risk markets, thereby offering households credit and insurance alternatives to migration. In

the new economic model, failures in credit and risk markets are the fundamental causes of international migration, not a low equilibrium wage in the labor market.

General-Equilibrium Effects

Both rural out-migration and migrant remittances may generate important general-equilibrium effects, as well, including feedback on the rural economy. For example, Mexico-to-U.S. migrant remittances in excess of $4 billion annually (U.S. Commission on Immigration Reform, 1987), most of which flow into Mexico's rural economy, increase rural households' demand for both food and manufactured goods. In this way, they generate demand linkages that may stimulate rural production activities and also incomes and employment in urban areas. Increases in urban incomes, in turn, increase the demand for food and other goods produced in rural areas.

General-equilibrium effects of migration and remittances on rural economies can be estimated using economy-wide modeling techniques, which trace how both remittances and the labor lost to migration income and production as they work their way through the migrant-sending economy. Unfortunately, with a few exceptions, economywide techniques have not been utilized to examine the impacts of out-migration on rural economies. The few that have offer evidence at both the national (Taylor et al., 1995) and village (Taylor and Adelman, 1996; Taylor, 1996; Adelman, Taylor, and Vogel, 1988) levels that migrant remittances produce significant multiplier effects on migrant-sending economies; that in the case of international migration, these effects are particularly important for rural areas; and that remittances also tend to have an equalizing effect on the distribution of income among socioeconomic groups.

Kim (1983, 1986) found that between 3% and 7% of 1976-81 GNP growth in South Korea was attributable, directly or indirectly, to migrant remittances. Ro and Seo (1988) set the figure at a remarkable 33% in 1982. Likewise, Hyun (1984) reported that a 10% increase in remittances brought a 0.32% increase in private consumption, a 0.53% increase in fixed investment, a 0.22% increased in GDP, and a 0.13% increase in prices. Based on his CGE analysis of Bangladesh, Habib (1985) estimated that the money remitted by Bangladeshi overseas workers in 1983 gave rise to an additional final demand of $351 million, which, in turn, generated 567,000 jobs. Ali (1981) and Mahmud (1989) found that while remittances to Bangladesh were targeted primarily to current consumption, a significant share went to nontraded goods such as land, housing, and education. After estimating employment multipliers, Stahl and Habib (1991) found that each migrant created an average of three jobs through remittances. Taylor et al. (1995) concluded that, in Mexico, remittances flow disproportionately into poor rural and urban households, and they create second-round income linkages that also favor the poor. In other words, many of the benefits of remittances accrue to households other than the ones that receive them, both inside and outside the rural economy; income linkages between migrant and non-migrant households transfer the benefits away from the remittance-receiving household.

Village research by Adelman, Taylor and Vogel (1988) estimated "remittance multipliers" from international migration to be equal to 1.78; that is, $1 of international migrant remittances generated $1.78 in additional village income, or 78 cents worth of second-round effects. The additional income was created by expenditures from remittance-receiving

households, which generated demand for locally-produced goods and services, bolstering the incomes of others in the village. They also found that remittances created new rural-urban growth linkages by increasing the demand for manufactured goods produced in Mexican cities. Finally, remittances stimulated investments in physical capital and schooling (by $.25 and $.13 per dollar of remittances, respectively) among both migrant and nonmigrant households in the village.

Village CGE studies from Mexico, Java, Kenya, and El Salvador find that migration tends to compete with local production for scarce family resources, raising rural incomes but in some cases producing, in the short run, a "Dutch disease" effect on migrant-sending economies. In the long run, however, remittance-induced investments appear to create positive effects of migration on community income. Both the household and regional effects of migration depend, however, on how remittances, and the losses and gains of human resources through out-migration, are distributed across households, on the existence of nontradable consumer and investment goods in the migrant-sending economy, and on production constraints in different households (Taylor and Adelman, 1996).

In general, migration is likely to have the largest positive effect on rural economies when the losses of human and other capital from out-migration are small; when the benefits of migration accrue disproportionately to households that face the greatest initial constraints to local production; and when households that receive remittances have expenditure patterns that produce the largest rural income multipliers.

Migration, Inequality, and Rural Welfare

A number of researchers have examined the distributional effects of migrant remittances by comparing income distributions with and without remittances (Barham and Boucher, 1998; Oberai and Singh, 1980; Knowles and Anker, 1981) or by using income-source decompositions of inequality measures (Stark, Taylor and Yitzhaki, 1986, 1988; Adams, 1989, 1991a; Adams and Alderman, 1992). These studies offer conflicting findings about the effect of remittances on income inequality.

Stark, Taylor and Yitzhaki (1986) provide a theoretical explanation for these conflicting findings. They argue that rural out-migration, like the adoption of a new production technology, initially entails high costs and risks. The costs and risks are likely to be especially high in the case of international migration. Given this fact, pioneer migrants tend to come from households at the upper-middle or top of the sending-area's income distribution (e.g., Portes and Rumbaut, 1990; Lipton, 1980), and the income sent home in the form of remittances is therefore likely to widen income inequalities.

This initial unequalizing effect of remittances is dampened or reversed over time as access to migrant labor markets becomes diffused across sending-area households through the growth and elaboration of migrant networks (see Massey, Goldring, and Durand, 1994). Thus,

Stark, Taylor and Yitzhaki (1988) found that migrant remittances had an unequalizing effect on the income distribution in a Mexican village that recently had begun to send migrants to the United States, but an equalizing effect on another village that had a long history of participating in Mexico-to-U.S. migration. They then conducted a welfare analysis of remittances using a social welfare function sensitive to both per-capita income and inequality. Remittances were shown to increase rural welfare in the case of both villages, although the positive effect of remittances on inequality dampened the welfare effect in the first village.

Taylor (1992) extended this analysis by taking into account the indirect effects of international migration on income and asset accumulation over time. He provides longitudinal evidence in support of the Stark-Taylor-Yitzhaki hypothesis. Lost labor effects tend to dampen the unequalizing effects of remittances in the short run, but the positive indirect effects of migration on household income in poorer families (achieved by loosening capital and risk constraints on local production) make migration more of an income equalizer in the long run.

Over time, the indirect effects of migration on both income and inequality become increasingly important. If the Stark-Taylor-Yitzhaki hypothesis is correct, then we would expect poorer households to have the largest capital and risk constraints on investments in local income-generating activities, and therefore, the largest incentives to place migrants abroad as "financial intermediaries" to facilitate the tasks of risk management and capital acquisition, other things being equal. Initially, however, barriers to international migration in the form of high costs, poor information, and uncertainty discourage poor households from sending their family members to labor abroad.

Stark, Taylor and Yitzhaki (1988) find evidence of such barriers in the Mexican case. As these barriers to international migration fall with the expansion of migrant networks, however, the benefits of international migration flow increasingly to the households that are most capital and risk constrained (i.e., lower income households). If these households invest in local income-generating activities, then indirect income effects should reinforce the increasingly favorable direct impacts of remittances on sending-area income distributions. This expectation is consistent with Taylor's (1992) and Taylor and Wyatt's (1996) findings from Mexico.

Findings from the relative deprivation migration studies of Stark and Taylor (1989, 1991) indicate that rural income inequality may be a determinant, as well as being influenced by, migration. In a Todaro model, a mean-preserving spread in the rural income distribution does not affect migration, because it leaves the expected income gains from migration unchanged. However, in a relative deprivation model, an increase in rural income inequality that makes some households more relatively deprived creates new incentives for migration by those households. The feedback of migration on relative deprivation may make rural out-migration a self-perpetuating process. As migration creates income gains for some rural households, it makes others (i.e., those not receiving remittance income) more relatively deprived. This, in turn, increases the latters' likelihood of participating in migration in an effort to overcome this relative deprivation in the future.

Migration's Impacts on Rural Migrant-Receiving Areas

A large and burgeoning literature addresses the impacts of immigration in developed countries, particularly the United States (for an excellent review, see Borjas, 1994). However, with very few exceptions, the focus of these studies has been on urban, rather than rural, labor markets. A nascent body of research examines the reshaping of rural economies in the United States through immigration. Interestingly, it echoes many of the themes and findings of research in the 1960s and 1970s on the impacts of rural population change in the United States (see above), but in a context of growing, rather than declining, rural populations. In LDCs, there has been growing interest in rural-to-rural migration and its implications for the environment.

Impacts of Immigration on Rural Economies in Developed Countries

Several conceptual models attempt to describe how immigrants affect local populations and economies (Taylor, Martin, and Fix, 1997). Two models mark the extremes. One argues that the presence of immigrant workers creates economies of scale and multiplier effects. In other words, the arrival of immigrants increases local economic activity and creates or preserves good jobs for local residents. This view characterizes much of the urban-focussed research on immigration in the 1980s; for example, see Borjas (1984); DeFritas (1988); Altonji and Card (1991); Bean, Lowell and Taylor, (1988); LaLonde and Topel, 1991; Borjas (1990); Grossman (1982); Muller and Espenshade (1985); Winegarden and Khor (1991); Simon, More and Sullivan (1993); Card (1990); Butcher and Card (1991); Vroman and Worden (1992); Fix and Passel (1994). Their findings generally support Michael Piore's (1979) argument that most recent immigrants are concentrated in distinct labor-market segments. According to Piore,

> The jobs [immigrants take] tend to be low-skilled, generally but not always low paying, and to carry or connote inferior social status; they often involve hard or unpleasant working conditions and considerable insecurity; they seldom offer chances of advancement toward better-paying, more attractive job opportunities (p. 17).

Because of this, migrants and native workers tend to be complements, not substitutes, in production. The econometric model these studies employ involves regressing wages and employment (weeks worked) for different native-worker groups on the number of immigrants in local labor markets (SMSAs). Implicitly, this corresponds to a statistical experiment in which immigrants are randomly injected into a number of closed labor markets.

The other extreme view, inspired by neoclassical trade theory, argues that immigrants take over local jobs and freeze low wages into place, competing with at least some groups of workers. It is based on a fundamental critique of the research methods utilized by earlier studies, recognizing that native workers are likely to respond to the arrival of immigrants by moving to less immigrant-impacted labor markets, shifting the labor-supply curve inward and dissipating

the impacts of immigration through internal migration. Studies that focus on immigration impacts on local economies, including local rural economies, therefore may mask the macro effect of immigration on wages and employment (Borjas, 1994).

There are reasons to expect a priori that both of these models help characterize the impacts of immigration in rural communities. Taylor, Martin, and Fix (1997) found that, in California, the preponderance of new immigrants are low-skilled, capital-poor workers who compete with other low-skilled immigrants for seasonal farm jobs. Most have poverty earnings. They coexist in rural towns with established, usually older immigrant groups who have some access to capital and often specialize in providing farmworkers with services like housing, transportation, food, and job placement. New immigrants create new sources of income (income linkages) for these established residents of farmworker towns, while constituting an inexpensive and flexible source of labor for agricultural employers who typically live outside the towns that house their workforce. The resulting mixture of positive income linkages for some groups and competition for low-wage, seasonal farm jobs among low-skilled immigrants creates a socioeconomic geography of contrast. While California's 12 major agricultural counties had farm sales of over $12 billion in 1993, more than any U.S. state except California, itself, an average of 26 percent of all residents of farm towns in these twelve counties lived below the poverty line in 1990. Data from the NAWS indicate that, nationwide, more than 50 percent of all farmworker households had incomes below the poverty line in 1996 (Mines, Gabbard, and Steirman, 1997).

Econometric findings reported in Taylor and Martin (1997) and Taylor, Martin and Fix (1997) point to a circular relationship between farm employment and immigration in 65 rural towns and cities of California. Taylor and Martin (1997) estimated a five-equation simultaneous-equation model for immigration, farm employment, migration, poverty, and welfare use. They found evidence of a circular relationship between immigration and farm employment between 1980 and 1990: an additional 100 farm jobs were associated with 143 more immigrants, and an additional 100 immigrants, in turn, were associated with the creation of 36 more farm jobs. Because most farm jobs are seasonal and offer workers below poverty-level earnings, each additional farm job was associated with $987 in welfare payments in 1990. There was no evidence that poor immigrants were more likely to receive welfare income than poor nonimmigrants in rural California. However, immigration constituted an important link in the farm employment-immigration-poverty-welfare chain. Based on a three-stage least-squares analysis of census tract data, Taylor and Martin (1998) found evidence of a "vicious circle" of immigration, poverty, and farm employment in the western United States between 1980 and 1990. It contrasted with "virtuous circles" both in the West and in the United States as a whole one decade earlier.

Taylor, Martin, and Fix (1997) examine the re-creation of rural poverty through immigration, drawing from an econometric analysis of census data and case studies of rural California communities.[2] They reach three broad conclusions: First, immigration, principally

[2] The two conferences were on "Immigration and the Changing Face of Rural California," held June 12-14, 1995, in Asilomar, California, and April 17-19, 1996, in Riverside, California.

from rural Mexico, is fueling an unprecedented growth in population, poverty, and public service demands in rural California communities. Second, upward mobility of immigrant farmworkers in rural California is the exception rather than the rule. Third, public resources available to integrate newcomers are declining even though the number of immigrants is increasing. In rural areas, federal assistance programs originally created for other purposes have become de facto immigrant assistance programs. This study found no evidence that the poverty impacts of immigration spill over into adjacent communities.

These findings are consistent with those of Gardner (1974) and others who documented a positive relationship between out-migration and rural incomes in earlier periods. Just as rural out-migration appears to have resolved the poverty associated with "too many farmers" between 1940 and 1970, immigration, stimulated by the expansion of low-skill farm jobs, appears to be creating a poverty associated with "too many workers" in the 1980s and 1990s. If history repeats itself, this new rural poverty will stimulate rural-to-urban migration. However, given an elastic supply of low-skilled workers from abroad, it is not clear whether future rural out-migration will alleviate poverty in rural communities.

More research is needed to understand immigration-employment-poverty links in rural areas and design policies to reduce poverty in an era of immigration-driven rural population growth.

Rural-to-Rural Migration in LDCs

Nearly all research on internal migration in LDCs addresses rural-to-urban migration, to such an extent that "internal" and "rural-to-urban" are often treated as interchangeable in migration research. Recently, there has been some interest in understanding magnitude of, and the forces driving, rural-to-rural migration—that is, the redistribution of populations within rural areas. This research is motivated primarily by the environmental ramifications of migration to remote rural areas in search of land to continue agricultural livelihoods. The World Bank's 1992 World Development Report notes that migration into new rural environments is an important mechanism by which rural population growth and poverty result in environmental degradation, including deforestation:

> "Because they lack resources and technology, land-hungry farmers resort to...moving into tropical forest areas where crop yields on cleared fields usually drop sharply after just a few years (World Bank, 1992, p.7)."

Bilsborrow (1992) compares magnitudes of different types of internal migration flows in 14 countries and finds that rural-to-rural migration is the largest in three and exceeds rural-to-urban migration in eleven, despite being almost universally ignored in the literature on internal migration. His research highlights statistical challenges to studying rural-to-rural migration, including questions surrounding the criteria used to classify populations as "rural" versus "urban" in different country settings. Nevertheless, they underline the potential importance of rural-to-rural migration for some countries, particularly those containing an extensive forest

margin or rural frontier, on the one hand, and high rural population densities or inegalitarian land distributions, on the other. Typically, migration to the rural margins is facilitated by public investments in roads to open up new agricultural frontiers (Bilsborrow and Carr, 1998). Salient examples include migration into the Brazilian and Ecuadorian Amazon, the emergence of new rural plantations in Malaysia and Thailand, agricultural labor migration from southern to northwestern Mexico, and the forced relocation of Javanese in Indonesia.

The same tools used to model rural-to-urban and international migrations and their impacts potentially are useful for studying rural-to-rural migration; however, to date, little formal modeling of rural-to-rural migration has appeared in the economics literature. Understanding the origins of rural-to-rural migration is crucial for determining the causes of, and formulating appropriate policy responses to, migration-induced deforestation in LDCs.

V
CONCLUSIONS AND POLICY CONSIDERATIONS

The movement of labor out of agriculture is both a quintessential feature of agricultural transformations and a prerequisite for efficient and balanced economic growth. Yet one of the motivations for migration research, particularly for Todaro (1969) and his followers, has been to identify appropriate policy measures to reduce the rate of rural out-migration. The case for government interventions turns on the argument that some market distortions exist and that these distortions result in "too much" rural out-migration as well as in various migration-induced externalities at migrant origins and destinations. Concern over such externalities underlies much of the research on rural out-migration in the United States between 1940 and 1970.

As Romans (1974; also see discussion in Greenwood, 1975) pointed out, social burdens or benefits from migration can arise from pecuniary externalities (e.g., income redistributive effects of the type discussed by Berry and Soligo (1969; see Part IV of this chapter); impacts of migration on prices and, through them, on the derived demand for labor at migrant origins and destinations; technological externalities (e.g., increasing returns to scale or various external economies associated with migration); and/or market distortions (e.g., effects of migration on the demand for, and revenues to support, public goods and services).

In a neoclassical world of complete and well functioning markets, there is little or no economic rationale for policies to reduce migration. In Todaro (1969), migration in excess of urban job creation results in high rates of urban unemployment, with obvious welfare costs for urban areas. In addition, because each new urban job stimulates the migration of more than one rural worker, the opportunity cost of urban job creation for the rural economy is larger than would be the case in a context of urban full employment. Todaro's policy prescriptions all focus on interventions in labor markets; i.e., combining urban wage subsidies with physical restrictions on migration, he argues, is necessary to achieve economywide production efficiency (a second-best solution). (Bhagwati and Srinivasan (1974) show that this is actually not correct because a first-best solution is possible using a variety of tax and subsidy schemes, without relying on

physical restrictions on migration. They, too, focus on labor-market interventions to reduce unwanted rural-to-urban migration.) The market distortion that results in too much migration in this view is a formal-sector urban wage that is institutionally set above the market-clearing level. This results in urban unemployment and creates the rationale for using an expected-income migration model.

The NELM shifts the focus of migration policy from interventions in labor markets to interventions in other markets, especially those for capital, risk, and information. In this view, market imperfections are the distortions that stimulate migration at levels that would not be optimal in a strictly neoclassical world. There is no reason to assume that disequilibrium in the labor market, reflected in migration, should be addressed by policy interventions in that market. As the Russian proverb cited by Stark (1982) so aptly puts it, "It is not the horse that draws the cart, but the oats."

Unlike in the Todaro approach, however, it is not clear whether there is too much or too little migration in a NELM world. For example, if rural households engage in migration in an effort to reduce their income risk or overcome credit constraints, the result is more migration than would be observed in the presence of perfect rural insurance or capital markets. On the other hand, migration risks, liquidity constraints on financing costly migration, and imperfect information about labor markets at migrant destinations would result in less migration than would be optimal in a world of perfect information and markets. While migration in excess of urban job creation pushes up the shadow wage associated with urban jobs, a positive feedback of migration on rural production reduces this shadow wage (Stark, 1982).

Nevertheless, who migrates matters. Rural market distortions create inefficiencies by discouraging migration by individuals who lack access to information (e.g., because they do not have migration networks, or contacts at migrant destinations) or who are less credit or risk constrained. In a first-best world, the individuals who migrate are those whose movement out of the rural sector results in the largest productivity and income gain for the economy as a whole. This is not necessarily the case when rural market imperfections drive migration decisions.

In the light of distortions in rural credit, risk, and information markets, it is clear that migration decisions do not take place in a first-best world in the NELM, as in the Todaro, view. However, adding a new constraint to the general-equilibrium system by physically restricting migration, as Todaro proposes, obviously does not transport us to a second-best world if market distortions outside the labor market drive rural out-migration. Rather than attempting to directly influence rural out-migration, policies should focus on alleviating imperfections in rural markets that encourage "too many" people to leave the rural sector--keeping in mind that leaving does not always mean economically abandoning--and perhaps also on making migration and remittances more conducive to rural development.

In immigrant-receiving rural areas in the United States, the limited evidence available suggests that a continuing influx of foreign workers to fill seasonal jobs may be a double-edged sword. Employers benefit from the presence of low-wage workers, but rural communities bear

the costs of providing services and public assistance to impoverished seasonal workers and their families. Immigration policies tend to produce unintended consequences, increasing rather than reducing agriculture's use of immigrant farmworkers and changing the structure of farm labor markets in ways that make immigration and labor laws more difficult to enforce and rural poverty more difficult to extirpate (Thilmany, 1996; Martin et al., 1995; Taylor and Thilmany, 1993).

In LDCs, the redistribution of population within rural areas towards extensive forest margins or rural frontiers carries with it potentially far-reaching environmental consequences, including the irreversible loss of biodiversity. Researchers are only beginning to address the negative environmental externalities associated with migration to the rural margins of LDCs. In the mean time, government policies frequently encourage this migration through infrastructure investments and other measures. It is likely that a complex interaction of government policies and market imperfections in migrant-sending areas shapes rural-to-rural migration and that environmental, like economic, outcomes are influenced by the selectivity of this migration.

Because the stakes are high and the potential for policy failures alongside market failures considerable, much more research is needed to determine whether, indeed, there is excessive rural migration in LDCs and excessive rural in-migration in high-income countries, and, if so, what are the true determinants of this migration and the appropriate roles for government policy. Disagreements over whether there is too much or too little migration partly reflect a scarcity of solid empirical research documenting alleged market distortions and their influence on migration and its welfare impacts. Until the hypotheses and welfare implications of competing migration models are more thoroughly tested (and appropriate data generated to support such tests), these ambiguities will persist. One thing is certain: regardless of what directions our migration policies and research take, the exodus of population out of the world's rural areas will continue and most likely accelerate in the 21st Century.

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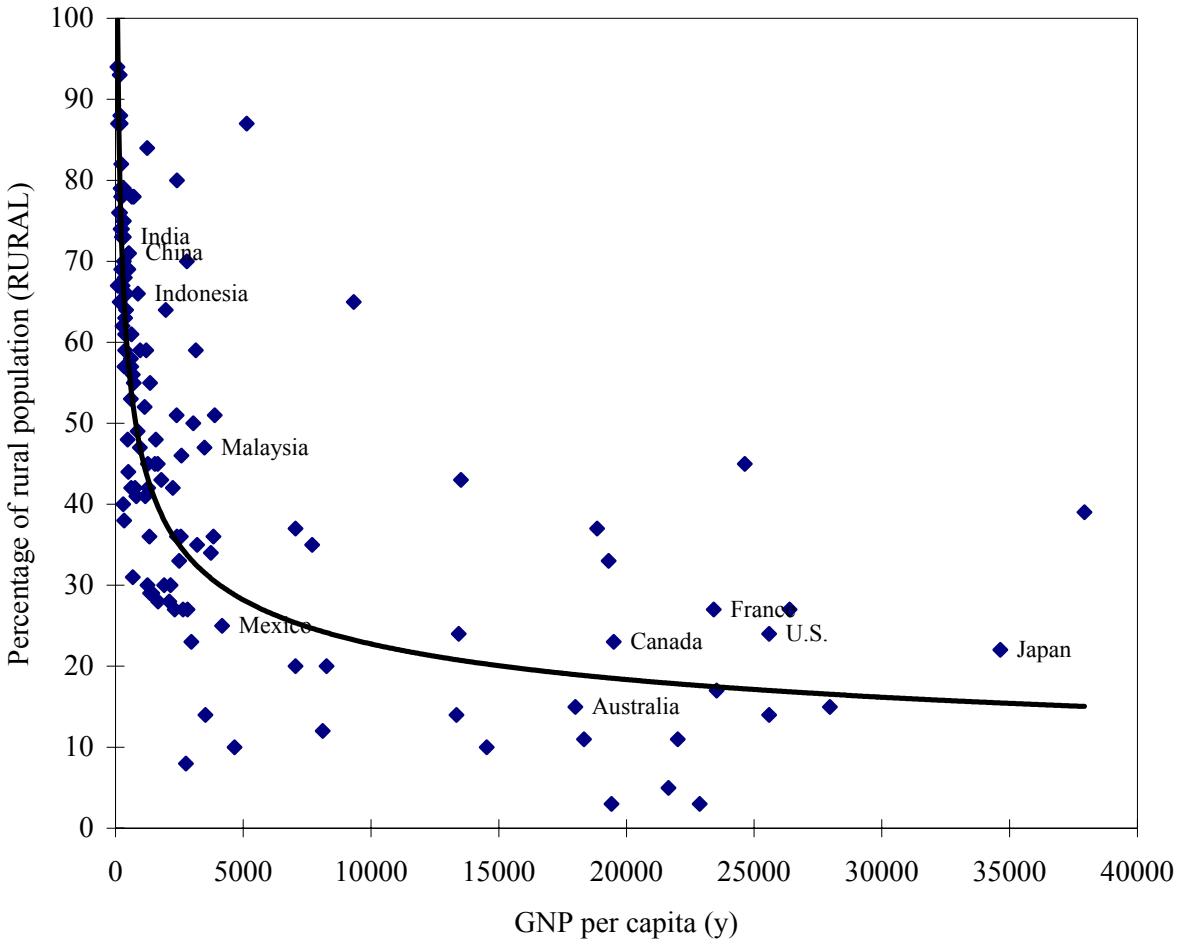
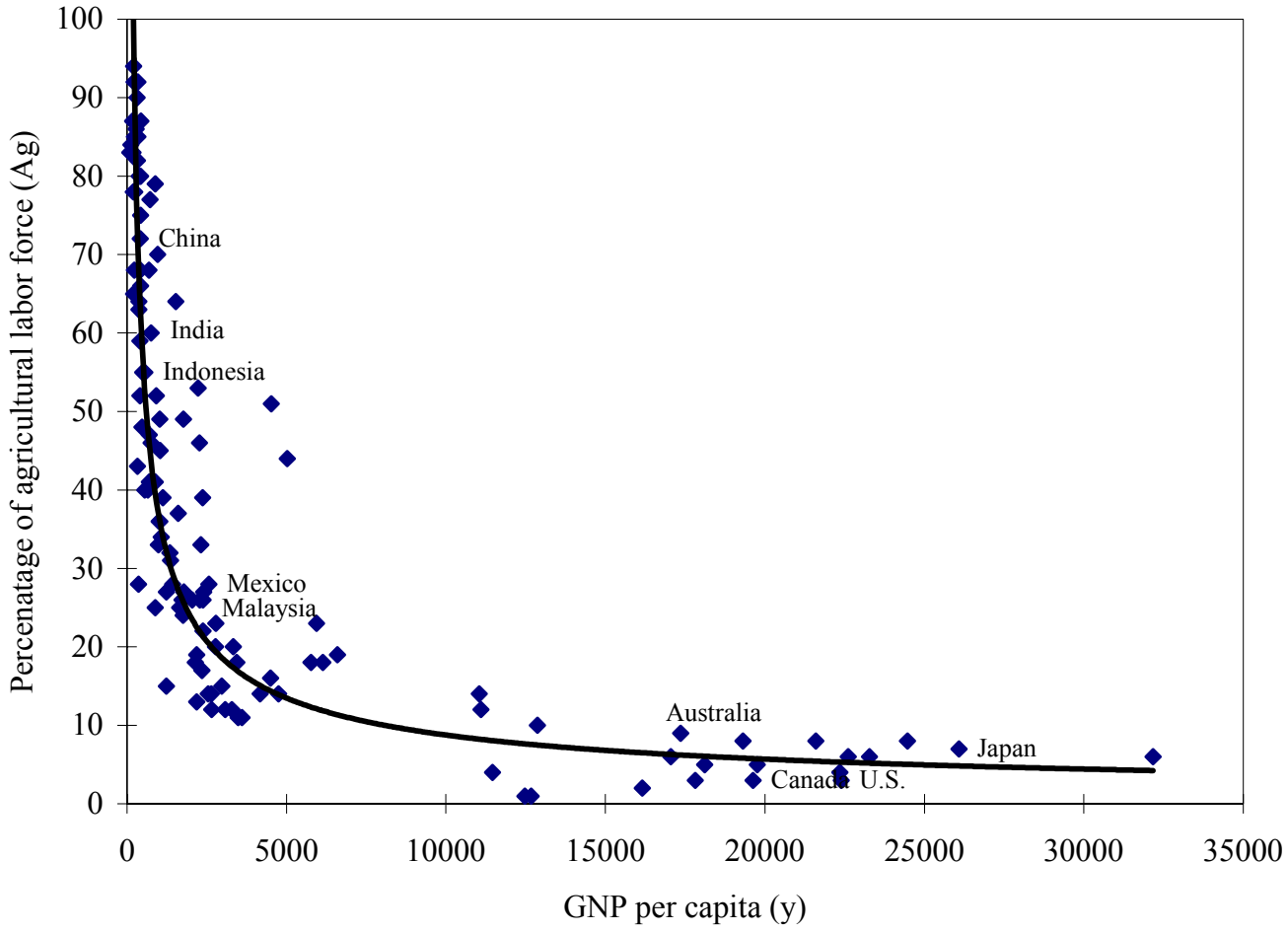
Figure 1 Rural Population Shares and GNP Per Capita, 1994



Regression Line: RURAL = 395.12 $y^{-0.31}$ (R^2 = 0.535, N = 127)

Figure 2 Agricultural Labor Shares and GNP Per Capita, 1990



Regression line: $Ag = 2672.9\ y^{-0.6211}$ ($R^2 = 0.783$, N = 122)