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The Effects of Proximity and Transportation on Developing Country Population Migrations

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Ravenstein's first law of migration, derived from observing place of birth in the British 1871 and 1881 censuses, states that most migrants move only a short distance, usually to large cities. (Ravenstein, 1885). Fifty six years later a Princeton astronomer generalized Ravenstein's first law as a gravity model, in which the number of people migrating is inversely proportional to the square of the distance between origin and destination and proportional to the product of their populations. (Stewart, 1941). Although economists are averse to promulgating immutable laws, Ravenstein's early observations have stood the test of time well. Both in the industrialized and developing countries, with respect to both internal and international migration, greater distances do deter movement. The appropriate measurement of distance may certainly be disputed and biases in the gravity models noted, when population measures are themselves endogenous, yet the general proposition that distance deters migration appears to be quite robust. (Long, Tucker and Urton, 1988).

Given this regularity it is remarkable that we understand so little about the underlying causes behind the deterrent effect of distance. Indeed, distance plays almost no role either in the development literature or even the 'new' economic geography. From the advent of development economics after World War II, the literature focused on two, homogeneous sectors: a backward rural sector and a modern urban sector. Migration received special attention solely as the process of transferring labor from agriculture to the industrial sector. Proximity of some villages to urban centers and 'remoteness' of others remained neglected. Moreover, perceptions of a uniform rural sector glossed over any internal variations within the rural economy; only rural-urban migration mattered, rural-rural migration was irrelevant.

The 'new' economic geography has revived interest in the core-periphery contrast. In much of this literature, labor is the only factor of production so migration of that sole input between core and periphery plays a pivotal role. Yet, once again, the core and periphery are internally homogeneous and distance from the core is largely irrelevant.

So why should distance play such a pervasive and persistent role in migration patterns and why does

it matter anyway? The first portion of this question is taken up in Section 2 after reviewing the nature of the evidence in the following section. Section 3 then turns to some implications of distance as a deterrent to migration, with particular emphasis on consequences for poverty and inequality of incomes. In Section 4 the paper turns to some of the potential policy concerns which consequently arise and offers some thoughts on the type of data and analyses which will be needed to resolve some of the remaining puzzles, of which there are many.

1. The Evidence

The measured propensity to migrate can be quite sensitive to the definition of migration. Consider just a few of the complications. First, there is some agreement that migration refers to a change of residence, but what defines residence? In many societies, 'home' is a place of allegiance but not necessarily where one lives; for instance, it is quite common to find household heads lodging for extended periods away from their 'home' where spouse and children live. Second, for how long must one 'reside elsewhere' to be considered a migrant? Again there is some agreement that short term visits should be excluded from the definition of migration, but less agreement about what constitutes short term. Whether seasonal movement to follow a cropping pattern should be counted as migration can profoundly alter the measured propensity in some developing countries. (For instance, 18.8 percent of all people migrating in the five years prior to the 1992 National Migration Survey in Thailand are reported to be seasonal migrants). Third, a distinction is also normally maintained between migration and residential mobility, the latter referring to a change of residence within an administrative boundary, such as moving from one dwelling to another within the same town. However, this distinction is not always made and The National Migration Survey of Thailand, for instance, identifies very high rates of internal migration, but these include residential moves within Bangkok. One final warning may be added. Almost all of the extant data on migration in the developing countries are derived from censuses which (like Ravenstein's data) report place of birth and of location at the time of enumeration. An increasing portion of developing country children are being born in urban hospitals and clinics - the result is that censuses record increasing urban-to-rural migration since the time of birth.

These difficulties notwithstanding, two types of evidence do indicate a preponderance of short moves. The first type of evidence documents the extent of migration across nested administrative boundaries. An illustration is provided in Table 1, which shows the number of people in the 1981 Census of India who reported changing place (village, town or city) of residence within the previous five years. About 50 million people had moved their place of residence during this five year interval, or approximately 7.1 percent of the population. However, only 14 percent of these migrants moved from one of India's states to another, nearly 29 percent moved from one district to another within the same state, while more than 57 percent moved to another place within the same district.

Table 1: Migration Streams in the 1981 Census of India

	Millions of Migrants				Total
	Rural-Rural	Rural-Urban	Urban-Urban	Urban-Rural	
Inter-State	2.00	2.08	2.12	0.74	6.94
Inter-District	5.80	3.34	3.69	1.54	14.37
Intra-District	19.97	4.50	2.12	2.10	28.69
Total	27.77	9.92	7.93	4.38	50.00

Source: Economic Commission for Asia and the Pacific (1995).

In a related vein it may be noted that in eleven of the nineteen OECD countries, for which data on the stock of foreign population by nationality are available, the largest immigrant source is from a neighboring country. (OECD, 1998). Of the eight OECD countries where this is not the case, only three draw their largest number of migrants from another continent - Moroccans in Italy and the Netherlands and Cape Verdians in Portugal. Otherwise, developing countries form the dominant source of foreign nationals in OECD countries only when they are neighbors (Mexico-US, China-Korea, Morocco-Spain) though Turkish migration to Germany and Denmark proves an exception. Moreover, Russell and Teitelbaum (1992, p.9) note that "Of the estimated 80 million persons currently counted as international migrants, roughly 35 million are in sub-Saharan Africa", while data tabulated by Russell, Jacobsen and Stanley (1990) suggest that 87 percent of these immigrants in Africa are from other African nations. Of course, some of the difficulties of measuring

international migration are well-known, such as the problems of counting illegal migrants, the fact that census data on country of nationality omit migrants who have assumed citizenship of the destination country, and that flow data on emigration are exceedingly rare. Nonetheless, the available data do strongly suggest that a great deal of international migration is over short distances to neighboring countries.

The second type of evidence is the wide range of econometric studies of extended gravity models, which regress migration flows on distance between origin and destination and other explanatory terms. The measures of distance vary, encompassing road miles between major cities of regions to simple straight lines, with specifications ranging from linear effects to constant elasticities to more highly nonlinear forms, yet both in internal migration studies and analyses of international migration, distance is fairly uniformly found to have a significant negative effect on migration flows.¹ Moreover these effects are often found to be large, with a doubling of the distance between locations lowering migration by a half or more. Yet whether such simple measures are appropriate cannot be deliberated without some sense of what they are meant to represent and herein lies the fundamental weakness of the gravity model, which postulates that distance affects the outcome without hypothesizing any underlying causal behavior.

2. Why Distance Matters: Notes on Underlying Causes

There is no shortage of suggestions in the literature as to why longer distance migrations may be less common. In his survey of migration in the developed countries, Greenwood (1997) identifies five categories of explanation:

- a. Distance is a proxy for the transport costs of moving.
- b. More distant moves require greater time and hence higher foregone earnings.
- c. Moves over longer distances impose higher costs of foregone, intervening opportunities..
- d. The psychic costs of separation from home rise with distance.
- e. Information about remote locations is more costly to acquire.
- f. Concentration of prior migrants in nearby places may lower the costs of shorter moves.

1. Early examples from the literature on internal migration in developing countries include Beals, Levy and Moses (1967) study of Ghana and Sahota (1968) on Brazil. On international migration to the USA see Lucas (1975).

It is worth pausing to consider some of these postulates more closely, as well as a few others besides.

First, then, consider the out of pocket expenses associated with relocation. In general, transport costs incurred in internal migrations are not large. Bihar is one of the poorest states in India. A third class railway ticket from Patna in Bihar to Delhi (over 500 miles) costs less than nine times the daily wage of an agricultural laborer in Bihar.² For all but the very poorest households, saving for such an expense is not inconceivable and, in fact, many travelers manage to avoid buying a ticket at all. The Indian context may be extreme, where passenger transport is subsidized by freight, but Sahota's (1968) data for Brazil indicate that the cost of a single ticket, at the sample mean, can be recouped from the mean gain in income among migrants within 1.5 months. Transport costs alone seem unlikely to deter more distant internal migrations in most contexts. Admittedly there are other forms of monetary costs associated with relocating residence, such as the cost of establishing a new home. However, although these costs may be greater in a larger town, there is no apparent reason to anticipate that such settling in costs would be correlated with distance moved. Transport costs, and hence distance, may nonetheless be significant deterrents to moving in three contexts. First, when frequent return visits are intended by potential migrants, which may well be the case when the migrant wishes to sustain a close link with family left at the point of origin. Second, although costs of single journeys domestically may not be high, the price of international travel is significantly greater. Third, for very poor households who are credit constrained, ability to raise funds to pay the costs of moving in advance of reaping higher earning in their new destination may be a constraint.

2. My thanks to Aditya Bhattacharjea and Vivek Srivastava for providing the information to make these rough calculations.

The second item on Greenwood's list emphasizes an additional component of the cost of moving - that of foregone earnings. Longer moves indeed normally require larger travel time (though even this depends upon the mode of travel), but the time involved is hardly extensive. Rather, the larger component of time commitment may involve job search. The limited evidence on job search among migrants in developing countries suggests that a significant portion of rural-urban movers have found their urban job before relocating and that spells of open unemployment among those who have not found a prior job are brief on average.³ Neither of these necessarily rule out significant foregone earnings: job search before moving may prove quite time consuming and involve loss of earnings; temporarily accepting a low paying job in town can keep open unemployment spells brief yet impose initial opportunity costs. But are these components of foregone earnings correlated with distance? The answer is far from obvious, though it is conceivable that the incidence of finding a job before moving may be greater for shorter moves (though this appears to remain untested).

The issue of intervening opportunities raises some interesting questions about the appropriate way in which to measure distance; distance to (and opportunity in) other potential choices now enters the calculus and to this we shall return later in this section.

The term 'psychic' costs has passed into common parlance among economists studying migration, intended to convey a sense of alienation from one's surroundings (though any link with the occult powers is obscure at best). Establishing a home in a context where a different language is spoken, where peoples of different ethnic groups are in the majority, where the life-style and institutions contrast with those at home, may be seen as a threat by some and as an exciting experience by others. Either way, geographic distance is often a very poor proxy for the changes which prevail. Under apartheid, moving from Soweto to Johannesburg was prohibited and would have meant entering a different world, while moving from white Johannesburg to Capetown presented far smaller contrasts. One can move 3,000 miles from one side of the US to the other and still find McDonald's. There is

3. See, for example, Banerjee (1991) and Banerjee and Bucci (1994).

also, surely, a large fixed ‘psychic’ cost involved in simply leaving home, irrespective of the distance moved.

If information about remote locations is more costly to acquire, then longer moves either involve higher costs or embody greater risks under less complete information. Information about job opportunities and life-style in alternative locations may be transmitted in a number of ways. In some contexts, media coverage is no doubt important in shaping perceptions and distance may then be an important factor where media coverage is more parochial. Perhaps the most important mechanism for transmittal, however, is a network of previous migrants, especially if these include kith and kin.⁴ This, of course, provides a strong link with the last element on Greenwood’s list, for when prior migrants have moved short distances, information transmitted over this network will concentrate on nearby locations. Yet this ultimately begs the question as to why the initial migrants did not move further. Important as networks may be, there seems no inherent reason why their role should lead to more frequent short moves. Moreover, as communications improve one might anticipate that the effect of even an initial network of contacts in nearby locations should diminish.

4. Carrington, Detragiache and Vishwanath (1996) cite a number of examples and construct a theoretical model in which moving costs decline with prior migration.

Beyond the list of components summarized in Greenwood's survey, one or two other potential factors may also be mentioned. There is some evidence that unemployed migrants prefer a location in which the labor market has some similarities to that at home, if only because this enables transfer of job or job-finding skills.⁵ To the extent that labor markets tend to be more homogeneous locally, this can encourage shorter moves; workers with prior experience only in agriculture may be less likely to make distant moves to find an industrial job in town or abroad. Migrants also frequently leave some assets in their place of origin, perhaps because they intend to return, because their private knowledge enhances their own returns on these assets beyond those achievable by others, or because of a lack of a well developed market for specific assets. To monitor these assets, especially when serious problems of moral hazard are involved in renting out, or simply to sustain the value of assets (perhaps especially social assets in the home area⁶) may then require frequent return visits adding an incentive not to move too far. The literature on family migration decisions has emphasized the importance of spreading family members across geographical settings which offer mutual insurance, perhaps enforced by understandings about inheritance, or care of assets and children left behind, as well as by altruism. Frequent visits may well be important in enforcing such understandings, again leaning toward not moving too far. Finally, before leaving this list which is growing too long, I cannot resist mentioning a growing theoretical literature which perceives trades as occurring between parties moving like particles in Brownian motion; a trading match is realized when the first pair of traders collide with mutually acceptable terms. Since collisions are more likely between parties starting closer together, short distance trades are more common. (Kiyotaki and Wright, 1993, Kranton and Minehart, forthcoming).

Even after this lengthy list of potential factors proxied by distance, it is not much clearer how best to measure distance in migration regressions, though one or two features do emerge. If one still believes that transport issues dominate, then travel cost (or at least distance to travel) is surely more appropriate than a straight line. Yet, even this suggestion is complicated by the fact that different

5. See, for example, Gibbs (1994) on the US and the discussion of Italian migration in Faini *et al.* (1997).

6. See Jagannathan (1987).

income classes are likely to adopt different travel modes. More generally, some non-linear representation of distance is likely to be appealing, but distance to where? The mention of intervening opportunities raises interesting possibilities on the importance of alternative distances; is the effect of distance to a chosen destination independent of distance to irrelevant alternatives (and if not then how should we impose some structure on the myriad alternatives)?⁷

7. For one approach, see Fafchamps and Shilpi (2000).

Certainly the predominance of short moves shapes some common features of migration. For instance, in the low income countries the most common form of migration is frequently rural-rural (as is apparent for India in Table 1). Though almost entirely neglected by economists, partly because of our preoccupation with a homogeneous rural sector, rural-rural migration actually offers many of the features normally modeled as the prerogative of rural-urban migration, such as the potential of earnings gain after job search, and of mutual insurance.⁸ Short migrations may also permit easier returns in the event of a crisis; in Indonesia during the financial crisis of 1998 massive return migration from towns to villages seems to have played an important role in the expansion of employment during the crisis, as the sharp currency depreciation enhanced profitability in agriculture. (Fallon and Lucas, forthcoming). Step migration - from village to town to city - also permits shorter moves and some authors have sought to explain this in terms of more complete information at close quarters. (Pessino, 1991). Whatever the cause, step migration may be one of the contributing factors to Ravenstein's second law - that while cities attract migrants from nearby villages, these villages in turn attract people from more remote rural areas - a feature with important implications for trickle-down development to which the following section returns.

Before turning to this, however, it is worth a sojourn to note some parallels in the international trade literature, where gravity models again fit the data on inter-country volume of trade quite well. Indeed, as Leamer and Levinsohn (1995) note, trade theorists have neglected this empirical regularity assuming orthogonality to other theories, as have migration theorists. At best, the trade literature draws upon Samuelson's iceberg corollary - that with each mile shipped a constant fraction of goods melts. In some dimensions the empirical trade literature is richer than the migration evidence, showing that common borders, a common language and the common occurrence of trade agreements between neighbors does not entirely nullify the effect of distance. (Rauch 1999, Eaton and Kortum 2000). There are even one or two studies which attempt to look at transport costs more systematically, tending to deduce (as in the migration literature) that the transport costs seem too low to explain the extent of price differences over space.⁹ Certainly the common links between trade and

8. See Rosenzweig and Stark (1989) on marriage and inter-village migration in semi-arid India, for instance.

9. For a discussion see Eaton and Kortum (2000). In a highly publicized recent contribution, Obstfeld and Rogoff (2000)

migration over space seem to remain neglected though potentially important. If the lack of trade connecting more distant sites leads to wide factor price differentiation then this should enhance the incentive to migrate. Yet, in practice, it seems that trade and migration flows follow quite common paths. Trade and migration both generate contacts leading to channels of information and familiarity which facilitate flows of both goods and people, both concentrated over shorter distances.

3. Why Distance Matters: Some Consequences

Why should we care that most migrations are over shorter distances? The principal concern is the potential for leaving 'remote' locations as poverty traps. How might this work, what are the counter arguments and what does the evidence show? The number of reasons to anticipate that more remote locations will become poverty traps, when migration is discouraged by greater distance, certainly outweigh the number of counter arguments. Among the former, at least three categories may be distinguished.

attribute several major macro-economic phenomena to trade costs but adopt an eclectic view as to the nature of those costs.

The first group of arguments refers to the role of labor migration in factor price equalization. It is well recognized that a sufficient set of conditions for factor price equalization through commodity trade alone is quite stringent. Provided that migration contributes to wage (and unemployment) convergence, the movement of labor from low wage to high wage locations helps to facilitate factor price equalization, left incomplete through commodity trade and capital mobility. Any barriers to labor mobility, such as the deterrent effects of distance, then sustain a wage gap leaving more remote locations in relative poverty. At least three elements may serve to exacerbate this effect. (a) Removal of brighter, better-educated individuals may serve to lower wages at origin. This could be true even for educated workers who remain, to the extent that agglomeration of educated workers enhances their productivity as some evidence indicates. Whether departure of educated workers lowers wages of less well educated workers depends upon at least two factors: first whether skilled and unskilled workers are complements or substitutes; and the extent to which stayers are well equipped (financially and intellectually) to take advantage of educational openings themselves as their peers leave. When departure of the best and the brightest does happen to lower the earning opportunities of those left behind this is likely to have a particularly pronounced effect in leaving low pay in more remote locations, since on average it seems that better-educated individuals move further.¹⁰ (b) Economies of scale in production (including agglomeration effects) can readily result in migration widening any initial wage gap, lowering living standards in more remote locations. (Faini, 1996). Indeed this is the backbone of much of the new economic geography. (c) Perhaps most interestingly, Molho (1995) expresses rather beautifully a process whereby remote locations may slip further and further behind in labor market outcomes. He introduces an effect which he calls “cumulative inertia... whereby individuals form attachments to area, friends job, etc., which grows over time” with a result that “Fewer out-migration opportunities in remote areas generate longer residence durations which become self-perpetuating”. (Molho, 1995, p.123). If one adds a distance decay parameter, whereby distance becomes an increasing deterrent to migration at more remote locations¹¹, to Molho’s story

10. See, for instance, Schwartz (1973).

11. See Fotheringham (1981) for models of decay parameters and related evidence.

then the most remote locations can slip further and further behind.¹²

A second set of factors leaving remote locations behind is the lack of remittances from out-migrants. We do not know whether distance deters remittance from a given number of migrants, but the decline in the number of migrants alone will suffice for this effect. The lack of remittances can have both a direct and an indirect impact on the relative impoverishment of more remote locations. The direct effect of lesser remittances is to lower available incomes and hence, over the longer run, to lower savings, physical investments and education. An indirect effect may also arise when remittances offer a form of insurance. (Lucas and Stark, 1985). Households in remote locations who are not offered the insurance effect of migrants' remittances are less likely to adopt high risk, high return investments in agricultural technology, for instance. Moreover, inability to smooth consumption during crises in remote locations may result in cumulative poverty through long-term effects of malnutrition and poor health care, or through discontinuation of schooling. (Fallon and Lucas, forthcoming).

Thirdly, scale economies are significant in the provision of a number of public amenities, including schools, health facilities, sewerage and water. As a result remote areas, with their small populations, are not cost-effective targets for limited investments in new facilities. For people who care greatly about such amenities, there is the potential to vote with their feet. However, for the inhabitants of more remote villages, whatever barriers to mobility are imposed by distance presumably serve to discourage such choices.

12. These ideas are also closely related to the geographic poverty traps analyzed in the context of China by Jalan and Ravallion (1998), though 'remoteness' is not one of the geographic poverty correlates explored in that study.

Do these arguments mean that the more remote locations and their populations will inevitably, increasingly be left behind? A counter argument is feasible. Remember Ravenstein's second law - although development of the cities attracts villagers from nearby, those villages in turn attract short distance migration from more remote villages. Indeed, it is important to note that through such migration chains, net aggregate migration may be very substantial over extended distances, even though each individual migrant moves only a short way. In other words trickle-down development, with metropolitan economic growth enhancing incomes in more remote locations, may occur without direct migration from remote villages to town.

So, on balance, what does the evidence show? One may dispute living cost comparisons and comparability of workers in unmeasured attributes, but there is no real dispute that urban wages are considerably greater than rural wages in developing countries; there is also agreement that the incidence of poverty is greater in rural areas. (Lipton and Ravallion, 1995). Within the rural areas there is also some considerable cross-sectional evidence of higher incomes and wages close to urban areas though not all of this evidence attempts to adjust for differences in skills and other personal attributes.¹³ Given appropriate comparisons, such evidence would be consistent with a failure of migration and commodity trade to generate factor price equalization over space. Yet a more difficult and important question remains even less well documented: to what extent does urban development and consequently tighter, urban labor markets lead to greater wage increments in nearby villages than in more remote rural areas? Dynamic evidence on this critical issue appears to be lacking, leave alone any analysis of the role of migration (and of Ravenstein's second law) in this process.

4. Policy Issues and Suggested Directions for Analysis

Almost all economic policy choices affect migration to a greater or lesser extent; choices ranging

13. For references, evidence and discussion see Henderson (1988), Tacoli (1998), Fafchamps and Shilpi (2000).

from the macroeconomic (affecting unemployment patterns or the terms of trade between agriculture and industry, for instance) to more micro choices (such as pay structures in the public sector or property rights to land). Moreover the impacts of many policy choices, upon both the efficiency of an economy's operation and who benefits from any gains, can depend critically upon the propensities of various groups to migrate. (Lucas, 1997). However, in keeping with the thrust of the prior section, the discussion here focuses upon policy strategies to alleviate poverty in rural areas and especially in more "remote" rural areas.

The poverty alleviation debate may be depicted in terms of stark extremes: if trickle down development does not work and if the rural poor are indeed immutably attached to their geographic poverty traps, then relief is only feasible *in situ*; on the other hand, if migration or trade indeed links the poorest rural areas to town, either directly or through a step-wise process, then it is entirely possible that the most cost-effective methods of rural poverty relief may involve urbanization. The truth no doubt lies somewhere in between, requiring some combination of policies.

Certainly our understanding of migration processes in this balance is hampered by the paucity of existing data in the developing countries. The only common sources of migration data are the decennial censuses of which most record place of birth, permitting some analysis of the stock of migrants but not of flows, intervening moves or emigration. Specialized surveys of migration are exceedingly rare. Rather, the migration analyst must hope for more common inclusion of migration modules in multi-purpose household surveys. (Lucas, 2000). Nonetheless, some aspects of the links between distance and migration may indeed be pursued in greater depth, even within the confines of existing data sets, while others will require additional data generation.

Unexplored techniques

The remarks at the close of the last section already suggest one important, potential line of analysis. Imagine a set of locations which are ordered in space according to their proximity to the core: this ordering might be constructed on the basis of distance, of travel time, or of common borders. In essence Ravenstein's second law may then be cast as a first order Markov process of net migration to

the next highest location. Such a spatial depiction of a Markov process could well be examined and tested for stationarity, even within the confines of some existing census data. Indeed, this approach could be considerably enriched by examining the simultaneous determination of both migration and employment opportunities as stochastic processes over space. Although the contribution of migration to wage convergence has received some attention, the spatial issues of this convergence process seem to have been relatively neglected. However, in contexts where panel data on earnings or consumption are available, either for individuals or even for districts, it should be feasible to test for locational stationarity in the process of growth that is at the heart of the geographical trickle down debate.

In a related vein, spatial auto-correlation techniques seem not to have been applied to migration analysis, even among the industrialized nations, although this would appear feasible with a number of existing data sets. In such an approach, some attractions which locations offer are not well represented by observed measures, but the magnitude of these unobserved attractions can follow an orderly pattern according to the proximity of the location.¹⁴ For example, in inter-district migration, surrounding districts may prove particularly popular choices for reasons that are not observed. At a more complex level, second tier neighbors may also prove more attractive than third tier, and so on, which speaks to the exploration of spatial auto-correlation that is not simply first order. The application of spatial auto-correlation to migration patterns may prove to have several advantages: in particular, the precision of estimates and reliability of hypothesis testing can be improved for observed effects, while the method permits a direct role for common borders which have proved important in examining trade flows but remain largely neglected in migration analysis. On the other hand, spatial auto-correlation will not aid in disentangling some of the mystery which surrounds the role of distance in discouraging migration for spatial auto-correlation tells us nothing directly about the causes underlying spatial patterns of attraction.

14. For a primer, see Dubin (1998). For an early application to a developing country see Case (1991) .

Dispersion and attraction of amenities

However well integrated the rural population becomes into the benefits of urban and industrial development, pockets of rural poverty are likely to persist. To address this, many developing countries adopt *in situ* policy packages encompassing subsidies and transfers aimed at the rural poor, tax incentives for private investments outside of the core, as well as rural development programs and public investments in rural amenities. Given scale economies it is clearly cheaper, *per capita*, to provide amenities in more populous centers, yet failure to move people to locations with centralized facilities or *vice versa* obviously results in villagers from more remote locations being impoverished by poor education and inadequate health care. On the other hand, there is a potential for moral hazard in dissipating facilities (or subsidies) widely: people may be induced not to move by the costly provision of attractive, consumer amenities in their home village. This potential has attracted some attention from empirical researchers in the industrialized countries¹⁵, though we lack any serious evidence in the developing countries.

To correct this lacuna, community level information about amenities are obviously key, and some of these data are occasionally collected through a community survey of the sampling areas of multi-purpose household surveys. (Frankenberg, 2000). Ideally such measures would include nearby access as well as amenities within the community, user costs and indices of quality. However, even such community surveys would not provide information about amenities in places foregone by potential migrants or those rejected by actual migrants. To compare amenities across communities more generally requires information beyond the sampling frame of a typical household survey, perhaps gleaned from secondary sources or a more comprehensive community survey. Alternatively, regional averages may have to proxy for amenities available in alternative locations, though such averages of necessity incorporate errors in representing specific locations' amenities and such errors may be particularly egregious when provision of amenities is very heterogeneous within a region.

15. In the US context the evidence is mixed as to the importance of local amenities in affecting migration. For a survey, see Charney (1993).

The role of education

An appropriate strategy for poverty alleviation not only requires a mix of reliance on trickle down relief and *in situ* programs but that mix between the two extremes is itself endogenous to key policy choices; the integration of poorer, more remote rural areas into urban development can be affected in a number of ways. One potentially important mechanism of integration is expansion and improvement of rural education.

A number of studies note that better educated migrants move further. Does this imply that efforts to further education in remote locations will accelerate out-migration? Possibly not, if this observed pattern proves sensitive to an expansion in education and, in particular, if the observed relationship is not a causal one. Schwartz (1973) interprets his finding, that education reduces the distance deterrent to migration in the USA, as supporting a hypothesis that distance acts as a barrier to information flows. Schwartz argues that better educated individuals are able to process information more easily and hence that information barriers, associated with distance, present less of a constraint on migration of the well educated. Other interpretations would seem feasible¹⁶, such as an effect of education on taste, increasing willingness to undertake risks or to explore new environs at greater distances. Another possibility is that the wage gap between origin and destination rises more steeply with distance for better educated workers; the returns to higher education are generally low in the rural sectors of most developing countries, so for rural inhabitants to reap the rewards to higher education may require moving to a metropolitan area (or even abroad).¹⁷ Irrespective of which of

16. There is some evidence that attempts to promote information about migration alternatives have had little effect on internal migration, at least in Thailand. See Fuller *et al.* (1985).

17. Thus Lucas (1985) finds that education has no positive effect on increasing the likelihood of migrating from village to town in Botswana, once the effect of education on urban earnings is incorporated in the decision.

these interpretations is favored, education remains a causal factor in affecting the distance decay parameter in migration.¹⁸ However, this is not true for at least two other plausible interpretations.

First, it is possible that both the propensity to migrate further and the decision to continue schooling are affected by unobserved attributes of individuals, such as innate abilities or attitude to risk. Expanding education to persons lacking such traits will not then induce similar migration responses. This is a problem common to much of the empirical literature on the effects of education and will be difficult to resolve short of the unlikely availability of migration data on identical twins! A second, potentially important correlate could, however, be more readily explored. Migration requires an initial investment, not merely to pay for transport but also to finance any initial job search. The opportunity cost of such initial investments is lower for wealthy families, suggesting that *ceteris paribus* members of wealthy families are more likely to migrate and perhaps to migrate further. We therefore need to test whether the common observation that better educated individuals migrate further is really a reflection of the fact that better educated individuals normally belong to wealthier families. Given an inability to borrow against future wealth, it is the wealth of a potential migrant's (extended) family prior to migration that presumably matters. Few migrants will be able to report such information reliably, particularly if they migrated long ago. Rather, this will require contexts in which family wealth is measured and the family is then asked about members who have recently migrated away. Given such information about family wealth and the education of the individual it should be possible to isolate the distinct effects of each upon migration.

Commuting and transport development

18. If the principal mechanism is through the increasing returns to education with longer moves, then significant expansion in education levels could nonetheless serve to lower these returns.

Another potentially important mechanism of integrating rural areas into urban development is improvement to transport systems. The cost of a one-way ticket may be low for internal migrants, but this does not mean that enhanced, cheaper transport leaves migration unaffected. Evolution of the transport system can profoundly reshape local labor markets through trade in goods too, either discouraging or promoting out-migration, depending in part upon changes to the village terms of trade and the labor intensity of new local activities. Although this outcome is ambiguous in theory, the facts that most villages export bulk agricultural goods, and import less transport-intensive items from town, suggests that lower transport costs are likely to improve the rural terms-of trade. Evolution of the transport system probably has other critical effects on migration patterns too. Information flows tend to follow transport routes with increased traffic in both people and goods. Commuting becomes a viable option over a greater radius, though whether commuting substitutes for a change of residence or culminates in a move after initial target saving is unclear. Ultimately, the effects of better transport on migration patterns remains both ambiguous and poorly documented.

Almost all of the extant theoretical and empirical literature on migration in the developing countries tacitly assumes that place of residence and workplace are identical. In fact, in many developing countries a substantial portion of rural household incomes is derived from non-farm earnings¹⁹, yet little is known about the extent to which such earnings are generated in nearby towns. In large part this common neglect reflects a dearth of data on the location of individuals' jobs. A few household surveys do collect information about commuting time and mode, yet whether the job is in an urban or rural setting is rarely asked. (Schaffner, 2000). This latter omission is particularly surprising in view of the emphasis which development economists have placed on the rural-urban divide in employment generation and rural-urban migration of labor. Another strand of literature demonstrates that in times of shocks to household incomes a common income smoothing strategy is enhanced participation in the wage labor market, but it is not always clear where these additional jobs are located. If the shock is common to an entire rural neighborhood (such as a monsoon failure) it seems unlikely that relief will be found in the local agricultural laborer market, but may instead involve

19. For references see Lipton and Ravallion (1995).

migration or commuting, perhaps to town, to a less blighted rural area, or to a rural works project.²⁰

More generally, it seems that our understanding of the choices between migration and commuting are poorly documented at least in the developing countries.²¹ Given data on place of work, as well as residence, the joint, discrete decisions with respect to residence and workplace could readily be modeled with commuting cost as a constraining factor in this choice. Any such analysis should provide key policy insights, for both the location of jobs and commuting costs are susceptible to a wide range of policy influences and to the existence and costs of transport systems in particular.

20. See, for example, Kochar (1995) and Smith *et al.* (1999).

21. For a recent contribution on inter-regional migration versus commuting in Sweden, with references to earlier literature, see Westerlund (1999).

Most of the evidence on the role of transportation systems in affecting migration patterns in the developing countries is confined to case studies. Much of this evidence suggests that investments in rural road networks initially encourage out-migration, and local population mobility in particular, but later reverse this effect through accelerated local development and more frequent commuting. (Findlay, 1981; Hugo, 1981). More systematic statistical analyses are clearly called for in this arena. The case study material suggests that an obvious approach is to look simultaneously at migration, commuting patterns and poverty in relation to some measure of transport availability. In principle this might be approached from cross sectional observations, or perhaps more powerfully from time series or panel data when transport improves over time.²²

Udall (1981) provides an early example relating household consumption and migration to local bus service in Colombia, concluding that enhanced service promotes migration to town from nearby villages but discourages migration from more remote areas. Jalan and Ravallion (1998) use panel data on household consumption in China to demonstrate that consumption growth varies systematically across geographic locations in ways that are not explained by measured household accumulation of assets; those areas that are thus designated to be poverty traps are shown to possess less dense rural road networks, though migration plays no explicit role in this analysis. These findings seem promising, though in pursuing such analyses further at least two inherent concerns must be borne in mind.

First, the effects of enhanced transport systems on migration patterns and on poverty reflect the outcomes of complex underlying structures: lower financial, time and inconvenience costs of transport can aid the initial moves of migrants, enhance the potential for commuting, alter the local terms of trade, or facilitate information flows, for instance. To the extent that these relationships are stable this would not matter in itself. However, in practice these underlying structures may not only alter but can in turn be susceptible to policy influences - as marketing and communication channels are developed, as the pattern of urban job creation changes, or as international trade reforms shift

22. For a dynamic view of the role of distance in US migration, see Mueser (1989).

domestic prices.

Second, observed improvements in transport are unlikely to be randomly distributed. (Pitt, Rosenzweig and Gibbons, 1993). If such improvements follow paths of prior migration or of existing information flows then we may falsely attribute migration patterns to transport developments alone. In principle this potential for reverse causality may be handled by use of instrumental variables. More generally, however, the combination of issues advocates a structural approach in which local price formation, labor demand and network formation must play key roles.

The role of networks

To this end, some empirical representation of networks will be necessary. Much remains to be explored in this vein and of community formation more generally. A tempting place to start is to use a measure of the stock of prior migrants as a proxy for the network available to a new migrant, then to test whether distance remains a significant deterrent after controlling for the stock of prior migrants. However, if current migration and the stock of prior migrants are both affected by some common, unobserved factors, as seems likely, then the estimated effects of distance on migration will be inconsistent. This problem is not entirely insurmountable, of course, if appropriate instrumental variables can be identified which are correlated with the stock of prior migrants but not otherwise correlated with current migration.

Meanwhile, work has begun delving more deeply into the mechanisms through which migrant networks may operate. Banerjee and Munshi (2000) argue that migrants tend to select destinations where they have access to social network based lending. In particular Banerjee and Munshi find evidence among communities producing knitted garments in Tirupur, South India, that “migrants to locations where they do not have access to their community’s lending networks will tend to have higher ability than the traditional residents of that location, but will invest less relative to their abilities.”²³ Das Gupta (1987) emphasizes the role that local networks play in offering security

23. Banerjee and Munshi, (2000), abstract.

mechanisms in rural India and hence the fact that a lack of networks can restrict out-migration. Greif (1993) explores the role of community enforcement of contracts among Maghribi traders. On the other hand, the role of community networks in finding employment for new migrants appears not to have been explicitly explored. Certainly such an exploration would seem quite tractable, if data on job search among migrants (such as that deployed in Banerjee 1991, Banerjee and Bucci 1994) can be combined with information about networks available to individual migrants.

No matter whether one is looking at the determinants of migration or attempting to uncover the mechanisms that underlie these effects, a common problem is that of defining the relevant community. Indeed, it seems probable that different reference groups will matter for different contexts; in some instances only immediate family members will offer a supporting network, while in others the extended family, fellow villagers or even an entire ethnic group may help. Most likely, there could be varying contours of help across such nested communities. Once again, this possibility could in principle be tested given appropriate data, such as information on whether migrants and potential migrants have kith and kin present in alternative locations. (Lucas, 2000). Perhaps, as such data become available, some light will finally be shed upon the causal structures underlying gravity models and Ravenstein's laws.

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