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How Efficiently is Capital Allocated? Evidence from the Knitted Garment Industry in Tirupur

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This paper studies the effect of community identity on investment behaviour in the knitted garment industry in the South Indian town of Tirupur. We document very large and systematic differences in both levels of capital stock and the capital intensity of production in firms owned by people from two different community groups. We argue that the differences in investment cannot be explained by productivity differences alone. We suggest that the most likely explanation is that the two communities differ in their access to capital.

1. INTRODUCTION

In everyday conversation people seem to take it as given that the particular investment choices made by someone would be influenced by the nature of his or her social ties—"she went into the garment business because she has good contacts in the department stores", "he went into business because his parents are rich", etc. Economists, on the other hand, typically regard these as anomalies that only exist because the markets do not function as they ought to—in the ideal market economy, productivity alone determines who invests where and how much. Social ties become important when transaction costs are large, as a way of limiting these transaction costs. For example, in environments where contracts do not offer adequate protection, you hire your cousin because you cannot trust others to do a good job and you lend cheap to your nephew because you are sure that he will not cheat you.

The goal of this paper is to provide an empirical assessment of the importance of social ties in determining the pattern of investment and, by implication, to evaluate the usefulness of the perfect markets benchmark, at least in the context of developing countries. Our empirical work is based on panel data that we gathered from the knitted garment industry in Tirupur, a town in Southern India that produces about 70% of India's knitted garment exports. The reason for choosing Tirupur as the setting for the empirical work in this paper is that we can take advantage of a recent change in the sociological composition of Tirupur's production cluster. Until the late 1980's, Tirupur was dominated by the Gounders, who are traditionally agriculturalists from the area. However, in the last decade a number of people from all over the rest of India have entered the Tirupur knitted garment industry, attracted by its success as an export centre. It is reasonable to suppose that at the time when we observed them (in the mid-1990's), the Gounders and the new migrants (whom we will henceforth refer to as Outsiders) differed significantly in the strength of

their community ties within the Tirupur area. We can therefore expect to learn something from the comparison of their patterns of investment.

This comparison is at the heart of this paper. After describing the setting in Section 2, we lay out in some detail in Section 3 the evidence on how firms belonging to the two communities differ in terms of investment and output. The basic facts that emerge from the comparison are as follows:

(1) The average Gounder firm that was set up during our sample period (1991–1994) started with almost three times as much fixed capital as a comparable Outsider firm.
(2) At all levels of experience (by which we mean the number of years since the firm went into business as an exporter), the average Gounder firm owns more fixed capital than the average Outsider firm that was started in the same year, though the difference is small for firms that have been exporting for more than 6 years.
(3) At all levels of experience, the capital intensity of production in an average Gounder firm (measured both by the ratio of fixed capital to exports and the ratio of fixed capital to total production) is between 1·5 and 2·5 times that of an average Outsider firm that was started in the same year.
(4) Output (measured both by exports and by total production) is initially lower in firms owned by Outsiders compared with firms owned by Gounders that were started in the same year, but grows faster with experience and crosses that of the Gounders after about 5 years.
(5) In contrast with the cross-community comparison, within each community, firms that invest more maintain higher levels of output at every level of experience.

The evidence shows sharp differences between the behaviour of output and investment across the two communities. Moreover, the within community patterns are quite unlike what we find when we compare the two communities. *Prima facie*, this suggests that community effects are indeed important.

There remains, however, the task of establishing that the community effects are true community effects and not the effects of unobserved individual characteristics. This is the subject of Section 4. The basic argument we make in this section relies on the fact that the Outsiders grow faster and, after a few years in business, produce more in absolute terms while using less capital, suggesting that the unobserved productivity differences are in their favour. Yet they invest less than the Gounders. This could be because more productive people actually need less capital, but then it is hard to explain why, as noted above, when we compare people within each community, those who produce more also invest more.

How then do we explain the fact that social ties have such strong effects on the pattern of investment? This is the subject of Section 5. We consider a number of alternative explanations: community links might matter because they reduce transaction costs in the capital market or in the labour market. They could also affect access to politically provided inputs or to buyers. We argue that the most plausible explanation is based on the shadow price of capital being substantially lower for the Gounders—this is why they invest more, despite being less productive.[1]

We conclude in Section 6 with a discussion of the policy implications of our research.

2. THE SETTING

2.1. *A brief history*

The setting for the empirical analysis is the South Indian town of Tirupur. Tirupur is located in Coimbatore district, in the modern Indian state of Tamil Nadu. This area was traditionally

1. This phenomenon has been dubbed "scrambling" by Caballero and Hammour (1998).

known as *Kongunad*, one of the five big sub-divisions of the Tamil-speaking country, prior to the arrival of the British. Kongunad is believed to have been colonized by the *Vellala Gounders*, an elite cultivator caste, in the 12-th century (Beck, 1972). While Kongunad is quite dry, the soil is fertile and there are significant reserves of subsoil water. Where well irrigation was available, high agricultural yields have been obtained from early times.

With the advent of the railways, Kongunad emerged as the most commercialized region in Tamil Nadu in the last quarter of the 19-th century as cultivation shifted into cash crops (particularly cotton). By the 1950's, Coimbatore had 20% of its land allocated to cash crops, which was the largest share of any district in Tamil Nadu, and it had one of the highest land values in the state (Baker, 1984). While the Kongu Vellala Gounders had always been wealthy, the cultivation of cash crops transformed this community into one of the wealthiest in Tamil Nadu.

While Tirupur's association with the cotton trade goes at least as far back as the 19-th century, the first textile manufacturing unit was only established in the town in 1935. The Nakarattars, a community traditionally involved in trading, initially dominated the industry. However, after a prolonged period of labour unrest in the mid-1960's, they were largely replaced by the Gounders (Swaminathan and Jeyaranjan, 1994). The Gounders are a so-called "right hand" (*valangkai*) caste, so they were traditionally confined to land-based activities; *this was their first significant commercial venture outside agriculture*. For the next 20 years or so, the industry was dominated by the Gounders and catered almost exclusively to the domestic market.

The export of knitted garments from Tirupur started to grow very rapidly around 1985, and in the early 1990's the annual growth rate was above 50%. This generated an inflow of new entrepreneurs from outside Tirupur. By the mid-1990's, which is when we observe the industry, about half of the exporters were Gounders while the rest were from all over India. In our sample of exporters, 58% are Gounders, and the rest are Outsiders: 9% are Mudaliars, 10% are Chettiars, and the remaining 23% are from outside South India, mainly from traditional trading communities such as Marwaris, Gujaratis and Khattri Punjabis.

2.2. *The industry*

The industry produces knitted garments and is largely focused toward exporting. Most firms produce t-shirts, targeted at low-end retail outlets in Europe and the U.S. There are essentially three types of firms in the industry: direct exporters, indirect exporters, and job-workers. Direct exporters are the ones who receive orders from abroad. Once they have an order they often pass on a fraction of the order to one or more indirect exporters. Indirect exporters are independent garment producers who are entirely responsible for their share of the order, delivering the finished product to the direct exporter prior to shipment.

Garment production is organized in a number of stages: the major stages are knitting, dyeing and stitching, while the minor stages include calendaring (shrinkage control), printing and curing. Most of these stages require some amount of fixed capital, making this industry quite different from stitched garment production which relies mainly on variable capital. The direct and indirect exporters will typically own the fixed capital (machinery, etc.) necessary for some stages of production, but not all of them. For the rest of the stages they will employ job-workers, who are specialized producers owning machinery only for a single stage.

Job-work and the use of indirect exporters allows for decentralization in the production process and is one reason why there can be large variations in the capital intensity of production (measured by the ratio of the amount of capital that the company owns to its production) in the population of direct exporters. However, such decentralization has costs of its own. Quality appears to suffer and delays in shipments, particularly during the peak production season, are more frequent. From our conversations with bankers in Tirupur and officers in the Export Credit

Guarantee Corporation (ECGC), a government agency that insures exporters, it appears that such delays often result in orders being rejected by foreign buyers. This is why more capital intensive firms, *i.e.* firms that do not rely heavily on job-workers and indirect exporters, are considered to have an advantage.[2]

Tirupur's success as an industrial cluster nevertheless owes a lot to the presence of these indirect exporters and job-workers: one reason the Outsiders come to Tirupur is because they have access to the indirect exporters and job-workers, and therefore can go into business without investing in a fully vertically integrated plant. The fact that Tirupur acts as a market and provides a way in which buyers can find exporters is also presumably important, at least for firms that are starting out.

2.3. *The communities*

It is reasonable to expect that the nature of social ties within the Tirupur industrial cluster vary significantly between the Gounders and the Outsiders. The Gounders in Tirupur are a wealthy, closely knit, community from that very area. In contrast, the other communities are literally outsiders, who only arrived in Tirupur in the 1990's with the surge in exports. They belong to traditional trading communities with well-established networks in other parts of the country, but in the early 1990's their community in Tirupur was quite small (although presumably this will change over time). In other words, at the time of our survey, most of their social ties were with people who were elsewhere, unlike the Gounders.[3]

There are several reasons why this might make a difference: first, given that most of their strong ties are with people elsewhere, the natural presumption is that the Outsiders have substantially less access to credit from their social network than the Gounders.[4] While we have no direct evidence showing that the effectiveness of networks diminishes with distance, it is a natural interpretation of the well-known fact that people choose to migrate to places where their community networks are already relatively well developed.[5] It also seems plausible on purely *a priori* grounds that the advantage of lending to someone known, for example, must be significantly diminished if the borrower is impossible to monitor and beyond the reach of most social sanctions.

Second, subcontracting should be easier for the Gounders, given that the bulk of indirect exporters and job-workers are from their community (74% of the indirect exporters and 72% of the job-workers are Gounders). This could occasionally be a problem (say, when one is forced by familial obligations to subcontract with some relative who is not particularly good at the job), but on the whole it should boost productivity.

2. For instance, Cawthorne (1995) quotes one of the Tirupur exporters as saying, "I want to be like the spinning mills here. That is my ambition. Then I will have all the stages [of production] as one operation.... With a large factory you know exactly what is going on." While Cawthorne does not share his view, a large number of exporters that we spoke with expressed the same sentiment.

3. It should be emphasized that what matters is not ethnic identity *per se* but the existence of social connections. There is certainly more than one Marwari *bania* family in the garment business in Tirupur, but as Timberg (1978) has emphasized, the exact sub-caste (Oswal vs. Shekhawati Aggarwal, for example) is very important in determining the direction of business transactions, as are specific social relationships (marriage ties, etc.).

4. The importance of social networks in lending has been widely recognized both in the theoretical and the empirical literature on credit markets—see Greif (1993, 2000), Townsend (1994), Udry (1994), Banerjee (1996) and Fafchamps and Lund (2000).

5. See Piore (1979) and Massey, Alarcon, Durand and Gonzalez (1987) for studies of Latin American migrants to the U.S. that argue that migration tends to flow to areas where past migrants have already established a foothold. Carrington, Detragiache and Vishwanath (1996) describe the support networks that were put in place for the later arrivals from the American South during the Great Migration. Similarly, Timberg (1978) describes how social ties framed the expansion of the Marwari community into specific cities in 19-th-century India. Das Gupta (1987) shows evidence for the converse proposition: her analysis of migration choices in Punjab, India, confirms that people do not want to migrate to places where they do not have social connections.

Third, Gounders would be expected to have an advantage with respect to politically provided inputs (roads, electricity, water, etc.), since they are much more closely tied to the local political establishment, both through family connections and also just by the fact of having been there for a long time.

Finally, there were very few Outsiders in the industry when the export boom started. As a result, firms that have been exporting the longest tend to be owned by Gounders.[6] These well-established firms may be an important source of referrals for new producers and it is likely that the Gounders will benefit more from them.

3. EMPIRICAL RESULTS

We begin with a brief description of the data collection in Section 3.1, which is followed by some basic descriptive statistics comparing the two communities in Section 3.2. As noted, an important feature of the empirical analysis is a comparison of the investment and output levels for the Gounders and the Outsiders. A detailed discussion on the identification problems that arise in this comparison is presented in Section 3.3. The results comparing capital stock, capital intensity, and output in the two communities are then presented in Sections 3.4–3.6, which are followed by robustness tests in Section 3.7. The empirical analysis concludes with the estimation of the output–investment relationship within each community in Section 3.8.

3.1. *Data collection*

The main data source for this paper is a survey of 600 direct exporters, indirect exporters and job-workers carried out in 1995. Details of the entrepreneur's background, his access to bank financing, as well as production and investment information over a 4-year period, from 1991 to 1994, were collected from each firm. Some supplemental information was collected through a brief re-survey in 1997.

Before turning to a description of the data, we briefly describe the sampling procedure employed in the 1995 survey, which is non-standard. The Tirupur production cluster is a complex institution, with production units spread all over the town. These units are located for the most part in converted residential structures, and there is no segregation of homes and firms in Tirupur. Many of the units are unregistered, so there is no comprehensive "list" of firms in the town. Moreover, accurate maps are unavailable: Tirupur, like most small Indian towns, is a maze of lanes and by-lanes. Given our resource constraints, we were unable to conduct a census of the entire town, which would have allowed us to randomly sample firms for the survey. Instead, we focused on areas in which production units are known to be concentrated. We identified 10 such "zones", and attempted to survey all the firms in each of these zones. The survey ultimately took 3 months to complete, and information was collected from 300 indirect exporters and 147 direct exporters. The distribution of firms by community, in our sample, is very even across the 10 zones, suggesting that communities do not cluster in particular areas.[7] Thus there is no *a priori* reason to suspect that our survey was biased towards a particular community.

3.2. *Descriptive statistics: some basic facts about the Gounders and Outsiders*

The discussion that follows focuses on the 147 direct exporters in the 1995 survey. Because we are particularly interested in comparing the investment behaviour and the export performance of

6. We will see later that the experience distribution for the two communities tends to be very similar, except at the top of the distribution (above the 0·95 quantile experience level) where Gounder firms are 1 year older than Outsider firms.

7. There is a single exception—one zone had a relatively low proportion of Gounders. Dropping this zone does not affect the estimated output and capital stock trajectories that we report below.

TABLE 1

Descriptive statistics

Community	Direct exporters: Gounders (1)	Direct exporters: Outsiders (2)
Panel A. Experience		
Mean (standard error of the mean)	2·75	2·87
	(0·17)	(0·18)
(in quantile)		
0·25	1	1
0·50	2	2
0·75	4	4
0·90	7	7
0·95	9	8
Panel B. Production		
Mean (standard error of the mean)	268·13	216·92
	(19·32)	(22·68)
(in quantile)		
0·25	80	70
0·50	150	130
0·75	300	250
Panel C. Capital stock		
Mean (standard error of the mean)	54·12*	29·34*
	(4·31)	(3·55)
(in quantile)		
0·25	7·0	5·0
0·50	20·0	14·0
0·75	84·5	31·6
Panel D. Other investment statistics		
Mean (standard error of the mean)		
Starting capital stock	23·14*	8·03*
	(5·91)	(1·76)
C–E ratio	0·57*	0·23*
	(0·08)	(0·02)
C–P ratio	0·31*	0·19*
	(0·04)	(0·02)
% production as indirect exporter	21·69*	12·9*
	(2·16)	(1·91)
Number of observations	239	191

Notes: Experience is measured as the length of time after the year of entry as a direct exporter.
Production and capital stock are measured in lakhs of rupees.
1 lakh = 100,000 and the exchange rate during the sample period was approximately Rs. 27 to the dollar.
* Denotes rejection of the equality of means for the two communities with greater than 95% confidence.

the Gounders and the Outsiders, the sample is partitioned by community in Table 1. Since we have data over a 4-year period, 1991–1994, the firm–year is the unit of observation for most of the statistics that we present here.[8]

8. The accuracy of the information provided by each firm is a potential cause for some concern since retrospective information is collected to construct the panel data set. Note, however, that our analysis concentrates on *differences* between the two communities. The estimated differences will not be biased as long as the accuracy of the information provided by the firms does not vary systematically across the two communities. The use of retrospective data also implies

We begin with the exporter's *experience* (defined as the number of years since he received his first direct export order) in panel A of Table 1. The experience distribution is roughly the same for the two communities, except in the very top quantiles of the distribution where Gounders have higher experience. This is consistent with the institutional background which suggests that the Gounders were established in Tirupur before the Outsiders (catering mainly to the domestic market), and that the arrival of the Outsiders coincided with the beginning of the export boom.

Turning next to production, reported in panel B, while the Gounders enjoy a slight advantage at comparable quantile levels across the distribution, the average level of production for the two communities is not statistically different at the 5% significance level.[9] Total production however includes both direct exports and indirect exports, which is production that helps complete other exporters' orders. Direct exports may be a better measure of performance than total production, as indirect exporting is typically a fallback when direct orders are unavailable. While not reported here, the patterns across communities that we reported in panel B would be unchanged if total production were replaced by direct exports.

While production levels may be comparable for the two communities, Gounders hold significantly more capital stock, both on average as well as at different quantile levels (in panel C). Restricting attention to the starting capital stock (*i.e.* capital stock in the year prior to the first export order), which is available for firms that entered during the sample period, we see in the first row of panel D that Gounders start with nearly three times as much capital.

The descriptive statistics just reported imply that both the capital–export (C–E) ratio, as well as the capital–production (C–P) ratio, should be significantly higher for the Gounders. This is indeed what we see in panel D: both ratios are roughly twice as large for the Gounders. Not surprisingly, Gounders find it harder to find direct export orders to employ their entire capital stock—we also report that Gounder firms devote a significantly larger fraction of their total production to indirect exports.

The large difference in the capital stock and the capital–output ratio translates into a clear difference in the extent of vertical integration as well. Defining vertical integration as ownership of machinery in all three stages of production (knitting, dyeing and stitching), 19% of the Gounders are vertically integrated, as opposed to 6% for the Outsiders (the difference in the probability of being vertically integrated for the two communities is statistically significant at the 5% level). These numbers increase to 51 and 35% respectively when we study partial vertical integration, defined as ownership in two or more stages of production (the difference between the two communities continues to be statistically significant). Gounders therefore have greater control over the production process.

3.3. *Output and investment trajectories: specification and identification issues*

We are interested in studying how output and investment for the Gounders and the Outsiders evolve with experience. Identifying this experience effect is a challenging statistical problem, even with panel data, when the overall economic environment and the quality of successive cohorts of entering firms is changing over time. The discussion that follows describes this problem and lays out the approach that we adopt in this paper to identify the experience effect.

that firms that exited the industry during the sample period will be missing in our data. This does not pose a problem for us since we have no reason to control for selection effects: indeed we will argue later that a plausible reason why the Outsiders outperform the Gounders is that they are subject to different selection pressures and consequently have higher ability.

9. Production and investment in this paper are measured in lakhs of rupees. 1 lakh = 100,000 and the exchange rate during the sample period was approximately Rs. 27 to the dollar.

One problem with identifying the experience effect comes from the fact that firms that started their business in different years may be very different: in other words firms are subject to a cohort effect. The basic regression that we estimate therefore takes the form

$$y_{it}^c = \Pi^c \text{EXP}_{it}^c + f_i^c + \eta_{it}^c. \tag{1}$$

Here y_{it}^c is either output, capital stock, or the capital–output ratio for firm i belonging to community c in period t. EXP_{it}^c refers to firm i's experience in direct exporting. f_i^c captures the cohort effect. Finally, η_{it}^c is a mean-zero disturbance term which collects all the exogenous idiosyncratic demand shocks that the firm has received over its lifetime, causing it to deviate from its expected trajectory in period t. η_{it}^c also reflects the firm's ability, relative to the average ability in the community.

If the quality of entering cohorts changes systematically over time, then f_i^c will be correlated with EXP_{it}^c. We must then control for cohort effects to obtain consistent estimates of the experience effect Π^c. We take two different approaches to control for the cohort effects in this paper. In one specification, f_i^c is assumed to be the same for all firms from the same community from the same cohort, and is controlled for with year of entry dummies. In the other specification, f_i^c is assumed to be firm specific and is controlled for with a firm fixed effect. The second approach is obviously more flexible, but has the disadvantage that the experience effect will be identified from the firms in our sample that change their output or capital stock in the 4 year period for which we have data.[10]

Ideally, we would have also liked to have been able to control for community specific year effects, representing, among other things, secular shifts in demand conditions over the sample period. However, as is well known (Deaton and Paxson (1994), Deaton (1997)), it is impossible to separately identify cohort effects, experience effects and the trend in the year effects. To see the problem, add a time trend in the regression equation given above to get

$$y_{it}^c = \Pi^c \text{EXP}_{it}^c + \gamma^c t + f_i^c + \eta_{it}^c. \tag{2}$$

Now in the case where we include a firm fixed effect in the regression, we are effectively differencing out each variable in the equation above from its sample mean. Observe that with a balanced panel, $\text{EXP}_{it}^c - \overline{\text{EXP}}_i^c = t - \bar{t}$, for all firms in the sample (here $\overline{\text{EXP}}_i^c$, $\bar{t}$ are means, computed over the sample period). It is therefore obvious that we cannot separately identify the experience effect and the time trend in the year effects in this case.[11]

One way of getting around this problem is to simply assume that there is no time trend in the year effects (as in Deaton and Paxson, 1994). However, this is not a good assumption for a growing industry. Instead, we assume that the time trend in the year effects is common across communities. Since the most plausible reason for a time trend is growth in foreign demand, this would seem to be a reasonable assumption in this setting. Other community specific year effects—such as year-to-year variations in each community's supply of credit—are likely to be uncorrelated with the time trend and can be included in the error term without biasing our results.

Under the assumption that the time trend in year effects is common to the two communities, the differenced regression equation can then be written as

$$y_{it}^c - \bar{y}_i^c = (\Pi^c + \gamma)(\text{EXP}_{it}^c - \overline{\text{EXP}}_i^c) + (\eta_{it}^c - \bar{\eta}_i^c), \tag{3}$$

where $\bar{y}_i^c$, $\bar{\eta}_i^c$ are the sample means. The difference in our estimates of $\Pi^c + \gamma$ across the two communities now correctly identifies the difference in the growth rates, and hence the difference in output levels at different levels of experience, which is ultimately what interests us.

10. In the case of the capital stock, for example, only 78% of the firms show a change during the sample period.

11. See Deaton (1997, pp. 123–127), for a clear discussion on identifying age effects (which we call experience effects) with panel data, when cohort effects and year effects are present.

TABLE 2

Investment trajectories

	ln(capital stock)			ln(C–P ratio)	ln(C–E ratio)
	OLS	Fixed effects	Entry dummies	Entry dummies	
Dependent variable	(1)	(2)	(3)	(4)	(5)
Experience	0·222	0·165	0·165	−0·165	−0·247
	(0·044)	(0·041)	(0·034)	(0·047)	(0·048)
Experience–Gounder	0·034	−0·029	−0·111	0·034	−0·005
	(0·058)	(0·050)	(0·050)	(0·070)	(0·076)
Gounder dummy	0·438	0·696	0·918	0·258	0·512
	(0·267)	(0·135)	(0·063)	(0·072)	(0·078)
Constant	1·745	2·051	2·047	−1·869	−1·414
	(0·194)	(0·098)	(0·039)	(0·053)	(0·055)
Entry dummies	No	No	Yes	Yes	Yes
Fixed effects	No	Yes	No	No	No
Year dummies	Yes	No	No	No	No
R-squared	0·252	0·960	0·865	0·782	0·704
Box–Pearson Q statistic	1·541	0·013	1·654	1·350	1·155
Number of observations	434	434	434	430	421

Notes: Robust standard errors in parentheses.
$Q \sim X_1^2$ under H_0: no serial correlation. The critical value above which the null is rejected at the 5% level is 3·84.
Entry dummies are constructed using all the possible years of entry.
Columns 1–3: capital stock regressed on experience.
Column 4: C–P ratio regressed on experience.
Column 5: C–E ratio regressed on experience.

Exactly the same argument goes through if we replace firm fixed effects with community specific year of entry dummies. The difference between the experience effects in the two communities is consistently estimated under the assumption that the time trend in the year effects is common across communities.

3.4. *Results on capital stock*

We saw in Section 3.2 that Gounders hold higher levels of capital stock and a higher capital–output ratio. We now subject these patterns in the data to more careful scrutiny by comparing these variables across communities at different levels of experience, after accounting for cohort effects as discussed above. Separate trajectories are estimated for each community, by introducing a Gounder dummy as an additional regressor and by interacting the experience variable with the Gounder dummy. The Gounder dummy picks up any level differences and the interaction tells us whether the trajectories are converging toward each other.

We begin with ln(*capital*) as the dependent variable in columns 1–3 of Table 2. Column 1 presents the capital stock regression without controlling for cohort effects. Capital stock is increasing with experience, and the Gounder dummy is significant at 10%, confirming that Gounders do invest more. However, the interaction of experience with the Gounder dummy is statistically insignificant in this specification.

Next, in column 2 of Table 2, we introduce firm fixed effects to control for cohort effects in the capital stock regression, and in column 3 we report an alternative specification, which includes a full set of year of entry dummies (corresponding to all entry years for the firms in

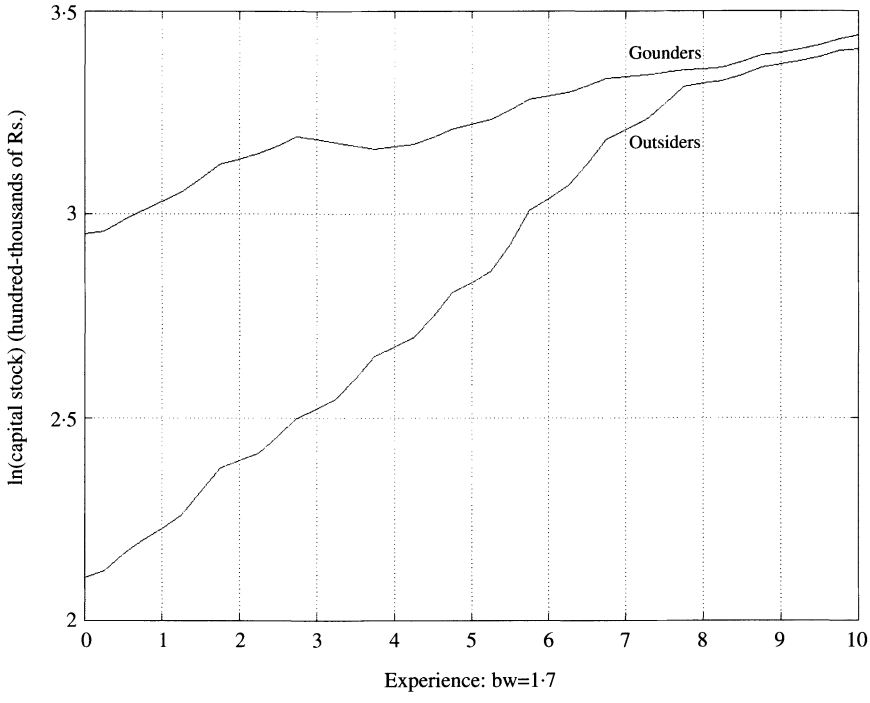

FIGURE 1
Capital stock—net cohort effects

the sample, estimated separately for each community).[12] While capital stock continues to grow with experience, the Gounder dummy is now positive and significant, whereas the Gounder–experience interaction term is negative (and significant in column 3).[13] These patterns across communities are easy to visualize with the corresponding nonparametric regression in Figure 1.[14] The trajectories are more or less linear, consistent with the linear specification reported in Table 2. We see that Gounders begin with much higher levels of capital stock, but the Outsiders narrow the gap over time.

12. Year dummies do not appear in columns 2 and 3 since we saw in Section 3.3 that experience effects, cohort effects, and the time trend in the year effects cannot be simultaneously identified. While the time trend in the year effects is now subsumed into the estimated experience effect, the Gounder–experience interaction term continues to identify the difference in the experience effects between the two communities. The constant term in columns 2 and 3 is computed as the mean of the firm fixed effects or entry dummies, for the Outsiders. The Gounder dummy is computed as the difference in this mean between the two communities.

13. The difference between columns 2 and 3 may be explained by the fact that the fixed effect estimates are identified from the 78% of firms that change their capital stock over the sample period. In contrast, all firms change their output levels over the sample period, and we will later see that the estimates with fixed effects and entry dummies are nearly identical in the output regressions.

14. To construct the nonparametric kernel estimates in Figure 1 (the other figures are constructed in exactly the same way), we go through the following set of steps (based on Porter, 1996): estimate the capital stock regression, separately for each community, with experience, experience-squared and a full set of year of entry dummies (but no constant term) as the exogenous variables. Compute the mean of the estimated entry dummies for each community. Add the appropriate community mean to ln(capital) for each firm–year observation, and subtract the estimated year of entry dummy that applies to that firm. This generates a measure of the capital stock of the firm after controlling for cohort effects. Finally, nonparametrically regress this measure of capital stock on experience. Note that the community intercepts in the nonparametric regressions simply measure the means of the entry dummies, as described above.

TABLE 3

Investment and production—semiparametric estimates

	Means (standard errors)			
	Less than 3 years		6–10 years	
Experience	Gounders	Outsiders	Gounders	Outsiders
Panel A. Investment				
ln(capital stock)	3·048*	2·279*	3·397	3·287
	(0·097)	(0·106)	(0·114)	(0·117)
ln(C–E ratio)	−1·198*	−1·763*	−2·795*	−3·258*
	(0·113)	(0·106)	(0·148)	(0·169)
ln(C–P ratio)	−1·742*	−2·091*	−2·611*	−3·134*
	(0·092)	(0·104)	(0·148)	(0·166)
Panel B. Production				
Production	4·793*	4·376*	6·011*	6·429*
(full sample)	(0·070)	(0·069)	(0·101)	(0·138)
Production	5·147*	4·470*	5·633*	6·498*
(<0·33 quantile)	(0·120)	(0·081)	(0·149)	(0·217)
Production	4·842*	4·336*	5·978*	6·655*
(0·33–0·66 quantile)	(0·109)	(0·112)	(0·113)	(0·171)
Production	4·546	4·297	6·130	6·015
(>0·66 quantile)	(0·109)	(0·117)	(0·127)	(0·121)

Notes: All statistics are computed net cohort effects for each firm.
Firms are partitioned using ln(capital/production), within each community, in Panel B.
ln(capital/production) is computed for each firm net of estimated experience and cohort effects.
* Denotes rejection of the equality of means for the two communities with greater than 95% confidence.

The obvious limitation of this nonparametric evidence is that the relatively small sample size prevents us from constructing pointwise confidence intervals. Panel A of Table 3 provides an alternative nonparametric summary of the patterns described in Figure 1, which does allow us to test for significant differences between the communities. Firms with up to 3 years of experience are classified as less experienced, while firms with 6–10 years of experience are classified as more experienced. We compute the average capital stock, by community, for firms at these different experience levels, after netting out the estimated cohort effects (entry dummies). We see in the first row of Table 3 that the Gounders begin with significantly higher capital stock, but that the two communities are statistically indistinguishable among the more experienced firms, consistent with the convergence that we saw in Figure 1. Note, however, that Gounder firms maintain at least as much capital stock as the Outsiders, at every level of experience.

3.5. *Results on capital intensity*

We now estimate the same regression replacing ln(capital) by ln(*capital/production*) and ln(*capital/exports*) as the dependent variables. While in general capital intensity is not a particularly good measure of investment (since it also depends on what is happening to output), the industry view in the knitted garment industry seems to be that firms have quite a bit of control over their capital intensity and that capital intensity is a key part of the firm's growth strategy. Everything else being the same, using more capital intensive methods gives the firm better control

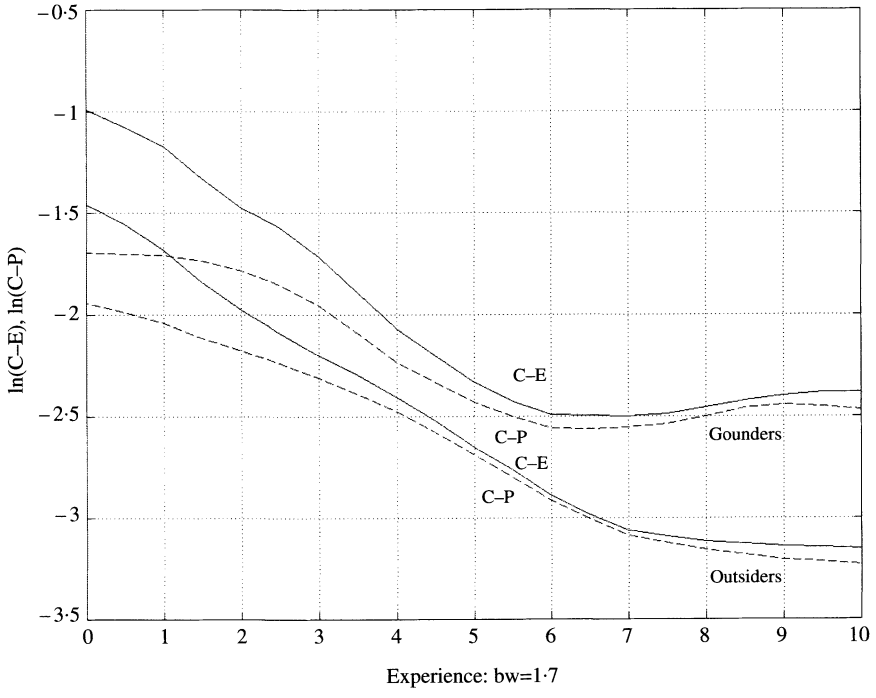

FIGURE 2
C–E ratio, C–P ratio—net cohort effects

over the quality of its products (including on time delivery) and this helps retain existing buyers and attract new buyers. In this sense capital intensity today is a measure of how much the firm is willing to invest in growing its business over the next period.[15]

The results on capital intensity are reported in columns 4 and 5 of Table 2. We control for cohort effects with year of entry dummies. While the capital–output ratio declines significantly with experience, the slope of the trajectory is essentially the same for the two communities (the Gounder–experience interaction terms are insignificant). Further, notice that the Gounder dummy is positive and significant in both regressions, which implies that the Gounders begin with a higher capital–output ratio and maintain that advantage at every level of experience.

The capital–output trajectories are once more conveniently described in the corresponding nonparametric regressions in Figure 2, which match the discussion above. While the C–P ratio must be lower than the C–E ratio by definition (production is the sum of direct and indirect exports), notice that the two curves converge at high levels of experience, in both communities. This observation suggests that young firms use indirect exporting as a fallback when they do not have enough demand, but this option becomes less important as the firm gains experience and establishes a customer base.

Finally, exactly as in the previous sub-section, we compare the mean levels of capital intensity among the less experienced firms and the more experienced firms across the

15. This idea is easily formalized using a production function of the class $X_t = F(X_{t-1}, K_{t-1}, \alpha)$. Here X_t should be thought of as the current stock of buyers while X_{t-1} is the previous period's stock, K_{t-1} is the capital stock in the previous period and α is some measure of ability. If, in addition, we assume that the production function is increasing and linearly homogeneous in both inputs, we can write it as $X_t/X_{t-1} = G(K_{t-1}/X_{t-1}, \alpha)$ with G being an increasing function of K_{t-1}/X_{t-1}. This makes the growth rate a function of the capital intensity.

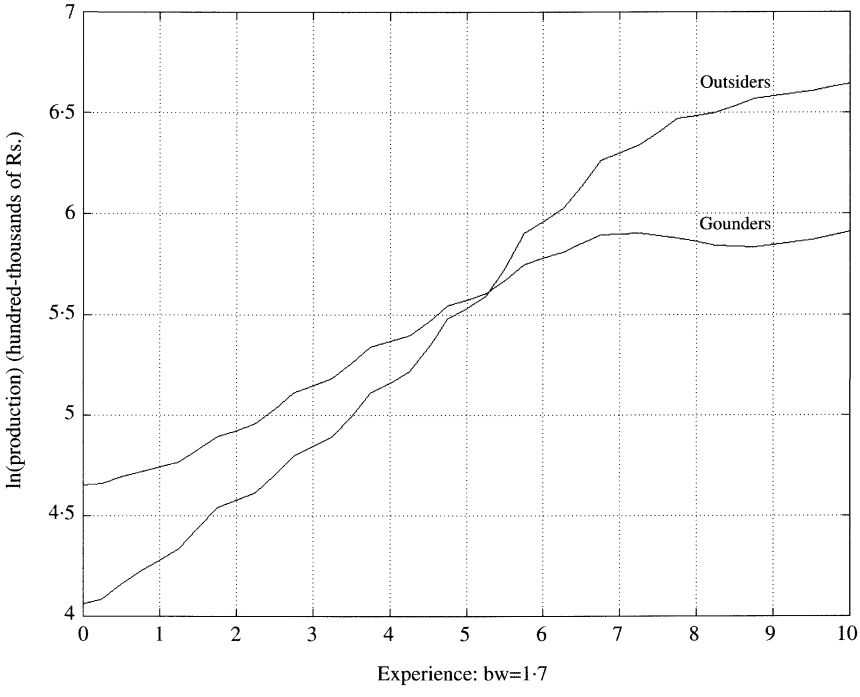

FIGURE 3
Production—net cohort effects

two communities. We report the results in panel A of Table 3. Gounders begin with significantly higher C–P and C–E ratios, and this difference is maintained at higher experience levels as well, consistent once more with what we saw in Figure 2.

3.6. *Results on output*

We saw in the previous sub-sections that the Gounders hold more capital stock on average, and maintain higher capital–output ratios at every level of experience. We now turn to the behaviour of output.

As with the capital stock regressions, we begin with a basic specification of the production regression that ignores cohort effects. This is reported in column 1 of Table 4, while the results after including fixed effects and entry dummies are reported in columns 2 and 3. Without controlling for cohort effects, the trajectories for the two communities are statistically indistinguishable. In contrast, the Gounder dummy is positive and significant once cohort effects are accounted for, with a shallower trajectory for Gounder firms (this is measured by the negative and significant Gounder–experience interaction term). These differences between the communities are apparent in Figure 3: Gounders begin at a higher level of production, but the Outsiders overtake them after about 5 years of experience.[16]

Total production includes indirect exporting, which is what firms do when they do not have enough business.[17] For this reason, the volume of direct exports may be a better measure of

16. Notice from the figure that the slope of the production trajectory is steeper for the Outsiders at all levels of experience.

17. We would expect indirect exporting to decline in importance as the firm gained experience, and established a customer base, if it was a fallback activity. Consistent with this view, we saw in Figure 3 that the gap between the C–P

TABLE 4

Production and export trajectories—all firms

	ln(production)			ln(exports)	
Dependent variable	OLS (1)	Fixed effects (2)	Entry dummies (3)	Fixed effects (4)	Entry dummies (5)
Experience	0·171	0·333	0·330	0·418	0·416
	(0·027)	(0·044)	(0·036)	(0·052)	(0·043)
Experience–Gounder	0·003	−0·148	−0·146	−0·108	−0·103
	(0·035)	(0·065)	(0·055)	(0·073)	(0·064)
Gounder dummy	0·127	0·664	0·656	0·420	0·378
	(0·184)	(0·119)	(0·052)	(0·146)	(0·066)
Constant	4·473	3·913	3·923	3·470	3·478
	(0·142)	(0·089)	(0·046)	(0·105)	(0·054)
Entry dummies	No	No	Yes	No	Yes
Fixed effects	No	Yes	No	Yes	No
Year dummies	Yes	No	No	No	No
R-squared	0·202	0·847	0·975	0·878	0·958
Box–Pearson Q statistic	1·335	0·001	1·127	0·036	1·054
Number of observations	432	432	432	423	423

Notes: Robust standard errors in parentheses.
$Q \sim X_1^2$ under H_0: no serial correlation. The critical value above which the null is rejected at the 5% level is 3·84.
Entry dummies are constructed using all the possible years of entry.
Columns 1–3: production regressed on experience.
Columns 4–5: exports regressed on experience.

performance than total production. To verify that the results we described above are robust to this alternative measure of performance, we replace total production with direct exports as the dependent variable in columns 4 and 5 of Table 4. Using either entry dummies or fixed effects to account for the cohort effects, the Gounder dummy continues to be positive and significant, while the Gounder–experience interaction terms are negative but less precisely estimated than in the production regressions. These patterns, with direct exports as the measure of output, are described in the corresponding nonparametric regressions presented in Figure 4.

We complete the description of the output trajectory by returning to Table 3 and comparing production levels, after netting out the estimated cohort effects (entry dummies), for the two communities. Gounders with up to 3 years of experience have significantly higher levels of production than comparable Outsiders as shown in the first row of panel B, but this pattern is reversed among the more experienced firms (those with 6–10 years of experience): the difference in output performance between the two communities that we observed in Figure 3 is thus shown to be statistically significant.

We saw in Table 2 and Figures 1 and 2 that Gounders maintain higher levels of capital stock on average, and maintain a higher capital–output ratio at every level of experience. Yet we see in Table 4 and Figures 3 and 4 that they display a flatter output trajectory and eventually end up producing less in absolute terms. This summarizes the first empirical result of the paper.

ratio and the C–E ratio narrows steadily with experience for both communities (recall that production is the sum of direct and indirect exports).

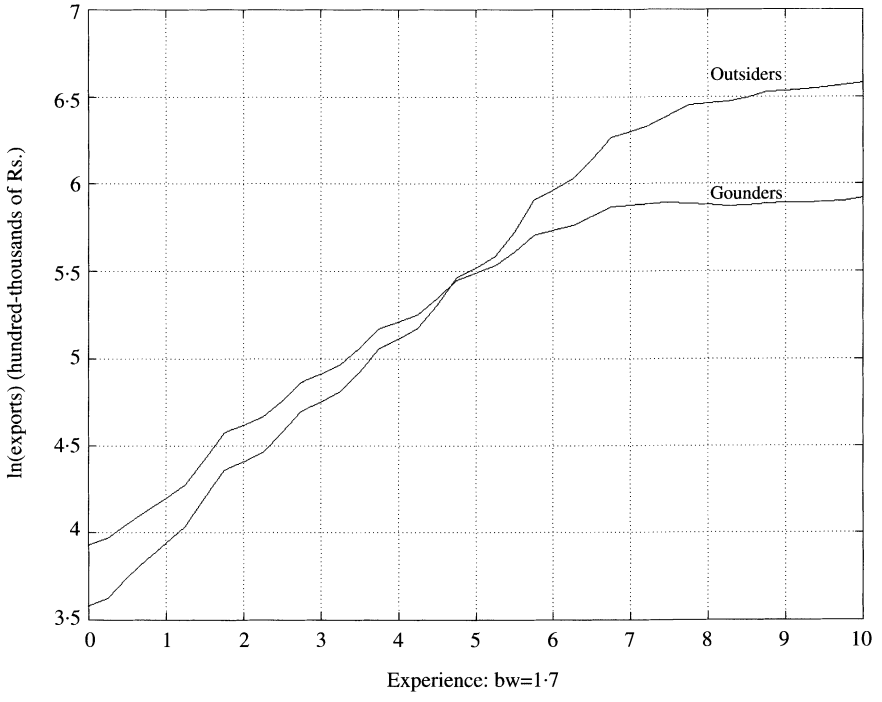

FIGURE 4
Exports—net cohort effects

3.7. *Disaggregated evidence on investment and production*

The term Π^c in equations (1)–(3) represents the trajectory of the average firm in community c, *i.e.* we have so far been comparing average Outsiders with average Gounders. To check whether the same results hold at different points in the distribution of firms, we use the capital–output ratio for each firm to partition the sample of firms within each community. To be more specific, since capital–output ratio varies with experience and across cohorts, we compute ln(capital/production) net of estimated experience and cohort effects. Then we divide the firms by their ranking according to this index into three equal groups (<0·33 quantile, 0·33–0·66 quantile, and >0·66 quantile) within each community.

Using the capital intensity to rank the firms is motivated by the argument, made in a previous sub-section, that in the context of the knitted garment industry, the level of capital intensity reflects the firm's investment strategy. Assuming that this is correct, it is likely that firms that have different levels of productivity will also choose different levels of capital intensity. The ranking by capital intensity would then be a reasonable proxy for a ranking by productivity.[18] It turns out that capital intensity is also strongly correlated with the level of the capital stock. It is therefore not surprising that the results reported here are very similar to the results obtained by partitioning the firms according to their capital stock (not reported, but available from the authors).

We begin by estimating the capital stock and the capital/production ratio, net of estimated cohort effects, for all three groups within each community. Rows 2 through 4 of Table 5 show that

18. Under the standard assumption of complementarity between investment and ability (productivity) the more capital intensive firms are also the more productive firms.

TABLE 5

Investment—net experience and cohort effects

Investment variable	Means (standard errors)			
	ln(capital/production)		ln(capital)	
	Gounders (1)	Outsiders (2)	Gounders (3)	Outsiders (4)
All firms	−1·970* (0·078)	−2·343* (0·088)	3·116* (0·077)	2·521* (0·090)
Partitioning firms by ln(capital/production)				
<0·33 quantile	−3·138 (0·101)	−3·414 (0·113)	2·116* (0·112)	1·502* (0·137)
0·33–0·66 quantile	−1·958* (0·056)	−2·424* (0·082)	3·123* (0·089)	2·716* (0·115)
>0·66 quantile	−0·828* (0·094)	−1·141* (0·091)	4·096* (0·094)	3·397* (0·104)

Notes: ln(capital/production) and ln(capital) are computed for each firm–year net of estimated cohort effects.
Firms are partitioned using ln(capital/production), net of experience and cohort effects, within each community.
* Denotes rejection of the equality of means for the two communities with greater than 95% confidence.

ln(capital) and ln(capital/production) are higher for the Gounders in all three restricted samples (<0·33 quantile, 0·33–0·66 quantile, and >0·66 quantile).[19]

Turning to the evidence on production, we estimate our standard regression (controlling for cohort effects) restricting the sample to firms below the 0·33 quantile ln(capital/production) level in their own community. This is reported in column 1 of Table 6. Comparing the Gounder dummy and the Gounder–experience interaction term in this regression with the corresponding estimates for the full sample in column 3 of Table 4, we see that the differences are, if anything, larger. Among these firms, Outsiders seem to have an even bigger advantage in terms of growth rates. The same basic patterns continue to be obtained with the firms whose ln(capital/production) lies between the 0·33 and the 0·66 quantiles, as can be seen in column 2 of Table 6.

In contrast, notice that the Gounder–experience interaction effect is completely absent for the high-ln(capital/production) firms (those above the 0·66 quantile level) in column 3. In other words, the Gounders who use the most capital intensive techniques tend to grow at the same rate as the corresponding Outsider firms. We will comment on this fact in Section 5.

We conclude the discussion on the production trajectories by comparing average output levels for less experienced and more experienced firms, paralleling the evidence for what we have already reported for the whole sample in Panel B of Table 3. Among the firms with the lowest ln(capital/production) levels as well as the firms in the middle quantiles, Gounder firms start off with higher levels of production, net of estimated cohort effects (entry dummies), in the second and third rows of panel B, but this pattern is reversed among the more experienced firms, with the Outsiders producing significantly more. This mirrors the pattern we had earlier obtained with the full sample. However, when we focus on the highest quantiles (shown in the last row

19. We saw in Table 3, with the full sample of firms, that the gap in ln(capital/production) between the Gounders and Outsiders is maintained at all experience levels. In contrast, while Gounder firms start off with significantly higher capital stock, firms in the two communities are statistically indistinguishable at higher experience levels. While the results are not reported here, exactly the same patterns are obtained in each restricted sample when we partition the firms into different ability levels.

TABLE 6

Production trajectories—partitioning firms by productivity

	ln(production)		
Dependent variable	<0·33 quantile (1)	0·33–0·66 quantile (2)	>0·66 quantile (3)
Experience	0·332	0·361	0·301
	(0·040)	(0·078)	(0·070)
Experience–Gounder	−0·257	−0·197	−0·048
	(0·087)	(0·109)	(0·088)
Gounder dummy	0·994	0·870	0·314
	(0·115)	(0·130)	(0·120)
Constant	4·045	3·800	3·887
	(0·093)	(0·113)	(0·092)
Entry dummies	Yes	Yes	Yes
Fixed effects	No	No	No
Year dummies	No	No	No
R-squared	0·983	0·979	0·980
Box–Pearson Q statistic	0·887	0·494	0·684
Number of observations	145	142	145

Notes: Robust standard errors in parentheses.
$Q \sim X_1^2$ under H_0: no serial correlation.
The critical value above which the null is rejected at the 5% level is 3·84.
Entry dummies are constructed using all the possible years of entry.
Firms are partitioned using ln(capital/production), net experience and cohort effects, within each community.
Column 1: production regressed on experience (<0·33 quantile).
Column 2: production regressed on experience (0·33–0·66 quantile).
Column 3: production regressed on experience (>0·66 quantile).

of Table 3), we find that Gounders produce more both when they are young and when they are old, though the difference among old firms is too small to be significant.

3.8. *The output–investment relationship within each community*

The empirical analysis up to this point compared the two communities. We saw that the Gounders maintain a higher capital–output ratio at every level of experience, and higher capital stock on average over the firm's lifetime. Yet the Gounders have a shallower output trajectory, and end up producing less (at high levels of experience). In the discussion that follows, we will estimate the output–investment relationship *within* each community. In contrast with the cross-community comparison, we will see that firms that invest more produce more at every level of experience.

The basic regression specification that we presented earlier in equation (1) is now modified to include a firm-specific investment term and an investment–experience interaction term

$$\ln(X_{it}) = \Pi_1 \mathrm{EXP}_{it} + \Pi_2 \ln(K_i)\mathrm{EXP}_{it} + \Pi_3 \ln(K_i) + f_i + \eta_{it}, \tag{4}$$

where X_{it} is the firm's output in period t and K_i is a measure of the firm's investment. Notice that the community superscript c does not appear in the equation above, since the output regression is now estimated separately for each community.

We use two measures of investment in this paper: the firm's capital stock and the capital–output ratio. The basic problem with introducing either of these measures of investment in the output regression (4) is that they will be correlated with the unobserved η_{it} term. Recall that this term represents the deviation from the firm's expected output in period t, which is determined

in part by the exogenous idiosyncratic demand shocks that the firm received over its lifetime. Introducing the capital–output ratio as a regressor is particularly problematic, since that variable is negatively correlated with η_{it} by construction. The capital stock is somewhat better but we also know that the capital stock will adjust to changes in demand, and hence is correlated with η_{it}. So our preferred specification uses the starting capital stock, just prior to the year of entry, which is available for *new* firms that entered during the sample period, as a measure of the firm's investment. It seems not too unreasonable to assume that it is independent of future demand shocks. Firms with higher starting capital also maintain significantly higher capital stock and capital–output ratios, after controlling for cohort effects, relative to firms with the same experience within their community.

Starting with the initial capital stock as the measure of investment in columns 1 and 2 of Table 7, we see that the coefficient on capital stock is positive and significant for both communities. While the capital–experience interaction term is less precisely estimated, it is also positive for both communities. Thus, a firm that starts with higher capital stock maintains a higher level of output, relative to the other firms in its community, at every level of experience.[20] Recall that, in contrast, the average Gounder firm has a starting capital stock which is almost three times as large as that of the Outsider firms and yet ends up producing less after 5 years of being in business.

One disadvantage with using starting capital is that we must restrict attention to new firms that entered the industry during the sample period. The experience variable cannot exceed 4 years in this restricted sample. We consequently replace starting capital with the current capital stock in columns 3–6 of Table 7. Columns 3 and 4 continue to restrict attention to new firms, while columns 5 and 6 include the full sample. Some bias is now built in, due to the correlation between η_{it} and the capital stock, but the basic patterns that we saw earlier in columns 1 and 2 continue to be obtained. The coefficient on capital stock is positive and significant across all columns in Table 7. The coefficient on the capital–experience interaction term is also positive (with one exception) across all columns (it is significant at the 10% level in column 3). Finally, the experience effects are positive and significant with the full sample of firms in columns 5 and 6. Firms that invest more maintain higher levels of output, relative to the other firms in their community, at every level of experience. This summarizes the second empirical result of the paper.

4. IS THIS REALLY A COMMUNITY EFFECT?

Is it possible that the effects we are attributing to the community are really the effects of unobserved individual characteristics that just happen to be correlated with community identity? In other words, could it be that the difference between Gounders and the Outsiders comes not from any difference in market access but from the fact that the average Gounder and the average Outsider differ in terms of ability?

In our data the Outsiders seem to outperform the Gounders. This is easiest to see by comparing the Gounders and Outsiders who have more than 5 years of experience. The Outsiders in this category own less capital stock than the corresponding Gounders. Yet they produce significantly more. Moreover, the growth rate of output is higher for the Outsiders with more than 5 years of experience compared with the corresponding Gounders, which rules out the possibility that the Gounders are trading off current productivity for future growth. Finally, these Gounders use more capital per unit of output and own more capital stock at every level of experience:

20. The constant term in Table 7 is computed as the mean of the entry dummies in the community. We also experimented with an alternative control for the cohort effects by estimating the output regression with firm fixed effects. While the results are not reported here, the capital–experience interaction term continues to be positive, but imprecisely estimated, for both communities (the firm's capital stock must be dropped in this regression).

TABLE 7

Production trajectories—within each community

Dependent variable	ln(production)					
Sample	New firms				All firms	
Capital variable	Starting capital		Current capital			
Community	Gounders (1)	Outsiders (2)	Gounders (3)	Outsiders (4)	Gounders (5)	Outsiders (6)
Experience	0·055	0·235	−0·141	0·092	0·245	0·285
	(0·169)	(0·121)	(0·189)	(0·195)	(0·113)	(0·086)
Experience–ln(capital)	0·062	0·048	0·100	0·083	−0·022	0·003
	(0·062)	(0·069)	(0·057)	(0·081)	(0·027)	(0·031)
ln(capital)	0·221	0·308	0·231	0·300	0·321	0·220
	(0·092)	(0·101)	(0·104)	(0·105)	(0·108)	(0·086)
Constant	2·475	1·421	2·450	1·401	2·020	1·543
	(0·306)	(0·179)	(0·322)	(0·217)	(0·351)	(0·191)
Entry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects	No	No	No	No	No	No
Year dummies	No	No	No	No	No	No
R-squared	0·974	0·979	0·976	0·979	0·978	0·980
Box–Pearson Q statistic	0·266	0·371	0·373	0·434	0·378	0·336
Number of observations	120	80	120	80	239	191

Notes: Robust standard errors in parentheses.
$Q \sim X_1^2$ under H_0: no serial correlation.
The critical value above which the null is rejected at the 5% level is 3·84.
Entry dummies are constructed using all the possible years of entry.
Starting capital is the capital stock prior to the year of entry.
New firms are firms that entered during the sample period.
Columns 1–4: new firms. Columns 5–6: all firms.
Columns 1–2: starting capital. Columns 3–6: current capital.

everything else being the same, this should give them a higher growth rate. The slower growth of the Gounders is therefore in spite of this additional advantage. Even the young Outsider firms, who invest less and use less capital intensive methods, grow faster. It is true that they produce less in absolute terms, but given that their initial investment is a third of what the Gounders invest, this is hardly surprising.

The presumption is, therefore, that the Outsiders are more able than the Gounders.[21] This accords with the *prima facie* evidence. It turns out that the Outsiders received more schooling than the Gounders; the average years of education for the two communities (with the standard error of the mean in parentheses) are 13·41 (0·45) vs. 11·90 (0·57). We can reject the equality of means for the two communities with just greater than 95% confidence. Further, 71% of the Outsiders vs. 58% of the Gounders belong to families with previous experience in the textile industry (this difference, however, is not statistically significant).

The challenge now is to explain why the Outsiders invest less, both in absolute terms and relative to their output, despite having higher ability. Note that this is true not only at the mean but also at different points in the distribution of the firms. In the previous section we saw that the

21. This is an industry where one would expect ability to be very important: the buyers in the industry, who are typically large department stores and clothing chains in the West, put a large premium on timely delivery and quality of the product. Orders are often very large and new firms, in particular, typically have only a small number of buyers. Failing to deliver the right quality at the right time can be very costly, since disappointed buyers may not come back and moreover the firm may end up with a bad reputation. The difference in performance between those who have the ability to manage things so that everything goes smoothly and the rest, may therefore be very large, especially in the long run.

same pattern—namely that Gounders invest more (both in absolute terms and relative to output), grow more slowly, and end up producing less after 5 years of experience—holds both when we compare just low capital intensity firms and when we compare just medium capital intensity firms. The pattern is also similar for the high capital intensity firms, but weaker, in the sense that the Gounder firms still invest strictly more, but their growth rate is not significantly lower.

It therefore seems clear that if we have to retain the assumption of equal market access in the two communities, we would have to accept that ability and capital are substitutes. Moreover, if we accept that the differences in capital intensity within each community reflect differences in ability (we really do not have much choice here, as long as we want to argue that everyone has the same market access), then the substitution assumption must hold not just at the mean but actually over most of the observed range of abilities.

There are, however, two problems with this assumption. First, it is unorthodox: the literature on the distribution of firm sizes, going back to Lucas (1978), has traditionally made the opposite assumption. Second, and much more damningly, it goes against what we find when we look within each community: if markets are perfect, there is no reason why we would get different results from comparing two Gounder firms (or two Outsider firms) than from comparing a Gounder firm and an Outsider firm. If in one case the firm that produces less has a higher capital stock, we should expect to see it in the other case as well. If in one case firms that invest more grow more slowly and eventually end up with lower levels of production, this should also be true in the other case. But this is clearly not what we see in the data. We showed in Section 3.8 that within each community, those who have a strictly higher capital stock produce more at all levels of experience and tend to grow faster, though typically not significantly faster. While not reported, this is separately true for low capital intensity firms and high capital intensity firms. In other words, the within community comparison shows no evidence of capital–ability substitution, across the range of observed ability values.

In sum then, we find that there is a sharp contrast between what we find when we compare firms within the same community and what we find when we compare firms across the two communities, which suggests that there is indeed something important going on at the community level. This is what we turn to next.

5. WHY DOES COMMUNITY IDENTITY MATTER?

In this section we discuss alternative explanations for why community identity plays a role in the knitted garment industry in Tirupur. We conclude the paper with a discussion of the relative merits of these explanations and what that implies for policy.

1. *Differential access to labour and subcontracting.* Gounders are local to the area around Tirupur and speak the local language, Tamil, as their mother-tongue. The Outsiders are typically from hundreds of miles away and, for the most part, are not Tamil speaking, except to the extent that they have learned it after coming to Tirupur. As noted in Section 2.3, the vast majority of indirect exporters and job-workers that we surveyed are Gounders, and there is reason to suspect that this is also true, to a lesser extent, among the labourers. Hence, in addition to their obvious communication advantage, the fact that Gounder direct exporters have social connections with some of the people with whom they work (indirect exporters, job-workers and labourers), might make it easier for them to get compliance. In a setting where courts are largely useless for contract enforcement, this could be a very significant advantage.[22]

22. It is theoretically possible that a part of this advantage could be nullified if the Outsiders have larger families. Unfortunately we do not have data on family size. Whatever impressionistic evidence we have tends to go the other

In principle, the use of indirect exporters and job-workers is a potential substitute for in-house production, and therefore having better access to them might be expected to reduce the usefulness of investment in fixed capital. We do not however see any evidence of such substitution. The Gounders clearly invest more at all levels of experience. Moreover, the capital–output ratio, which reflects the fraction of output produced in-house is actually higher for the Gounders.

The assumption that access to labour/subcontracting is a complement to fixed capital, though *prima facie* less plausible, fits the facts better. In this case we would expect the Gounders to have a higher marginal product of capital and therefore to invest more. However, the fact that the Gounders have this cost advantage and in addition invest more, should make them outperform the Outsiders. As we saw above, this is emphatically not the case: Outsiders both grow faster and produce more in absolute terms (once they have been in business for 5 years).

We therefore need to assume that the Gounders are less able. Since they invest more than the Outsiders, this implies once again that ability and capital must be substitutes if the price of capital is not allowed to vary across communities. However, as argued above, this is inconsistent with the observation that firms that invest more perform better at every level of experience within each community.

2. *Differential access to politically provided inputs.* Being the single largest business community in Tirupur, in addition to being Tamil in a state where there are no non-Tamil politicians, must give the Gounders a significant political advantage over the Outsiders. This might translate into easier access to publicly provided inputs such as power, water and roads and protection from unwanted interventions by the state. Formally this is exactly like having cheaper access to labour/subcontracting and has exactly the same limitations, in terms of explaining the observed patterns in the data.

3. *Differential access to capital.* We have already discussed reasons why the Gounders may be expected to have easier access to credit for investing in Tirupur, through their social networks, than the Outsiders. In addition, the Gounders have no presence in industry outside Tirupur, while the Outsiders are typically from communities that have a presence in every industrial hub in India. This would suggest that the opportunity cost of capital within the Gounder networks should be lower than the corresponding number for the Outsiders. Therefore, it is plausible that the Gounders in Tirupur face a lower effective price of capital than the Outsiders.

Unfortunately we do not have any direct evidence on this point. While the firms in our survey were willing to discuss access to bank credit, when it came to issues that had to do with where they got the rest of their money, we met a lot of resistance, and in the end decided not to ask any questions. From what they did tell us we learnt that 64% of the fixed capital in Gounder firms and 55% of the capital in Outsider firms is self-financed, where self-financing is defined to include any money that they have raised from private, *i.e.* informal, sources. This goes in the right direction in the sense that the Gounders do seem to rely more on what we call network capital and the difference is actually larger than it might appear since the Gounders own almost twice as much fixed capital as the Outsiders. We also learned from the background literature that *nidhis* (informal credit institutions) and *chit funds* (rotating savings and credit associations) have been used extensively in Kongunad since early times (Baker, 1984) and people we talked with claimed that this continues to be the case, particularly among Gounder businessmen.

way—since siblings and children of siblings are counted as family members, Gounders are the ones who have the larger families in Tirupur. Moreover, in the Tirupur industry family labour is, at best, a small part of the labour that is used to operate the machines. The owner's family is typically only involved in management-type jobs. We do have data on how many family members are involved in running a particular business. The differences are too small to be significant given our sample size, but the Gounder firms, not surprisingly, seem to involve more family members.

Finally, there is some evidence suggesting that there is substantial borrower-to-borrower variation in the opportunity cost of capital. The 1989 Report on *Urban Informal Credit Markets in India* (Dasgupta, Nayar and Associates, 1989) provides data on interest rates charged by non-banking financial companies involved in financing the handloom textile industry in Bangalore and Karur, both close to Tirupur: the rates varied between 44 and 68%. This would have been the opportunity cost of capital for those who did not have their own sources of capital and needed to borrow from the market. Yet the rates paid by these same non-banking financial companies to those who deposited money with them was 18%, which was actually higher than the interest rate paid by nationalized banks on term deposits (around 9%). The opportunity cost of capital for someone who had the capital or someone who had friends or relatives who had the capital and were willing to lend to them at cost, was therefore no more than 20%. The gap in opportunity costs between a borrower who has good access to his network's capital and a borrower who does not, can therefore be at least 25% and possibly as much as 50%.[23]

Once we accept the premise that the opportunity cost of capital is lower for the Gounders, a number of things fall into place. It is, of course, easy to see why the Gounders would invest more and use more capital intensive methods. We do need to assume that there is an ability gap between the two communities to explain why the Gounders perform so much worse than the Outsiders, but now we do not need to give up the assumption that capital and ability are complements: the fact that the low ability Gounders invest more in fixed capital does not pose a problem because the Gounders also face a lower cost of capital. Therefore, there is also no problem reconciling what we observe inside each community and what we find when we compare the two communities. The point is, within each community the main source of variation across firms is in ability, while when we compare the Gounders and the Outsiders, there are both ability differences and differences in the cost of capital, and they go in opposite directions.

Finally, the fact that the opportunity cost of capital is lower for the Gounders can provide a partial explanation for the ability gap between the two communities. The marginal Gounder enters the industry not because he is particularly skilled in the knitted garment business but because it is the only way he can benefit from his social network. It is therefore not surprising that he would be less able than the marginal Outsider, who has come to Tirupur only because he has reason to think that he is particularly well-suited to the garment business.[24] Likewise, one would expect an Outsider to give up and leave as soon as he finds that he is not particularly suited to the industry, while a Gounder would have the incentive to keep trying.

If the difference between the ability distributions in the two communities arises from this type of selective entry or exit, we would expect most of the difference to be at the low end of the distribution. It follows that the gap between Outsiders and Gounders should be less pronounced among those, within each community, who are the most successful. As noted in Section 3, Table 6, this is indeed the case: if we rank firms by capital intensity, the Gounder–Outsider gap is smallest among those firms that are in the top third of their community.

4. *Differential propensity to exit.* The Outsiders are probably more likely to close shop and leave than the Gounders. This should not affect the incentive to invest as long as the market for

23. The two industries are, however, not strictly comparable since the handloom industry borrows mainly for working capital while the Tirupur industry needs much more long-term capital to finance its fixed investment. The *Report* also tells us that long-term finance from Finance Corporations (but not necessarily in the textile industry or in that area) costs between 24 and 48%, while the same Finance Corporations pay between 16 and 21% on the deposits that they take. Finally a case-study of the auto-financiers in Namakkal (in South India, reasonably close to Tirupur) summarized in the *Report*, tells us that the rate for long-term auto loans is 40% while the same companies pay 21% on deposits with them.

24. This argument was formally developed in a previous version of the paper. More generally there is a long tradition of theoretical arguments suggesting that migrants should be expected to have more ability and some evidence that seems consistent with this view (see Borjas, 1987).

second-hand fixed capital works efficiently, so that the price of installed capital is equal to what it would have cost for someone else to install. However, if the market for second-hand capital is very inefficient, this provides another reason why the opportunity cost of capital would be higher for the Outsiders compared with the Gounders, which would explain why they invest less.

On *a priori* grounds, this seems less plausible than the previous story for why Gounders face a lower opportunity cost of capital: everyone in the knitted garment industry uses more or less the same machines and to the extent that we know, the machines are not customized in any way. The machines are also relatively simple and do not have a reputation for being particularly delicate. Therefore, one would expect a thriving market in second-hand machinery. Our impression from talking to people in the industry is that this is indeed the case.

5. *Differential access to buyers.* Most industry veterans in Tirupur are Gounders. This may give the Gounders an advantage in attracting buyers when they are just starting out because they can get referrals from other well-established Gounders. This would explain why the Gounders invest a lot initially (they are much more sure that they can make use of the installed capacity). The fact that the Outsiders eventually catch up with them could then be a combination of the forces of convergence (once you start in business you get your own contacts and then your connections do not matter as much) and the fact that the Outsiders are more able.

The problem with this view is that while the Outsiders outstrip the Gounders in terms of production, they continue to invest less both in absolute terms and per unit of output, which suggests that ability and capital must be substitutes. As before, this goes against what we find when we compare firms within a single community.

6. CONCLUSION

What comes out most clearly from our data is the very substantial role played by community identity in determining how much a firm will invest. This is in obvious contrast with the neoclassical model where the allocation of capital is guided entirely by its marginal product in alternative uses. In terms of explaining why community identity matters in this particular context, our data is most useful in ruling out potential theories: it seems clear that differential access to either subcontracting or politically provided inputs cannot really explain what we see. Differential access to buyers can be a reason why the Gounders do well in their early years, but it cannot explain their long-term performance. The two explanations based on imperfections in the credit market and in the market for second-hand machines, fit the data much better, and among these, on *a priori* grounds we tend to favour the former.

The fact that community identity is very important for investment is, in this view, a symptom of ill-functioning capital markets. The desired policy response is therefore to try to improve the functioning of the capital markets—simply trying to discourage community-based lending by imposing regulations on informal credit transactions, will probably do more damage than good.[25] The emphasis should be on raising the returns paid by the banking sector, and the financial sector more generally, which would require dealing with the manifest inefficiency of the (largely public) banking sector, and creating a climate where the interests of lenders and shareholders are well protected.[26]

25. This is however not obvious: Banerjee and Newman (1998) show an example where banning network lending *increases* net output.

26. A similar argument has been made by La Porta, Lopez-de-Silanes and Shleifer (1998) who suggest that large joint-family-owned conglomerates—a particular manifestation of lending networks—arise because the formal capital markets function badly and generate significant efficiency costs.

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REFERENCES

BAKER, C. (1984) *An Indian Rural Economy, 1880–1955: The Tamilnad Countryside* (Delhi: Oxford University Press).
BANERJEE, A. (1996), "Notes Towards a Theory of Industrialisation in the Developing World" (Mimeo, MIT).
BANERJEE, A. and NEWMAN, A. (1998), "Information, the Dual Economy, and Development", *The Review of Economic Studies*, **65** (4), 631–653.
BECK, B. (1972) *Peasant Society in Konku: A Study of Left and Right Subcastes in South India* (New Delhi: Vikas Publishing House).
BORJAS, G. (1987), "Self-Selection and the Earnings of Immigrants", *American Economic Review*, **77** (4), 531–553.
CABALLERO, R. and HAMMOUR, M. (1998), "Macroeconomics of Specificity", *Journal of Political Economy*, **106** (4), 724–767.
CARRINGTON, W., DETRAGIACHE, E. and VISHWANATH, T. (1996), "Migration with Endogenous Moving Costs", *American Economic Review*, **86** (4), 909–930.
CAWTHORNE, P. (1995), "Of Networks and Markets: The Rise and Rise of a South Indian Town, the Example of Tiruppur's Cotton Knitwear Industry", *World Development*, **23** (1), 43–56.
DAS GUPTA, M. (1987), "Informal Security Mechanisms and Population Retention in Rural India", *Economic Development & Cultural Change*, **36** (1), 101–120.
DASGUPTA, A., NAYAR, C. P. S. and Associates (1989) *Urban Informal Credit Markets in India* (New Delhi: National Institute of Public Finance and Policy).
DEATON, A. (1997) *The Analysis of Household Surveys: A Microeconometric Approach to Development Policy* (Baltimore: The Johns Hopkins University Press).
DEATON, A. and PAXSON, C. (1994), "Intertemporal Choice and Inequality", *Journal of Political Economy*, **102** (3), 437–467.
FAFCHAMPS, M. and LUND, S. (2000), "Risk-Sharing Networks in Rural Philippines" (Mimeo, Oxford University).
GREIF, A. (1993), "Contract Enforceability and Economic Institutions in Early Trade: the Maghribi Traders' Coalition", *American Economic Review*, **83** (3), 525–548.
GREIF, A. (2000), "On the History of the Institutional Foundations of Impersonal Exchange: From Communal to Individual Responsibility in Pre-Modern Europe" (Mimeo, Stanford University).
LA PORTA, R., LOPEZ-DE-SILANES, F. and SHLEIFER, A. (1998), "Corporate Ownership Around the World" (Mimeo, Harvard University).
LUCAS, R. (1978), "On the Size Distribution of Business Firms", *The Bell Journal of Economics*, **9** (2), 508–523.
MASSEY, D., ALARCON, R., DURAND, J. and GONZALEZ, H. (1987) *Return to Azatlan: The Social Process of International Migration from Western Mexico* (Berkeley: University of California Press).
PIORE, M. (1979) *Birds of Passage: Migrant Labor and Industrial Societies* (Cambridge: Cambridge University Press).
PORTER, J. (1996), "Essays in Econometrics" (Unpublished Ph.D. Dissertation, MIT).
SWAMINATHAN, P. and JEYARANJAN, J. (1994), "The Knitwear Cluster in Tiruppur: An Indian Industrial District in the Making?" (Working Paper No. 126, Madras Institute of Development Studies).
TIMBERG, T. (1978) *The Marwaris: From Traders to Industrialists* (New Delhi: Vikas Publishing House).
TOWNSEND, R. (1994), "Risk and Insurance in Village India", *Econometrica*, **62** (3), 171–184.
UDRY, C. (1994), "Risk and Insurance in a Rural Credit Market: An Empirical Investigation in Northern Nigeria", *Review of Economic Studies*, **61** (3), 495–526.