

**Rural-Urban Linkages
for Growth, Employment, and Poverty Reduction**

**Joachim von Braun
International Food Policy Research Institute
Washington, D.C., USA**

**Ethiopian Economic Association
Fifth International Conference on the Ethiopian Economy
June 7–9, 2007
United Nations Conference Center, Addis Ababa
Keynote, Plenary Session I**

Rural-urban linkages for growth, employment, and poverty reduction¹

Joachim von Braun

Introduction

Traditionally, development policy and related research have adopted a simplified concept of rural and urban areas, with the words *rural* referring to more “remote farming areas” and *urban* to “crowded cities.” To a large extent, this view has facilitated the isolated treatment of issues affecting each space, and it has as a result failed to acknowledge the important poverty-reducing interlinkages that exist between the two spaces and the many variants of the spaces. In reality, farming areas (the very rural) and the megacity (the very urban) coexist along a continuum with multiple types of flows and interactions happening between those two spaces. The efficiency and effectiveness of infrastructure and market and nonmarket institutions are important in facilitating such interlinkages. Key research questions, then, include these: What are the critical infrastructural and institutional barriers to optimal links between urban and rural areas? Further, what policy and program interventions are needed to create infrastructure and to facilitate or strengthen institutions to forge dynamic links between businesses, sectors, and geographic areas?

New contextual and exogenous conditions are changing the opportunities for rural-urban linkages as well as the intensification of such linkages. Elements of the changing conditions include (a) increasing trade and capital flows, which prompt rapid changes in the agriculture and food system as urban consumers increasingly influence the nature and level of interactions among the various stakeholders in the agri-food chain; (b) the information revolution, as more and more rural communities benefit from enhanced access to communications technologies that carry relevant information and facilitate new market institutions and services; and (c) increasingly decentralized governance structures across the developing world, as national governments and policymakers, as well as private investors, are involved in regional development and interregional competitiveness.

Although urbanization is part of a healthy economic development process, its unguided shape and speed often bring about market and other institutional failures and result in adverse effects on people and the environment. The urban share of poverty is increasing: by 2002 the urban share of the poor had increased to almost 25 percent from around 19 percent in 1993 (Ravallion, Chen, and Sangraula 2007). Policy must address market failures in urbanization dynamics and in rural stagnation—that is, labor market, services market, and goods market failures attributable to ill-guided expectations, information gaps, and missing markets (e.g., finance); government failures due to biased taxation, pricing, and investment policies; and the negative environmental externalities sometimes engendered by urbanization or lack of rural change.

Against this broad context, the more narrowly stated question this paper addresses is this: how can rural-urban linkages be improved to accelerate inclusive growth, expand employment, and serve the poor? The key premise is that the lack of economically optimal rural-urban linkages is bad for economy-wide growth in that it divides societies, leads to inefficiencies, and is a root cause of inequality, which is in itself growth inhibiting (World Bank 2005). Conversely, strong linkages enhance growth because they facilitate the flow of resources to where they have the largest net economic and social benefits. However, such linkages cannot be taken for granted in development; they must be optimally invested in to help reduce transaction costs related to the linkages of diverse types and stimulate positive externalities and spillover effects. As such, rural-urban linkages need more policy attention, which requires that adequate

¹ The research assistance of Tewodaj Mengistu and the comments and contributions of Maximo Torero and Shenggen Fan (all at IFPRI) on earlier drafts are gratefully acknowledged.

institutional and organizational structures be put in place. And, to that end, central and local governments need appropriate coordination mechanisms.

The paper starts with a brief synthesis of theoretical and conceptual frameworks of rural-urban linkages so as to identify points of entry for policy. Thereafter, megatrends in rural-urban linkages are reviewed. Next, policies facilitating rural-urban linkages and some criteria for setting policy priorities are identified. Finally, areas for related economic research needs are mentioned.

I. Concepts and framework

The economics profession has dealt with the issue of geography and spatial allocation of economic activity in waves of high and low attention. Such waves have in part been driven by changing beliefs and disbeliefs in planning tools and in the role of government in regional economic policy. As the roles of local governments expand, local policies and institutions have more influence in determining investment and transaction costs and thereby spatial allocations of economic activity. In recent years, we have seen a resurgence in academia and in policy of the importance of “geography” to the understanding of economic transactions. This section briefly reviews the evolution of theoretical thinking on spatial allocation of economic activity and also the driving forces behind spatial differentiation.

1. The evolution of rural-urban linkage concepts and theory

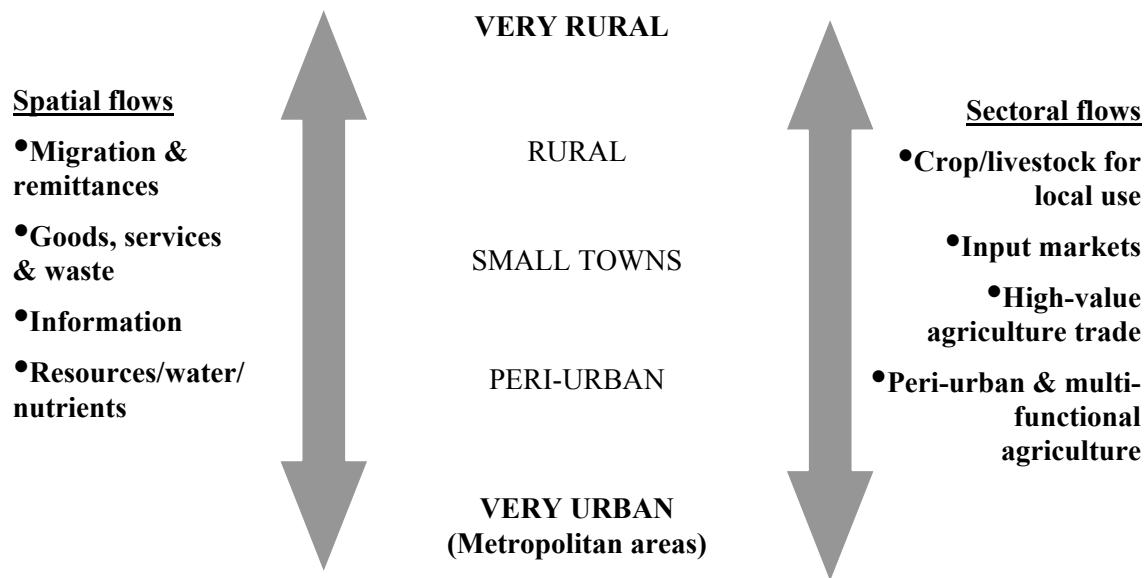
In 1826 J. H. von Thünen undertook an early, classical analysis of the spatial allocation of economic activity. Using a model of agricultural land use, he showed how market processes determined land use in different geographical locations, and more specifically how land use is a function of transport costs to markets and the farmer’s land rent. His model generated concentric rings of agricultural activity around a central city, with dairy and intensive farming closest to the city, followed by timber and firewood in the second circle, grain production in the third, and finally, ranching and livestock activities in the fourth circle. Urban demand is a key driver of spatial allocation of economic activities already in this basic model of marginal returns to assets and labor.

In 1933 Walter Christaller achieved another breakthrough when he developed the *central place theory* to explain how urban settlements are formed and spaced out relative to each other. The main premise of Christaller’s theory was that “if the centralization of mass around a nucleus is an elementary form of order, then the same centralistic principle can be equated in urban settlements” (Agarwal 2007). His model, later refined by Lösch (1954), predicted an urban hierarchy of human settlements around hexagonal shapes (the hexagon being the geometrically closest approximation of efficient ways to travel between the settlements), with varying sizes of centers. The size of the center is determined by the type of goods and services it provides, whereby larger settlements (fewer in numbers) provide goods and services of a “higher order” (which require a large market both in terms of income and population and are therefore more specialized), and smaller settlements provide goods and services of a “lower order.” In this framework, since some of the demand for the goods produced in the centers (such as manufacturing) comes from peripheries, production is tied with agricultural land distribution (Krugman 1991).

Such conceptual frameworks not define only *rural-urban* linkages but also *urban-urban* linkages between centers of differing scale related to economies of scale in sub-sectors of the economy. However, the early models were based on strong assumptions such as homogeneous spaces, uniform consumer preferences, and proportionality of transport costs to distance while they are really characterized by different factor endowments. Therefore, such models’ applicability to real settings is limited. Nevertheless, they do clarify the gradual nature of the differentiation between urban and rural areas: in reality, and as expected

in the theory of economic geography mentioned above, the “very rural” and the “very urban” coexist along a continuum with many in-between stages varying from small towns to peri-urban areas (Figure 1).

Figure 1. The stylized rural-urban continuum



Moreover, a dynamic set of flows exists between these various spaces, creating interdependencies between them. In Ethiopia, for instance, rural households undertake a significant proportion of their economic transactions in local market towns, where they purchase half of their needed agricultural inputs and consumption goods (including food) and sell about a quarter to three-quarters of their crops and livestock (Hoddinott and Dercon 2005).

In general, two types of flows can be distinguished (Figure 1). The first type is *spatial*, which includes flows of people, goods, money (in the form of remittances, for example), technology, knowledge, information, and waste. In biophysical perspectives, flows of water, biomass products, and nutrients are relevant. The second type is *sectoral*, which includes flows of agricultural products going to urban and peri-urban areas, and goods from the urban manufacturing areas going to more rural areas (Tacoli 1998). Though goods and factors can move from one area to the other, such movements involve costs. Such costs may be information costs, transport costs, or policy-induced costs.² Such costs may be the result of noneconomic and/or historical factors, and as these costs are reduced, spatial integration will increase, resulting in increased trade between rural and urban areas and, subsequently, an increased level of urban-rural linkages (Chowdhury and Torero 2007).

2. Forces behind spatial differentiation

Since the early 1990s, various economic studies explaining spatial differentiation have emerged. Generally, three types of arguments can be distinguished: the first focuses on geographical endowments

² Policy-induced costs are costs such as tariffs and restrictions on interregional movements of goods and factors. We separate policy-induced costs from transport and information costs because whereas any change in the latter usually involves reallocation/redirection of public and private resources, policy-induced costs do not necessarily require such actions.

determining comparative or absolute advantages; the second focuses on the existence of linkages (backward and forward) that cause agglomeration of certain activities (Venables 1996); and the last argument relates to urban biases in government policies in taxing, pricing, and investment/spending (Fan et al. 2005).

An example of the first type of argument comes from Gallup and Sachs (1998), who look to inherent geographical differences such as climate and location to explain spatial differentiation. According to them, people tend to converge to locations that are conducive to growth, and as such, some locations are at an absolute disadvantage compared with others. Through an econometric analysis, they show that landlocked (because they are subject to higher transportation costs) and tropical (because they are subject to higher levels of disease) regions are the most disadvantaged.

The second type of argument is represented by Krugman's (1991) "new economics of geography," whose central assertion is that "the world economy can engage in a process of self organization in which locations with seemingly identical potential end up playing very different economic roles" (Krugman 1999). Building on Christaller and Lösch, he finds that while some of the demand for the goods produced in centers (e.g., from the manufacturing sector) comes from the periphery, demand also comes from the manufacturing sector itself because of backward linkages to other manufacturing industries. This adds a "circular causation" dimension—that is, manufacturing concentrates in a location where the market is large, and at the same time, the market is large where manufacturing is concentrated. Krugman also points to forward linkages as sources of agglomeration of economic activities, as other things being equal, people prefer to live and produce near the concentrated manufacturing sector because it is cheaper to buy goods in this central location where they are produced.

Additionally, Krugman adds a dynamic perspective incorporating changes in economic parameters—such as transportation costs, share of nonagricultural products in expenditure, and economies of scale—to his model. He finds that populations start concentrating in central areas and regions start diverging when the nonagricultural expenditure passes a critical threshold and there are large economies of scale to production and lower transportation costs (Krugman 1991). However, focusing on transport and communication costs, Venables (1996) finds that spatial agglomeration of economic activity happens only at intermediate price levels. He finds that in the other two extreme situations where transport and communication costs are either very high or very low, economic activity tends to be dispersed, but for different reasons. In the case of high costs, economic activity is dispersed because firms need to be closer to consumers, and in the reverse case of low costs, firms will consider other issues besides costs of transport and communications when deciding on location.

Porter (1998) provides an additional perspective to the new economics of geography. His "new economics of competition" looks at how geographical concentration of a certain economic activity (or a cluster) can create and sustain an advantage for a firm over other regions/locations. According to him, "once a cluster begins to form, a self-reinforcing cycle promotes its growth, especially when local institutions are supportive and local competition is vigorous." However, imperfect competition can also lead to less integration than expected. Faminow and Benson (1990) assume that buyers and sellers are spatially dispersed and intraregional transport costs exist. In this case, producers and consumers consider only nearest rivals. Hence the market is characterized by oligopolistic (oligopsonistic) competition where the expected pricing response of rivals determines prices. In such a situation, the seemingly positive return from arbitrage may reflect only the existence of transportation costs.

The third type of argument asserts that spatial differentiation arose out of urban-biased and industry-focused policies that reinforced and furthered the divide between rural and urban areas. Because the modernization imperative gave precedence to urban-based industrialization, many developing countries

shifted their resources out of agriculture and disproportionately concentrated their public resources in the urban sector. Indeed, based on simplistic interpretations of the works of Hirschman (1958), in the 1970s it was widely believed in the developing world that the agricultural sector had weak linkages to the rest of the economy, and that as a result the policy focus should be on promoting industrialization rather than agricultural productivity. These strategies levied heavy taxes on the agricultural sector and applied rural production and price controls to protect and subsidize urban-biased development policies (Adelman 2001). Schiff and Valdés (1992) found that direct and indirect government taxation on the agricultural sector in 18 developing countries depressed domestic agricultural terms of trade by 30 percent and resulted in an income transfer out of agriculture equal to 46 percent of agricultural GDP per year. Public investment policies also frequently resulted in public investments and subsidies that favored urban-centered social services. For example, despite the fact that rural residents account for 69 percent of China's total population and that almost 50 percent of the national GDP was produced by the rural sector (agriculture and rural township and village enterprises), government spending in rural areas accounted for only 20 percent of total government expenditures in 2000 (Fan et al. 2005).

Against the backdrop of the preceding discussion of conceptual and theoretical evolution, in the following section some megatrends of change affecting rural-urban linkages and their main policy determinants are discussed.

II. Mega-trends and domains of policies facilitating rural-urban linkages

In the last decade, developing countries as a whole have experienced relatively high growth rates: from 1994 to 2004, low- and middle-income countries grew on average by 4.4 percent annually, and sub-Saharan Africa by around 3.5 percent (World Bank 2006). At the same time, the level of interaction between urban and rural areas has intensified, with both positive and negative implications. The first part of this section reviews these interactions in more detail. Subsequently, the second part reviews how widespread economic growth has played out spatially, and whether rural areas have participated in this growth process. What emerges from the analysis is that a large divide between rural and urban areas in developing countries still exists, and as a result major inequalities persist between the two spaces. Finally, the third part looks at facilitators of the intensification of rural-urban linkages with positive externalities, and the types of strategic investments that would allow for these.

1. Flows between rural and urban spaces and their implications for rural transformation

Driven by technological progress, improvements in infrastructure, and liberalization and creation of markets, globalization has meant rapid rural transformation across the developing world. As such, the interactions connecting the various spaces between the “very rural” and the “very urban” have become deeper. The evolution of spatial and sectoral flows is explored next.³

Spatial flows

Migration and remittances

Urbanization is happening at accelerated speeds across the developing world—from 1994 to 2004, the annual population growth rate in urban areas for developing countries as a whole was on average 2.6 percent, as opposed to 0.6 percent for rural population growth. The reclassification of areas from rural to urban plays an important part in this change. The average annual rate of urban population growth is even

³ The following subsection does not comprehensively address all rural-urban flows. It is therefore important to keep in mind that a number of other types of flows exist—for instance, through nutrition and health (including animal health–human health interactions, and adaptation in nutrition behaviors in rural areas that are becoming more urban).

higher for sub-Saharan Africa at 4.4 percent, as opposed to 1.5 percent for rural population growth (World Bank 2006). This trend is expected to continue over the coming decades with urban populations in less-developed regions surpassing rural populations by 2020. In Africa, this will happen around 2025, when the urban and rural populations will reach 807 million and 687 million, respectively (UNDESA 2006).⁴

The causes and dynamics of migration are complex. The economic thinking behind migration decisions dates back to the Harris-Todaro model (1970), which asserts that an individual's decision to migrate is based on the differences in expected earnings in the formal urban sector and the expected earnings in the village. Since then, economic theory has evolved to focus on families as a unit of analysis, as opposed to just the individual. Stark and Bloom (1985) found that migration is a household decision and families invest in a migrant (or migrants) in return for future receipts of remittances. As such, migration is a source of income diversification for households facing income risks and is also circular in that it entails continued (rural-urban) interaction between migrant(s) and their families, who remain in the area of origin.

More broadly, however, migration is determined by push and pull factors. Push factors include droughts, land scarcity, and low wages or absence of wage labor in out-migration areas, and pull factors include better job opportunities and/or the possibility of higher income and lower or different risk profiles in destination areas (von Braun 2005). On the one hand, if people migrate because they are pushed away by the unavailability of work in rural areas, they risk joining the already high number of unemployed in urban areas (Garrett 2005). On the other hand, if people migrate because they have found better jobs, then migration is welfare enhancing (i.e., migrants would be better off and would be able to send remittances back to their communities).

However, rural migration is not always restricted to large urban centers. For instance, in the Philippines migration to smaller towns in rural areas that offer comparable "urban like" opportunities in education and employment for migrants is common. This counters the migration flow to more congested metropolitan centers of the country (Quisumbing and McNiven 2005). And migration is not always permanent. There is a strong component of seasonal migration in developing countries (especially in Asia and Africa), whereby people are "pulled" into urban areas as a result of strong growth in manufacturing and services. One of the advantages of such migrations, beyond increased earnings, is that the availability of these urban jobs is not tied to the agricultural season, which entails that people can work both in the rural and urban areas (Deshingkar 2005). Seasonal migration can be welfare enhancing; for instance, a recent study in Vietnam found that seasonal migration resulted in an annual increase of about 5 percent of household expenditure, and a 3 percentage point decrease in the poverty headcount (de Brauw and Harigaya 2007).

One of the main outcomes of increased migration (including international migration) linkages is growing remittance receipts in many developing countries (Table 1). Such remittances can play a very important role in supplementing incomes in receiving households. Additionally, the increase in purchasing power of receiving households can stimulate the local economy, and in the particular case of rural areas, increased remittance receipts can stimulate the rural nonfarm economy (Thanh et. al. 2005).

⁴ In 2020, the urban and rural populations in less-developed regions are forecast to reach 3.3 billion and 3.1 billion, respectively. The numbers in 2005 were, respectively, 2.3 and 3 billion. In Africa, the urban population in 2005 was a little over 366 million and that of rural areas was around 556 million (UNDESA 2006).

Table 1. Workers' remittances, receipts (millions of current US\$)

	2002	2003	2004
Ethiopia	34	46	133
Bangladesh	2,850	3,180	3,572
Honduras	711	860	1,135

Source: World Bank 2006.

Much of the *global* change in labor allocation is related to intersectoral shifts due to enhanced growth in other sectors (manufacturing, industry, and services) in urban areas. Over the next 15 years, the economically active population is projected to increase from 3 billion to 3.5 billion, and while farm employment may go down by about 300 million, employment in services and industry, both in urban and rural areas, is estimated to grow by an addition 400 million people each. It is noteworthy that much of the employment growth is expected in rural (including small town) services and industries (see Table 2).

Table 2. Global employment change, 2005 to 2020 (in billions)

	Farm	Services and industry—rural areas	Services and industry—urban areas	Total
2005	0.9	0.6	1.5	3.0
2020	0.6	1.0	1.9	3.5
Change 2005 to 2020	-0.3	+0.4	+0.4	+0.5

Source: Author's estimates of sector shares based on ILO economically active population projections.

Resource and environmental flows

The intensification of rural-urban linkages with respect to environmental flows has occurred as a result of increased urban demands for rural resources such as land, water, and air. The most visible change is associated with the physical expansion of urban areas, as urbanization has led to the extension of urban space onto rural space to accommodate growing populations and growing levels of economic activity. Demand for land around cities has increased to build residences, industries, and transport corridors such as roads and highways, as well as for the disposal of urban waste (both industrial and household) (McGranahan et al. 2004).

In many low- and middle-income countries, the growth of cities has produced densely populated and impoverished squatter settlements in peri-urban areas, where people have little access to adequate shelter, sanitation, and other types of services. People residing in these urban sprawls are prone to diseases as often they have no access to safe water and sanitation. In addition, they have to cope with high levels of pollution as manufacturing, food-processing, and urban-building activities release their chemical waste into the atmosphere, soil, and waterways in the nearby peri-urban areas (McGregor et al. 2006).

Water is a resource with strong spatial dimensions, as interregional water flows provide critical links between urban areas and their surroundings. For one, many cities across the world are situated near waterways. This can have important negative ecological implications in terms of loss of ecosystems and loss and degradation of water systems. Second, water diversions created to service urban areas affect both upstream and downstream users and increase the competition between urban and rural demands for water. Moreover, urban areas release waste in local waterways or coastal water, contaminating the water, which can in turn cause health problems for downstream users and damage aquatic systems (Millennium Ecosystems Assessment 2005).

Urbanization also creates pressure on elements of agriculture production, as it increases demand. That can lead to environmental degradation if the intensification entails ill-applied external inputs (Millennium Ecosystems Assessment 2005). Additionally, increased demand for certain agricultural products such as meat and grains can lead to the rise of monocultures, which have contributed to reduced biodiversity in rural areas.

Sectoral flows

The failures of development strategies based on import-substituting industrialization (e.g., in many Latin American and African countries) and the successes of countries that pursued agricultural-led growth (e.g., China) have demonstrated that agricultural productivity growth is essential to launching an economy-wide growth, especially in predominantly agrarian societies. Indeed, agriculture growth engenders both backward linkages in the form of increased demand for farm inputs such as fertilizers and farm equipment, and forward linkages, as increased farm households' income translates into increased demand for consumption goods and services (Mellor 1995; Hazell and Röell 1983; Diao et al. 2007; de Ferranti et al. 2005). These linkages can subsequently lead to rural transformation, with an expansion of the rural nonfarm economy (RNFE) and better linkages with the rest of the economy, with increasing sectoral and spatial flows between rural and urban areas.

In the last couple of decades, significant gains in agricultural labor productivity have been achieved; agricultural value added per worker in low- and middle-income countries increased by approximately 43 percent from 1985 to 2003, going from US\$405 to US\$580⁵ (World Bank 2006). Additionally, globalization of agriculture has led to enhanced agricultural trade and the commercialization of traditional agricultural processes. And, as a part of the general trend toward the liberalization of markets, many developing countries have reduced the level of government intervention (e.g., elimination of price controls on agricultural commodities, reduction of export taxes, privatization and/or dissolution of state-owned enterprises, reduction of subsidies, etc.) in the agricultural sector. As a result of these reforms, some countries, especially those where reforms were fully implemented, experienced an increase in trade and higher levels of competition, as well as reduced marketing margins, although in some cases, marketing margins remain high due to inadequate transport infrastructure and high levels of uncertainty (see Kherallah et al. 2002 for an overview of market reforms in sub-Saharan Africa, and Gabre-Madhin 2001 for grain market reform in Ethiopia).

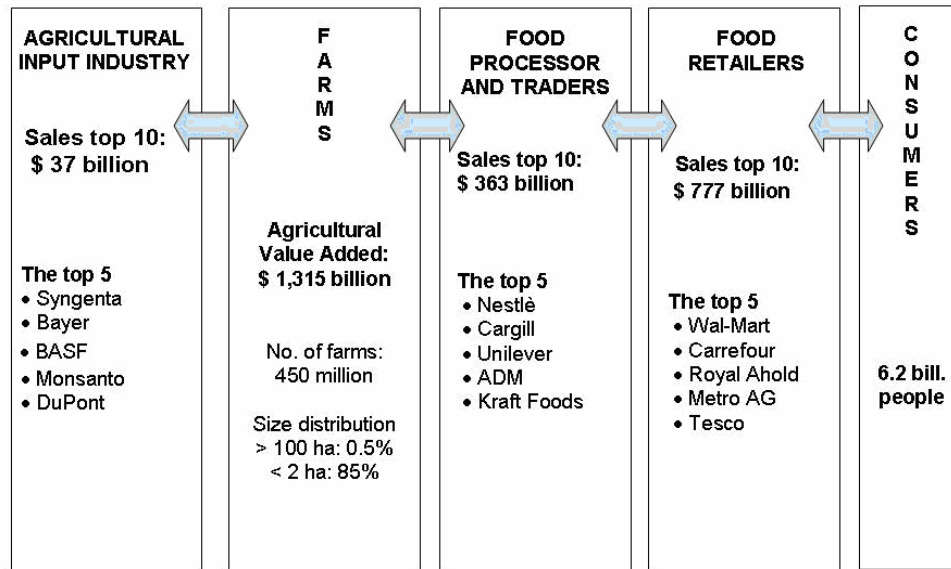
An additional outcome of the increased opportunities brought about by globalization and the liberalization of the 1980s and 1990s is the expansion of the RNFE (von Braun and Pandya-Lorch 1991). Indeed, the RNFE now accounts for approximately 25 percent of full-time employment and about 30 to 40 percent of rural household income in developing countries (Haggblade, Hazell, and Reardon 2007), and in sub-Saharan Africa and Latin America nonfarm activities account for 40 to 45 percent of average rural household income (Barrett et al. 2001).

Another feature of the globalization of agriculture is that consumer preferences across the globe have become major driving forces of agricultural production systems. As Figure 2 depicts, they spend about \$4 trillion on food and beverages. The retail industry caters to them, while the food-processing and trading industry supplies the retail sector and procures from the farm sector, which in turn is supplied by agriculture input industries. Rising consumer incomes and urbanizing lifestyles have increased the demand for high-value agricultural products, which include meat and fish, fruits and vegetables, and dairy products. To meet these demands, agricultural producers in developing countries are diversifying toward these products. In Indonesia, for instance, the production of high-value products has been increasing

⁵ The data are in 2000 constant dollars.

faster than that of cereals. However, this diversification is spatially limited to certain locations (Chowdhury, Gulati, and Gumbira-Said 2005).

Figure 2. The global agri-food business chain (2005)



Source: von Braun 2005.

2. The rural-urban divide

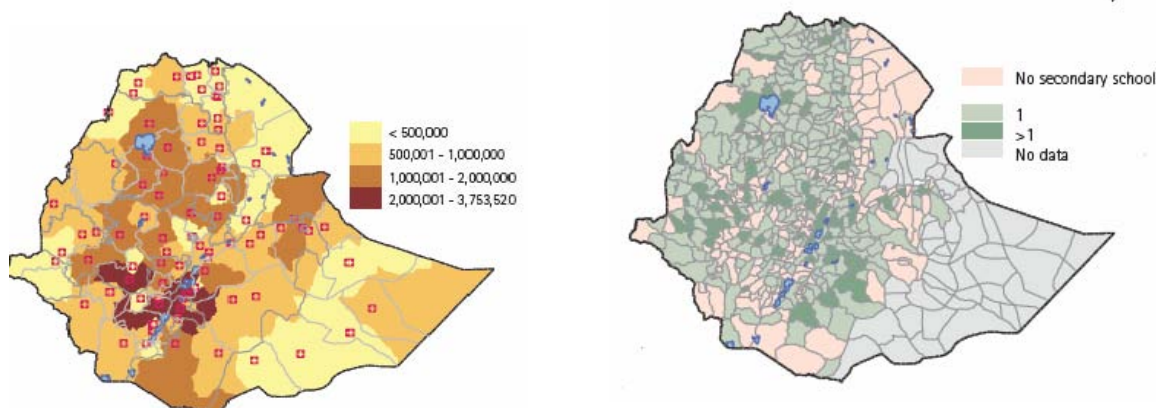
Despite increasing levels of rural-urban interaction, major rural-urban disparities continue to exist across the developing world. As a result of adverse terms of trade between agricultural and nonagricultural product prices as well as urban biases in government spending on health, education, and physical infrastructure across the developing world, major inequalities between urban and rural areas persist, not only in terms of income but also in asset endowment and human development (Eastwood and Lipton 2004). Thus, while inequality exists separately within the rural and urban spheres, the largest differences are between urban and rural areas; most of the poor live in rural areas and depend on agriculture and related trade, services, and processing activities for their livelihoods. Additionally, in many countries, rural inhabitants do not have the same level of access to social services, such as health and education facilities (see Figure 3 for the Ethiopian example) and infrastructure as their urban counterparts, further perpetuating existing inequalities.

Even more concerning, the rural-urban divide seems to be widening in parts of the developing world (Eastwood and Lipton 2004). China and India provide illustrations. Both countries have experienced sustained economic growth over the last decade (on average 9.5 percent annually for China and 6.25 percent for India between 1994 and 2004) and have achieved major success in poverty reduction (see Table 3).

Figure 3. Spatially differentiated access to services in Ethiopia

Population per hospital

Secondary schools



Sources: CSA, EDRI, and IFPRI 2006.

However, economic growth and poverty reduction have been distributed unevenly. In both countries the bulk of the poor still live in rural areas and are concentrated in certain regions. In China, the majority of the poor are concentrated in the interior of the country, and in India half of the poor are concentrated in just three states—Uttar Pradesh, Bihar, and Madhya Pradesh. Moreover, spatial inequality in both countries seems to be increasing. In China, the difference in the average monthly per capita income between urban and rural areas almost doubled between 1994 and 2004, going from US\$99 to US\$16, and the percentage of total inequality (measured using general entropy) due to inequality between inland and coastal areas increased from 6.5 percent in 1990 to 11.6 percent in 2004.

Similarly, in India, the difference between average monthly per capita income in urban and rural areas rose from US\$21 to more than US\$27 and the percentage of total inequality due to inequality between the North and South regions increased from 2.6 percent in 1990 to 15.9 percent in 2003 (Table 3, Gajwani et al. 2006). According to Gajwani et al., the rising rates in spatial inequality can be partly traced back to efforts to liberalize trade and open up the economy to foreign direct investment in the 1990s, as well as to increasingly decentralized governance structures.

Table 3. Poverty levels and mean income in China and India

		China		India	
		1994	2004	1994	2004
Poverty (% of population living on less than \$1 a day)	Rural	34.6	16.8	52.0	40.2
	Urban	0.9	0.3	25.9	19.6
Average monthly income per capita (US\$)	Rural	34.64	76.84	37.25	44.8
	Urban	133.96	237.97	58.55	72.28

Source: Data from World Bank 2007.

Increasing inequalities are also a central feature of agricultural production in many developing countries, especially in terms of access to land. Indeed, approximately 85 percent of the world's farms are smaller

than two hectares, and of those farms, 90 percent are in low-income countries. For instance, farm sizes in sub-Saharan Africa remain predominantly smaller than one hectare, and there is evidence that farm size is still gradually shrinking over time due to population growth and density (von Braun 2005).

3. Domains of policy facilitating rural-urban linkages

This subsection reviews how actions in three major areas alluded to in the conceptual discussion above—research and development (R&D) and technology, infrastructure, and market institutions—can further stimulate rural-urban linkages to promote growth, create employment, and reduce poverty. Additionally, policies that would further facilitate rural transformation and rural-urban linkages are reviewed.

R&D and technology

Technologies work through factor and output markets, processing, and consumption linkages. Here, two types of technologies that have had a substantial impact on rural growth and poverty reduction are explored: innovations arising from agricultural research and development and improvements in information and communications technologies (ICTs).

Agricultural research and development

Science and technology are fundamental for rural-urban linkages, and in this context, agricultural research is fundamental. The Green Revolution experience, especially in Asia, has shown that agricultural R&D can result in technological breakthroughs that enable considerable improvement in agricultural productivity, resulting in agricultural growth, which in turn can translate into substantial rural development and poverty reduction. The Green Revolution technologies, which include high-yielding varieties complemented with irrigation and intensive fertilizer use, were developed in response to the threat of widespread hunger in Asia in the early 1960s emanating from steep population growth and the related overuse of water and land resources. The results were that the new technologies not only enabled higher production of food to meet the growing demand (thus permitting many countries to achieve food security at the national level) but also had spillover effects in terms of rural development, as in the rural nonfarm sectors through consumption and production linkages (Haggblade, Hazell, and Reardon 2007). The urban poor were major beneficiaries of the Green Revolution due to the price-reducing effects of technology.

Today, technological innovations in agricultural production continue to be significant sources of agricultural productivity growth, which can in turn translate into rural growth and poverty reduction. For instance, it is estimated that in Asia and Latin America, for each additional dollar of income generated in agriculture, between \$0.6 and \$0.9 and between \$0.4 and \$0.6, respectively, of income is additionally generated in the local rural non-farm economy (Haggblade, Hazell, and Reardon 2007). The multipliers are lower for sub-Saharan Africa because of agro-climate conditions and the lack of infrastructure and sound policies.

Nevertheless, while agricultural performance has been relatively high in recent years, there is cause for concern. Eighty developing countries today together spend only a total of about \$1.4 billion on agriculture R&D, which represents only 6 percent of global expenditures. Furthermore, together, the agricultural R&D expenditures of China and India represent 22 percent of the total developing country investments (Pardey et al. 2006). Many small and medium-sized developing countries are not investing enough in agricultural R&D. In effect, as the positive spillovers from technologies previously derived from industrialized countries' R&D dry up, and because even the capacity for adapting technologies is constrained by the low level of expenditures in small and medium-sized developing countries, many of

these countries have only limited access to available growth-enhancing technologies. As a consequence, rural-urban linkages become weaker.

Information and communications technologies

ICTs can lower transaction costs by reducing information asymmetries⁶ and opening up market possibilities for rural inhabitants, which can result in additional network externalities. Indeed, at the macro level, tele-density is positively associated with growth. Wavermann et al. (2005) found that 10 more mobile phones per 100 people increased GDP by 0.6 percent. But there seems to be a minimum threshold of about 15 percent coverage to achieve the strongest growth effects (Torero and von Braun 2006). Africa and South Asia are far below that critical threshold, especially in rural areas.

At the micro level, the welfare gains from having access to ICTs are large, as the alternatives (sending a messenger or letter) are much costlier and more time consuming. In effect, the welfare gains from a telephone call range between US\$1.62 to US\$1.91, for instance, in Bangladesh and Peru. As such, the willingness to pay for access to telephones is also relatively high, and typically exceeds the actual prevailing tariff rates (Torero and von Braun 2006).

If information asymmetries persist between producers and consumers based in two spatially separated locations, intermediaries who facilitate the transaction between urban and rural areas emerge, and therefore, any change in information asymmetry can lead to a change in the intermediation process and can lead to the demise of existing (traditional) intermediaries and the rise of new (modern) intermediaries, as is currently happening in the modern food value chains in many developing countries. If not corrected, the lack or differential access to market information can create direct barriers to mutually beneficial exchange and greatly increase the costs associated with trade. The consequences of asymmetric information are that equilibrium may or may not exist, or if equilibrium exists, resources are used less efficiently than they would be if there were symmetric information. Thus, the availability of efficient and reliable market information is a key ingredient in fostering rural-urban linkages.

Infrastructure

Infrastructure works as a bridge between the rural and urban worlds, and between the agricultural sectors and others sectors of the economy.⁷ In particular, in situations characterized by a wide dispersion of production and consumption centers, transport costs account for a significant proportion of total costs to link urban and rural areas. An improvement in rural road quantity (length or density) and quality lowers travel time and reduces vehicle running and maintenance costs, which in turn lowers the actual costs of marketing produce and reduces the costs of delivering inputs, increasing the inter-linkages between urban and rural areas. But the indirect effects of infrastructure for flow of goods, services, and information are important benefits beyond transport cost reductions.

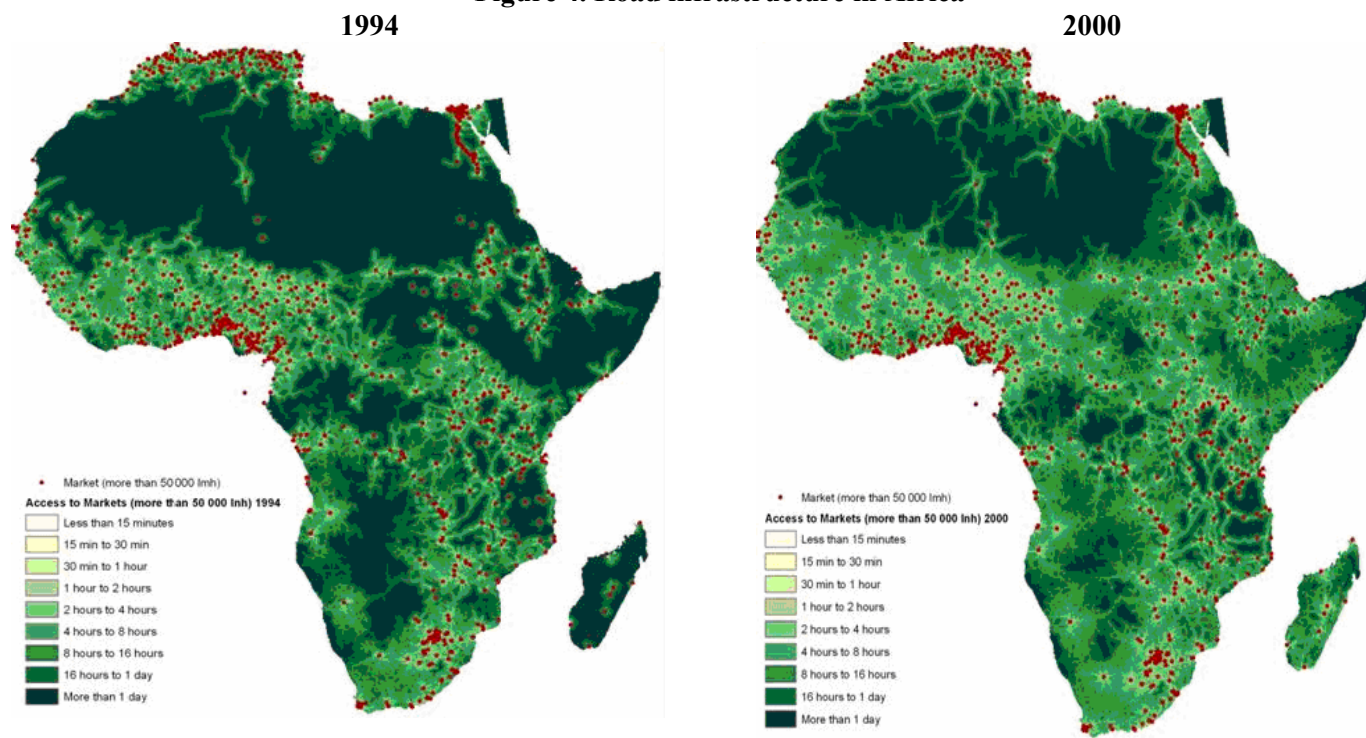
The large returns in terms of growth and poverty reduction of investments in rural roads are well known. For example, in China, the returns to investments in rural roads in terms of national income are over three times that of investments in urban roads—for every yuan invested in rural roads, the return is around 6 yuan, versus 1.55 yuan for urban roads. The returns in terms of poverty reduction are equally better for rural road investments—5.67 persons per 10,000 yuan invested versus 0.31 for urban roads (Fan and Chan-Kang 2005). Similarly, Mogues et al. (2007) find that investments in roads have the highest returns

⁶ Information bottlenecks hinder effective rural-urban linkages by raising transaction costs by increasing search, screening, and bargaining costs.

⁷ The aggregate-level links between poverty and rural infrastructure have been studied by several authors, but among the most important of these works, in addition to those cited above, are Lipton and Ravallion (1995), Jimenez (1995), and Van de Walle (1996).

compared with other investments considered.⁸ However, the study also finds that returns to road investments vary by region, with regions with better road networks benefiting most. As such, in the last decade, many developing countries have invested heavily in rural roads. For example, in the majority of the African continent, while still high, the time it takes to access markets composed of more than 50,000 inhabitants has been drastically reduced (see Figure 4).

Figure 4. Road infrastructure in Africa

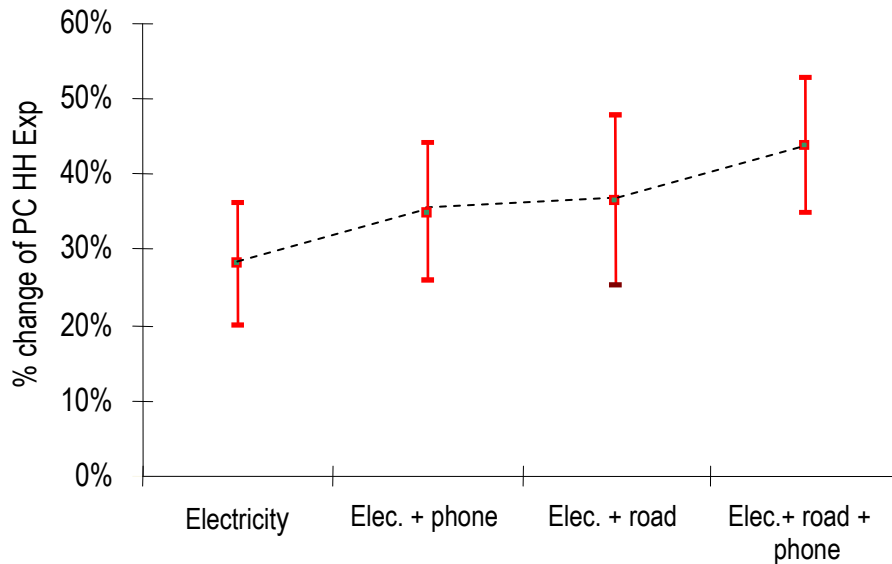


Source: M. Torero (IFPRI) 2006.

What is less well understood, however, is the interaction effect between different types of infrastructure investments and how they can efficiently reduce the major barriers to rural-urban linkages. To that end, one study looking at the complementarities of investments in multiple types of rural infrastructure in Bangladesh found that the effect on household welfare can be more than the sum of the individual impacts, and even multiplicative in some cases (Figure 5; Chowdhury and Torero 2007; and see also Escobal and Torero 2005 for rural Peru). This suggests that providing different types of infrastructure simultaneously rather than individually can potentially strengthen the welfare and poverty-reducing gains of rural infrastructure provision. As such, optimal investment in rural-urban linkages entails complex bundles of infrastructure components.

⁸ The other types of public investments the study considers are agricultural, health, and education investments.

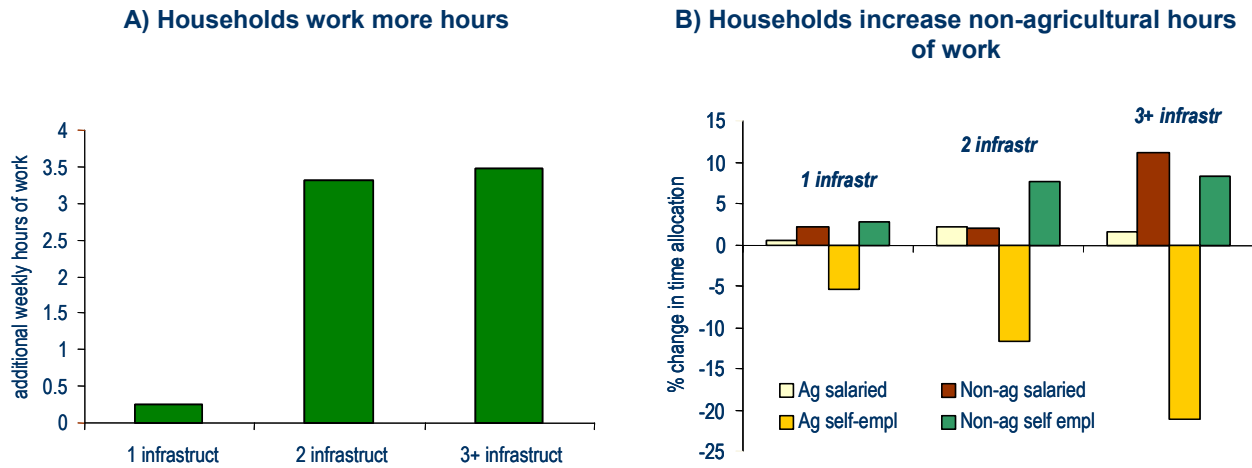
Figure 5. Investment complementarities in rural Bangladesh



Source: Chowdhury and Torero 2007.

Moreover, and in addition to the direct impacts, it is important to understand that there are three possible channels through which improvements in access to infrastructure may indirectly affect rural and urban linkages. First is the impact of changes on the proportion of working hours allocated to different activities—specifically shifts in labor devoted to agricultural and nonagricultural activities given that access to better-quality infrastructure (e.g., electricity) leads to greater opportunities for nonfarm work activities and therefore higher interlinkages with rural areas. The second channel captures the effect of changes in the household’s total working hours as a result, for example, of longer hours of access to electricity (see Figure 6 for the case of Peru, and similar results hold for Bangladesh; Chowdhury and Torero 2007). Finally, there is scope for increases in rural households’ market efficiency as their purchasing power is bolstered by reduced transportation costs or reduced information asymmetries through access to phones. In this line, the third channel captures changes based on returns to labor (that is, hourly wages) allocated to agricultural and nonagricultural activities. Specifically, in the case of agricultural activities, this will be directly related to prices of their products. These three linkages do not yet include the benefits from linkages through access to services, such as health and education.

Figure 6. Indirect effects of access to infrastructure in Peru
 (Propensity score matching (kernel); control group: households with no assets)



Source: Escobal and Torero, 2004.

Market institutions

In developing countries, particularly the low-income ones, market failures such as deficiencies in information and lack of regulation and legal enforcement mechanisms persist and restrict the level of trade between different spaces (Gabre-Madhin 2001). As such, developing adequate market institutions and strengthening them are essential to facilitating spatial flows.

As globalization evolves, the consumer-driven agri-food chain is becoming more integrated, incorporating more small farmers through arrangements such as producer-marketing cooperatives, which facilitate horizontal cooperation, and contract farming, which facilitate vertical cooperation. Such arrangements can substantially boost the income of poor rural households by helping reduce transaction costs and variability in prices of agricultural products. Additionally, such arrangements give farmers better access to produce markets and to technological innovations in agriculture. A study looking at the impact of a large Ethiopian dairy cooperative on the commercialization of smallholders found that, on average, farmers in cooperatives had better market access, higher productivity, and better-quality milk relative to individual farmers (Francesconi and Ruben 2007). However, such arrangements are usually information intensive and require adequate legal frameworks and organizational capacity. Thus, to maximize the potential gains for farmers from integration within the globalized agri-food system, it is necessary to provide farmers access to communications technologies, as well as training and capacity building. An opportunity here is in commodity exchanges appropriately adapted to the infrastructure and institutional environments of low-income countries. In addition, access to insurance and credit in rural areas can potentially prevent “stress migration.” Thus, development of these markets, for instance, fostered by transaction-cost-cutting ICTs, can have efficient gains in labor markets. In relation to migration and increased receipts of remittances in rural areas, investment opportunity outlets and enhanced banking and savings institutions need to be developed in many countries.

Policies facilitating rural transformation

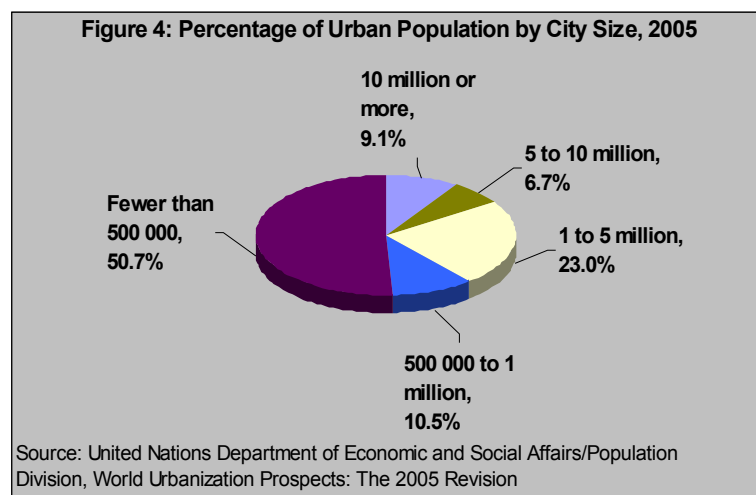
Diversification of rural economies

The development paths taken by many countries have shown that it is inaccurate to simply associate *urban* with *industry* and *rural* with *agriculture*. As stated earlier, rural economic activities outside the agricultural sector are a major source of income and employment, and therefore the rural nonfarm sector is an important contributor to economic growth and poverty reduction during the economic transformation of many developing countries. Rural nonfarm activities are especially important in countries where landlessness prevails, offering the rural poor important economic alternatives to traditional land-dependant activities. However, the ability of the rural nonfarm sector to absorb part of the agricultural labor force is limited.

Development of small towns

The majority of urban dwellers in developing countries do not live in a megalopolis but rather in medium-sized cities (Figure 7). Consequently, small and medium-sized towns play an important role as an intermediary point along the rural-urban continuum, linking and benefiting both rural and urban areas through consumption, production, and employment patterns as well as various types of economic and social provisions (e.g., Satterthwaite and Tacoli 2003; Wandschneider 2004)

Figure 7. Percentage of urban population by city size, 2005



Source: UNDESA, World urbanization prospects: The 2005 revision.

More specifically, small and medium-sized market towns and cities are extremely important to the economic activities of rural households because they provide the economic space for rural households both to purchase their inputs and household items as well as to sell their final products at local markets, thereby linking rural producers to the national and global economy. For example, apart from remittances, rural households in Ethiopia were found to have few direct links to more distant urban centers or the capital, with intermediary cities being the main urban locations where rural households undertook economic activities (Hoddinott and Dercon 2005). Consequently, the development of small and medium-size town infrastructure has the potential to lower transportation costs and improve access to markets for both urban and rural consumers and producers. Small towns can also serve as a stepping-stone or an end point for rural residents seeking opportunities outside of the agricultural sector by absorbing some of the agricultural labor, thereby alleviating the pressure put on already congested metropolitan centers while at the same time contributing to the growth of the national economy and transformation of agriculture.

Furthermore, many higher-level rural services in health and education depend on urban locations. Access to such services depends on infrastructure that links rural and urban areas. This affects, for instance,

access to secondary education, and much of rural areas' more complex health services are delivered through small and medium-size towns' hospitals and clinics. For instance, people gain access to TB and ARV (HIV/AIDS) treatment in eastern Africa mainly in towns through hospitals, and today in some countries access to treatment because of the cost of transportation is more of an issue than are treatment availability and the price of the drugs. This specific example of HIV/AIDS-related rural-urban linkages is of a two-way nature over time: whereas the source of the disease was at first largely urban and along transregional infrastructure axes (transit roads), the disease later became more rural; and the secondary feedback now is about the linkages in the health services, as access to such services requires well-functioning rural-urban linkages. Otherwise, access to treatment at the urban health system is impaired.

III. Conclusions and research implications

The paper highlights the need for new attention to the spatial dimensions of development and to rural-urban linkages for inclusive growth—that is, growth that includes rural areas and the poor. The nature of such “attention” by policy and advisory communities includes

- distinguishing the various types of dynamic flows that exist between rural and urban spaces;
- reviewing the transaction costs of all economic activities between rural and urban areas with an eye toward their optimal reductions; and
- focusing on the nontrivial positive and negative externalities of spatial allocation and concentration of economic activities, including services supporting them.

We have emphasized four *types of public policy actions* that are crucial for enabling better rural-urban linkages:

1. Scaling up of innovation in agriculture and along the whole value chain
2. Scaling up of transport and communications infrastructure toward optimal densities
3. Development of market institutions, including labor markets, that enable the participation of rural areas and the poor in the national economy
4. Reduction of policy barriers to productive rural-urban linkages and services in decentralized political systems

One must keep in mind that policy and investment priorities for fostering rural-urban linkages cannot be “one size fits all.” They much depend on initial conditions and require a dynamic analytical framework.

These policy issues pose new *challenges for research*:

1. Much progress has been made in regionally disaggregated analysis and economic modeling. Integration of spatial analysis through, for example, the use of GIS technologies can be useful to the visualization and understanding of changing realities (Wood et al. 1999). Many of the economic models on which the rural-urban framework is based are static, simplistic and do not take into consideration spatial realities such as agro-ecological conditions and growth potentials.
2. The development analyses of practitioners need a broader perspective, too. Agriculture programs should not be planned and evaluated in isolation from infrastructure—the planned incremental output may go nowhere. And vice versa, infrastructure investment, say, roads, should not be planned and evaluated in isolation from agriculture investments—the road might lead to nowhere.
3. In addition, historical, social, and cultural settings, as well as the types of institutions governing space, need consideration (Martin 2003). Blending aggregate modeling with information systems that capture local knowledge is a challenge. Sector-specific and domain-oriented economic research (e.g., agriculture economics, infrastructure economics, and services-related economics research) needs to come together to address the opportunities of rural-urban linkages jointly.

References

- Adelman, I. 2001. "Fallacies in Development Theory and Their Implications for Policy", In *Frontiers of Development Economics: The Future in Perspective* ed. Meier, G.M. and Stiglitz, J.E.; The World Bank & Oxford University Press, Washington DC & Oxford, pp. 103-134
- Agarwal, P. 2007. Walter Christaller: Hierarchical Patterns of Urbanization. <http://www.csiss.org/classics/content/67>
- Barrett, C. B., T. Reardon, and P. Webb. 2001. Nonfarm income diversification and household livelihood strategies in rural Africa: Concepts, dynamics, and policy implications. *Food Policy* 26: 315–31.
- Chowdhury, S., A. Gulati, and E. Gumbira-Said. 2005. High-value products, supermarkets, and vertical arrangements in Indonesia. Markets Trade and Institutions Division Discussion Paper no. 83. Washington, D.C.: International Food Policy Research Institute.
- Chowdhury, S., A. Negassa, and M. Torero. 2005. Market institutions: Enhancing the value of rural-urban links. Markets Trade and Institutions Division Discussion Paper no. 89. Washington, D.C.: International Food Policy Research Institute.
- Chowdhury, S., and M. Torero. 2007. Urban rural linkages in Bangladesh: Impact of infrastructure and the food value chain on livelihoods and migration of landless households, women in the Northwestern region. International Food Policy Research Institute. Discussion paper (forthcoming)
- CSA, EDRI, and IFPRI (Central Statistical Agency of the Federal Democratic Republic of Ethiopia, Ethiopian Development Research Institute, and International Food Policy Research Institute). 2006. *Atlas of Ethiopian Rural Economy*. Addis Ababa and Washington, D.C.: CSA and IFPRI.
- de Brauw, A., and T. Harigaya. 2007. Seasonal migration and improving living standards in Vietnam. *American Journal of Agricultural Economics* 89 (2): 430–47.
- de Ferranti, D., G. Perry, W. Foster, D. Lederman, and A. Valdés. 2005. *Beyond the city: The rural contribution to development*. World Bank Latin American and Caribbean Studies. Washington, D.C.: World Bank.
- Deshingkar, P. 2005. How rural is rural? ODI Opinions no. 52. London: Overseas Development Institute.
- Diao, X., B. Fekadu, A. S. Taffesse, K. Wamisho, and B. Yu. 2007. Agricultural growth linkages in Ethiopia: Estimates using fixed and flexible price models. IFPRI Discussion Paper no. 00695. Washington, D.C.: International Food Policy Research Institute.
- Eastwood, R., and M. Lipton. 2004. Rural and urban income inequality and poverty: Does convergence between sectors offset divergence within them? In *Inequality, growth, and poverty in an era of liberalization and globalization*, ed. G. A. Cornia. Oxford, England: Oxford University Press.
- Escobal, J., and M. Torero. 2005. Measuring the impact of asset complementarities: The case of rural Peru. *Cuadernos de Economía* 42 (Mayo): 137–64.
- Faminow, M. D., and B. L. Benson. 1990. Integration of spatial markets. *American Journal of Agricultural Economics* 72 (1): 49–62.

- Fan, S., and C. Chan-Kang. 2005. Road development, economic growth, and poverty reduction in China. IFPRI Research Report no.138. Washington, D.C.: International Food Policy Research Institute.
- Fan, S., C. Chan-Kang, and A. Mukherjee. 2005. *Rural and urban dynamics and poverty: Evidence from China and India*. Washington, D.C.: International Food Policy Research Institute.
- Francesconi, G. N, and R. Ruben. 2007. Impacts of collective action on smallholders' commercialisation: Evidence from dairy in Ethiopia. Paper prepared for presentation at the I Mediterranean Conference of Agro-Food Social Scientists, 103rd EAAE Seminar: Adding Value to the Agro-Food Supply Chain in the Future Euromediterranean Space, April 23–25, Barcelona.
- Gabre-Madhin, E. 2001. Market institutions, transaction costs, and social capital in the Ethiopian grain market. Research Report no. 124. Washington, D.C.: International Food Policy Research Institute.
- Gajwani, K., R. Kanbur, and X. Zhang. 2006. Comparing the evolution of spatial inequality in China and India: A fifty-year perspective. Development Strategy and Governance Division Discussion Paper no. 44. Washington, D.C.: International Food Policy Research Institute.
- Garrett, J. 2005. *Beyond rural urban: Keeping up with changing realities*. Washington, D.C.: International Food Policy Research Institute.
- Gallup, J., and J. Sachs. 1998. Geography and economic development. In *Annual World Bank Conference on Development Economics, 1998*, ed. B. Pleskovic and J. Stiglitz. Washington, D.C.: World Bank.
- Haggblade, S., P. B. R. Hazell, and T. Reardon, eds. 2007. *Transforming the rural nonfarm economy*. Baltimore: Johns Hopkins University Press, forthcoming.
- Harris, J., and M. Todaro. 1970. Migration, unemployment, and development: A two-sector analysis. *American Economic Review* 60 (1): 126–42.
- Hazell, P. B., and A. Röell. 1983. Rural growth linkages: Household expenditure patterns in Malaysia and Nigeria. Research Report no. 41. Washington, D.C.: International Food Policy Research Institute.
- Hirschman, A. D., 1958. *The Strategy of Economic Development*. New Haven, Conn.: Yale University Press.
- Hoddinott, J., and S. Dercon. 2005. Livelihoods, growth, and links to market towns in 15 Ethiopian villages. Food Consumption and Nutrition Division Discussion Paper no. 194. Washington, D.C.: International Food Policy Research Institute.
- Jimenez, E. 1995. Human and physical infrastructure: Public investment and pricing policies in developing countries. In *Handbook of development economics*, vol. 3, ed. J. Behrman and T. N. Srinivasan. Amsterdam: North-Holland.
- Kherallah, M., C. Delgado, E. Gabre-Madhin, N. Minot, and M. Johnson. 2002. *Reforming agricultural markets in Africa*. Baltimore: Johns Hopkins University Press for IFPRI.
- Krugman, P. 1991. Increasing returns and economic geography. *Journal of Political Economy* 99 (3): 483–99.

- . 1999. The role of geography in development. In *Annual World Bank Conference on Development Economics, 1998*, ed. B. Pleskovic and J. Stiglitz. Washington, D.C.: World Bank.
- Lipton, M., and M. Ravallion. 1995. Poverty and policy. In *Handbook of Development Economics*, vol. 3, ed. J. Behrman and T. N. Srinivasan. Amsterdam: North-Holland.
- Lösch, A. 1954. The economics of location. New Haven, Conn: Yale University Press. (Originally published 1939).
- Martin, R. 2003. Putting the economy in its place: Economics and geography. Paper presented at the *Cambridge Journal of Economics* Conference, Economics for the Future: Celebrating 100 Years of Cambridge Economics, September.
- McGranahan, G., D. Satterthwaite, and C. Tacoli. 2004. Rural-urban chance, boundary problems, and environmental burdens. Working paper series on rural-urban interactions and livelihoods strategies. Working Paper no. 10. London: International Institute for Environment and Development.
- McGregor, D., D. Simon, and D. Thompson, eds. 2006. *The peri-urban interface: Approaches to sustainable natural and human resource use*. London: Earthscan.
- Mellor, J. W., ed. 1995. *Agriculture on the road to industrialization*. Baltimore: Johns Hopkins University Press for IFPRI.
- Millennium Ecosystem Assessment, 2005. Ecosystems and Human Well-being: Biodiversity Synthesis. World Resources Institute, Washington, DC.
- Mogues, T., G. Ayele, and Z. Paulos. 2007. The bang for the Birr: Public expenditure and rural welfare in Ethiopia. IFPRI Discussion Paper no. 00702. Washington, D.C.: International Food Policy Research Institute.
- Pardey, P. G., J. M. Alston, and R. R. Piggott, eds. 2006. Shifting ground: Agricultural R&D worldwide. Issue Brief no. 46. Washington, D.C.: International Food Policy Research Institute.
- Porter, Michael E. 1998. "Clusters and the new economics of competition." *Harvard Business Review*, 76 (Nov.-Dec.), pp. 77-90.
- Quisumbing, A., and S. McNiven. 2005. Migration and the rural-urban continuum: Evidence from the rural Philippines. FCND Discussion Paper no. 197. Washington, D.C.: International Food Policy Research Institute.
- Ravallion, M., S. Chen, and P. Sangraula. 2007. The urbanization of global poverty. Background paper prepared for the World Bank's *World development report, 2008*. Washington, D.C.: World Bank.
- Satterthwaite, D., and C. Tacoli. 2003. The urban part of rural development: The role of small and intermediate urban centres in rural and regional development and poverty reduction. Rural-Urban Working Paper no. 9. London: International Institute for Environment and Development.
- Schiff, M., and A. Valdés, 1992. *The Plundering of Agriculture in Developing Countries*. Washington DC: The World Bank, 1992.

- Stark, O., and D. E. Bloom. 1985. The new economics of labor migration. *American Economic Review* 75 (2): 173–78.
- Tacoli, C. 1998. Rural-urban interactions: A guide to the literature. *Environment and Urbanization* 10 (1): 147–66.
- Thanh, H. X., D. N. Anh, and C. Tacoli. 2005. Livelihood diversification and rural-urban linkages in Vietnam's Red River Delta. Food Consumption and Nutrition Division Discussion Paper no. 193. Washington, D.C.: International Food Policy Research Institute.
- Torero, M., and J. von Braun. 2006. *Information and communication technologies for development and poverty reduction*. Washington, D.C.: International Food Policy Research Institute.
- UNDESA (United Nations Department of Economic and Social Affairs). 2006. World population prospects: The 2006 revision and World urbanization prospects: The 2005 revision. Online access <http://esa.un.org/unpp> (last accessed May 22, 2007).
- Van de Walle, D. 1996. *Infrastructure and poverty in Viet Nam*. Washington, D.C.: World Bank.
- Venables, A. 1996. Trade policy, cumulative causation, and industrial development. *Journal of Development Economics* 49 (1): 179–98.
- Virchow, D., and J. von Braun, eds. 2000. *Villages in the future: Crops, jobs, and livelihood*. Heidelberg and New York: Springer.
- von Braun, J. 2005. Agricultural economics and distributional effects. *Agricultural Economics* 32 (s1), 1–20. Malden, Mass.: Blackwell for IAAE.
- von Braun, J., and R. Pandya-Lorch, eds. 1991. Income sources of malnourished people in rural areas: Microlevel information and policy implications. Working Paper on Commercialization of Agriculture and Nutrition no. 5 (May). Washington, D.C.: International Food Policy Research Institute.
- Waverman, L., Meschi, M. and M. Fuss. 2005. *The Impact of Telecoms on Economic Growth in Developing Countries*. Vodafone Policy Paper Series, Number 2.
- Wood, S., K. Sebastian, F. Nachtergaele, D. Nielsen, and A. Dai. 1999. Spatial aspects of the design and targeting of agricultural development strategies. EPTD Discussion Paper no. 44. Washington, D.C.: International Food Policy Research Institute.
- World Bank. 2005. *World development report, 2006: Equity and development*. New York: Oxford University Press.
- . 2006. *World development indicators, 2006*. Washington, D.C.
- . 2007. PovcalNet Database. Washington, D.C. Online access <http://iresearch.worldbank.org/PovcalNet/jsp/index.jsp> (last accessed May 2, 2007).