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# Migration networks and microenterprises in Mexico

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## Abstract

Are migration networks associated with lower capital costs, or the alleviation of capital constraints? We examine these questions with data measuring access to remittance flows among small-scale entrepreneurs in Mexico. Using a survey of more than 6000 self-employed workers and small firm owners located in 44 urban areas of Mexico, we estimate the impact of attachment to migration networks on the level of capital investment, the capital–output ratio, sales, and profits of microenterprises. The impact is identified from the geographic pattern of migration from Mexico driven by the completion of rail lines in the early 1900s. For the full sample of firms, we find that migration is associated with higher investment levels and higher profits, but not higher sales. The strongest effects on investment are in the categories of automobiles, tools and inventories. When the sample is limited to firms in high-capital sectors, investment, sales, and profits all increase with attachment to the migration networks, suggesting that attachment to the migration network alleviates capital constraints in those sectors.

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## 1. Introduction

There is growing empirical evidence of the role networks play in shaping economic activity. Networks allow for trade over long distances (Greif, 1993) and in locations where formal legal enforcement is not available (McMillan and Woodruff, 1999). Where capital markets are imperfect, networks may play a role in allocating capital among uses and users (Banerjee and Munshi, 2004). In countries with high rates of international emigration, migration networks may

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play an particularly important role in determining economic outcomes. [Munshi \(2003\)](#) provides evidence that networks are an important feature of Mexico–U.S. migration. In this paper, we examine the impact of the migration networks in Mexico on the development of microenterprises in the country.

Migration to the United States has long been an important feature of Mexican life. In 2000, more than 9 million Mexican-born individuals were resident in the United States, about 9% of the population born in Mexico. Early migration of workers from Mexico to the United States came in two waves associated with guest worker, or *Bracero*, programs. The first of these was during the 1910s, at the start of World War I. The second began in 1942 during World War II. The distribution within Mexico of the points of origin of early migrants to the United States was closely associated with the location of rail lines which went northward to the Texas border. Though railroads are no longer the most important means of transport for U.S. bound migrants, the rail lines remain closely associated with migration. The early migrants formed the foundation for migration networks that persist to the present day.

We examine the impact of migration networks on microenterprises using data from a very detailed survey of more than 6000 microenterprises located in 44 urban areas of Mexico, representing 92% of Mexico's urban population. We show that migration is associated with a significantly higher rate of investment and a significantly higher capital/output ratio. The effects are large. A one standard deviation increase in the migration rate in an entrepreneur's state of birth is associated with a 35%–40% increase in the level of capital invested in the enterprise. Examining the level of investment by type of asset, we find that investments in tools, inventories and vehicles are all associated with stronger links to migration networks. Migration is correlated with higher capital–output ratios as well. In the full sample, we find no robust relationship between migration and the level of output of an enterprise. The results from the full sample are strikingly similar to those described by [Banerjee and Munshi \(2004\)](#) for a sample of firms in the Indian knitted shirt industry. However, for Mexico we do find that the increased investment is associated with higher profit levels. Moreover, when we isolate firms operating in high-capital sectors, we find a positive relationship between migration on the one hand and all four of the outcome measures—including sales—on the other. In the low capital sector, we find a much weaker connection between migration and investment, and a strong relationship only for the capital–output ratio. These results suggest that migration networks may play a role in alleviating capital constraints in high capital sectors.

Our identification strategy exploits variation in the degree to which individuals in Mexico are connected to historical migration networks. We measure connection to the migration network with a group level variable, the rate of migration in an individual's state of birth. We then instrument for this with the distance from the capital of the state in which an individual was born to the nearest station on the north/south rail lines as they existed in the early 1900s. Of course, rail lines may affect local economic activity in many ways, potentially invalidating the instrument. Partly for this reason, we limit our focus to the approximately 28% of individuals who currently reside in a state in Mexico which is different from their state of birth. Note that these individuals may differ in important (and unmeasured) ways from those who reside in their state of birth, so the implication of our results should be viewed as being limited to the sub-group of internal migrants.

The paper relates to two literatures. The first is the growing literature on the impact of migration on sending country development. There is an extensive and established literature on the relationship between migration and economic development of sending regions. Much of the literature, however, focuses on rural–urban migration within countries ([Stark, 1978, 1980; Rozelle et al., 1999](#)). Earlier studies focusing on international migrants generally examined the

impact in rural areas within the countries from which migrants emigrate. Examples of this include Lucas (1987) and Lucas and Stark (1985), who analyze the impact on earnings returned by migrant workers in South African mines. Taylor (1992) and Taylor and Wyatt (1996) examine agricultural asset accumulation in a sample of rural households receiving remittances in Mexico.

There is smaller, but growing literature examining the impact of migration on non-agricultural activities. Dustmann and Kirkchamp (2002) provide evidence that savings of returning migrants may be an important source of startup capital for microenterprises. They find that 50% of a sample of Turkish emigrants returning from Germany started a microenterprise within 4 years of resettling in Turkey, using money saved while working abroad. Mesnard (2004) and Mesnard and Ravallion (2005) also find a connection between return migration to Tunisia and entry into self-employment, and Ilahi (1999) finds similar evidence in Pakistan. Early evidence of a correlation between migration, remittances and entry into self-employment in Nicaragua is provided by Funkhouser (1992). With respect to Mexico, Massey and Parrado (1998) examine enterprise formation in a sample of 30 communities in central-west Mexico, including five neighborhoods in large cities. They conclude that earnings from work in the United States provided an important source of startup capital in 21% of the new business formations. Escobar Latapi and Martinez Castellanos (1991) report that earnings from U.S. migration were an important source of startup capital in 7 of 19 manufacturing firms they surveyed in Guadalajara.

The second literature which relates to the issues addressed in the paper is the literature on capital constraints, and particularly the importance of networks in the provision of finance. In this regard, recent papers by Banerjee and Munshi (2004) on the Indian knitted shirt industry and Banerjee and Duflo (2003) on changes in the lending laws in India are particularly relevant. Banerjee and Munshi study production in a single industry where members of a relatively capital rich community (Gounders) face lower costs of capital than do members of a capital poor community (Outsiders). Banerjee and Munshi show that entrepreneurs in the capital rich community (or network) have higher capital-investment levels and higher capital-output ratios. Capital-rich (Gounder) firms also have higher sales levels when very young, but grow more slowly than the capital-constrained Outsiders. Banerjee and Munshi conclude that imperfections in capital markets prevent the capital costs from equating across communities. Banerjee and Duflo (2003) show that increases in access to capital may also alleviate capital constraints.<sup>1</sup> The variation in the Banerjee–Duflo data comes not from networks but from changes in Indian laws dictating set-aside lending for firms with certain characteristics. They find that increased access to capital is associated with higher sales and higher profits, suggesting that firms use the increased access to make fresh investments rather than using the bank loans to pay off non-bank loans bearing higher interest rates. When we use our full sample, our results are quite similar to those of Banerjee–Munshi. Like them, we find that attachment to liquidity is associated with higher investment and capital–output ratios, but not to higher sales. When the sample is limited to firms in high capital sectors, our results are close to Banerjee–Duflo. For this subsample, we do find evidence that sales are higher among firms with stronger attachment to the network.

The main challenge in both of these literatures is to cleanly identify impacts of migration or credit constraints. For migration, the cleanest identification strategies in the existing literature derive from short-terms shocks.<sup>2</sup> Munshi (2003) uses changes in rainfall (e.g., droughts) to

<sup>1</sup> Using a sample of much larger, publicly traded firms in the United States, Lamont (1997) shows that liquidity shocks increase investment in units of firms, even where those units themselves experienced no shock, and hence, no change in the marginal productivity of capital.

<sup>2</sup> Mesnard and Ravallion (2005) use a change in policies by destination countries of Tunisian migrants as a source of exogenous variation.

identify the strength of migration networks among a set of communities in high migration states in Mexico. [Yang \(2004\)](#) uses the Asian currency crisis as a source of changes in the value of remittances received by Filipino families with migrants overseas. He takes advantage of the fact Filipino migrants work in many different countries. We use cross-sectional data and are not aware of any identifiable exogenous shock to exploit in our data. Given our identification strategy, our results should be interpreted as representing the longer-term effect of migration on microenterprises in Mexico. These may differ from the response to transient shocks identified by Yang.

Because the use of distance from rail lines as an instrument is so critical to the interpretation of our results, we begin by examining the validity of this instrument, and discussing other issues related to identification, in Sections 2 and 3. The data are described in Section 4 and the regression results presented in Section 5. Section 6 offers some conclusions.

## 2. Migration patterns

Mexican workers were recruited to work in the United States in large numbers during the first two decades of the 20th century. The largest source of demand came from the railroads and farms in the southwestern United States. After the start of World War I, the United States established a guest worker, or *Bracero* program, in part to offset the decline in immigration from Europe during the war. Encouraged by this and by the chaos surrounding the Mexican revolution, the flow of workers from Mexico to the United States increased markedly during the 1910s and 1920s.

Three rail lines built between 1884 and 1900 were the major means of transporting labor recruiters south into Mexico and transporting workers north to the United States.<sup>3</sup> The first, the Central Mexican Railroad went south from what is now Ciudad Juarez to Irapuato in the state of Guanajuato, where it branched east to Mexico City and west through Guadalajara to Colima near the Pacific Coast. In the north, the Central Mexican Railway connected to the Southern Pacific and Texas Pacific Railroads in Texas. A second line, the Mexican International railroad, ran a shorter distance Durango through Chihuahua to Piedras Negras, where it connected with the Southern Pacific in Eagle Pass Texas. Finally, the Mexican National Railroad traveled north from Mexico City through San Luis Potosi and Monterrey, reaching the border at Nuevo Laredo and Brownsville in eastern Texas. This third line was less well connected to rail lines in the United States.

[Foerster \(1925\)](#) provides data on the state of origin of migrants registering in Texas, California, Arizona and New Mexico during the year 1924. (In 1920, these states represented more than 90% of the Mexican-born population in the United States, see [Borjas and Katz, 2005](#).) We calculated the distance from the capital city of each state to a stop on any of the main north/south rail lines as they existed in the early 1900s (see [Mexican Central Railway, 1900](#)). Where the line passed through the state, as is the case in 16 states, we assigned a distance of zero. For border states not served by the rail line and for Baja California Sur, we used the distance from the capital city to the border. The link between distance to the rail line and migration measured in 1924 is very strong. The correlation between these distances and percentage of the population of each of Mexico's 32 federal entities migrating in 1924 is 0.72.

These same rail lines remained linked to migration during the second *Bracero* program, which began in 1942. The state-level correlation between distance to the rail lines and migration between

<sup>3</sup> Railroads were the only practical means for traveling long distances over land in Mexico in the early 1900s. According to [Coatsworth \(1972, Chapter 3\)](#), stage coach travel was five times more costly and one-fifth as fast in 1910.

1955 and 1959, the peak years of the Bracero Program, is 0.75. The correlation between migration rates in the 1920s and 1950s is 0.78. We use the distance to these rail lines as an instrument for current migration patterns. The rail lines were directly related to migration in the early 1900s. This early migration led to the establishment of migration networks, which persisted even after other rail lines were constructed and other means of transportation became more commonly used. There are several potential concerns with the use of rail lines as an instrument, which we address in the next section.

### 3. A framework and identification issues

To clarify the issues related to identification of network effects, consider a simple Lucas-style span of control model (Lucas, 1978). Potential entrepreneurs weigh their earnings from wage work against the earnings from self-employment. The latter are a function of the individual's entrepreneurial ability and market conditions. For example, suppose an entrepreneur faces a simple production function of the sort  $Y = \theta D K^\alpha L^{1-\alpha}$ , where  $K$  and  $L$  are capital and labor,  $\theta_i$  represents entrepreneurial ability, and  $D$  represents (perhaps temporary) shocks to demand in the industry in which the firm operates. Demand for capital of entrepreneur  $i$  will then be a function of the interest rate ( $r$ ), the wage rate ( $w$ ),  $\theta_i$ , and  $D$ :<sup>4</sup>

$$K_{id} = f(r, w, \theta_i, D) \quad (1)$$

where the subscript  $i$  indexes the individual and the subscript  $d$  indicates demand for capital. The wage rate affects investment through the decision to enter self-employment.<sup>5</sup>

The relevant interest rate is the rate of interest earned on savings up to the level of an individual's wealth and the rate of interest paid on loans after that point. We refer to this interest rate schedule as the supply of capital. Capital may come from the entrepreneur's personal wealth, or from loans from either formal sources (e.g., banks) or informal sources (e.g., family members or friends). In reality, formal bank lending to firms of the size in our sample is very rare in Mexico. Less than 3% of enterprises in our sample report receiving loans from banks.<sup>6</sup> Personal wealth and loans from family members and friends are the most common sources of capital. The supply of capital is a function of:

$$K_{is} = g(W, B, I, T) \quad (2)$$

where the subscript  $i$  indexes the individual,  $s$  indicates supply of capital, and  $W$  is the entrepreneur's wealth or savings,<sup>7</sup>  $B$  represents access to bank loans,  $I$  access to informal loans

<sup>4</sup> Demand for investment capital may also depend on factors such as the security of property rights (Besley, 1995; Johnson et al., 2002). Empirically, we find no evidence of this among our sample of firms, perhaps because their small size leaves them outside the formal institutional structures in Mexico, and below the radar screen of regulators.

<sup>5</sup> Lucas (1978) develops a model to show that under similar assumptions, those with entrepreneurial ability above some endogenously determined threshold will become entrepreneurs, while remaining agents will become wage workers. An increase in per capita income is associated with an increase in wage rates, leading the lowest ability entrepreneurs to abandon self-employment in favor of wage work.

<sup>6</sup> By comparison, 51% of firms in a sample drawn using the same size criteria in the United States report having a loan from a formal financial institution. The U.S. data are drawn from the Federal Reserve's *National Survey of Small Business Finances*, 1994.

<sup>7</sup> Wealth or savings may include profits from the business which are reinvested in the enterprise. In the Fazzari et al. (1988) framework, reinvestment of cash flow allows a credit-constrained firm to adjust towards its optimal capital stock over time. This suggests that the age of the firm will affect the level of investment. The business cycle might affect investment levels as well, through its impact on cash flows. We control for both of these in the regressions.

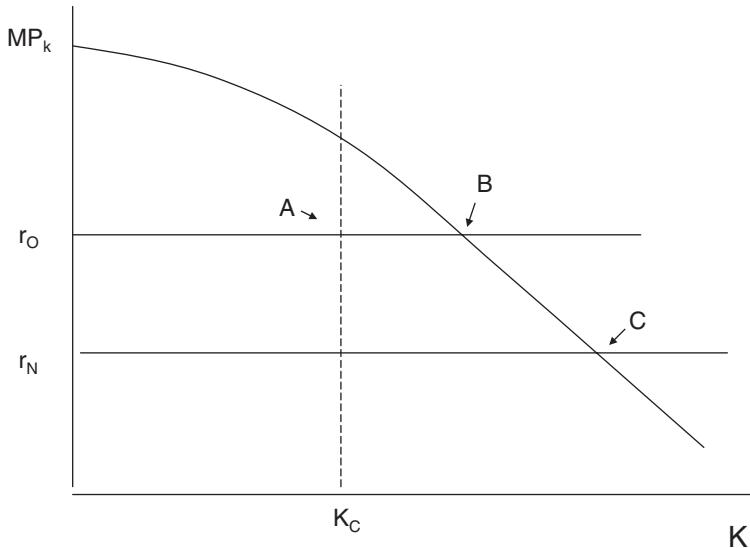


Fig. 1. The effect of constraints and capital networks on the level of invested capital.

and  $T$  access to trade credit. The level of capital invested in the firm then depends on both the demand for capital and its supply.

If the migration network has more liquidity, then those in the network will face a lower cost of capital than those outside the network. The network might also serve to alleviate capital constraints faced by microentrepreneurs. These two possibilities are illustrated in Fig. 1, which shows the marginal product of capital at any level of capital stock. The figure is drawn for the case of diminishing marginal product of capital. The cost of capital for those outside networks, denoted  $r_O$ , is higher than the cost of capital within migration networks,  $r_N$ . A constrained firm outside the network finds itself at a point like that labeled A, associated with capital level  $K_c$  where the marginal product of capital exceeds the market cost of capital. An unconstrained firm outside the network will be at the point labeled B, and an unconstrained firm in the migration network at point C. In either case, the implication is that networked firms will use capital. For many production functions (for example, Cobb–Douglas), networked firms will also have higher capital–output ratios. If the network alleviates capital constraints (i.e., a movement from A to C), then firms will certainly have higher sales and higher profits as well. If the network only reduces the cost of capital (i.e., a movement from B to point C), then whether sales increase depends on the elasticity of demand. For small niche markets with inelastic demand, sales of unconstrained firms may not increase.<sup>8</sup>

Our data do not allow us to differentiate directly between the case of lower capital costs and the case of constraint alleviation with lower capital costs. But the effect of the network on output provides a weak test of this. If we find no effect on output, we would conclude that the networks

<sup>8</sup> Profits will increase mechanically with the fall in interest rates from the market to the migration network level. However, it is less clear that this increase will be reflected in our data. A very small percentage of firms report having formal bank loans. Most invested capital is from the owner's personal resources or informal loans from family members. The informal loans often have no explicit interest rate, and hence the reduction in the cost of external credit may not be reflected in the firms' reported expenses and profits.

serve only to lower the cost of capital. If sales increase as well, increased capital may be alleviating capital constraints as well.

### 3.1. Issues with identification

Our intent is to isolate the effect of migration networks operating through the supply or cost of capital. In order to do that, we must be able separate that effect from the other effects of migration. One obvious issue is that individuals who migrate, or family members of those who migrate, might be expected to have unmeasured characteristics which differ from individuals who do not migrate. The migrants, on average, might be expected to be more entrepreneurial than non-migrants. We address this concern by using a group level measure of migration: the overall migration rate in an individual's state of birth. The question of identification then becomes a question of the independence of the overall migration rate from the overall average unmeasured characteristics. That is, the identification question is one of correlation between state-level migration rates and the distribution of entrepreneurial ability at the state level.

At the group level, there are at least two broad concerns with identification of the effects of migration on the supply of capital. The first is that the strength of migration networks may be correlated with the overall distribution of entrepreneurial ability,  $\theta_i$ , in the population. The second is that migration may be correlated with other factors affecting the demand for capital of microenterprises. In either case, the effect of migration on the level of capital employed could be causal—for example, remittances flowing from migration may increase the demand for goods and services produced by microenterprises—or spurious. We discuss each of these issues, and how we address them, in turn.

With respect to the distribution of entrepreneurial ability, one concern is that high migration regions may have been selected by U.S. labor recruiters early on because people inhabiting those regions are particularly entrepreneurial. The fact that major north/south rail lines connected Mexico's largest cities—Mexico City and Guadalajara—with important border cities, combined with the fact that migration followed those rail lines alleviates to some extent a causal story linking entrepreneurial ability with migration. But there could still be a spurious connection between the rail lines and entrepreneurial ability. A second concern related to the distribution of entrepreneurial ability is the selection of who migrates. Almost 10% of the population born in Mexico resides in the United States—and the percentage is much higher in some states. Given that our data are limited to individuals resident in Mexico in 1998, the distribution of  $\theta_i$  among the population in our sample will be affected by the selection of who migrates. We argue in this section that the available evidence suggests that the rail lines were not significantly correlated with the distribution of entrepreneurial ability at the time of early migration.

With regard to the connection between early migration and the entrepreneurial ability of the region, we note that the northern terminus of all three rail lines was determined by their U.S. owners (Coatsworth, 1972; Kuntz Ficker, 2000). In the case of the Mexican Central Railway, the crossing point of El Paso was selected to link with the existing network of the company's parent, the Atchison, Topeka and Santa Fe. The Mexican National Railroad was linked to the railway system controlled by its major investor, Jay Gould. The southern terminus of both lines in Mexico City was determined by the centrality of that city to the life of the country. While the specific route of the rail line might have been affected by the lobbying ability of individual municipalities, at the level of the state, the route was largely determined by geography given the two end points. There might be slightly more concern about politics playing a large role in these two parts of the lines: the western spur of the Central Railway to Guadalajara, which was completed in 1889, and the

line to Colima near the Pacific coast, completed in 1907. Perhaps these lines resulted from particularly adept lobbying on the part of the states of Jalisco and Colima. As we note below, the main results are robust to excluding individuals born in these two states.

Even if there were no causal link between regional entrepreneurial ability and access to the rail line, there may have been a spurious correlation. We have literacy data from the population census of 1910, and somewhat more detailed education and occupation data from the census of 1940. The earlier period predates the first wave of migration during the 1910s and 1920s, when the percentage of Mexican-born population living abroad was very low. The second precedes the larger wave of migration associated with the second Bracero program in effect from 1942 to 1965. Moreover, the percentage of Mexican-born individuals residing in the United States decreased during the 1930s due to a large return migration during the Depression. The population missing from Mexico's 1940 census due to migration abroad was reduced as a result.

Data from the population census of 1910 suggest there is no significant correlation between literacy rates in that year and subsequent migration rates when the latter are measured either using the data for 1924 (Foerster, 1925) or data from the peak migration years of the second Bracero program, 1955–1959.<sup>9</sup> There is a small positive correlation (0.08) between literacy in 1910 and 1924 migration rates, and a small negative correlation (−0.03) between literacy in 1910 and 1955–1959 migration rates. Data from the 1940 census on the level of self-employment (self-employed as a percent of all employed) indicate that self-employment rates are insignificantly correlated with subsequent migration rates. We find similarly small and insignificant correlations between migration rates during the peak of the *Bracero* program, 1955–1959, and occupation structure in 1940.<sup>10</sup> There is some negative correlation between levels of education in 1940 and subsequent migration rates. Migration rates are higher in states with a larger percentage of residents with less than 6 years of schooling (0.31) and smaller in state with more population having 68 years of schooling (−0.31) or 9–11 years of schooling (−0.19), though the latter correlation is not significant at the 0.10 level. To the extent that educational attainment is correlated with entrepreneurial ability (a standard assumption in the literature), the education data suggest that there may be some negative correlation between migration rates and entrepreneurial ability. If so, this will bias our results downward.

We also have some concern that the railroads may have had a direct effect on the profitability of microenterprise investments, perhaps because they increased the economic growth in the areas where they passed. While limited data from the first half of the century make it difficult to fully address this concern, we note that by mid-century, the railroad network extended to every state in Mexico. The growth-inducing effects of railroads thus had a half-century to take hold even in those places which were far from rails when the migration networks were first formed. Of course, it might be the case that regions with earlier access to railroads gained advantages over those obtaining rail lines at a later time, and that time has not dissipated this advantage.

A separate concern related to the endogeneity of the distribution of  $\theta_i$  is that of selection. Almost 10% of the individuals born in Mexico currently reside in the United States. These individuals are clearly not randomly selected from the population born in Mexico. Hence, even if

<sup>9</sup> The *Bracero* migration rate data come from González Navarro (1974).

<sup>10</sup> The measured correlation between self-employment in 1940 and *Bracero* (1955–1959) migration is low and negative (−0.05), while the correlations between the 1940 self-employment rate and current (1995–2000) migration rates is low and positive (0.07). The correlation between *Bracero* migration rates and the percentage of employment in agriculture (0.07), trade (−0.10), manufacturing (−0.07) and professional services (−0.03) are all low and highly insignificant.

Table 1  
Regression results: labor force participation and self-employment status

	Males				Females			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	LFP	LPF	SE status	SE status	LFP	LFP	SE status	SE status
	OLS	IV	OLS	IV	OLS	IV	OLS	IV
Migration rate, state of birth	−0.125 (1.21)	−0.10 (0.36)	−0.38 (1.85)	−0.21 (0.83)	−0.29 (2.37)	−0.397 (1.45)	0.145 (0.59)	0.002 (0.01)
State fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	No	No	Yes	Yes	No	No	Yes	Yes
Number of observations	28123	28123	20707	20707	31120	31120	8342	8342
R <sup>2</sup>	0.07	0.09	0.17	0.18	0.03	0.03	0.30	0.27

t-values in parentheses. Standard errors are corrected for clustering at the state of birth level. Data are from the 1998 National Employment Survey. The sample is limited to individuals 18–65 years of age residing in urban areas. Labor force participation is defined as working 35 h or more per week. For the self-employment regressions, those working in agriculture are excluded.

the distribution of entrepreneurial talent were identical in high and low migration states prior to migration, that distribution might differ in important ways after migration.

We can provide little direct evidence on the characteristics of migrants residing outside of Mexico. The data to examine even measured characteristics of Mexican migrants are less than perfect. As a result, there is little consensus on the measured characteristics of those missing from Mexico.<sup>11</sup> We can, however, look at the data on outcomes related to self-employment. We do this first by running regressions on labor force participation and entry into self-employment, reported in Table 1. We find no robust relationship between links to migration networks and either labor force participation or entry into self-employment. We define labor force participation as working full time, 35 h/week or more. All of the results are very similar if we instead use a threshold of 20 h/week. All of the regressions control for the age and estimated work experience of the individual, the squares of both of these, and for GDP per capita in the individual's state of birth. The regressions on self-employment status include controls for seven broad industry categories, though again, the results are not sensitive to this.

The regressions in Columns 1 and 2 report the labor force participation results for males, and those in Columns 5 and 6 report the similar results for females. For males, we find no relationship between connection to the migration networks and participation in the labor force. For females, we find a significant negative relationship between work force participation and migration in the OLS regression, but again this is not robust to instrumenting for migration using distance from the capital of the individual's state of birth and the north/south rail lines. Columns 3–4 and 7–8 report the results of regressions on self-employment, conditional on labor force participation, for males

<sup>11</sup> See Chiquiar and Hanson (2005), who examine the patterns of migration from Mexico based on information provided by migrants in 1990 U.S. population census. They construct counterfactual wage distributions in including U.S. migrants in the Mexican labor market. Their findings suggest that migrants would have wages slightly higher than the median in Mexico, centered in the 5th and 6th deciles (see Figs. 6 and 7). Ibarraran and Lubotsky (2005), on the other hand use data from the Mexican population census to show that migrants are negatively selected. The U.S. census is more likely to undercount young single migrants who are less well established in the U.S., while the Mexican census undercounts migrants who move as a household, who are more likely to be urban and have higher levels of education than other migrants.

and females, respectively. For males, we find a negative relationship between the probability of being self-employed and migration networks in the OLS regression, significant at the 0.10 level. This result, however, is not significant when migration is instrumented. For females, we find no significant relationship in either the OLS or the IV regressions. We conclude that there is no robust relationship between migration and labor force participation or occupational choice.

What do these results suggest about selection of who migrates? In a world without capital constraints, the lack of a robust connection between migration and self-employment would suggest that migrants are selected equally from all parts of the distribution of  $\theta_i$ . But other researchers have found evidence that migration helps overcome capital constraints, suggesting that the unconstrained capital case is the relevant case.<sup>12</sup> One scenario consistent with both capital constraints and the results in Table 1 is that selection of who migrates offsets the positive effect of migration on entry into self-employment in Mexico. That is, if those with higher entrepreneurial ability are disproportionately likely to migrate, then migration will be negatively correlated with entrepreneurial ability in the sample of individuals remaining behind in Mexico. We caution that this does not necessarily imply that our estimates of the effect of migration on the performance of microenterprises will be biased in a downward direction. None of the results in Table 1 provides information on whether the migrants come disproportionately from the highest end of the range of  $\theta_i$ , from the range just above the  $\theta_i$  associated with entry into self employment, or equally from all parts of the range above  $\theta_{\min}$ . Having reached the limits of what these data allow us to say about any selection bias, we leave the issue of selection as a caveat to the interpretation of our findings.

### 3.2. Migration and product demand

Aside from the distribution of entrepreneurial talent, migration networks may also affect the demand by microentrepreneurs for capital through an increase in the demand for the goods and services they produce, or through an increase in the wage rates in the regions where they work. Massey and Parrado (1994) use the term “migradollars” for the first possibility. Even absent direct causation, the regions with high migration may differ in ways that affect demand for the output of microenterprises. Large firms may not find markets there attractive, for example, leaving larger market shares for microenterprises. A final related concern is that the rail lines themselves might have affected the industrial structure of the region.

We address this issue by focusing our attention on individuals who currently reside in a state other than their state of birth. About 28% of those in the sample live in a state other than their state of birth. Among this group, the correlation between the migration rate in the state of birth and state of residence is positive but low, 0.16. The birth state provides us with a measure of the individual’s connection to migration networks, while the internal migration separates that network connection from the other effects of migration on the local economy. To take an example, we can compare a sample of individuals who currently live in Mexico City, some of whom were born in high migration regions and some in low migration regions. Given the size of firms in our

<sup>12</sup> Mesnard (2004) and Mesnard and Ravallion (2005) find that migrants returning to Tunisia with larger savings are more likely to enter self-employment. Dustmann and Kirkchamp (2002) and Ilahi (1999) reach similar conclusions looking a sample of migrants returning to Turkey and Pakistan, respectively. Indeed, at first glance our results appear to be at odds with these other findings. It is important, and relevant, to point out that they are not entirely comparable in this regard. The other authors use samples of returning migrants, while we use a sample of those remaining in the country of origin (which may include some returned migrants). Hence, our sample is affected by selection in very different way from theirs.

Table 2  
Receipt of remittances

	Males	Females
	(1)	(2)
	Internal migrants only	Internal migrants only
Migration rate in state of residence	4.49 (3.32)	12.82 (5.79)
Migration rate in state of birth	3.27 (3.96)	5.68 (7.28)
Number of observations	278,778	312,079
% of sample receiving remittances	0.69%	1.51%
Pseudo $R^2$	0.035	0.027

*t*-values in parentheses. Standard errors for the migration rate in state of residence are adjusted for clustering at the level of state of residence, and standard errors for the migration rate in the state of birth are adjusted for clustering at the level of the state of birth.

sample, their markets are primarily local.<sup>13</sup> Hence, individuals born in different states will have different levels of connection to migration networks, but face similar market characteristics.

Do international migration networks survive internal migration? We verify that they do using data from Mexico's 2000 census of population. The census includes information on whether individuals receive remittances from anyone currently residing outside of Mexico. When we examine the probability an individual household receives remittances, we find that the receipt of remittances is increase both in the migration rate of the household head's state of residence and state of birth. That is, after controlling for the migration rate in the state of residence, the migration rate in the state of birth is positively associated with the receipt of remittances. Regressions demonstrating this are shown in Table 2. The sample is divided between males and females, and limited to individuals residing in a state other than their state of birth. For both males and females, the overall migration rate in the state of residence has a larger measured effect, but for both, the probability of receiving remittances is increasing in the migration rate of their state of birth as well.

In sum, we address identification issues in the following way: In all of the regressions we report, we use distance to the railroads as an instrument for migration. We also measure the link to the migration network through migration rates in an individual's state of birth, and focus on individuals currently residing in a state other than their state of birth. Even so, we want to stress two caveats. First, by using historical migration, we are identifying the long run effects of migration on microenterprises. Second, the results are based on a sample of individuals who have migrated internally within Mexico since their birth. These individuals may differ in unmeasured ways from those who remain in their state of birth. Hence, the results may not generalize to the overall population.

#### 4. Microenterprise data

We use enterprise investment data from Mexico's 1998 National Survey of Microenterprises (ENAMIN for its Spanish initials). The sample for the ENAMIN is drawn from the self-employed workers surveyed in the National Urban Employment Survey (ENEU for its Spanish initials) in

<sup>13</sup> All of the firms in the data have fewer than five employees, with the exception of those in the manufacturing sector, where the upper limit is 15. We verify that the main results are robust to excluding manufacturers from the sample, and excluding the handful of firms (seven) engaged in wholesale trade.

the fourth calendar quarter of 1998. The ENEU is a household-based survey. Hence, the ENAMIN sample includes both registered and unregistered firms. The ENAMIN survey is restricted to firms with fewer than 15 workers (including the owner) in manufacturing and fewer than 5 workers in other sectors. The survey asks enterprise owners about their sales, investments, and employees. The survey also includes some information on the founding of the enterprise, the sources of capital, and the owner's work history. The questions related to investments in the enterprise are quite detailed. Owners are asked about up capital investments in seven categories (tools, vehicles, buildings, and so on), and also about inventories of finished goods and inputs.

The 1998 ENAMIN contains data for 12,005 microenterprises owned by 11,823 individuals in 44 urban areas in Mexico. Each of Mexico's 32 federal entities (31 states and the Federal District) is represented. Where a single individual owns two enterprises, we combine the data on those enterprises. Many of the enterprises are operated to supplement income earned in wage work. In about one-third of the cases, the owners report working less than 35 h/week in the enterprise. In regressions on the size of the enterprise, we focus on enterprises in which the owner works full time, at least 35 h/week. We also limit the sample to firms whose owners are between 18 and 65 years of age. Using these criteria, the sample consists of 7588 firms.<sup>14</sup> Missing data reduce the sample size to 6044 enterprises. Most of this reduction (1482 of 1544 cases) is due to missing data on capital stock. While this is of some concern, we note there is no correlation between missing information on capital stock and the independent variables of interest. We focus on a the sample of individuals who currently reside in a state other than their state of birth. A total of 1675 individuals fit these criteria, 1269 males and 406 females. These internal migrants represent 28% of the sample of enterprises meeting the other criteria. Compared with the full sample, internal migrants have slightly lower levels of schooling (about 1/3rd of a year less) and are a year older. On average, their enterprises have the same amount of invested capital and have been operating for the same number of years. In measured characteristics, then, the subsample of internal migrants is similar to full sample.

The majority (58%) of owners in the sample are self-employed workers hiring no employees. Only 20% of the firms employ at least one paid worker, and 22% of the firms employ family members working without pay. Just over 3% of the firms are partnerships. The reported owner of the majority (76%) of the enterprises is a male, and we use the gender of the owner to differentiate enterprises. The most common activity of the firms is commerce (35%), almost all of which is retail trade. Repair services (16%) and manufacturing (12%) are next most common activities. The remaining firms operate restaurants (11%), in construction (8%), miscellaneous personal services (including cleaning services, 7%), professional services (5%) and transportation services (6%).

Enterprise owners are asked the replacement cost of the capital equipment used in the business (tools, equipment, vehicles, real estate, and so on), and the value of inventories of finished and unfinished goods. We sum these data to obtain an estimate of the capital invested in the firm. For each asset identified in the survey, owners are also asked if they own, rent, or have borrowed the asset. We exclude assets that are rented or borrowed, since these do not represent investments by the owner. The median firm reports a replacement cost of owned assets of \$752. The range is quite large, with 25% of the firms investing less than \$125, and 10% investing more than \$9500. Only a small part of the invested capital—6% for males and 15% for females—is in inventories.

<sup>14</sup> The age restriction has no effect on either the significance or magnitude of the results we report below. Including enterprises whose owners work part time does not affect the statistical significance of the results, but does decrease the magnitude of the measured effects by about 20% for males and 30% for females.

The level of capital investment varies considerably with the sector in which the firm operates. At one end, those in transportation and professional services have the highest investment levels, with the median firm reporting a replacement cost of about \$6100 and \$2800, respectively. At the other extreme, firms in the construction industry have median investment level of only \$97, and firms in miscellaneous personal services \$184. The most common activity, commerce, has a median replacement cost of invested capital of \$1330.

Entrepreneurs finance their investment almost entirely through personal savings and loans from family members and friends. The survey includes questions on sources of startup finance and also on loans and trade credit currently received by the enterprise. About 24% of the firms reported having received loans to start their business. Four-fifths of the firms receiving loans report that the source of the loan was a family member or friend. Only 2.5% of the firms received bank credit at startup. About 8% of firms report that they currently have a loan, with just over one-quarter of those loans coming from banks or other formal credit institutions.

The upper limits on firm size in the ENAMIN sampling criteria produce a potentially biased sample. If remittances relieve capital constraints enough that firms grow beyond the upper limits for sampling, then they will be excluded from the survey. This does not appear to be cause for major concern. Only 1% of the sample outside of manufacturing has 5 employees, and only two manufacturing firms have more than 11 employees. Moreover, the ENAMIN data from which the sample is drawn indicate that only a small percentage of firms exceed these size criteria (3% for manufacturing, 4% for other firms). Hence, we expect that any bias resulting from the selection of the ENAMIN sample criteria is likely to be small.

## 5. Regression results

The framework developed in Section 3 suggests that we investigate the effect of migration networks on a series of outcomes. First, we expect networked firms to have higher investment levels and higher capital output ratios. If non-networked firms are capital constrained (and even if they are not under some circumstances), we also expect to find higher output and higher profits. We examine each of these four outcomes in this section. We begin by estimating a reduced form regression for capital investment, derived from Eqs. (1) and (2). Denoting the level of migration in an individual's state of residence as  $M_k$  and the migration rate in an individual's state of birth as  $M_j$ , we can write:

$$K_{ijkl} = c + \varphi w_{kl} + \beta \Gamma_i + \delta \Phi_k + \gamma \Omega_j + \eta_1 M_j + \eta_2 M_k + I_l + \varepsilon_{ijkl} \quad (3)$$

The level of capital invested by entrepreneur  $i$  from state of origin  $j$  and state of residence  $k$ , operating in industry  $l$ , is a constant  $c$ , an industry fixed effect  $I_l$ , a vector of entrepreneur and firm level characteristics  $\Gamma_i$  (e.g., education, age, and age of firm), a vector of state of residence characteristics  $\Phi_k$  (e.g., GDP per capita, bank credit per capita), a vector of characteristics of the state of birth  $\Omega_j$  (e.g., per capita income), the wage rate in the state and industry in which the firm operates  $w_{kl}$ , the migration rates in the state of birth and residence, and an error term. Given the underlying equations, we interpret the coefficient on  $M_k$  as the combined impact of demand for capital and supply of capital, and  $M_j$  as indicating a capital supply effect.

The basic regressions include several variables measuring the economic conditions in the state in which the firm is located (the vector  $\Phi$ ). If important state level controls correlated with migration rates are missing, however, our estimate of the impact of remittances may be

biased. We therefore focus most of our attention on regressions which control for state fixed effects, of the form:

$$K_{ijkl} = c + \beta \Gamma_i + \gamma \Omega_j + S_k + \eta_1 M_j + I_l + \varepsilon_{ijkl} \quad (4)$$

where  $S_k$  is a state fixed effect for the state of residence. The state fixed effects subsume the variation in migration rates in the individual's state of residence. The state and industry variables account for nearly all of the variation in state/industry wage rates, so we drop that from the specification as well.

### 5.1. Enterprise investment and capital–output ratios

**Table 3** reports the results of a regressions on the log of invested capital. We combine the data for males and females because the female sample is small and because separate regressions indicated that the effects we are most interested in are of similar magnitude across genders. (These results are available from the authors.) In the first column, an individual's connection to the migration network is measured by the rate of migration in the state of residence and the rate in the state of birth. The sample is limited to internal migrants, so these variables always take different values. The controls include the level of education, estimated work experience (age minus education minus 6), age of the firm, the square of each of these, the log of per capita income in the individual's state of birth, and industry fixed effects. The standard errors in this and all reported regressions are adjusted for clustering at the state-of-birth level. The rate of migration in the state

Table 3

	(1)	(2)	(3)	(4)	(5)
OLS	IV	IV	IV	IV	IV
Internal migrants only	Internal migrants only	With state FE	Without manufacturing, wholesale	All individuals, state FE	
<i>(A) Regression results: log of replacement cost of invested capital</i>					
Migration rate, state of residence	−1.53 (0.62)				
Migration rate, state of birth	7.87 (5.79)	7.18 (4.22)	9.10 (3.65)	8.00 (2.94)	9.35 (3.52)
State fixed effects	No	No	Yes	Yes	Yes
Industry controls	Yes	Yes	Yes	Yes	Yes
Number of Observations	1675	1675	1675	1475	6044
R <sup>2</sup>	0.29	0.29	0.32	0.33	0.29
<i>(B) First stage for IV regressions: migration rate in the entrepreneur's state of birth</i>					
Distance to north/south rail lines		−0.010 (5.38)	−0.009 (5.29)	−0.009 (5.19)	−0.007 (4.61)
State fixed effects	No	Yes	Yes	Yes	Yes
Industry controls	Yes	Yes	Yes	Yes	Yes
Number of Observations	1675	1675	1475	6044	
Partial R <sup>2</sup> of instrument	0.55	0.45	0.45	0.24	

t-values in parentheses. Standard errors are corrected for clustering at the state of birth level. Sample limited to owners 18–65 years of age working at least 35 h/week.

In addition to the variables shown, all regressions include 7 variables indicating the sector of activity. Other controls included in the regression are years of schooling of the owner, the estimated labor market experience (age minus years of schooling minus 6), the age of the firm in years, the square of each of these variables, a dummy indicating the owner reports data for two enterprises and the income per capita in the owner's state of birth.

of birth is positively related to the level of investment, while the rate of migration in the state of residence is not.

The remaining regressions in [Table 3](#) focus on the rate of migration in the individual's state of birth. In Column 2, we instrument for the migration rate using the distance to the railway lines. The measured effect of migration falls slightly for males and increases slightly for females, and both remain statistically significant. The bottom panel of [Table 3](#) shows the first stage regression. As with the main regressions, the standard errors in the first stage are adjusted for clustering at the state-of-birth level. The first stage regression indicates that the location of rail lines explains a large portion (55%) of the variance in current migration rates. Column 3 adds state fixed effects to the regressions. The measured impact of attachment to the migration network increases, though not significantly so, when the state fixed effects are added. The measure of attachment to migration networks is significant not only statistically, but economically as well. A one standard deviation change in the migration rate (0.039) is associated with a 0.35 log point change in the investment level, indicating a very large impact.

Next, we check to see if the results are robust to dropping manufacturing firms and wholesalers from the sample. Migration measured by the individual's state of birth may have an effect on the demand for goods and services sold by the enterprise if the firm's market is not limited to local areas. Because all of the firms outside manufacturing have fewer than five workers—about 80% have no paid workers—it is reasonable to assume that these firms generally face local markets. Both the nature of the goods produced and the size limits mean that manufacturers may face geographically dispersed markets. Remittances flowing into their birth states may result in higher demand for their products. The same is true for firms engaged in wholesale trade, though there are only seven of these in the sample. The regression in Column 4 shows that eliminating these firms has no significant effect on the results. Finally, Column 5 reports the results when we expand the sample to include individuals living in their state of birth. We find results quite close to those reported in Column 3 for the sample of internal migrants.

The results in [Table 3](#) take the capital stock as a whole. The ENAMIN data report investments in several different categories. To see which types of investments are associated with migration networks, [Table 4](#) reports regressions on the level of investment in each of

**Table 4**  
Log of replacement cost of invested capital by type of investment

	(1)	(2)	(3)	(4)	(5)
	IV	IV	IV	IV	IV
Real estate	Tools and equipment	Vehicles	Inventories	Other investments	
Migration rate, state of birth	3.04 (0.85)	4.70 (1.69)	9.35 (2.38)	6.38 (2.00)	3.44 (1.01)
State fixed effects	Yes	Yes	Yes	Yes	Yes
Industry controls	Yes	Yes	Yes	Yes	Yes
Number of observations	1675	1675	1675	1675	1675
R <sup>2</sup>	0.13	0.42	0.34	0.41	0.34

t-values in parentheses. Standard errors are corrected for clustering at the state of birth level. Sample limited to owners 18–65 years of age working at least 35 h/week. The migration rate is instrumented with the distance from the north/south railway lines, as described in the text. In addition to the variables shown, all regressions include 7 variables indicating the sector of activity. Other controls included in the regression are years of schooling of the owner, the estimated labor market experience (age minus years of schooling minus 6), the age of the firm in years, the square of each of these variables, a dummy indicating the owner reports data for two enterprises and the income per capita in the owner's state of birth.

five categories: real estate, tools and equipment, vehicles, inventories, and other investments. Some firms report no investment in a given category. Table 4 uses the log of the investment level plus \$1, so that the zero investment level is defined. We discuss below the differences in results when we look at the log investment level conditional on having positive investment.

Across the full sample, about a third of the investment firms make is in real estate and almost a third is in vehicles. Of the remainder, 16% is in tools, 8% in inventories, and 12% in other investments. Using the same specification as in Column 3 of Table 3, we find that attachment to the migration network is associated with increases in investment in tools and equipment, vehicles, and inventories. The latter two are significant at the 0.05 level; the first at the 0.10 level. The largest increase is in vehicles. We also ran regressions on the investment level conditional on reporting some investment in the category (results available from the authors). These produce several differences in the pattern of significance: migration networks are associated with higher levels of investment in real estate ( $\beta=9.07$ ,  $t=4.14$ ) and the category of other investments ( $\beta=6.21$ ,  $t=2.93$ ); and tools and equipment are no longer significant.

We next turn to the capital–output ratio, total output, and profits. Table 5 reports the results of regressions where the dependent variable is the capital–output ratio, defined as the total capital invested in the firm divided by gross sales in the month before the survey. The specification is the same as that shown in Eq. (4). We find a very strong relationship between attachment to the migration network and the capital–output ratio. The results with the IV are slightly larger than the OLS results. A one standard deviation increase in the migration rate of an individual's state of birth is associated with a one-fifth of a standard deviation increase in the log capital–output ratio.

Table 5  
Capital/output, sales, and profits

	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	IV	OLS	IV	IV	IV
	Log capital/output	Log capital/output	Log sales	Log sales	Log of profits	Log of profits
Migration rate, state of birth	3.18 (4.09)	4.78 (4.17)	2.09 (1.88)	0.73 (0.54)	1496 (2.17)	401 (0.52)
Capital stock					0.046 (4.56)	
Capital <sup>1/2</sup>					– 6.91E–07 (3.46)	
Capital <sup>1/3</sup>					3.54E–12 (2.90)	
Capital <sup>1/4</sup>					– 5.34E–18 (2.58)	
State fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	1623	1225	1623	1623	1626	1626
R <sup>2</sup>	0.22	0.21	0.32	0.32	0.15	0.22

*t*-values in parentheses. Standard errors are corrected for clustering at the state of birth level. Sample limited to owners 18–65 years of age working at least 35 h/week.

The migration rate is instrumented with the distance from the north/south railway lines, as described in the text. In addition to the variables shown, all regressions include 7 variables indicating the sector of activity. Other controls included in the regression are years of schooling of the owner, the estimated labor market experience (age minus years of schooling minus 6), the age of the firm in years, the square of each of these variables, a dummy indicating the owner reports data for two enterprises and the income per capita in the owner's state of birth.

### 5.2. Sales and profits

We next turn to sales and profits. If networks are alleviating capital constraints, we should certainly expect sales and profits to increase. If they are only lowering the cost of capital for networked firms, then sales and profits will not necessarily increase. For sales (Columns 3 and 4 of [Table 5](#)), there is a significant increase in sales in the OLS regressions (0.10 level). But the measured effect is much smaller in the IV regressions, and the coefficient is insignificant.

Does the increased investment result in higher profits for the microentrepreneurs? The answer appears to be yes. Columns 5 and 6 show the results of regressions with the total profit, measured in dollars, as the dependent variable. The regression in Column 5 does not control for the firm's capital stock. Without controlling for capital stock, attachment to the migration network is associated with higher profit levels. A one standard deviation increase in the migration rate is associated with almost US\$60 per month in increased profits, about 15% of the mean profit reported by firms in the sample. Once we control for capital stock (Column 6), the direct effect of the migration network becomes insignificant. This suggests that migration affects profits only through the returns earned on the increased investments associated with migration.

### 5.3. Discussion of results

Collectively, we find that migration is associated with higher investment levels, higher capital–output ratios, and higher profits. There is no robust finding on sales. These results suggest that the migration networks provide access to capital, which leads to higher investment levels and profits. But, like the networks described by [Banerjee and Munshi \(2004\)](#), the lack of any increase in the sales level casts some doubt on whether the liquidity from migration networks is relieving capital constraints.

We can think of several alternative explanations for the initial pattern of results, but they find little support in the data. We explored the possibility that micro entrepreneurs connected to the migration network may substitute capital for labor, but found no evidence in the data that they were doing so. Neither their own hours worked, nor the likelihood of hiring paid or unpaid workers are significantly associated with migration networks. We also explored the possibility that they were purchasing equipment they would otherwise rent. Again, we find no evidence that amount of rented equipment is negatively associated with migration.

We can make a bit more progress if we divide the sample into high capital and low capital sectors. [Table 6](#) shows the mean and median capital by sector, ranked by median capital.

Table 6  
Mean and median invested capital by sector

	Mean invested capital	Median invested capital
Construction	\$686	\$97
Miscellaneous services	\$3399	\$184
Repair services	\$2461	\$369
Restaurants	\$2183	\$337
Manufacturing	\$5210	\$1566
Trade	\$4229	\$1330
Professional services	\$9725	\$2811
Transportation	\$13,219	\$6054

Data in US dollars, translated using the exchange rate in the fourth calendar quarter of 1998.

Table 7

High and low capital sectors

	High capital sectors				Low capital sectors			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	IV Log capital	IV Log of sales	IV Log capital/output	IV Profits	IV Log capital	IV Log of sales	IV Log capital/output	IV Profits
Migration rate, state of birth	13.73 (3.74)	3.92 (1.85)	5.85 (3.07)	1272 (1.03) 0.045 (5.32)	4.93 (1.70)	-2.01 (0.96)	3.49 (3.08)	148 (0.20) 0.035 (4.75)
Invested capital								
State fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	967	927	927	937	708	696	696	689
R <sup>2</sup>	0.27	0.26	0.21	0.25	0.31	0.39	0.20	0.26

t-values in parentheses. Standard errors are corrected for clustering at the state of birth level. Sample limited to owners 18–65 years of age working at least 35 h/week.

The migration rate is instrumented with the distance from the north/south railway lines, as described in the text. In addition to the variables shown, all regressions include 7 variables indicating the sector of activity. Other controls included in the regression are years of schooling of the owner, the estimated labor market experience (age minus years of schooling minus 6), the age of the firm in years, the square of each of these variables, a dummy indicating the owner reports data for two enterprises and the income per capita in the owner's state of birth.

Construction, miscellaneous services, repair services and restaurants have less than the overall median level of invested capital, and we label these low capital sectors. The remaining sectors are labeled high capital. Table 7 reports the four sets of regressions—invested capital, log sales, capital output, and profits—with the sample broken into high and low capital intensity. In the high capital sectors, closer attachment to the migration network is associated with higher investment, higher sales, higher capital output ratios, and higher profits. The latter are caused only by the higher investment level.<sup>15</sup>

The results for the low capital sectors are much different. Here, the measured effect on the level of invested capital is about a third what it is in the high capital sector, a statistically significant difference. Migration has a negative but insignificant effect on sales, and a positive and significant effect on the capital–output ratio. Profits are increasing in the level of capital stock, with no direct impact of attachment to the migration network on profits. With the sample broken into high and low capital sectors, the results suggest that the increased availability of capital is not relieving constraints in low-capital sectors, but is relieving capital constraints in high-capital sectors.

## 6. Concluding remarks

We find evidence that migration is associated with larger investments and higher capital–output ratios among microenterprises in Mexico. There is also evidence that the higher investments are associated with higher levels of profits and, at least in more capital intensive sectors, with higher sales levels as well.

<sup>15</sup> Regressions available from the authors indicate that connection to the migration network is not associated with the choice of entry in to high or low capital sectors.

The results are consistent with the sort of community effects found by Banerjee and Munshi among tee shirt manufacturers in India. Membership in a more liquid community leads to higher investment which is consistent with individuals in that community facing lower costs of capital. For entrepreneurs operating in more capital-intensive sectors, the results are perhaps closer to those found by Banerjee and Duflo among Indian firms gaining and losing access to bank finance. Our results suggest that in these sectors, migration networks may help overcome capital constraints in Mexico. Though we focus on capital stock and not entry, these latter results complement recent research from countries other than Mexico which suggests that migration relieves credit constraints and allows increased entry into self employment (Mesnard and Ravallion, 2005; Ilahi, 1999; Dustmann and Kirkchamp, 2002).

One final qualification of the results is worth reiterating. Identification issues led us to focus on the sample of individuals residing in a state in Mexico other than their state of birth. These individuals represent 28% of the full sample. They may differ in unmeasured ways from individuals residing in their birth state. Hence, the results may not extend to the larger population.

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