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Community Networks and the Process of Development[†]

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Anyone who has spent time in a developing country knows the importance of social connections, which can help individuals land jobs, and provide them with credit and other forms of support. At first glance, it might appear that such connections distort the economy by giving select individuals an unfair advantage. However, modern economics provides another perspective on this phenomenon, arguing that when markets function imperfectly, networks of socially connected individuals can *enhance* economic efficiency. For example, when the ability of new hires cannot be observed by the firm, incumbent workers will refer competent members of their community to their employers. These new hires will work diligently both so as not to let down the workers that referred them, and also to avoid the social sanctions they would face from their network if they were caught shirking. In this example, social connections solve information and commitment problems.

Unlike information networks, which can be organized around casual acquaintances or even anonymous online communities, networks that solve commitment problems must be based on strong social ties to support the sanctions that are needed to maintain cooperative behavior (Karlan, Mobius, Rosenblat, and Szeidl 2009; Dhillon, Iverson, and Torsvik 2013). Commitment networks will thus typically be organized around close-knit communities that have been in place for long periods of time, sometimes spanning multiple generations. Depending on the context, these communities could be based on kinship (for example, castes in India

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[†] To access the Data Appendix, visit
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and clans in sub-Saharan Africa) or on geographical proximity (neighborhoods or villages). Members of these well-established communities will work together successfully to achieve common objectives, sacrificing immediate individual gain when they are sufficiently patient and when the threat of social sanctions is sufficiently severe.

Although community networks may improve outcomes for their members, a major limitation of these informal institutions is that their benefits are restricted to select populations. For example, individuals from a small number of communities that have established business networks (by historical good-fortune) will find it easier to receive the credit and support that they need to start a new business. However, other and possibly more-deserving individuals from other communities will be shut out. This misallocation of resources and talents when community networks are active was first documented in Banerjee and Munshi (2004). It explains, in part, why less-efficient firms may continue to operate in developing economies (Hsieh and Klenow 2009). It also has obvious consequences for the dynamics of development.

When credit markets function imperfectly, modern growth theory tells us that wealth inequality can persist over many generations (Galor and Zeira 1993; Banerjee and Newman 1993). Once networks are added to the mix, new opportunities for mobility open up at the level of the community. Members of communities that are fortuitously able to establish new networks work together to overcome credit and other constraints, moving as a group to new locations and new occupations (Munshi 2011). The dynamics of the wealth distribution in the overall population will now be more complex, with networks forming and dissipating within and across communities over the course of the development process. How this process actually unfolds will depend not only on the initial wealth distribution, but also on the community structure and the exogenous sequence of events that triggers the formation of new networks.

My objective in this paper is to lay the groundwork for a new network-based theory of economic development. The first step is to establish that community-based networks are active throughout the developing world. Plenty of anecdotal and descriptive evidence supports this claim. However, showing that these networks improve the economic outcomes of their members is more of a challenge. Over the course of the paper I will present multiple strategies that have been employed to directly or indirectly identify network effects. The second step is to look beyond a static role for community networks, one of overcoming market failures and improving the outcomes of their members in the short-run, to examine how these informal institutions can support group mobility. A voluminous literature documents the involvement of communities in internal and international migration, both historically and in the contemporary economy. As with the static analysis, the challenge here is to show statistically that community networks directly support the movement of groups of individuals. I will show how predictions from the theory can be used to infer a link between networks and migration in very different contexts.

While community networks may provide important group benefits to their members, these benefits may come with some undesirable welfare consequences. Individuals belonging to other communities may be shut out of new employment opportunities. Individual mobility could, moreover, be severely restricted in existing networks. The third step in laying the groundwork for the new theory is to provide empirical support for this aspect of network-based development, namely that independent individual mobility will be constrained, both in communities where networks have formed as well as in other communities. I do this drawing on recent research from India (Munshi and Rosenzweig 2006, 2014). This paper concludes by discussing how the standard growth model could be augmented to incorporate community networks, and what consequences these additions might have for our understanding of the development process.

Community Networks in Developing Economies

Social networks are a ubiquitous feature of developing economies. A first very visible role for networks is to support business activity, with a small number of communities typically dominating trade and manufacturing. For example, expatriate Indian communities dominated East African business during and after colonial rule until their members were forced to leave in the 1970s. Ethnic Chinese have controlled business in South East Asia for centuries. A similar story is true in India, the setting for a number of studies discussed in this paper, where a small number of Hindu castes and non-Hindu communities have historically dominated and continue to dominate business activity (Gadgil 1959; Nafziger 1978).

This concentration of business activity in the hands of a few communities does not, however, imply that opportunities are never available to outsiders. Indeed, all the communities listed above took advantage of fortuitous historical events to make their start in business. Indians took advantage of British colonial rule to enter business in East Africa, while communities such as the Bohris and the Parsis did the same in India. More recently, Damodaran (2008) describes how a number of agricultural castes have taken advantage of the restructuring of the Indian economy over the past three decades to move into business. This group mobility will be central to the discussion of network-based development that follows. For the moment, it suffices to note that business activity continues to be heavily networked in developing countries; supporting evidence can be provided by studies from Vietnam (McMillan and Woodruff 1999), India (Munshi 2011), and various countries in sub-Saharan Africa (Fafchamps 1997, 1999, 2003; Fisman 2003).

A second role for social networks in developing economies is to find and secure jobs for their members. To take one example, numerous accounts by contemporary observers and an extensive social history literature indicate that friends and kin from the origin community in Europe helped secure jobs for migrants to the American Midwest in the 19th century and the first quarter of the 20th century

when this region was developing (Conzen 1976; Hoerder 1991). As discussed in greater detail below, African-American networks were also forming in northern US cities at this time. Halfway around the world, caste-based labor market networks were forming in the Indian cities that grew under British colonial rule. The presence of these networks has been documented in Mumbai's textile mills (Gokhale 1957), docks (Cholia 1941), railway workshops (Burnett-Hurst 1925), and transportation facilities (Chandravarkar 1994).

Although these networks may no longer be as active, they have evolved or have been replaced by new networks. Labor market networks continue to be active in cities throughout the world, most often among migrant populations. Depending on the context, these networks can be organized around the family, the kin group (caste or clan), the origin village, or the destination neighborhood. Once the networks have established a niche in the destination economy, they will consolidate their position over time, making it difficult for newcomers to enter. However, new groups are nevertheless continually entering the labor market in these economies. This process of group mobility is described in greater detail below. For the moment, it suffices to note that labor markets in developing countries continue to be heavily networked, as documented, for example, in studies from China (Bian 1994; Zhang and Li 2003; Giles, Park, and Cai 2006; Wang 2013), South Africa (Magruder 2010), and India (Munshi and Rosenzweig 2006).

A third role for social networks in developing economies is to provide social insurance for their members. Traditional agrarian economies are characterized by wide fluctuations in income. Under these conditions, risk-averse individuals benefit substantially from institutions that smooth their consumption. Without access to market credit or government safety nets, mutual insurance arrangements naturally emerge within well-established communities. The commitment problem that arises in such arrangements is that individuals with a positive income shock in a given period, who must make a transfer to individuals who received a negative shock, will be tempted to renege on their obligation. The threat of exclusion from the insurance arrangement in the future will sometimes be sufficient to deter such deviations from cooperative behavior. However, additional pressure may be required, which typically takes the form of social sanctions. Well-established communities are well positioned to implement such social sanctions. Not surprisingly, insurance networks are organized around close-knit social groups throughout the world; as for example, in India (Townsend 1994; Ligon 1998; Mazzocco and Saini 2012; Munshi and Rosenzweig 2014); the Philippines (Fafchamps and Lund 2003); Mexico (Angelucci, Di Giorgi, and Rasul 2014); and Cote d'Ivoire (Grimard 1997).

The central thesis of the new literature on informal institutions is that these institutions provide a range of benefits and services to their members when markets function imperfectly. To document the benefits that social networks provide their members, it is first necessary to define the relevant community—that is, the population from which the network is drawn. In China, urban networks appear to be restricted to relatives and friends (Bian 1994; Zhang and Li 2003; Wang 2013).

In sub-Saharan Africa and India, more elaborate networks are organized at the level of the clan and the caste, respectively (Luke and Munshi 2006; Munshi and Rosenzweig 2006; 2014). In Mexico and the United States, the village or neighborhood appears to be the social unit around which networks are organized (Massey, Alarcón, Durand, and González 1987; Munshi 2003; Sampson, Raudenbush, and Earls 1997). Although individuals select into networks, the domain of the community is treated as predetermined in most analyses of networks. Examples from India feature prominently in the discussion that follows, so it will be useful at this point to introduce the reader to the Indian caste system and the caste-community around which networks are organized in that country.

The caste system is a distinctive feature of Hindu society. A central tenet of this system is that individuals must marry within their own (sub)caste or *jati*. Non-Hindu communities follow the same rules of endogamous marriage as Hindus, as do converts to Christianity who continue to marry within their original *jatis*. Sample surveys from rural and urban India indicate that close to 95 percent of Indian marriages continue to follow these traditional rules (Munshi and Rosenzweig 2006, 2014; Munshi 2011; Luke and Munshi 2011). The longevity of the caste system has been the subject of intense debate, with some social scientists arguing that this system was put in place as recently as the colonial period as a way of dividing the native population (de Zwart 2000). Recent genetic evidence, however, indicates that the rules of endogamous marriage were put in place from 1,900–4,200 years ago, and that the Indian population today consists of 4,635 distinct genetic groups (Moorjani et al. 2013). A dense web of marriage ties, formed over many generations, links members of each caste (directly or indirectly) to each other. The spatial segregation by caste that continues to characterize the Indian village further strengthens local caste connections. Not surprisingly, networks serving different functions have historically been organized, and continue to be organized, around the caste in India. What distinguishes caste networks from networks in other countries is their scope (extending over multiple villages) and their size (consisting of thousands of individuals). I will return to this point towards the end of the paper when linking social structure to the dynamics of development. For the moment, we will focus on the static benefits that (caste) networks provide their members.

The first role played by India's caste networks, going back many centuries, would have been to provide mutual insurance for their members. In Munshi and Rosenzweig (2014), we use data from the Rural Economic Development Survey (REDS), conducted at multiple points in time over the past four decades, to show that transfers from caste members are important and preferred mechanisms through which consumption is smoothed in rural India. Participation in caste-based insurance is relatively high, with 25 percent of the households in the 1982 survey and 20 percent in 1999 reporting that they gave or received caste transfers (gifts or loans) in the year prior to the survey. The amount received is 20–40 percent of the receiving household's annual income. This is a substantial amount and so multiple households will support a receiving household when it is in need of

Table 1
Percent of Loans by Source and Purpose in India

Purpose:	*Investment*	*Operating expenses*	*Contingencies*	*Consumption expenses*	*All*
Source:					
Bank	64.11	80.80	27.58	25.12	64.61
Caste	16.97	6.07	42.65	23.12	13.87
Friends	2.11	11.29	2.31	4.33	7.84
Employer	5.08	0.49	21.15	15.22	5.62
Moneylender	11.64	1.27	5.05	31.85	7.85
Other	0.02	0.07	1.27	0.37	0.22
Total	100.00	100.00	100.00	100.00	100.00

Source: Munshi and Rosenzweig (2014). Data are from the 1982 Rural Economic Development Survey (REDS).
Notes: Statistics are weighted by the value of the loan and sample weights. Investment includes land, house, business, etc. Operating expenses are for agricultural production. Contingencies include marriage, illness, and others.

support. Consistent with this view, sending households contribute 5–8 percent of their annual income on average. An important role for the caste networks is to help households meet major contingencies like illness or marriage, which are relatively infrequent. The fraction of participating households would thus expand significantly if the time-window was increased to five or ten years.

Transfers within the caste include gifts and loans. Despite the fact that loans account for just 23 percent of all transfers by value, we see in Table 1 that caste loans make up 14 percent of the total credit received by households in the year prior to the 1982 survey. Caste loans are the dominant source of informal (nonbank) credit, exceeding the amount received from moneylenders, friends, and employers. They are the dominant source of finance across all sources, including the bank, for meeting contingencies. Data from the 2005 Indian Human Development Survey (IHDS), reported in Munshi and Rosenzweig (2014), indicate that these credit patterns have remained relatively stable over time. One reason why caste loans have maintained their importance is that they are obtained on easier terms than other sources of credit. In Munshi and Rosenzweig, we report that over 20 percent of caste loans by value require no interest payment and no collateral (as is true for all gifts, which account for the bulk of within-caste transfers).

While caste-based rural insurance networks might have been in place for centuries, urbanization in India is a relatively recent phenomenon. When India's cities started to grow under colonial rule in the 18th and 19th centuries, the new networks that formed were also organized around the caste, supporting the movement of rural–urban migrants and finding them jobs once they arrived (Morris 1965; Chandavarkar 1994; Rudner 1994). This widespread use of caste-based networks led to the fragmentation of urban labor markets along caste lines. Although most

historical accounts of caste-based networking in Indian cities are situated prior to independence in 1947, a few studies conducted over the subsequent decades in India indicate that these patterns persisted over many generations. For example, Patel (1963) surveyed 500 mill workers in Mumbai in 1961–62 and found that 81 percent had relatives or members of their caste in the textile industry. Half of the workers got jobs in the mills through the influence of their relatives and 16 percent through their friends, many of whom would have belonged to the same caste. Forty years later, my colleague and I (Munshi and Rosenzweig 2006) surveyed the parents of school children residing in the same area of the city, and 68 percent of the fathers employed in working class occupations reported that they received help from a relative or member of their caste in finding their first job, while 44 percent of fathers in white-collar occupations reported such help.

Labor market networks are active throughout the world, and similar referral patterns have been documented in other economies. For example, Rees (1966) reports that informal sources accounted for 80 percent of all hires in blue-collar occupations and 50 percent of all hires in white-collar occupations in an early study set in Chicago. We would expect social ties to play an even stronger role for migrants in the United States. Indeed, over 70 percent of the undocumented Mexican immigrants, and a slightly higher proportion of the Central Americans, that Chavez (1992) interviewed in 1986 found work through referrals from friends and relatives. Similar patterns have been found in contemporary studies of Salvadoran immigrants (Menjivar 2000), Guatemalan immigrants (Hagan 1994), and Chinese immigrants (Nee and Nee 1973; Zhou 1992). Individual respondents in the Mexican Migration Project, discussed in greater detail below, were asked how they obtained employment on their last visit to the United States; relatives (35 percent) and friends or *paisanos* from the origin village in Mexico (35 percent) account for the bulk of job referrals (Massey et al. 1987).

Estimating Network Effects

There will be many contexts in which individual outcomes and community clustering can be observed but direct information on community support is unavailable. Consider the clustering by a small number of communities in business that is observed throughout the developing world. One interpretation of these community clusters is that they are active networks, with firms belonging to these networks supporting each other from one generation to the next. A second interpretation is that community networks only support first-generation businessmen; once a community has established itself in business, then from the next generation onward individuals inherit the business and can operate independently of the network. We would observe a positive correlation between a firm's performance and the number of firms from its community (a standard measure of network size) in either case, but this correlation would be spurious if the second interpretation was valid. The

size of the community cluster would simply proxy for the number of generations that its member-firms had been in business in that case. To identify the effect of the network on individual or firm performance, more sophisticated research designs are required.

Panel data can be used to control for fixed firm or individual characteristics, in which case we would be effectively studying the effect of changes in the size of the community network on change in firm performance. However, this approach would create a new problem, with changes in network size proxying for changes in the environment that directly determine performance. Continuing with the business example, firms would exit the business when times are bad. It could thus appear as if a decline in network size results in a decline in the performance of the firms that remain, when in fact the correlation is spurious once again. The same identification problem would arise if we estimated the relationship between network size and labor market outcomes with panel data. In addition to firm or individual fixed effects, a statistical instrument is needed that predicts changes in network size but does not directly determine outcomes.

In Munshi (2003), I show how this can be done in the context of immigrant Mexican labor networks in the United States. Migration from Mexico tends to be recurrent, with individuals working in the United States for spells of three to four years and then returning. Panel data from the Mexican Migration Project (MMP) can be used to study the labor market outcomes in the United States of a sample of individuals drawn from different Mexican origin communities (villages) over multiple migration spells. The idea is to assess whether the same individual does better in spells where he has access to a larger network in the United States.

The Mexican Migration Project collected information from a large number of Mexican origin communities. Each community was surveyed once only, and retrospective information over many years was collected from approximately 200 individuals. This information included the location of the individual in each year (US or Mexico) and his labor market outcome (employment, job-type). I measure the size of the community network in the United States in a given year by the fraction of sampled individuals in the community who were located in the United States in that year. To test for network effects, the sample is restricted to person-years in the United States. In the most basic specification, we would regress each individual's labor market outcome on the contemporaneous size of his US community network, including fixed effects in the regression.

Once fixed effects are included, we are effectively assessing the effect of changes in network size on changes in labor market outcome. Is the individual more likely to be employed (and holding a better job) in years in which his network in the United States is relatively large? However, we know from the discussion above that even if a positive correlation is obtained, this correlation could be entirely spurious if individual labor market outcomes and the size of the community network are jointly determined by (unobserved) economic conditions in the United States. To estimate the causal effect of networks on individual outcomes, we need to find a statistical

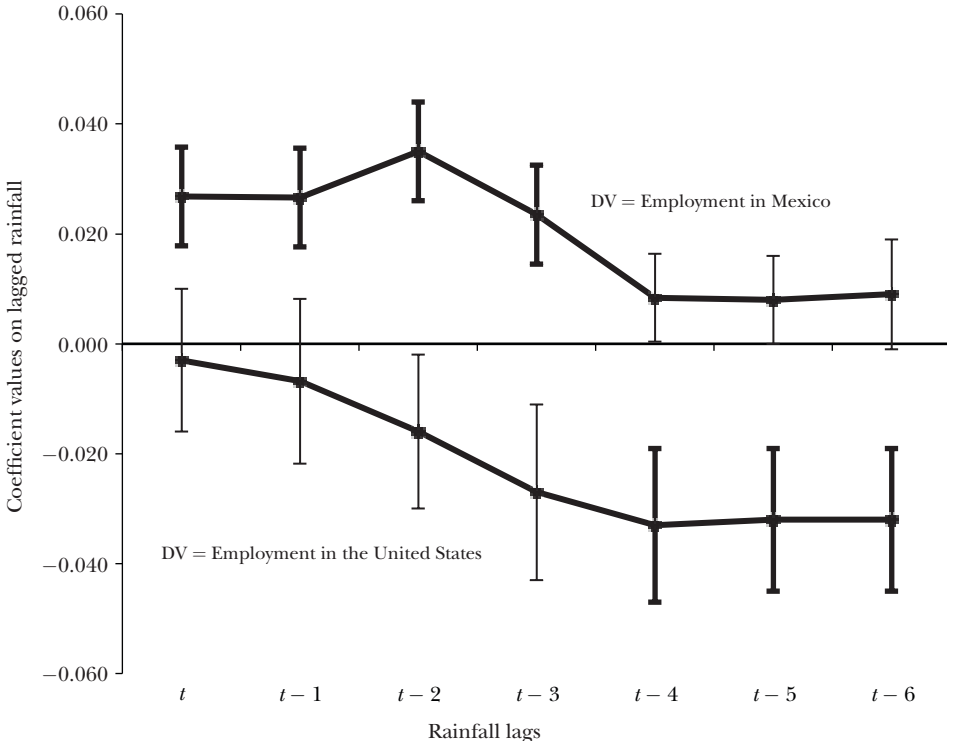
instrument for network size. A valid instrument will generate changes in network size but will be uncorrelated with direct determinants of individual labor market outcomes in the United States. My innovation is to use rainfall in Mexican origin communities, or more correctly rainfall shocks once fixed effects are included, as instruments for network size in the United States.

In practice, network effects will depend on their size and their vintage, since migrants who have been in the United States longer are more established and better positioned to provide referrals. Instead of simply including the size of the network as the key regressor, a more sophisticated specification would thus include the fraction of sampled individuals who recently arrived in the United States and the corresponding fraction for established migrants, separately as regressors. Recent migrants would have moved to the United States partly in response to recent-past rainfall shocks, while established migrants would have moved in response to distant-past rainfall shocks. Because rainfall shocks in Mexico are the exogenous source of variation in the size of the network in the United States, it will be convenient to describe the main results in terms of these shocks. It will then be straightforward to reinterpret the results in terms of network size.

Figure 1 reports the estimated rainfall coefficients (with single standard error bands) for two regressions. The first regression restricts the sample to person-years in the United States. The dependent variable is employment in the United States and the regressors are current and lagged rainfall, going back six years, in Mexico. The second, supporting, regression, restricts the sample to person-years in Mexico. The regressors remain the same, but the dependent variable is now employment in Mexico. Both regressions include individual fixed effects. With employment in the United States as the dependent variable, the coefficients on lagged rainfall in Mexico are *negative* and significant; notice that they get larger in magnitude and more significant as we go further back in time. In contrast, with employment in Mexico as the dependent variable, the coefficients on current and recent rainfall are *positive* and significant, weakening as we go further back.

These results can be interpreted as follows. When rainfall in the Mexican origin community is relatively low, the demand for labor declines, hence the positive coefficient on current and lagged rainfall with employment in Mexico as the dependent variable. The negative demand shock of low rainfall (remember we have individual fixed effects, so everything is in terms of deviations from the mean) encourages individuals to move from Mexico to the United States. Results reported in Munshi (2003) indicate, as expected, that a negative rainfall shock in Mexico results in an immediate increase in the size of the network (number of migrants) in the United States. Over time, these migrants get established and build a reputation with their employers. This allows them to provide information and job referrals to members of their network, explaining why low rainfall in Mexico results in positive labor market outcomes in the United States with a long lag. If we replaced recent-past and distant-past rainfall with the number of recent and established migrants as regressors, and then instrumented appropriately, we could estimate the magnitude of the

Figure 1
Employment–Rainfall Relationship in the United States and Mexico
(coefficient on lagged rainfall for regressions with DV = Employment in Mexico, and DV = Employment in the United States)



Source: Munshi (2003).
Notes: This figure reports the coefficients on current and lagged rainfall in the individual's Mexican origin community, with single standard error bands. The y-axis is the coefficient value and the x-axis is the rainfall lag, ranging from the current period t to $t - 6$. The coefficients on the rainfall lags are reported for two regressions: with employment in the United States and in Mexico as the dependent variables (DV). Vertical lines measure single standard errors on either side of the point estimate. Coefficients that are significant at the 5 percent level are denoted by bold error bands.

network effect. I find that it is the number of established migrants that matters for labor market outcomes in the United States, as expected, and that the network effects are large; if the networks were shut down but migration flows remained unchanged, unemployment would increase from 4 to 10 percent. Complementing this finding, the prevalence of preferred (more remunerative) nonagricultural jobs would decline from 51 to 32 percent.

The reduced-form results reported in Figure 1 provide credible evidence that community networks improve the outcomes of their members. Local rainfall in

Mexican communities far from the border has no impact on the US labor market. However, it has a strong effect on the number of migrants, and these migrants, in turn, improve outcomes for their network-members years later when they are established. One alternative interpretation of Figure 1 is that it reflects an individual experience effect; the individuals who moved in response to the negative rainfall shock years ago are now doing better themselves. However, when in Munshi (2003), I restrict the sample to individuals who arrived recently in the United States, I find that the estimated network effects are even larger. This is exactly what the theory would predict, since newcomers to the foreign labor market benefit the most from referrals.

The preceding example provides a framework for identifying network effects. Panel data (and fixed effects) allow the econometrician to control for selection into the network. Rainfall shocks in the origin location generate exogenous variation in the size and the vintage of the network in the destination labor market. Finally, the theory is used to place additional restrictions on the data; as predicted, recent arrivals benefit more from the network, while established migrants contribute disproportionately to the network. The setting of Munshi (2003) is exceptionally well-suited to testing for network effects because both panel data and a clean source of variation in network size (by vintage) is available. It is, however, possible to identify network effects even when this is not the case, as long as there is exogenous variation across networks or communities, by deriving and testing additional predictions from the theory. This approach has also been followed by an emerging literature on community networks in economics (for example, Luke and Munshi 2006; Magruder 2010; Beaman 2012; Wang 2013).

While community networks may provide useful benefits to their members, a recurring message of this paper is that they can give rise to inefficiencies of their own. One such inefficiency is paradoxically a consequence of the very mechanism that gives community networks their strength; while strong social ties may solve commitment problems within communities, capable individuals outside these communities can be left out. In Banerjee and Munshi (2004), we show that this can result in a substantial misallocation of resources.

The Banerjee and Munshi (2004) analysis is situated in the South Indian town of Tirupur, a production cluster that supplies 70 percent of India's knitted garment exports. The textile industry in Tirupur was initially controlled by a local trading community. However, after a prolonged period of labor unrest in the 1960s, it was taken over by the Gounders, a community whose previous economic activity had been confined to agriculture (Swaminathan and Jeyaranjan 1994). For the next 20 years, the industry continued to be dominated by the Gounders and catered almost exclusively to the domestic market. Starting from the mid-1980s, however, the export of knitted garments from Tirupur started to grow extremely rapidly and by the early 1990s the growth rate exceeded 50 percent. This growth generated an influx of entrepreneurs from outside Tirupur. In 1996, when Banerjee and I conducted a survey of firms in the industry, collecting retrospective panel

data on investment and production for each firm, about half the entrepreneurs were Gounders while the rest belonged to traditional business communities drawn from all over the country. Banerjee and I exploit this heterogeneity in the sociological composition of Tirupur's production cluster to identify a mismatch between (network-based) credit and entrepreneurial ability in this industry.

Two facts uncovered by our survey motivate the theory and the empirical strategy used to identify misallocation. First, as shown in Figure 2A, the Gounders hold more capital stock than the Outsiders at all levels of experience. Adjusting for differences in production, the Gounders use roughly twice as much capital per unit of production than the Outsiders, as reported in Banerjee and Munshi (2004). Second, as shown in Figure 2B, production grows faster for the Outsiders than for the Gounders at all levels of experience. Let the growth in production be determined by entrepreneurial ability and capital, with the standard assumption that these inputs are complements. If production grows faster for the Outsiders despite having lower capital stock, they must have higher ability. If ability and capital are complements, and the Outsiders have higher ability, then the Gounders will only invest more if the cost of capital is lower for them. The inefficiency that we identify is that relatively cheap Gounder capital failed to reach more capable individuals outside the community.

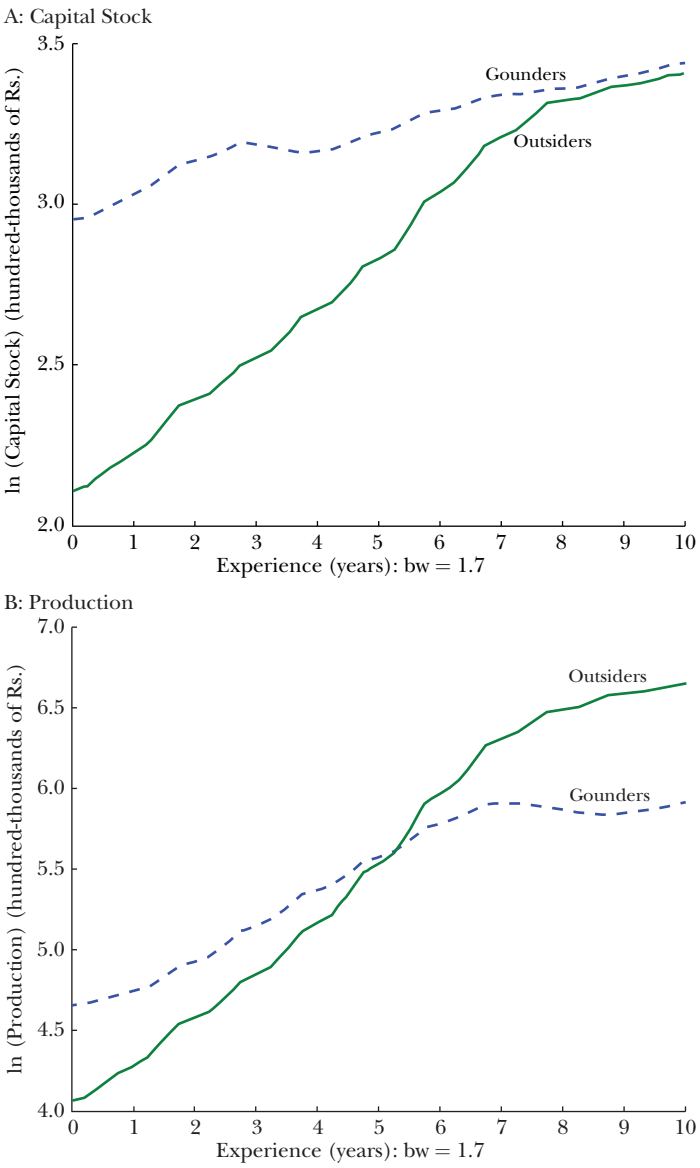
One alternative explanation for these empirical findings, which does not imply that resources are allocated inefficiently or that interest rates vary across communities, is that ability and capital are substitutes in this industry. The Outsiders, who are endowed with higher ability on average for historical reasons or due to selection pressures, would then invest less, but could still end up growing faster than the Gounders. To examine this possibility, in Banerjee and Munshi (2004), we look within each community. Among the Gounders and, separately, among the Outsiders, firms who invest more grow faster consistent with the assumption that ability and capital are complements. It is only *across* communities that less-capitalized firms grow faster. Variation in investment and production across communities, together with restrictions from the theory, allow us to infer that community networks are active (without actually observing these networks) and that they result in a misallocation of resources.

Community Networks and Group Mobility

My analysis of Mexican migrant networks describes the inner workings of a remarkable institution. Passel, Cohn, and Gonzales-Barrera (2012) estimate 12 million Mexican-born people living in the United States in 2011, about half of whom are unauthorized. As noted, migration from Mexico tends to be recurrent—the typical migration spell in the MMP data is four years. This implies that many millions of Mexicans must form the pool that supplies short-term labor to the United States. Established members of the network provide referrals and support

Figure 2

Capital Stock and Production for Gounders and Outsiders in the Textile Industry in Tirupur



Source: Banerjee and Munshi (2004).

Notes: Figure 2 reports nonparametric regressions describing the relationship between capital stock and the firm's years of experience (Figure 2A) and production and the firm's years of experience (Figure 2B). Separate regressions for the Outsiders and the Gounders are reported in each figure. "bw" refers to the bandwidth used in the kernel regression. Capital stock and production are measured in hundred-thousands of Rupees.

new arrivals from this pool, with each migrant typically matched with a completely different group from his community from one trip to the next. Strong pre-existing community ties are needed for the network to function so well without long-term interactions between individuals at the destination.

While these ties may give individuals access to the US labor market, with its higher wages, it is worth noting that members of these communities have remained in low-skill occupations (with low levels of human capital) for generations. From a growth perspective, what is needed is movement into more skilled occupations and greater investments in human capital, and while this may not have been achieved in the Mexican case, community networks have achieved this objective in other contexts. I have already discussed how caste-based networks supported the movement of their members from agriculture into skilled industrial occupations during British colonial rule in India. Similar patterns of occupational mobility have been documented for Europeans who arrived in the United States in the 19th and early 20th centuries. While German bakers and British miners may have carried their traditional occupations with them, most arriving migrants found niches in new occupations (Gordon, Edwards, and Reich 1982). These patterns of occupational mobility continue to this day as evidenced by the rapidly growing literature on community-based migration to the United States (for example, Kotkin 1992; Fairlie and Meyer 1996; McKenzie and Rapoport 2007, 2010; Patel and Vella 2013).

The main challenge when a person attempts to enter a new occupation is that the individual is an outsider without connections to employers, workers, buyers, or suppliers. Community networks substitute for these individual connections, allowing their members to help each other and bootstrap their way out of traditional occupations into more remunerative occupations. It is tempting to infer from the variation in levels of migration across origin communities and the occupational clustering that is typically observed at the destination that migrants move as a group, typically into new occupations. However, additional evidence is needed to support this claim. For example, levels of migration were much higher from Southern counties in the United States where labor-intensive plantation crops were grown during the Great Migration (the mass movement of African-Americans to the North early in the twentieth century). One explanation for the higher level of migration, discussed below, is that black networks formed in Southern plantation counties, supporting the movement of groups of individuals to Northern destinations. An alternative explanation is that economic and social conditions were disadvantageous to blacks in the plantation counties, leading to the independent departure by many individuals. To identify group mobility supported by underlying networks, I will once again exploit exogenous variation in community characteristics, together with predictions from the theory. The following examples show how this can be done in very different contexts.

My first example describes how a historically disadvantaged caste moved from agriculture into the international diamond business with the support of an underlying community network over the course of a single generation. India does not produce rough diamonds. The rough diamonds are imported, for the most part

from Antwerp, then cut and polished in domestic factories, before being sold on the Mumbai market to foreign buyers or shipped directly abroad. Most Indian diamond exporters buy their rough diamonds in Antwerp. A packet of rough diamonds costs thousands of dollars, so diamond exporters (without deep pockets) typically receive the packets on supplier credit. The commitment problem that arises here is that the exporter will not repay the supplier if there is little chance that the supplier will do business with the exporter in the future.

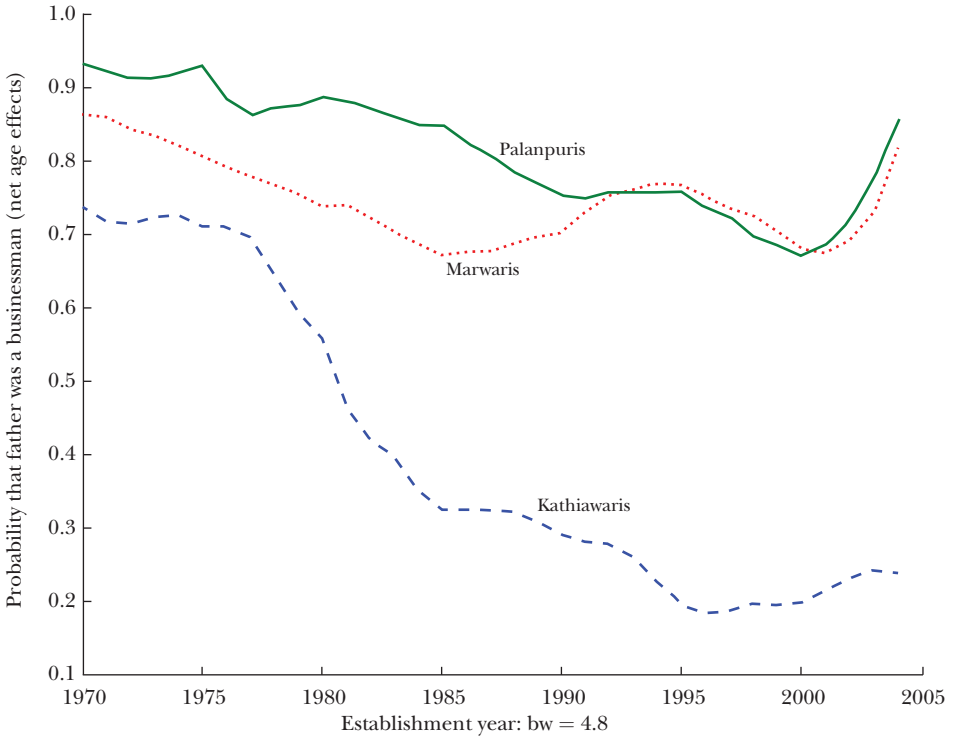
One solution to this commitment problem is to write formal contracts, but such contracts are difficult to verify in the diamond industry. An alternative solution, which is only available to well-established wealthy firms, is to set up a branch in Antwerp and operate simultaneously as a rough diamond supplier in Antwerp and a polished diamond exporter from India. The permanent presence of these firms in Antwerp allows them to build up a reputation in the market and to buy rough diamonds on credit from other suppliers (for their diamond export business) when the need arises. Yet another solution, which is chosen by most Indian diamond exporters, is to visit Antwerp for a few days each month and to use their community network to access rough diamonds on credit from a variety of suppliers. Firms who follow this strategy establish long-term relations with a small number of suppliers. When they need to buy rough diamonds from other suppliers, members of the community who have close ties with those suppliers stand guarantor for them. The recipients of these referrals will repay the rough diamond suppliers, even if they do not expect to do business in the future, because they will face severe social sanctions and lose the support of the entire network if they renege on these obligations.

The preceding discussion indicates that a first-generation diamond exporter could operate profitably in the industry with his community network substituting for the parental support (connections and resources) that entrepreneurs from established business families receive. In Munshi (2011), I examine the dynamics of such a network. As it grows stronger, it will attract more first-generation businessmen into the industry. If there is positive selection on ability into this industry, the marginal ability of entrants into the network, measured by their educational attainment, will decline over time. The novel insight from this dynamic theory of group mobility is that once they form, new networks will strengthen most rapidly in communities with the worst outside options (least-remunerative traditional occupations). It follows that intergenerational occupational mobility will be correspondingly greater in those communities. The theory can be summarized as follows:

$$\text{weak outside options} \rightarrow \text{larger changes in network size} \rightarrow \text{greater intergenerational mobility.}$$

In Munshi (2011), I take advantage of an exogenous shock to the world diamond industry—the discovery of massive diamond deposits in Australia's Argyle mines in 1979—to test this theory. Two traditional business communities, the Palanpuris and the Marwaris, initially controlled the business end of the diamond industry,

Figure 3
Family Background of Entering Entrepreneurs in India's Diamond Industry



Source: Munshi (2011).
Notes: Figure 3 reports nonparametric regressions describing the relationship between the entrepreneur's business background and the firm's year of establishment. Business background is an indicator variable, which takes the value 1 if the entrepreneur's father was a businessman. Separate regressions for each community are reported in the figure. "bw" refers to the bandwidth used in the kernel regression. The nonparametric regression controls for the entrepreneur's age (which is related to but not perfectly correlated with the year of establishment).

leaving the cutting and polishing to a lower caste of agricultural laborers known as the Kathiawaris. The story told in industry circles is that some of the Palanpuri businessmen, who had established branches in Antwerp by the time of the supply shock, helped their trusted Kathiawari labor contractors enter the business by supplying rough diamonds to them. Once the initial group had entered business, they encouraged more of their community members to follow, and today the Kathiawaris are a significant presence, with hundreds of firms, in the Indian diamond industry. This variation in the social background of communities in the industry is used to test the theory of group mobility.

Figure 3 describes the relationship between the business background of Indian diamond exporters and the year of establishment of their firms, based on

nonparametric regressions using data obtained from a survey of nearly 800 firms conducted in 2004–2005. While there is a mild decline in the fraction of Marwaris and Palanpuris who report that their father was a businessman over time, this decline is particularly steep for the Kathiawaris from the late 1970s onwards. Although 70 percent of the Kathiawaris who entered the industry in 1970, before the supply shock, report that their father was a businessman, this statistic declines steadily and drops below 20 percent by 2000. In Munshi (2011), I show that most of the occupational mobility documented for entering Kathiawari entrepreneurs in Figure 3 was driven by the dramatic shift out of agriculture in this community over a single generation.

The theory of group mobility generates specific predictions for the selection of new entrants into business, across communities, as underlying networks strengthen. Figure 3 provides empirical support for these predictions; there is greater occupational mobility in the historically disadvantaged Kathiawari community, reflected by the increasing share of first-generation businessmen, over time. However, an alternative explanation for these patterns, which does not require networks to be active, is that outside options (returns in the traditional occupation) were declining relatively steeply over time for the Kathiawaris. This would have encouraged individual Kathiawaris to move independently, with an accompanying increase in the proportion of first-generation businessmen. But without the support of a community network, these new entrants would have fared increasingly poorly in the diamond business.

In Munshi (2011), I provide two pieces of evidence supporting the hypothesis that an underlying network supported the movement of the Kathiawaris as a group into the diamond business. First, I use administrative data on diamond exports, available annually for 95 percent of the surveyed firms over the 1995–2004 period (or as long as they had been exporting) to show that Kathiawari firms grow at least as fast as firms from other communities on average. This result is inconsistent with the alternative (non-network) explanation provided above, and is obtained despite the fact that entering Kathiawari entrepreneurs are increasingly disadvantaged over time (more likely to be first-generation businessmen and less educated). Indeed, once we control for compositional change in the industry with firm fixed effects, exports grow significantly faster for the Kathiawaris than for the other communities. There is a community-level force that is improving the performance of Kathiawari firms relatively rapidly over time, and our interpretation of this force is that it reflects the support that is being provided by a rapidly strengthening community network.

Providing direct support for this hypothesis, a second piece of evidence in Munshi (2011) is that the frequency of intraindustry (and intra-caste) marriages, which reduce commitment problems within the network, increases relatively steeply for the Kathiawaris. Almost none of the early Kathiawari entrants who established their firms before 1975 married within the industry. By 2004, however, 50 percent of the entrants were marrying within the industry, surpassing the corresponding marriage rates for the Palanpuris and Marwaris, which remained roughly constant over time. These intercommunity differences are robust to including the number of firms, by

community, in the industry to account for the size of the marriage pool at each point in time, and are also obtained for the entrepreneurs' children. Complementing the marriage results, Kathiawaris are more likely to organize their production in ways that leave them more dependent on the network; that is, they are less likely to have a branch in Antwerp, and these differences in organizational structure widen over time.

The preceding example exploited variation in outside options (returns to traditional occupations) across communities, together with predictions from the theory, to show that individuals moved as a group into business. The next example takes the same approach, except that communities now vary with respect to their social connectedness, and are based on geography rather than kinship. The setting for this example is the American South in the decades of the late 19th century after Emancipation. In Chay and Munshi (2014), the objective is to assess whether and where African Americans were able to overcome centuries of social dislocation and form new networks once they were free.

The point of departure for the analysis in Chay and Munshi's (2014) is the observation that black spatial proximity varied substantially across Southern counties, during and after slavery, depending on the crops that were grown in the local area. Where labor-intensive plantation crops such as tobacco, cotton, rice, and sugarcane were grown, blacks worked (and lived) in close proximity to each other. Where crops such as wheat and corn were grown, blacks were dispersed more widely. Restricted social interaction across plantations and forced separation would have prevented black networks from forming during slavery. Black networks could have formed without restriction after Emancipation, but their size would have been determined by spatial proximity—that is, the connectedness of the population in the local area. Greater connectedness would have supported higher levels of cooperation, resulting in larger networks. These larger networks would, in turn, have allowed blacks to work more effectively as a group to achieve common objectives in the decades after Emancipation.

Southern blacks had two significant opportunities to work together at this time. First, blacks were able to vote and to elect their own leaders during and just after Reconstruction, 1870–1890. Second, blacks were able to leave the South and find jobs in Northern cities during the Great Migration, whose initial phase ran from 1916 to 1930. Based on the theory, more-connected populations would have supported the formation of larger networks of black activists during Reconstruction and larger networks of black workers moving together to Northern cities during the Great Migration. This, in turn, would have given rise to greater overall political participation and migration. The theory can this be summarized as follows:

$$\text{population connectedness} \rightarrow \text{network size} \rightarrow \text{political participation and migration.}$$

While a positive relationship between population connectedness and particular outcomes during Reconstruction and the Great Migration is consistent with

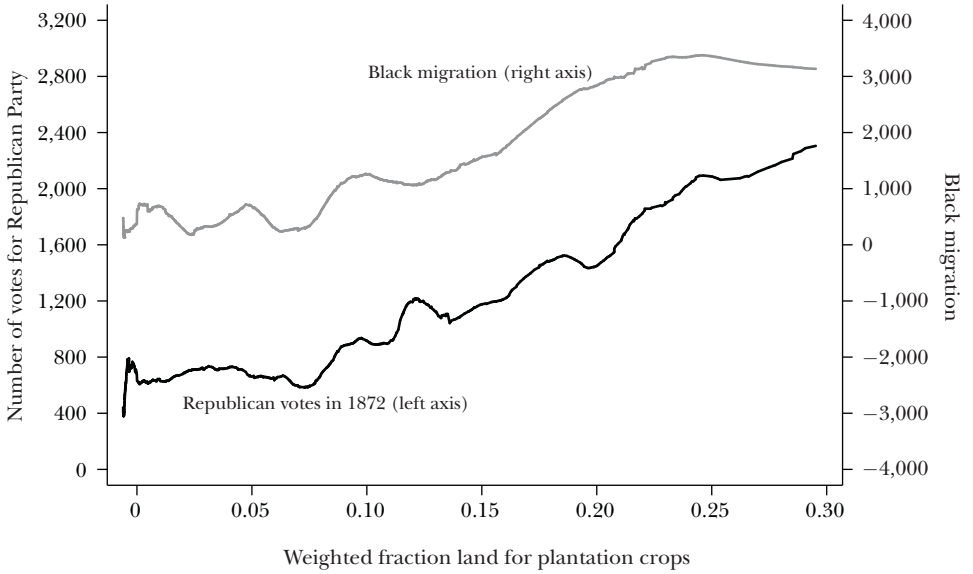
the presence of underlying (unobserved) black networks, other explanations are available. For example, racial conflict could have been greater in counties where labor-intensive plantation crops were grown, encouraging individual black voters to turn out during Reconstruction and to move independently to Northern cities during the Great Migration. Alternatively, adverse economic conditions in these counties could have encouraged greater migration, without requiring a role for black cooperation. In Chay and Munshi (2014), our strategy to identify the presence of underlying networks takes advantage of an additional prediction of our theory, which is that networks will only form above a threshold level of population connectedness. There should thus be no association between the outcomes of interest—political participation and migration—and population connectedness up to a threshold and a positive association thereafter.

Figure 4 reports the relationship between population connectedness and (separately) black political participation and migration. Population connectedness is measured by the fraction of cultivated land in the county that was allocated to labor-intensive plantation crops in 1890, midway between Reconstruction and the Great Migration, adjusting for differences in labor intensity across those crops. Black political participation is measured by the number of Republican votes in the 1872 presidential election, since blacks would have voted almost exclusively for the Republican Party (the party of the Union) at that time (Morrison 1987). The black migration measure is derived from intercensus changes in the black population between 1910 and 1930 (recall that the Great Migration commenced around 1916), adjusting for natural changes due to births and deaths. It appears from Figure 4 that the specific nonlinearity implied by the theory, characterized by a slope discontinuity at a threshold, is obtained for both political participation and migration.

In Chay and Munshi (2014), we construct a statistical estimator that allows us to test whether the data-generating process underlying a particular outcome is consistent with the theory. Based on this test, we verify that both relationships reported in Figure 4 are consistent with the theory. In addition, we show formally that the specific nonlinearity implied by our theory of network formation is also obtained for the following outcomes: 1) the election of black leaders during Reconstruction, which complements the pattern of voting; 2) church congregation size in black denominations, which is the most direct available measure of network size; and 3) the clustering of black migrants in Northern destination cities. In contrast, this nonlinearity is not obtained for 1) Republican votes after Reconstruction when blacks were effectively disfranchised; 2) black migration prior to 1916; 3) white migration; or 4) church congregation size in nonblack denominations.

No single alternative can explain the specific nonlinear relationship between population connectedness and outcomes associated with underlying networks obtained for blacks alone at particular points in time. The nonlinear relationship that is obtained for black church congregation size and the clustering of black migrants in Northern destinations, in particular, provides direct support for the hypothesis that blacks were able to work together to achieve common objectives in

Figure 4
African-American Political Participation and the Great Migration



Source: Chay and Munshi (2014).
Notes: Figure 4 reports a nonparametric regression describing the relationship between black political participation during Reconstruction, measured by the number of Republican votes in the 1872 presidential election, and population connectedness, measured by the weighted fraction of cultivated land allocated to plantation crops. A separate nonparametric regression reporting the relationship between black migration and the population connectedness measure is also reported in the figure. Political participation, migration, and population connectedness are all measured at the level of the county. The weights in the population connectedness measure reflect differences in labor intensity across plantation crops. The weighted measure is normalized to have the same mean and standard deviation as the corresponding unweighted measure, which is simply the fraction of cultivated land allocated to plantation crops, to make the connectedness measure more easily interpretable. The weighted measure is multiplied by a constant and then added to another (negative) constant, which is why the x-axis starts below zero.

counties where population connectedness exceeded a threshold. If black migration decisions were based on factors that did not include a coordination externality, then the probability of moving to the same destination would not track migration levels so closely.

The two examples discussed in this section document that community networks can play a role of great importance in occupational transitions. Over one million blacks (one-tenth the black population at the time) moved from the rural South to Northern cities during the initial phase of the Great Migration (Marks 1983). This is one of the largest internal migrations in history, and although anecdotal evidence suggests that community networks linking Southern counties to Northern

cities did emerge (Gottlieb 1991; Grossman 1989), the Chay and Munshi (2014) paper is the first to identify and quantify network effects in the Great Migration. Our estimates of these network effects are large; for example, over half of the migrants to the North came from the third of Southern blacks who lived in the most connected counties, while less than 15 percent came from the third in the least-connected counties.

The movement of Kathiawaris from agriculture into business, described earlier in this section, is also an occupational transition of considerable importance. The diamond industry accounts for roughly 14 percent of India's total merchandize exports and has competed with textiles, and more recently with computer software, as the country's top export industry over the past three decades. It is estimated that approximately 1,000 Indian diamond export firms employ over a million workers. The diamond industry is associated with a high degree of community networking throughout the world because of the difficulty in enforcing legal contracts (Coleman 1988; Richman 2006). Apart from their static role in solving commitment problems, in Munshi (2011), I show that community networks have also supported an extremely high level of intergenerational occupational mobility in the Indian diamond industry. This role is not restricted to this industry. Damodaran (2008) documents the emergence of a new business class in postcolonial India, drawn from a select group of agricultural castes and from castes that historically dominated the bureaucracy and various white-collar professions. Community (caste) networks very likely played a major role in these occupational transitions as well.

Community Networks and Misallocation

We have seen how inefficiencies can arise when community networks are active because resources fail to cross community boundaries. While community networks will support the economic activity and the mobility of their members, outsiders will be shut out. The discussion that follows highlights a second inefficiency that arises within these networks. Community networks will support the mobility of *groups* of individuals, but they will restrict the mobility of *individual* members.

Consider a rural network providing mutual insurance to its members. Households with migrant members will have reduced access to these networks for two reasons. First, migrants cannot be as easily punished by the network, and their family back home now has superior outside options (in the event that the household is excluded from the network). It follows that households with migrants cannot credibly commit to honoring their future obligations at the same level as households without migrants. Second, an information problem arises if the migrant's income cannot be observed. If the household is treated as a collective unit by the network, it always has an incentive to misreport its urban income so that transfers flow in its direction. If the loss in network insurance from having a migrant in the family

exceeds the income gain, then large wage gaps could persist without generating a flow of workers to higher-wage areas. This misallocation of labor is paradoxically amplified when the informal insurance networks work exceptionally well, because rural households then have more to lose by sending their members to the city.

One way to circumvent these restrictions on mobility would be for the members of the rural community to move to the city as a group. Members of the group could monitor each other and enforce collective punishments, solving the information and commitment problems described above. They would also help each other find jobs at the destination. A limitation of this strategy is that a sufficiently large (common) shock is needed to jump-start the new network at the destination and such group-level opportunities occur relatively infrequently. A second strategy to reduce the information and enforcement problems that restrict mobility is for individuals to migrate temporarily. The principal limitation of this strategy is that it will not fill the large number of (permanent) jobs that require firm-specific or task-specific learning. Both strategies described above are used by rural households to facilitate mobility, as discussed in this paper. Individuals will nevertheless be discouraged from migrating permanently and the labor market will not clear, potentially giving rise to large rural–urban wage gaps. As noted, this misallocation is exacerbated when rural networks are well-functioning. This is the basis for our claim in Munshi and Rosenzweig (2014) that exceptionally well-functioning caste-based rural insurance networks, together with the absence of formal insurance, are responsible for the exceptionally large rural–urban wage gap in India.

The most direct test of this hypothesis, in line with the examples discussed earlier, would be to compare migration rates in populations with access to rural insurance networks of different quality (size and connectedness). However, an exogenous source of variation in the quality of insurance networks across castes is unavailable. What we do instead in Munshi and Rosenzweig (2014) is look within the caste-community and theoretically identify which households benefit more or less from caste-based insurance. We then test whether those households are less or more likely to have migrant members.

When an insurance network is active, the income generated by its members is pooled in each period and then distributed on the basis of a pre-specified sharing rule. This smooths consumption over time, making risk-averse individuals better off. The literature on mutual insurance is concerned with how much risk-sharing occurs, taking the size of the network and the income-sharing rule as given. To derive the connection between networks in the rural origin and rural–urban migration, however, it is necessary to take a step back and derive the income-sharing rule. The rule that is chosen in equilibrium determines which households choose to participate in the network and therefore, forego the gains from migration. The first theoretical prediction of Munshi and Rosenzweig (2014) is that the income-sharing rule that maximizes the surplus generated by the insurance network will involve some amount of redistribution. This implies that relatively wealthy households within their caste benefit less from the network and so will be more likely

to have migrant members. Our second theoretical prediction is that households who face greater rural income risk, and therefore benefit more from the insurance network, will be less likely to have migrant members. The latter result would not be obtained if the network treated migrants and the rest of their family that remained in the village independently. It would also not be obtained if rural insurance networks did not offer substantial benefits. By not sending their members to the city, households would forego substantially higher income and the gain from income diversification.

Using a variety of data sources and empirical techniques, in Munshi and Rosenzweig (2014) we obtain evidence consistent with both predictions of our theory. We then estimate the structural parameters of a model of insurance and migration in which the income-sharing rule and migration are determined simultaneously. Counterfactual simulations of the model that quantify the effect of formal insurance on migration indicate that a 50 percent improvement in risk sharing for households with migrant members (who lose network insurance) would increase the migration rate from 4 to 9 percent. In contrast, halving the rural–urban wage gap, which is currently as high as 20 percent in India, would reduce migration by just one percentage point. The analysis of migration in economics has traditionally focused on average differences in wages at the origin and the destination. As discussed above, a literature documenting the role played by networks in supporting migration is rapidly emerging. The analysis in Munshi and Rosenzweig (2014) adds a new perspective to the relationship between networks and migration, showing how networks at the origin can constrain the movement of individual members.

Migration is dampened in the preceding analysis because it results in a loss in origin-network services, not because movers face explicit sanctions or restrictions. There are certain circumstances, however, under which networks will actively restrict the movement of their members. To illustrate this phenomenon, consider an urban network providing job referrals for its members. Recall that the analysis in Munshi (2003) shows that larger networks are more effective. When a member of the network leaves the market that the network operates in to find a job in a different location or a different occupation, the migrant will not internalize the cost imposed consequently on the rest of the network through his or her departure. This cost will be especially large when multiple networks are competing for scarce jobs. Social sanctions will have little effect once the individual has moved on, and under these circumstances it may be optimal for the community to place restrictions on mobility. These restrictions could take the form of a culture that builds loyalty to the community and a strong identification with traditional lifestyles. This type of culture is often associated with farming and blue-collar communities where cooperation was historically important (for example, Elder and Conger 2000; Gans 1962; Kornblum 1974).

While a culture that restricts mobility may have been welfare-enhancing when it was put in place, its persistence can result in a dynamic inefficiency if the returns to new occupations increase sufficiently. There is a common perception that farming

and blue-collar communities stubbornly resist change. This perception has even made its way into the media, as for example, the portrayal of the Boston-Irish working class in the 1997 film *Good Will Hunting* or Polish dockworkers on cable TV shows like *The Wire*. Munshi and Rosenzweig (2006) provide a more formal analysis of such resistance to change in Mumbai's working class communities even as the returns to white-collar occupations grew with the restructuring of the Indian economy in the 1990s.

I have already described how caste networks established niches in urban labor markets during the colonial period and how these networks maintained their position in the market over many generations. These networks typically formed in working class (blue-collar) occupations, which provided stable employment with relatively high wages from the 19th and through much of the 20th century. This situation changed dramatically in the 1990s, with the growth of the corporate sector in cities like Mumbai where the traditional working class jobs had been simultaneously declining over time. Adult workers were already locked into the occupations they had selected. In Munshi and Rosenzweig (2006), we examine occupational mobility in this environment by studying the schooling choices made by their children.

Schooling in Mumbai can be in English or Marathi, which is the local language. English schooling channels students into white-collar jobs, while Marathi schooling, which is less expensive, channels them into working class jobs. The increase in the returns to white-collar occupations, which was effectively an increase in the returns to English schooling, resulted in a shift into English schools from 1990 onwards. However, this response to economic change varied substantially across castes and by gender. Among the boys, schooling choice was strongly determined by the fraction of adult men (the preceding generation) from the student's caste in working class jobs, after controlling for parental and household characteristics. This intergenerational persistence did not weaken across successive cohorts entering school over the 1990s, even as the returns to English grew over time, indicating that the traditional networks were restricting occupational mobility. These restrictions on mobility help explain the absence of convergence in schooling choice across castes documented in Munshi and Rosenzweig (2006). In contrast, there is no intergenerational persistence for the girls. Women did not benefit from the traditional working class networks. While girls from (male) working-class castes also start with lower rates of English schooling in 1990, unlike the boys, convergence across castes is complete by 2000.

Towards a Theory of Network-Based Growth

The preceding sections describe a world in which community networks support their members in a variety of ways when markets are incomplete. In addition to these services in the immediate term, networks also play a dynamic role, supporting the permanent movement of groups of individuals from the community across space and occupations. However, this community-based support comes at a cost.

Competent individuals without access to a community network are shut out of jobs and economic activities. For those individuals with a network, there is a different cost, which is that independent mobility is discouraged. The relationship between networks and mobility, a key ingredient in the process of development, is thus complex. Despite this complexity, there might be substantial gains to incorporating networks in models of growth.

When credit markets are imperfect and there is a fixed cost to investing in human capital, or when inherited (parental) human capital is occupation-specific, families can get locked into occupations from one generation to the next. Families in low-skill occupations with low levels of human capital stay poor, while families in high-skill occupations with correspondingly high levels of human capital stay wealthy, despite being endowed with the same level of ability on average (Galor and Zeira 1993; Banerjee and Newman 1993; Maoz and Moav 1999; Hassler and Mora 2000; Mookherjee and Ray 2003). A strong implication of what is sometimes known as the "new classical" growth model is that initial wealth will have long-term consequences, resulting in occupational traps and permanent wealth inequality. Once we add networks to the mix, however, the outcome is not so certain. A community-based network effectively substitutes for parental wealth and human capital, allowing groups of individuals to bootstrap their way into new occupations over the course of a single generation. Therefore, what matters for long-term outcomes is not just initial household wealth, but also the social structure and the distribution of shocks (both positive and negative) across communities and over time.

Consider a country such as India, where the population is stratified into large and cohesive communities. These communities are well positioned to support well-connected and well-functioning networks, and so the development process in such a country will be characterized by groups of individuals belonging to the same community making occupational transitions. Large common shocks will be needed to generate movement, but once a transition is initiated, it will involve large numbers of individuals. In countries with smaller communities, there may be greater individual flexibility, but transitions that involve a major mobilization of resources, such as the move from trade to capital-intensive manufacturing, may be difficult to achieve. Growth may thus be rapid initially in these countries, but the long-term outcome is less clear. A complete characterization of the relationship between networks and growth might well go a long way in explaining differences in the development trajectory and the dynamics of inequality we observe across countries.

Growth theory has always been responsive to advances in microeconomic theory. The canonical growth model with its prediction of convergence, was based on neoclassical microfoundations: in particular, perfect markets. When these strong assumptions began to be relaxed by microeconomists in the 1980s, the new growth model, based on credit market imperfections, followed with its predictions for the persistence of inequality. Given recent advances in the economics of networks at the micro level, it may be time for an augmented growth model that incorporates networks.

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