

Reviews Articles

## Rural-urban migration and implications for rural production

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**Abstract.** Rural to urban migration has always been an inherent part of the economic development process, but its impacts are poorly understood, and are often feared by governments, which has led to policies that either attempt to explicitly or implicitly hinder migration. A major concern is that rural-urban migration can threaten food security, through reductions in agricultural production. In this paper, I examine the recent literature on migration and agriculture, which takes the challenge of statistically identifying impacts of migration seriously. I begin by discussing rural-urban productivity gaps and implications for policy, following through to impacts on agricultural production and rural investment.

**Keywords.** Migration, rural development, agricultural production, rural investment.

**JEL codes.** J61, O13, Q12, R23.

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Rural to urban migration is part and parcel of the economic development process. As economies develop, people move from working solely in agriculture into the manufacturing and service sectors. This movement takes place through literally millions of decisions made by individuals and households to begin to move away from farms held by households and into either other, more productive rural areas or urban areas. A substantial literature in development economics shows that migration is, on average, quite beneficial to those who migrate (e.g. Young, 2013). Moreover, not all movement is rural-urban within countries; migrants also gain when they move from one urban area to another (e.g. Bryan and Morten, 2017).

So voluntary migration plays an important role in economic development. However, the implications of migrants are quite contentious. Due to negative perceptions of migration, policies often either explicitly or implicitly attempt to hinder migration. Under the guise of maintaining food security, some governments have used explicit barriers to

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movement, akin to China's *hukou* system that has been gradually relaxed since the late 1980s (e.g. Mallee, 1995). Such restrictions may lead over time to the misallocation of resources within the economy either geographically (Jalan and Ravallion, 2002) or across sectors (Adamopoulos *et al.*, 2017). Given food and nutrition security concerns of governments, it is important to quantify the effects of internal migration on agricultural production and productivity, if any exist.

This paper describes the drivers of rural-urban migration and the developing evidence base related to implications of migration for the rural economy of developing countries. The first section presents an illustrative model to motivate potential implications of migration for rural areas, and discusses its implications. The second section describes evidence related to the rural-urban wage gap, and the third section reviews the literature on effects of migration on agriculture and rural investments, with a careful eye towards papers that provide more carefully argued identification strategies. The final section concludes with policy implications.

### 1. Theory: implications of migration for agriculture and rural investment

To understand the potential impacts that migration can have on rural areas as migrants leave, a simple theoretical framework can provide useful insights. Migration is inherently a dynamic process, so the illustrative model presented here uses a two period framework. Consider a household that is deciding whether or not to send out a migrant. The household is assumed to initially have some capital ( $K$ ), a labor endowment ( $L$ ), and a fixed amount of land ( $\bar{A}$ ), and produces agricultural goods according to a production function  $f$ . If a migrant is sent out, then they may send back remittances ( $R$ ), which can either be consumed or invested in period two. The household makes two choices; the first is whether or not to send out a migrant in period one, and the second is how much of any remittances to invest in further production in period two.

For simplicity, the household is not assumed to save between period one and two, and further it optimizes the utility of consumption across the two periods using the following objective function:

$$\max_{L,I} U_1(K, L_1, \bar{A}) + U_2(E[f(K + E(I), L_2, \bar{A})] + E[R - I]) \quad (1)$$

The expectations operators suggest that agricultural production, the capital investments, and remittances in period 2 are uncertain. According to the model, the household trades off potential labor (and production) in period 1 for either increased consumption through remittances in year two, or increased production through investment. Based on the household level objective function, migration would only occur if the gain in utility in period 2 exceeds any loss from period 1.

As a result, theoretically rural-urban migration can have multiple effects in the short term on agriculture or agricultural production. First, migration can potentially cause a lost labor effect; if the individual migrating worked on the farm prior to migrating, household production might suffer if that individual's labor cannot be replaced either by other family labor, hired labor, or potentially by capital services. Slightly extending the model, households might also substitute out of labor intensive crops into less labor intensive

crops, or they might rent out some of their land to other households if property rights over that land are strong enough. Second, migrants might send back remittances which allow households to make investments in the family farm. Such investments could include inputs such as fertilizer, herbicides, or pesticides, all of which could increase productivity. So at first glance migration could have indeterminate effects on agricultural production or productivity, at least beyond the immediate effects.

Further, in the short term there are potentially more subtle effects on agricultural production. First, one might perceive that by sending away migrants, households are signaling that they do not need all of their land. If land rights are not fully secure, then migration might lead to higher land expropriation or at least weaker property rights over land. Second, decision making about agriculture within the household may change. If the migrant played a role in making those decisions, depending upon the duration of migration spells and communication channels to the migration, someone else within the household might take over deciding what crops to grow, the use of inputs or techniques, how much product to sell, and to whom to sell crops. Third, migration may interact with agricultural risk in complex ways. Migration is inherently risky, but the correlation between migrant income and agricultural income is likely much lower than the correlation between local off-farm wage labor and agricultural income, since weather risks are spatially correlated.

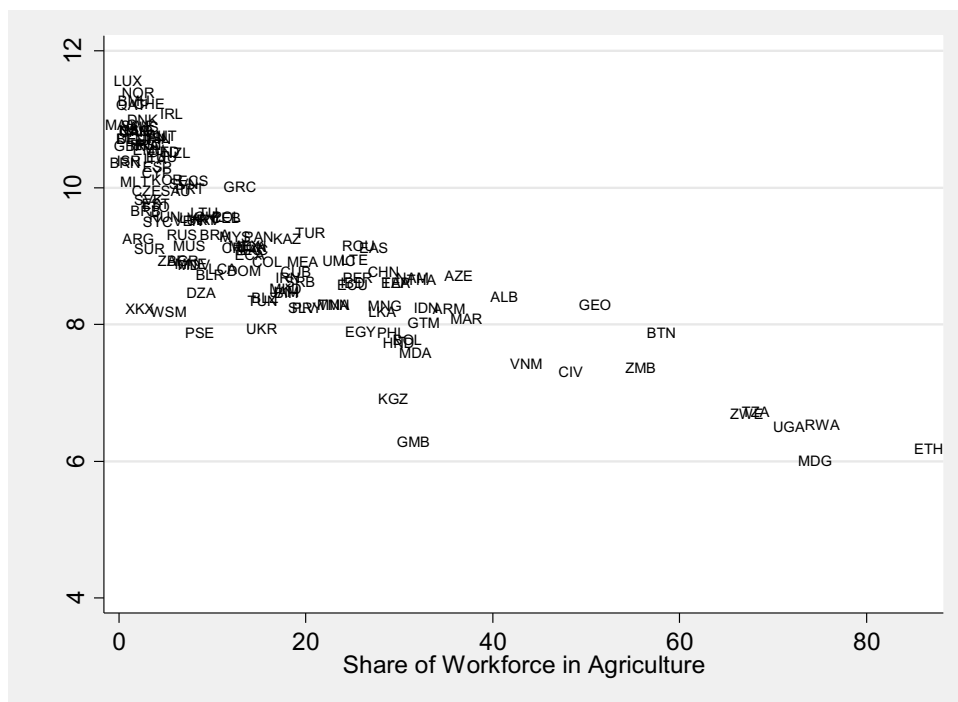
In the longer term, investments that households make in the rural economy may also be affected by migration. Three types of investments are particularly important—investments in the nutrition of young children, in education of older children, or in various forms of investment, whether housing, durable goods, or production. Investments in the nutrition of young children may come either through remittances allowing the consumption of more nutritious foods, or through the removal of one mouth for households to feed. Other investments would take place through remittances or migrants bringing home income, and would depend upon the perceived highest return. For example, the household might perceive long-term investments in education would have the highest return; alternatively, households might perceive high returns (in terms of comfort) to improving housing stock or purchasing durables. Productive investments are risky but if expected returns (less any risk premiums) were high enough, migration could stimulate productive investments as well.

In sum, theoretically rural-urban migration may have several different impacts on agriculture or agricultural households, which can either be quite direct or indirect. These impacts differ due to context specificity, but there are clear average gains to migration at the individual level. From a whole economy perspective, migration is also beneficial, as it allows economies to reap returns to locally increasing returns to scale from agglomeration (Krugman, 1991). Therefore, it is important to understand some of the ways that policy makers can embrace migration and find ways to mitigate costs associated with migration; some of these costs are clearly borne publicly while many of the benefits accrue to individuals or businesses.

## **2. Migration, selection, and the productivity gap**

The labor shift out of agriculture into manufacturing and services has long been thought of as essential to the economic development process (e.g. Lewis, 1954), and the

**Figure 1.** Correlation between GDP per capita and the Share of the Workforce in Agriculture, by country, 2015



Source: World Development Indicators (2016).

share of labor in the agricultural sector has a strong, negative correlation with GDP per capita on a country basis (Figure 1). A recent literature both demonstrates that a large gap exists between returns to labor within and outside of agriculture (e.g. Gollin *et al.*, 2014), and a debate has surfaced on whether this shift causally relates to the shift from agricultural to non-agricultural work, or relates to worker selection into the non-agricultural sector. If the former explains the gap, then implicit or explicit barriers must exist that constrain individuals from moving out of agriculture. As a result, a policy response to improve welfare would be to reduce such barriers, which might include property rights over land (e.g. Jacoby, Li, and Rozelle, 2002), or access to formal insurance (Munshi and Rosenzweig, 2016). On the other hand, if the whole gap is due to selection on individual characteristics, then policies to help improve human capital to improve returns to labor both within and outside agriculture should be emphasized. Lagakos and Waugh (2013) theoretically demonstrate that worker sorting can generate a substantial productivity gap due to the presence of a subsistence food constraint in a Roy model.

From a macroeconomic perspective, several authors have documented the gap between returns to labor in and outside of agriculture. In studying cross-country productivity differences, Restuccia *et al.* (2008) find that the agricultural productivity gap is 3.2—in oth-

er words, that productivity is higher outside of agriculture by a factor of 3.2. Gollin *et al.* (2014) combine national accounts with cross-sectional data from microeconomic surveys, and find that by controlling for differences in hours worked and human capital per worker between the two sectors, the average agricultural productivity gap falls to 2.1.

From a microeconomic perspective, several papers have also documented a wage gap between laborers in agriculture. Using household fixed effects, Beegle *et al.* (2011) find an average wage gap of 36 percentage points between migrants and non-migrants from Kagera, Tanzania. Moreover, they find that as migrants have moved farther, they are better off. Consistent with this idea, Bryan and Morten (2017) build a model of migration with migration costs as well as potential benefits to agglomeration, and find it consistent with costly movement in Indonesia. They suggest that eliminating moving costs could increase output by an average of 20 percent, by improving selection of workers into specific markets.

Two other micro studies suggest there may not be gains to reducing migration constraints. First, Young (2013) argues that the entire gap can be explained by selection on education, through the study of Demographic and Health Surveys in 65 countries. However, his study uses proxy variables for consumption, including household asset ownership, adult education levels, and child health. Perhaps more convincingly, Hicks *et al.* (2017) use two long panels in very different countries (Indonesia and Kenya) and show that the productivity gap can fully be explained by a complete set of individual and year fixed effects. However, due to the nature of their analysis any gains are measured only among individuals with productivity measured in both sectors; in other words, they cannot rule out the possibility that moving costs or other frictions may constrain individuals who could not migrate, and would have higher productivity in the non-agricultural sector.

The discussion above has neglected the fact that returns to labor in agriculture are highly variable over the year. During specific points in the agricultural calendar, returns to labor may be quite high in agriculture, and could even exceed returns to labor outside of agriculture. An example would be during the harvest of perishable crops for which capital is not available or is too costly. On the other hand, at times returns to labor in agriculture may be close to zero, which can lead to seasonal migration. However, seasonal migration does not always occur on its own. In a randomized intervention, Bryan *et al.* (2014) induce seasonal migration during the hunger season in Bangladesh, when agricultural tasks are minimal, and find that consumption increases by 30 to 35 percent among households of those who were induced to migrate, and further seasonal migration remains 8-10 percentage points higher in years after the intervention among those who were induced to migrate.

In sum, there is clear evidence in the literature that there is a labor productivity gap between agriculture and non-agriculture. It also seems clear that some of that gap is due to the selectivity of migrants out of agriculture a large portion of that gap can be accounted for by selectivity. However, there is also strong evidence that migration is constrained either in general or at the very least seasonally. Such constraints include potential access to land (Jacoby *et al.*, 2002) and other informal rural institutions. Certain institutions, such as caste-based informal insurance networks in India, may further hinder migration by reducing access to such insurance (Munshi and Rosenzweig, 2016). Moreover, due to agglomeration urban areas are likely to continue to grow economically more rapidly, implying that even if selective sorting drove all migration, the equilibrium is constantly shifting at the margin.

### 3. Effects of migration on agriculture and rural livelihoods

A major challenge in conducting research on the impacts of migration in general is that a number of endogenous and difficult to observe factors affect the migration process. Migrants are likely to be different from non-migrants in both observable and unobservable ways. The opportunities that potential migrants observe outside the village are also not likely to be observable in advance of migration. Moreover, if we consider migration from a household decision making perspective, households must both choose whether or not to send out a migrant, as well as which individual or individuals should migrate.

As a result, understanding the implications of migration for sending households and areas in general is challenging empirically. The above discussion implies that in order to be able to credibly measure the impacts of migration on rural livelihoods, one needs either a randomized experiment (e.g. Bryan *et al.*, 2014), a natural experiment that causes variation in the opportunity to migrate, or a credible instrumental variable that plausibly causes differences in the opportunity to migrate but does not affect household production. For the latter strategy, it is worth noting that such instruments are both probably best linked to a policy change, and represent an estimate akin to a local average treatment effect (Angrist and Krueger, 2001). In other words, impacts estimated with instrumental variables represent impacts on those most likely to be affected by the instrument, rather than the population at large. Given the challenge in identifying impacts of migration, in some cases below evidence from studies of international migration will be included as they have strong identification strategies.

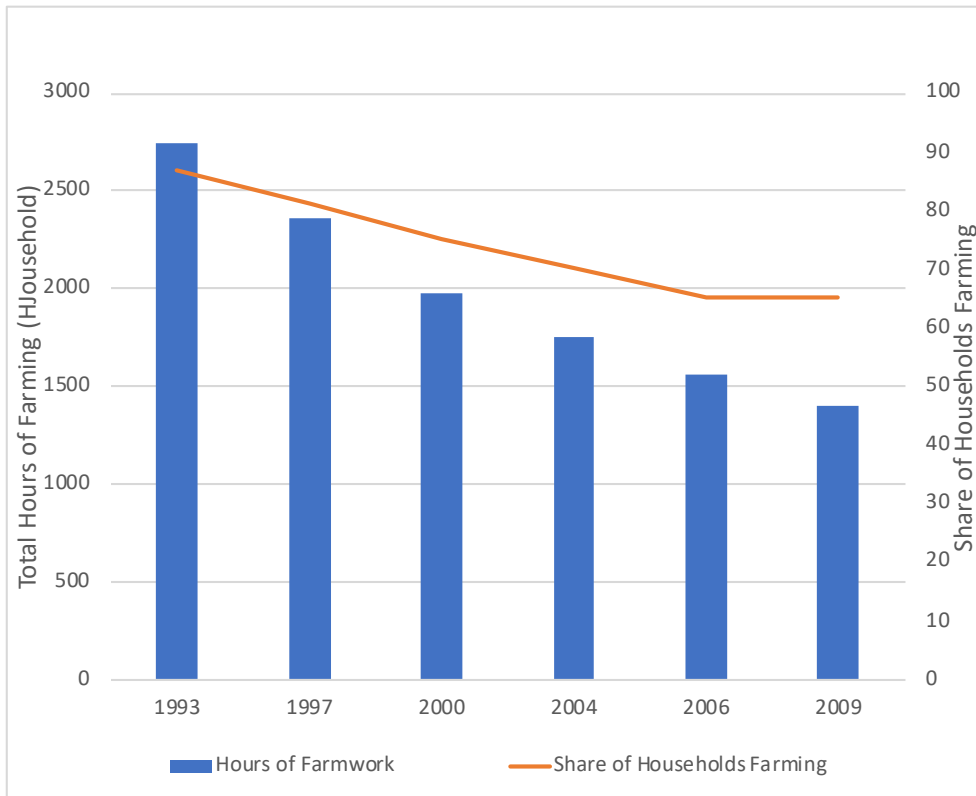
#### 3.1 Impacts of migration on agricultural production

As discussed in the introduction, there are several competing effects that migration can have on smallholder agricultural production. Relatively recent loosening of restrictions on rural mobility in both India and China have substantially increased the volume of internal migrants in the world (Deshingkar, 2006). Much of the resulting literature focuses on internal migration in China, though there are examples from India, Bangladesh, and Vietnam as well.

In China, there is suggestive evidence that migration shifts production on the margin from more labor to capital intensive techniques. Rozelle *et al.* (1999) and Taylor *et al.* (2003) find that maize yields and agricultural income in northeast China, respectively, are reduced with migration, but increase with remittances. However, they instrument migration with a community network variable and remittances with a community remittance norms variable; both are likely influenced by long term factors that may also affect agricultural production practices and incomes. Giles (2006) uses panel data and weather shocks to instrument for village level migration, and finds that as more village migration leads to lower variance in household agricultural income.

Perhaps the best evidence on the implications for internal migration for agriculture in China is indirect. De Brauw *et al.* (2013), in studying agricultural labor changes resulting from migration, show that in the China Health and Nutrition Survey panel labor inputs fall substantially between 1993 and 2009 (Figure 2), both in terms of the share of households doing any farmwork and the number of hours reported conducting farmwork.

**Figure 2.** Hours of Farmwork and Share of Households Farming, by Survey Round, Rural Areas of China, China Health and Nutrition Survey



Nonetheless, according to national statistics, during the same period the value of agricultural production rose by 297 percent in real terms, while cereal yields increased by 19.5 percent. Meanwhile, the power (measured in kilowatts) of agricultural equipment being used increased by 175 percent over the same period (China Statistical Yearbook, 2010). Whereas these statistics do not explain how production has been changing at the household level, they clearly show that rapidly increasing internal migration has not negatively affected production in the aggregate, and are highly suggestive that capital has begun to replace labor in Chinese agriculture.

Outside of China, there is further evidence that internal migration does not have much of an effect on overall production. Quisumbing and McNiven (2010) study a panel from Mindanao, in the Philippines, and find no evidence that either internal or international migration has much effect on overall agricultural production. Similarly, de Brauw (2010) finds evidence of a shift from labor intensive crops (specifically, rice) to land intensive crops in Vietnam among Vietnamese households participating in seasonal migration.

Further, there is some emphasis in the literature on understanding the relationship between migration and agricultural technology adoption. For example, in studying data

from Bangladesh Mendola (2008) finds a negative correlation between internal (either permanent or seasonal) migration and high yielding variety (HYV) adoption, but a positive correlation between international migration and HYV adoption. However, she uses both household and village level network variables as instruments, either of which could be correlated with agricultural outcomes that might be affected by network participation. Foster and Rosenzweig (2008) look, in fact, for an opposite correlation; they find that households with initially higher yields for HYVs are less likely to send out migrants in following years. The discussion of impacts on household labor returns to this paper.

Finally, it is worth mentioning two papers that use exogenous variation to identify the impacts of international migration on a large set of outcomes, including agricultural income. Specifically, in studying migration from Pacific Islands to New Zealand made possible through lotteries, Gibson *et al.* (2011a) find no effect on agricultural income caused by migration from Tonga, and Gibson *et al.* (2013) find a positive effect on agricultural income caused by international migration from effect from Samoa, though it trails off as migrants have been gone for a longer period of time.

In sum, there is scant evidence that migration has a negative impact on agricultural production or income among those left behind. Instead, households appear to adjust either by shifting to more land intensive crops at the margin, or by substituting capital for labor, and consequently the value of agricultural production does not appear to change. To shed more light on the types of changes Before discussing whether migration affects household investments, we explore whether it affects either household or village level labor allocations.

Given that migration is often gender specific, it can further change bargaining within households that migrants leave, with implications for agricultural decision making. Chen (2006) uses the CHNS to show mild evidence of non-cooperative behavior within households when fathers leave; specifically, mothers spend less time on chores and labor within the household enterprise (agriculture). Using later rounds of the CHNS, Mu and van de Walle (2011) find that women do more farmwork after migrants leave. De Brauw *et al.* (2013) find that the increasing out-migration of males in China during the 2000s do not affect overall agricultural productivity using several data sources.

Much of the further evidence in the literature relates to international migration. Mendola and Carletto (2009) find that having a migrant abroad from Albania increases the supply of unpaid work among women, presumably including agriculture. But Antman (2015) finds an increase in decision making power among households that male Mexican migrants left for the United States; she finds that resources shift towards girls from boys, and women exhibit more decision making power.

In sum, recent evidence suggests that as internal migration progresses, it leads to specialization on the farm. Wage impacts do not appear to be zero as predicted by Lewis (1954); rather, direct and indirect evidence from South Asia suggests that as labor is withdrawn from rural markets wages do increase. Perhaps most important from a policy perspective, migration has complicated interactions with insurance, as sending out a migrant acts as a substitute for formal insurance. And migration can affect gender relations within households; to the extent that there is a feminization of decision making as a consequence of migration, women may make more decisions about crops to grow, sell, or related to investment decisions, which can affect the way crops are sold on input and output markets.



### 3.2 Impacts of migration on household investments

Migration is a dynamic process, and perhaps not surprisingly it therefore can also affect the types of investments that rural households make. Assuming that migrants send back remittances, some portion of those remittances may be consumed or saved for investment. If household decision makers can estimate the returns to various types of investment, one might broadly consider three categories of investments. First, households might decide to invest in productive activities within the village. Second, they might decide to invest in durables or improving their housing stock. Such investments might be preferred to productive investments, because the return in terms of consumption is stable, and returns to productive investments might be expected to be lower or quite variable. Third, households could decide to invest in their children, either through ensuring that younger children eat better or older children stay in school longer. The latter effect might be tempered as children get older, however, and become candidates for migration (Glewwe and Jacoby, 2004).

There is little evidence that rural-urban migration leads to productive investments in rural areas. De Brauw and Giles (2018) find that increased village level migration leads to increased productive investment levels, but among richer households, not among poorer ones. Since migration in their sample is more likely to emanate from poorer households, this finding is likely due to general equilibrium effects. In some contexts, remittance rates may be too low to generate enough capital for investment; de Brauw *et al.* (2014) for example compute remittance rates among internal migrants from several African countries, and find they are below 50 percent.

There is more strong evidence from the literature on international migration; a potential rationale is that international migration may lead to larger remittances. Related to migration from Mexico to the United States, Woodruff and Zenteno (2007) find that households in villages with larger long term migrant networks exhibit higher investment in microenterprises. Yang (2008) uses exchange rate shocks during the Asian financial crisis to statistically identify remittances back to the Philippines, and finds that they lead to increased levels of self-employment and entry into new types of entrepreneurship. On the other hand, Gibson *et al.* (2011a) actually find negative impacts on investments in agriculture and livestock among households in Tonga that migrants left for New Zealand; it could be that households sold livestock to finance the initial migration and did not replace them.

There is substantial anecdotal evidence that migrant remittances are often invested in either durables or improved housing. Housing both might serve to make the household better off and to make the household more attractive for the migrant to return to (e.g. Yang, 2011). However, the evidence is largely not causal but shows interesting correlations; a challenge is that one needs both panel data that can demonstrate the timing of investments, and one has a plausible identification strategy. An example related to rural-urban migration is de Brauw and Giles (2018), who use plausibly exogenous variation in the timing of ID distribution to show that in China low income households make investments in housing when exposed to more migration. From the international perspective, perhaps the most interesting correlation in the literature is found by Osili (2004), who uses a unique sample of Nigerian migrants in the United States matched to households in Nigeria to demonstrate housing investments among those households as well.

Somewhat more tractable to measure, at least in terms of timing, is the relationship between migration and investments in the nutrition of young children (children under 5). A positive nutritional status among children under 5 years old has been shown to lead to improved outcomes later in life, including higher wages (Maluccio *et al.*, 2011). Remittances are not the only mechanism by which nutrition investments might occur; increased women's decision making power within households is also correlated with better nutritional outcomes among young children (Ruel and Alderman, 2013), though there might be negative impacts if less time is spent caring for children as a consequence of migration. As such, understanding the correlation between migration and the nutritional status of young children is an empirical question.

The main source of evidence on internal migration and young child nutrition is again China; Mu and de Brauw (2015) use a panel within the CHNS and an interaction between wage growth in capital cities and the initial migrant network size to show parental migration improves the weight of children for their age, but not their height. Internationally, Carletto *et al.* (2011) use difference-in-difference methods to find a positive correlation between migration from Guatemala to the United States and child height. In both papers, the effect of migration is measured as a net effect, rather than being caused by either income or changes in women's decision making power. In contrast, Gibson *et al.* (2011b) find a causal negative impact of migration on child height in Tonga. There, one would assume that the time allocation channel discussed above dominates the income and women's decision making power channels.

Among older children, households may use migrant remittances to make investments in education, as additional schooling is positively correlated with higher wages. However, from a policy perspective in some countries school attendance among younger children is nearing universal, so there is potentially little chance of impact at young ages in such countries. Moreover, as children get older, there is a potential tradeoff between schooling and finding work as a migrant. So as with other questions related to migration, the net effect of migration on school enrollment is an empirical question.

Perhaps not surprisingly, there is credible evidence in the literature related to findings in both directions, and as with some of the other topics covered in this paper, some of the best evidence relates to international migration. Specifically, Yang (2008) finds that remittances lead to increased school enrollment in the Philippines; Theorahides (forthcoming) extends Yang's analysis by aggregating individual level data on destinations from specific localities to instrument for demand shocks, and similarly finds a school enrollment increase of 3.5 percent with spillovers to non-migrants. On the other hand, McKenzie and Rapoport (2011) use historical migration rates by state as an instrument, and find that migration reduces school enrollment among 12 to 18 year old boys and 16 to 18 year old girls.

Two recent papers demonstrate that not all impacts of migration on education are positive. De Brauw and Giles (2017) show that as migrant opportunity increases within villages from a four province sample in China, high school enrollment decreases. During most of the period they study, completion of middle school is mandatory, so the first major schooling decision individuals make is whether to continue with school or not after mandatory schooling is completed. Similarly, Pan (2017) uses a change in the *hukou* policy related to children with urban registered fathers and rural registered mothers reduces high school enrollment among affected children at the margin.

To summarize, migration can affect rural investment through remittances. These investments can have important implications for rural productivity if they are made in productive activities or in children; the effects of housing or durables investments are not likely to change the rural returns to labor in the longer run. To enhance the ability to make productive investments, it is important to be able to remit—in some African countries, remittance levels are low, potentially due to high transaction costs of remitting. If returns to productive investment are high enough in expectation, then rural returns to labor should increase, potentially changing the evolution of the rural-urban wage gap.

#### **4. Realizing the Development Potential of Migration**

The previous two sections have demonstrated that first, in most of the world a rural-urban labor productivity gap exists, and urban laborers obtain roughly twice the return to their labor that rural laborers do. Even if this gap is largely due to selection rather than migration restrictions, the presence of local agglomeration effects and locally increasing returns to scale suggest that so long as economies are growing migration will continue from rural areas to urban areas. Moreover, the rural economy appears to adapt quickly to these changes; impacts of migration on agricultural production in much of the developing world seem minimal. Migration can lead to important investments in microenterprises, nutrition, or schooling, but all differ by context.

From a policy perspective, internal migration would seem to be a phenomenon that can help foster economic growth by improving the allocation of labor across sectors. As a result, it seems important to consider migration as policies are developed. While migration might make the provision of public goods such as schools and health clinics a moving target, these are less costly to build and maintain in urban areas than in rural areas on a per capita basis, as population densities are higher. But migration should also be considered when designing other policies, such as social protection. An excellent example is the example of the NREGA workfare program in India, which Imbert and Papp (2017) show was not as effective at growing the rural economy as it would have been had it not reduced seasonal migration.

Perhaps more effective would be policies that enhance linkages back to rural areas, such as information and communications technologies. Ensuring that financial regulations allow for the growth of mobile money services, for example, can help facilitate remittances back to rural areas, also dampening any potential negative effects on agricultural production. Moreover, ensuring that land rights are not threatened or perceived to be threatened when migrants leave can help provide informal insurance to migrants, potentially allowing more people to choose where they want to live.

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