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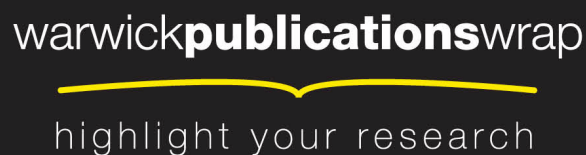
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**Discrimination or Social Networks? Industrial Investment in Colonial
India**

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Discrimination or Social Networks? Industrial Investment in Colonial India

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Abstract

Industrial investment in Colonial India was segregated by the export oriented industries, such as tea and jute that relied on British firms and the import substituting cotton textile industry that was dominated by Indian firms. The literature emphasizes discrimination against Indian capital. Instead informational factors played an important role. British entrepreneurs knew the export markets and the Indian entrepreneurs were familiar with the local markets. The divergent flows of entrepreneurship can be explained by the comparative advantage enjoyed by social groups in information and the role of social networks in determining entry and creating separate spheres of industrial investment.

¹ My debt is to V. Bhaskar for many discussions to formalize the arguments in the paper. I thank, Wiji Arulampalam, Sacsha Becker and Nick Crafts and for helpful suggestions and the participants at All UC Economic History Meeting at Caltech, ESTER Research Design Course at Evora and Economic History Workshop at Warwick for comments. I am grateful to the Economic and Social Research Council, UK, for support under research grant R000239492. The errors are mine alone.

Introduction

Bombay and Calcutta, two metropolitan port cities, experienced very different patterns of industrial investment in colonial India. One was the hub of Indian mercantile activity and the other the seat of British business. The industries that relied on the export market attracted investment from British business groups in the city of Calcutta. Bombay, on the other hand, became the centre of the import substituting textile industry. Indian cotton traders from different communities moved from trade to production of cotton textiles. Few British entrepreneurs were present. On the other hand, British industrial interests exercised monopoly control over various industrial activities in Calcutta and the hinterland. British firms were set up in tea, jute and coal and here the presence of Indians was minimal. Although geographical factors determined the location of these industries, who invested and why remain questions of interest.

The literature on early industrial development of India has emphasized the role British investment and entrepreneurship. Some scholars see it as a crucial factor in the development of an economy scarce in capital, technology and entrepreneurial skills.² Max Weber argued that the negative effect of Hinduism on entrepreneurial spirit was a reason for India's economic backwardness.³ Morris criticized Weber, arguing that Indians did become industrial entrepreneurs when conditions were attractive.⁴ Others have emphasized the negative impact British rule in circumscribing the sphere of operation for domestic capital.⁵ This literature emphasizes the discrimination faced by Indian business and the favours received by British entrepreneurs from the colonial state. This led to the absence of

² Buchanan, *The Development of Capitalist Enterprise in India*, Anstey, *Economic Development of India*.

³ Weber, *The Religion of India*

⁴ Morris, "Values as an Obstacle to Economic Growth"

⁵ Bagchi, *Private Investment in India*, Gadgil, *Industrial Evolution of India*.

Indian interests in Calcutta. While this may explain the absence of Indian business interests in Calcutta, it does not explain their dominant presence in Bombay. British capital dominated investment in infrastructure, in particular the railways. The picture appears to be quite different when we look at manufacturing industry. The presence of Indian capital in cotton textiles industry and the relative absence of British capital in this sector invoke the “Lucas question” on why capital didn’t flow from rich to poor countries, where returns were high and political uncertainties low.⁶ Only a quarter of British capital went to the Empire of which only 30 percent went to the colonies under British rule with India receiving two thirds.⁷ These flows to the Empire were in sectors different from those to the rest of the world during the period 1865-1914. Davis and Huttenback show that capital flows to manufacturing and trade in the Empire were well below the world average, while in transport it was higher. India’s share in agricultural and extractive industries and transport was higher than the world average, but the largest share went to transport. Sectors such as tea, rubber and gold absorbed most of the remainder.

This paper offers an explanation of the absence of British investment in some sectors and segmented world of industrial investment by British and Indian capital. By matching the volumes of investment to the ethnicity of the investors, I argue that informational asymmetry can explain why capital did not necessarily flow to activities of high return. The role of social networks in long distance trade in history is well researched. Less is known about its role in investment. This paper explores the role of social networks in decisions to invest in industry. Investors faced significant risks and problems of moral hazard and asymmetric information. Consequently, investment flows were influenced by

⁶ Lucas “Why doesn’t capital flow”

⁷Davis and Huttenback “The export of British finance”

the extent of knowledge that investors had of particular markets. The information was transmitted through community networks creating separate spheres of investment. I argue that access to information about markets differed across social groups and gave an advantage to specific groups in specific markets. Conditional on the initial advantage, information flows within a network further accentuated the segregation of economic activity by social group and showed up in the different investment patterns in the cities of Calcutta and Bombay.

The paper is organized as follows: I start with a discussion of the nature and magnitude of industrial investment in colonial India. This is followed by a summary of the theoretical literature on long distance capital flows and informational constraints and a simple model to analyze the determinants of industrial investment in colonial India. The empirical section tests for discrimination in industrial investment and the role of social networks in entry into industrial activity. The final section concludes.

Capital and Entrepreneurship: The Industrial Divide

The early development of corporate business was in banking, insurance, transport, and tea. The railways attracted most of British investment. Corporate interest in manufacturing industry dates back to the mid-19th century. Changes in company law led to the formation of limited liability joint stock companies.⁸ In Calcutta the companies were set up by British entrepreneurs who could raise capital from markets in Britain as well from British expatriates.

Firms were floated on the London Stock Exchange as sterling companies or in India as rupee companies. The sterling companies raised capital in Britain and traded shares in the London stock market. Some sold block shares to British expatriates in India. The rupee companies raised capital from Indians as well as British expatriates. These firms were run by

⁸ Rungta, *The Rise of Business Corporations*, pp 43-45

managing agents or specialist management firms that owned shares, but were not required to have a majority shareholding. These firms managed companies across industries through long term agency contracts. Managing agents could be either British or Indian firms, the latter typically the Indian counterpart of the British agent. In the context of India's industrial sector, firms are classified as British or India in relation to the managing agent. We can adopt a simple criterion to classify all sterling companies as British owned and managed. The picture is less clear for rupee companies. Capital was raised in India and did not show up as direct inflow of foreign capital. However, the managing agents were the Indian counterpart of the British agency firms and acted as an indicator of ownership. This is a reasonable assumption as all decisions were undertaken by these agents and the new issue of shares also relied on their reputation and social connections. The reputational value of the managing agency houses in raising capital in the British and Indian markets was important.⁹ In the tea industry, which was the largest sector, most companies were sterling companies, while in jute and coal, the typical firm was a rupee company managed by the Indian counterpart of the British agent. The second largest sector was cotton. Here the Indian firms were dominant.

Looking at the ethnicity of the investors, they came from different communities and bought shares according to the type of industry and the ethnicity of the managing agent. British investors in the Britain invested in Sterling companies registered in London. British investors resident in India bought shares in Rupee companies registered in India. While systematic quantitative evidence is difficult to come by, case study based evidence from individual managing agency houses indicate that British investors accounted for bulk of the investment. For the agency house Bird and Company, nearly 90% of the investment in rupee companies in

⁹ Chapman, *The Merchant Enterprise*, p 123

tea and jute came from British investors.¹⁰ When Davar, a Parsi, floated the first cotton mill in 1854, fifty leading traders of Bombay paid up the initial capital of Rupees 500,000. Majority of the shareholders, were Parsis, the same community as the entrepreneur, but many were from other communities, including two Englishmen.¹¹ Davar retained a large chunk of the shares, Parsis and Gujaratis subscribed one-third.¹²

This third group of investors were Indian. Until the First World War they invested primarily in the cotton textile industry. Qualitative evidence suggests that they channelled their investments through community networks. Table 1 presents a summary picture of investment in industries in colonial India. Table 2, shows the community divide across the two cities Calcutta and Bombay in the first quarter of the 20th century in commercial activity including its industrial sub-sector. The racial and regional divide is striking suggesting a chasm between the commercial worlds of the two cities.

Estimates of Investment

Chapman's estimates show that total British investment in Sterling and Rupee companies increased from £349 million in 1905-06 to £528 million in 1914-15.¹³ Railways accounted for nearly half the capital and tea plantations one-fifth. The value of paid up capital of 373 sterling companies operating in India was £78 million in 1911, with debentures issued for £45 million. In comparison, the paid up capital of the 2463 companies registered in India was only £46 million with £6 million debentures.¹⁴ Table 3 shows the breakdown of investment in sterling and rupee companies. Tea accounted for the largest of sterling investment in 1915. In jute and coal, investment was primarily in rupees

¹⁰ Chapman, *Merchant Enterprise*, p126

¹¹ Morris, *Growth of large scale industries*, p574.

¹² Tripathi, *The Oxford History of Indian Business*, p97

¹³ Chapman, *Merchant Enterprise*, p 121

¹⁴ Foreman-Peck, *Foreign investment and imperial exploitation*, p366.

and the magnitudes of investment were much smaller, not only in relation to sterling investment in tea, but also in comparison with rupee investment in cotton textiles. The two largest sectors of investment in 1915 were tea in Eastern India dominated by British companies and cotton textiles in Western India dominated by Indian companies.

Data on paid up capital allows us to track the changes in investment in rupee companies from 1880. Paid-up capital is likely to underestimate the total volume of investment as enterprises raised loans from banks, particularly British owned firms. Loans were obtained from machinery producers as well.¹⁵ This creates a distortion if some sectors have better access to loans. A more serious problem is that paid up capital in older firms will have a lower nominal value. Information is not detailed enough to correct for this. Therefore investment in sectors with older firms will be underestimated further.

Figure 1 presents the relative position of different sectors in rupee investment. In 1880 tea had the largest share. However, by 1900 investment in cotton textiles was higher than that in tea and banking and by 1914 cotton textiles was by far the largest sector of Rupee investment. In this paper, the focus will be on cotton vs. jute as examples of manufacturing investment. Figure 2 shows Bagchi's estimates of industrial investment after 1900. Bagchi uses import of machinery as an indicator of investment. This gets rid of the biases introduced in the use of paid up capital. Industrial investment increased up to the First World War, particularly in jute. The period also saw reinvestment of profits by British firms in India and investment in industrial firms by British residents encouraged by the stable Rupee- Sterling exchange rate.¹⁶ After the war investment in cotton textiles

¹⁵ Morris, The growth of large scale industry , p579

¹⁶ Bagchi, Private Investment in India, p76

measured by the import of industrial machinery grew relatively faster than investment in jute and reflected the change in the balance of investment between Calcutta and Bombay.¹⁷ The importance of British investment in tea and jute, but not in cotton textiles is another reminder of the Lucas question – Why British capital flowed to some sectors and not to others. With this as the motivation, I turn to the informational constraints in facing investors and entrepreneurs.

Informational Constraints and Capital Flows

The recent literature on international capital flows provides a valuable backdrop to our analysis of the Indian economy in colonial times. Lucas argued that even accounting for differences in productivity of labour, the return on capital could be five times higher in India. As a net borrower, India would have a strong incentive to appropriate capital investments, but this threat was low under colonial rule.¹⁸ In such cases the low volumes of capital flows may be explained if the imperial power exploited its monopoly position and restricted capital flows to keep return on capital high. This does not seem to have been the case in British India. First of all, as Lucas points out, industry was too small in the economy to influence the average wage. Secondly, there is no evidence of taxation or discouragement of capital investments. On the contrary, large inflows of capital into railways were encouraged as the British government in India guaranteed favourable rates of return.

Bovenberg and Gordon set out a model of asymmetric information to explain why capital flows do not equalize returns across countries. They consider a situation where domestic investors are better informed about the quality of the investment project than foreign investors. Foreigners fear being overcharged and hesitate to buy equity. Thus

¹⁷ Bagchi, *Private Investment in India*, p 83-84

¹⁸ Lucas, *Why doesn't capital flow from rich to poor countries*.

asymmetric information between foreign and domestic investors prevents capital from flowing to high return economies.¹⁹ Empirical evidence from recent cross-country equity flows support the view that information asymmetries reduce the involvement of foreign investors.²⁰ Portes et al. estimate a gravity model for capital flows and find the distance and speed of information flows, measured by telephone connections, have significant effects. The results suggest that local producers have better information about local markets and foreign firms are not willing to undertake long distance investment even when political risks are minimal. These informational barriers may be reinforced by the absence of institutions that are effective in enforcing commercial contracts.²¹

The return on investment in the Empire has been estimated to be higher than investment in domestic securities.²² While the average British investor in England would have been happy with a rate of return that compared well with the return on investment in Britain, Indians sought higher rates of return that was comparable to those obtained in alternative activities in India.²³ Efforts to raise capital for the railways in India had not succeeded. But the guaranteed return of 5 per cent was attractive for British middle class investors.²⁴ Morris suggests that there were differential rates of profit in different activities and Indians were drawn to those sectors that yielded a higher rate of return. Traditional activities in trade and commerce had high returns. The average rate of return in money

¹⁹ Bovenberg & Gordon, Why is Capital so Immobile Internationally.

²⁰ Portes & Rey, The Determinants of Cross-Border Equity Flows.

²¹ Bordo et. Al, Is Globalization Today really different from Globalization a Hundred Years Ago.

²² Davis & Hunttenback, The political economy of British imperialism, p125.

²³ Morris, Growth of large scale enterprise p572. Rajat Ray has criticized Morris – he cites the view of the American consul in India that there were two separate markets in India- the demand for high quality goods by the middle classes where the profit margin was high, but volume of sales was low and the much larger mass market where the profit margin was lower. If the American consul was right, this would suggest higher profits for the industries the British invested in.

²⁴ Macpherson, Investment in Indian Railways, p186.

lending, internal trade and real estate transactions was 9-10%.²⁵ Indian entry into the jute industry began only after the jute cartel pushed up profits and suggests that the required rate of profit was higher for the Indian entrepreneurs.²⁶

Morris's argument, if correct would explain why Indians did not invest in the industries dominated by the British. They had no incentive to do so, given the higher returns to be obtained in cotton textiles. However, this view still does explain why the British failed to be attracted to cotton textiles. For an explanation based on social discrimination to hold there should have been barriers to entry for Indian entrepreneurs in the high echelons of British business in Calcutta. There is support for this. Less than 4 percent of company directors in tea were Indians and there were none in jute in 1911.²⁷ Such barriers operated in one direction against Indian capital and do not explain why British capital stayed out of a major industry, despite all the advantages it enjoyed under the colonial state.

A different view of discrimination is that British capital entered those sectors which were complementary to their domestic industrial interests.²⁸ Jute was an aberration as this industry did not rely on the Indian market as cotton textiles did and Dundee did not have the same political clout as Lancashire. This argument is flawed. Indian jute products competed in the world market with the industry in Dundee and gained market share. British industrial interests were not a homogeneous group. The interest of Lancashire textile producers differed from those of the textile machinery producers. In 1843 the British Parliament repealed the act prohibiting the sale of machinery abroad. This opened new

²⁵ Tripathi, *The Oxford History of Indian Business*, p80

²⁶ Morris, *Indian industry and Business in the Age of Laissez- faire*, pp136-137.

²⁷ Chapman, *Merchant Enterprise*, p122

²⁸ Sen, "Pattern of British enterprise"

possibilities for exporters of textile producing equipment in Britain, which they did not hesitate to seize. There is much evidence to suggest a close cooperation between Indian textile entrepreneurs and the British textile machinery manufacturers. Davar who set up the first textile firm in Bombay was advised by Platt Bros from Oldham on the type of machinery needed.²⁹ In general machinery makers had close contact with the textile entrepreneurs. They offered large commissions to promoters of the order of 5% and accepted deferred payment.

Morris was the first to recognize that familiarity with markets can explain why the spheres of investment were different for British and Indian capital.³⁰ Informational differences gave each social group a different assessment of profitability of a sector. Morris argued that Europeans tended to get involved in markets which were export oriented or closely supported by the state.³¹

The informational constraints faced by investors were different from those faced by entrepreneurs. Potential entrepreneurs had information about investment opportunities. Potential investors were guided by the risk associated with shares in a foreign company. Familiarity with products could overcome this type informational constraint. Reputational value of the entrepreneur could also be a factor. Entrepreneurs decided which is a profitable enterprise and the investors chose whether to invest in the enterprise. Investors' choice depended on who the entrepreneurs were and the type of industry.

British investors could invest in sterling or rupee companies. They could choose to invest in tea, cotton or jute or utilities such as railways. There were two types of British investors: those resident in Britain and those resident in India. The first group invested

²⁹ Rutnagar, *Bombay Industries: The Cotton Mills*, p9.

³⁰ Morris, *The South Asian Entrepreneurship and the Rashomon Effect*.

³¹ Morris, *Growth of large scale industry*, p580

mainly in railways and public utilities and in tea, while the second invested in rupee companies in tea, jute and coal. Britain was the main market for tea, and consumers were familiar with the product. In India, it was still a consumption good largely unknown. Tea attracted large volumes of sterling investment in London. When the tea companies were floated in the 1860s and 1870s, it turned into a mania. On the other hand, jute was relatively unknown to the average British consumer and jute companies in Scotland might have might have been less risky. Only a handful of jute companies were registered in London. It was a product widely used in India for centuries and most of the capital was raised locally.

The demand for coal came from the British owned railway companies and this sector was dominated by British firms. The majority of coal firms were set up and managed by British managing agents in India and the investors were British expatriates living in India. Jardine Matheson, the managing agent, argued that it was better to issue shares in India where there was local knowledge.³² The British agents found it relatively easy to borrow from the banks in India.³³

The export trade in jute and tea was in the hands of British companies and this gave British entrepreneurs an informational advantage. Jute and coal were sold both in local and foreign markets, but these sectors remained dominated by British capital until the 1920s. About 25% of jute output was sold in the domestic market. This market was well known to the Indian traders buying and selling raw jute and jute products³⁴, but the local traders were reluctant to become entrepreneurs. They had no involvement in the export trade. Demand for coal came from sectors that were dominated by British capital. Railways accounted for

³² Chapman *Merchant Enterprise*, p124.

³³ Ibid

³⁴ Morris, *Indian industry and business*, p136.

over 30% of total demand for coal.³⁵ The cost of transporting coal from Bengal to other region remained high in comparison to the price of imports and Indian industry used substantial amounts of imported coal. After 1900, the price of imported coal increased making Bengal coal competitive in the home market as well as in the nearby export markets.³⁶ Indian owned firms that were in the industry were small and produced poorer quality coal that was sold in the local market.

The managing agency system may be seen as an institutional innovation, which addressed the problem of informational constraints in long distance investment by providing a trustworthy name to the British investor. This system was universally adopted by British business in Asia. The reputational value of the managing agent can be seen as an important factor attracting investors in another country. If a new firm was unknown to the British investor, the managing agent associated with it had a reputation.

It was the market for cotton textiles was relatively unknown to the average British investor. Cotton textile firms in Lancashire exported to the Indian market, where the distribution was in the hands of Indian traders. These traders had knowledge of local market in cotton textiles and became entrepreneurs when the opportunity arose. The trade in raw cotton had been in the hands of these local merchants in Western India. They made large profits in the cotton famine, ready to be invested. The cotton traders came from specific communities, such as the Parsis and Bhatias. The community based trading networks had in long history in intra-regional as well as Indian Ocean trade. A few British firms that entered this industry had also been involved in the cotton trade.

³⁵ Buchanan, *The Development of Capitalist Enterprise*, p264.

³⁶ Rungta, *The Rise of Business Corporation*, pp174-75.

In this framework, Informational asymmetries are defined by social groups. Information flows were easier within social group and restricted across groups. Therefore if members of a social group chose one industry, others could be persuaded to invest in it too. Members of a community made similar decisions to diversify from trade to industry in response to changing economic conditions of the 19th century. They also made similar decisions to migrate. Bhatia and Parsi merchants moved from Surat to Bombay as the city began to grow in the 18th century. Marwari traders moved as a group from North –Western India in search of new business opportunities.³⁷

A Simple Model of Informational Advantage

This simple model illustrates the way in which informational flows within a community give rise to a herding effect so that different communities specialize in different industries. There are two sectors and two communities. First, any initial entrant is a pioneer, who observes only imperfectly which niche is profitable. The pioneer has the option to enter either industry and select a niche. However, in compensation, such an entrant earns monopoly profits initially. Second, entrants from the same community become informed about the profitability of a niche once successful entry takes place. By entering the same industry, they face reduced risk, and this offsets the congestion arising from additional entry. On the other hand, entrants from a different community suffer from competition and the congestion and have no informational benefits. This produces a tendency towards segregation, with different communities specializing in distinct industries.

Assume for simplicity that there are two industries, A and B

In each industry, there are several niches , indexed by $i \in \{1,2,\dots,n\}$

³⁷ Timberg., *The Marwaris*,

Only one of these niches is profitable, and each of them has equal prior probability.

Let L be the loss suffered by entering an unprofitable niche. Let G_i be the gain from entering a profitable niche in industry i , $i \in \{A, B\}$.

We assume that G_i is a random variable that is independently and identically distributed according to density f on $[\underline{G}, \hat{G}]$.

At each date t , individual has an investment opportunity, and can invest either in industry A or B , and must also choose a niche to enter in either industry.

He observes G_A and G_B , and also observes signals S_A and S_B , where $S_i \in \{1, 2, \dots, n\}$ is a signal of which niche is profitable. S_i equals the profitable niche with probability $p > (1/n)$, and with probability $((1-p)/(n-1))$ it equals one of the other niches.

Thus the posterior probability of success of a niche for which a favourable signal is obtained is p , and the expected profit from entry (without any additional information), is

$$pG_i + (1-p)L - c,$$

where c is the cost of capital.³⁸ Let G denote the break-even level of profit where the above expression equals zero. Assume that there are no sunk costs. Thus an individual without any additional information will enter if and only if $G_i \geq \hat{G}$

Once he enters, he finds out whether the niche is actually profitable or not. If it is profitable, he continues in the industry, and if it is unprofitable, he exits at the end of the period.

Now consider any individual who follows the first entry. We assume that such an individual either belongs to the same community, C , as the first entrant, or to a different community, \hat{C} . If he belongs to the same community, he observes the niche that the first entrant chose. He also observes an exit decision and learns if the first entrant's choice was the right one. Thus, he now believes that the probability that this niche is profitable is 1 rather than p . As in the models of herd behavior,³⁹ the follower will ignore his own information and the signal he observes and follow the first entrant. However, he has to share profits with the current incumbent, and his payoff is $G_i(2) < G_i$.

³⁸ Since the posterior probability of success in a niche, where no signal is observed is $(1-p)/(n-1)$, which is strictly less than $1/n < p$, it is strictly worse to enter a niche where no signal is observed.

³⁹ Banerjee, "A simple model" and Bikchandani et al, "Learning from behavior of others. The model here differs from the models of herd behaviour and the informational cascades as the follower observes whether the first entrant was successful or not, whereas in the herd behaviour literature outcomes are not observed.

More generally, let $G_i(m)$ denote the profits when m firms are already in the market, which is assumed to be decreasing in m . Thus for any value of t G_i , there exists m^* G_i such that at most m^* firms can profitably enter. Note that this value of m^* assumes that firms perfectly know which niche is profitable.

Notice that a following entrant of the same community also learns that the niche is not profitable if the first entrant exits after one period. If the follower observes a positive signal for a different niche, he assigns a higher probability $p_1 > p$.⁴⁰

Consider now an individual who is from, \hat{C} , a different community from that of the first entrant into industry i , and all previous entrants into the industry i .

Suppose that there are m entrants into this industry. Since he cannot observe the niche, his expected profit is

$$p G_i(m) + (1-p)L - c,$$

which is strictly less than the payoff of the first entrant. On the other hand, if no firm has entered industry j , his payoff from entering industry j is given by

$$p G_j + (1-p)L - c.$$

Thus if $G_j > G_i(m)$ and $G_j \geq \hat{G}$, he will prefer to enter industry j rather than i . In other words, an entrant from a different community \hat{C} will prefer to enter a new industry as there is less competition from the existing firms and he does not have the same informational advantage as the members of the community C .

Let us consider industry dynamics under the assumption that $G_A \approx G_B$, that is profitability levels are close to each other in the two industries.

Let us assume that at each date, there are two possible entrants, one from each community. Thus at date 1, in a pure strategy equilibrium, the two entrants will choose different industries. If one chooses industry A , the other will prefer industry B since monopoly profits in B will be greater than duopoly profits in A .

Now suppose that both entrants are successful. Then at date 2, each entrant has a choice between $G_i(2)$ with probability p (if he chooses the industry of a different community) or $G_j(2)$ with probability one.

⁴⁰ Bayesian updating implies $p_1 = (n-1)p / (n-1)p + (n-2)(1-p) > p$

Thus if he enters, he will choose the industry chosen by his community predecessor. This argument iterates -- at any date that an entrant enters, he will choose the industry chosen by the predecessors in his community.

Of course, it is possible that one of the initial entrants, say from community \hat{C} in industry B, chooses a wrong niche as he gets the wrong signal while the entrant from community C chooses the right niche. In this case, he will choose to exit, and the succeeding entrants from community \hat{C} will not have full information on the profitability of the niche, whereas following entrants from community C will be fully informed about the profitable niche in industry A.

It is an equilibrium for the informed individual to choose industry A, earning $G_A(2)-c$, while the uninformed individual chooses a niche in industry B, earning

$$pG^B+(1-p)L-c.$$

Thus, even in this case, the pattern of industry specialization by different communities is sustained.

To summarize, the model incorporates the advantage of information flow through the community network in reducing risk for a member of the same social group and offsetting the congestion arising from additional entry. A member of the other social group face adverse effects competition and congestion without the benefit of better information. This produces a tendency towards segregation with different social groups specializing in different industries. Even unsuccessful entry by a member of the same community is informative as it narrows down the set of profitable niches and the entrants face reduced risk.

This model is ex ante symmetric so that each social group is equally likely to enter either industry. In reality, the British had better information about the export markets in tea and jute, while the Indians had better knowledge of the domestic market in cotton textiles. This implies that the quality of signal, that is the value of p in the model would depend on the identity of the entrant. It is larger for the British in the export industries and larger for the

Indian in the import substituting industries. Therefore ex ante the British were more likely to be the pioneer in the export industry and Indians in cotton textiles. The model implies that the herding effect would lead to persistence even if profitability was different in the two industries. To the extent the quality of the signal depended on prior knowledge of markets, there may be examples which run contrary to the simple model outlined, such as the presence of a few British firms in cotton textiles. Note that these entrepreneurs were also involved in the domestic cotton trade and therefore would have a higher p than a British firm not involved in cotton trade.

The model also assumes that the profitability of the industries is stationary over time and varies only with the number of entrants. This is a simplification and the model can be extended to allow for the profit opportunities to change over time across industries. It can be modeled by assuming that $G_i(m)$ is determined by a Markov process, where at any date, profits could increase or decrease stochastically so that it may become unprofitable for a new follower to invest in the industry chosen by a member of his social group even if perfectly informed. He may prefer to invest in the other industry even if he is less informed. Similarly rising profitability of an industry may induce members of the other community to enter even in the absence of full information. An example is the entry of Indian traders in the jute industry when profits rose during the first world war. Entry of one firm generated further entry.

Measuring constraints

The empirical strategy adopted in this paper is to rule out explanations that suggest barriers to entry. If discrimination against Indian capital or the privileges enjoyed by British

capital explain the different spheres investment, then we should be able to measure economic attributes that differ across industries

Did the minimum efficient scale differ across sectors? If the Indian entrepreneurs had a disadvantage in raising capital through the stock market or had limited access to credit from the formal British owned banking sector, they would be more likely to enter industries where the initial capital outlay was lower. If scale economies did not matter then, in any given industry, firms started by Indians would tend to be smaller. I can test both propositions using firm- level data.

Table 4 presents comparative start-up capital outlays required in different industries using both aggregate data from Rungta and firm-level information from various sources.⁴¹ It shows that the average paid up capital in cotton mills was lower compared to the paid up capital of an average jute mill right from the 1880s to 1910. However, this is not the case for the average coal or tea firm. The absence of Indians in these sectors indicates a relatively minor role of a capital constraint. Table 5 focuses on the two comparable industries cotton and jute and provides measures of machinery used and employment. Although the machinery employed is not directly comparable across the two sectors, the loom is the main equipment for weaving. Unlike jute, many cotton firms produced a large quantity of yarn as the finished product. Therefore cotton firms list the number of spindles and looms. I construct a measure of loom equivalent by aggregating spindles and looms in the cotton industry. (See table for the details) Although the loom equivalent is higher for cotton mills, jute firms employed significantly more labour. This seeming anomaly is due

⁴¹Morris suggests that initial investment in jute was about the same if not lower than the setting up cost in an average cotton mill and could not have deterred entry. Morris uses Rungta's estimates paid- up capital of Rs 933,000 in 1881 and Rs 1.5 million in 1901 in an average jute mill. However Rungta's data on cotton textiles show that the average paid- up capital in cotton mills was less than Rs 900,000 in both years.

to the aggregation problem. About two hundred spindles could be operated by one worker whereas one worker attended to one loom. Both capital outlay and number of workers were higher in the jute firm. This could have given Indian entrants a disadvantage if they were capital constrained. However, it has already been noted that such an argument cannot be used to explain the absence of Indian entrepreneurs in tea and coal.

The second test for the presence of a capital constraint is to see if there is difference in size between British and Indian firms, in industries where they co-exist. If capital constraint was systematically greater for the Indians, we might expect Indian firms to be smaller than British firms. I compare firms *within* the industries: cotton and jute. Note that Indians were the majority group in cotton, but a minority in jute the opposite holds for the jute industry. This procedure has the advantage that we can use a physical measure of capital, the loom equivalent, rather than a value measure, since we only make intra industry comparisons. On the basis of the measure of loom equivalent and looms, we can make comparisons across firms according to ownership for the year 1924.⁴² Table 6 shows that in each industry, the majority group has the larger firm, although this difference is not statistically significant. In the cotton textile industry in Bombay, the Indian firms on average were larger than British firms, while in the jute industry, British firms were larger. Thus the initial hypothesis, that Indians were uniformly more capital constrained, is not borne out. Instead it appears that the minority group may face more difficulty in raising capital. If capital had been a constraint for Indian firms, then British firms would tend to be larger in all sectors.

⁴²I have chosen the year 1924 as there was a significant group of Indian firms in the jute industry by this period.

I compute the capital- labour ratio intensities in mills run by different communities in the cotton textiles in Bombay to test for systematic differences. The only group which had a higher capital- labour ratio is the Sassoon group, reputed to be most efficient in the industry. The ratio was similar across all other groups and the British firms were not more capital intensive. (See table 7)

Although Indian entrepreneurs might have been rationed out of the formal banking sector, they could raise capital through the indigenous networks. The initial start- up capital came from profits made in trade. Entrepreneurs in cotton textiles typically had made money in trade as did Indian entrepreneurs in jute. The rupee companies formed by the Indians raised finance through local networks. The profits made by the cotton traders during the cotton famine of the 1860s created an advantage. The capital to set up the first cotton mills was raised by the Parsi entrepreneurs from their own resources and contribution from family and friends. The Bhatia merchants, who were the first Hindu entrepreneurs, also raised their own finances⁴³ 70-80% of the authorized capital was paid up soon after the firm was set up. Small firms tended to sell a small number of high value shares and large firms tended to float shares of low face- value that could be taken up by a larger number of investors.⁴⁴ Although Davar had failed to find the financial support in three years earlier, by 1854 raising capital for a cotton mill in Bombay did not prove difficult. Oriental mills sold 500 high value shares of Rupees 2500 each, but had to limit subscription to four share per person due to the high demand.⁴⁵ On the other hand British firms found it more difficult to raise capital in the Bombay region. Greaves, Cotton & Company, the largest European managing agent controlling seven spinning mills was

⁴³ Rutnagar, *Bombay Industries*, p46

⁴⁴ Rungta, *The Rise of Business Corporations*, pp59-60.

⁴⁵ Morris, *Growth of large scale industries*, p575.

unable to raise capital to diversify into weaving .⁴⁶ European capital was no more than 10-20% of total capital invested in cotton. In Calcutta, the average jute or tea firm did not have problems in mobilizing capital. The capital for the rupee companies came from British civil servants, army personnel and traders.

Another constraint that could have deterred entry of Indian entrepreneurs is the rate of profit. Did profit rate differ across industries? If the Indians were guided by higher returns and were capital constrained, then the profit rates should have been higher in cotton textiles although there are no obvious reasons why British firms were not attracted by higher profits. Existing estimates suggest an average rate of profit of 9 percent in jute and 10 percent in cotton.⁴⁷ Table 8 shows the profit rates and dividend rate across sectors using firm level data. There were no systematic differences in profits across export and import substituting sectors. Cotton and jute showed comparable mean profit rates, while tea had a higher return. Coal shows a much lower profit rate with the median firm making no profit. Higher dividends were paid in tea, but comparable rates were paid in jute and cotton. If lower median profit rate discouraged British business in cotton, this was clearly not the case in coal. This is no evidence that Indian entrepreneurs were drawn to industries with particularly high rates of return or that capital constraint alone determined the industrial divide between British and Indian capital

Social Network Effect

The role of social networks in economic activity in Sub- Saharan Africa has been highlighted by Fafchamps when information about the market is limited and involves search costs.⁴⁸ Evidence from traders in Madagascar finds that family ties were important

⁴⁶ Morris, Growth of large scale industry, p579.

⁴⁷ Morris, Growth of large scale industry, p572

⁴⁸Fafchamps, Market Institutions in Sub-Saharan Africa, pp16-17

in starting businesses, but less important in the long run.⁴⁹ In contemporary India, the effect of social network in entry has been explored in the context of the diamond industry. The study finds that the entry of a few members of a community in the diamond trade led to further entry from the same community which had few outside options.⁵⁰ In 19th century India too community ties were important in decisions to enter into industrial activity. These caste boundaries were clearly defined. Caste and community networks had been important in Indian Ocean trade in the 17th and 18th centuries.⁵¹ These same ties formed the basis of industrial investment. Given the non- formal structure of dissemination of information about markets, the community was a relatively costless way to acquire information about new markets and opportunities. There were broadly five social networks in industry Bombay: Parsis, Hindus, Muslims, Jews and Europeans. The Hindu community was represented by specific trading castes, such as the Bhatias.

Parsis were the first social group to become industrial entrepreneurs. A close knit community, they made their wealth from opium and cotton trade. They were also one of the first groups to embrace western education. As a community, the Parsis had fewer barriers to interacting with other groups and on foreign travel, which gave them greater contact with western society. The high level of human capital in the Parsi community gave them an advantage in industry.⁵² Tripathi argues that the exposure to new ideas and values and a desire to learn western industrial practices was common to the pioneers from different communities.⁵³ The first Hindu textile entrepreneur, Khatau Makanji, belonged to a small

⁴⁹ Fafchamps and Minten , Relationships and traders in Madagascar.

⁵⁰ Munshi, Strength in Numbers.

⁵¹ Ray, Asian capital in the age of European domination.

⁵² White, *Competition and Collaboration: Parsi Merchants and the English East India Company*, Desai, Origins of Parsi Enterprise, Bagchi, *The Private Investment in India*.

⁵³ Tripathi, *Historical Roots of Entrepreneurship*, p108.

group of progressive Bhatia merchants and had links with Parsi merchants, which broadened their outlook⁵⁴ The Bhatias came from Gujarat and traded in raw cotton, textiles and grain. The community played an important role in the religious reform movement of the 1870s. Mulji Thackersey, one of the leaders visited England and admired Western *industrial values*. Guha sees the success of the Parsis and Gujarati communities in Bombay as a consequence of the less imposing presence of the British in the commercial sector rather than religion and Western education⁵⁵

The move to set up cotton mills came from members of a social groups involved in trade and others from the group followed. In the case of another pioneer Ranchhodlal who belonged to a community with little involvement in trade, entry into the cotton textile industry had a different outcome. Other social groups in his city with links to cotton trade did not follow. The Jains, who were cotton traders, refused to get involved when Ranchhodlal approached them for funds. It took them and their traditional rivals, the Vaishnava Baniyas another couple of decades to move into this industry.⁵⁶ The success of the firms run by the Parsis had little impact on the traditional Hindu business groups until 1875.⁵⁷ The first non Parsi to enter the industry in Bombay was Khatau Makanji, a Bhatia merchant from Gujarat.⁵⁸ He was followed by many Hindu merchants. The majority of the Hindu mills in Bombay belonged to the Bhatia merchants. There were no Muslim entrepreneurs until the entry of Curimbhoy in 1888, who soon became one of the largest agents in the industry. David Sassoon, a Jewish entrepreneur, migrated to Bombay from

⁵⁴ Tripathi *Historical Roots of Entrepreneurship*, p109.

⁵⁵ Guha, "More about Parsi Seths"

⁵⁶ Mehta, *Indian merchants and entrepreneurs in historical perspective*, p196.

⁵⁷ Morris, *The growth of large scale industries*, 1982, p580-1

⁵⁸ Tripathi, *Historical Roots of Entrepreneurship*, p 108.

Baghdad and established himself in the opium trade.⁵⁹ He was a pioneer in his community. One of the main British companies was Greaves & Cotton. The company was set up in 1863 by James Greaves who had been involved in the cotton trade in Gujarat and had extensive knowledge of the local markets. George Cotton was an agent of the East India Company and was involved in the cotton trade as well. Five spinning mills were set up in the next 20 years.⁶⁰ The managing agent Greaves & Cotton and Bradbury & Brady were two British managing agents who controlled twelve out of fifteen British enterprises.⁶¹ With the development of the railway lines, the internal trade in cotton, which had been dominated by Indian merchants, had become more accessible to the British companies.⁶²

The Indian merchants in eastern India traded in jute, rice and other agricultural commodities. The Marwaris as a group worked closely with British industrial and exporting firms, but did not enter industrial activity right up to the First World War. The Bengalis with western education entered into partnerships with the British in banking, insurance and shipping in the early decades of the 19th century, but disappeared after the middle of the 19th century and the Marwaris emerged as the main brokers to the British companies. Timberg documents the rise of the Marwaris as industrial entrepreneurs from the futures market in opium, and specie to trade in raw jute and jute products in Calcutta. They began to speculate in the share market and bought shares in jute firms.⁶³ Birla and Hukumchand started the first two Indian- owned jute mills in Calcutta, and this encouraged entry by several others from the community in the 1920s.

⁵⁹ Rutnagur, Bombay industries, p58.

⁶⁰ Greaves Cotton and Company: A century of Progress, Bombay 1959.

⁶¹ Morris, , The growth of large scale industries , p580

⁶² Vicziány, Cotton Trade and Commercial Development of Bombay, 370-372.

⁶³ Timberg, *The Marwaris: From traders to Industrialists*, pp161-166.

The cotton textile industry provides the context to test the role of the social network as a determinant of entry. Five different communities, including the British were involved in this sector. The largest investment was shared by the Parsis and the Hindus. . The entry of different groups happened in clusters and is shown in figure 3. We use entry dates of 97 firms between 1850 and 1915 to test if presence of community members in the industry led to further entry. Table 9 shows the pattern of entry in Bombay's textile industry by social groups. Table 10 presents the probability of entry. The results show that cumulative presence of members of a community increased the probability of entry. Total number of firms in the industry also increased the probability of entry, but the effect was much smaller, confirming that social network effect mattered for decisions to enter.

Conclusion

I have argued that informational asymmetry explains the industrial divide between British and Indian business. Though geographical factors contributed to the location of tea, jute and coal in the hinterland of Calcutta and the cotton textile industry in Bombay, the involvement of British entrepreneurs and investors in the export oriented industries and their limited presence in the main import substituting industry is better explained by informational constraints rather than discrimination. The paper argues that this divide reflects the nature of the two product markets, local versus international, and highlights the importance of informational constraints in determining flows of entrepreneurship and capital. The role of the social networks in information flows further accentuated the segregation by economic activity.

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Data Sources:

Investors India Year Books
 Bombay Cotton Mills Association Annual Reports
 Statistical Abstract of British India

Table 1: Dominant Source of Capital and Entrepreneurship by Industry (1914)

INDUSTRY	PRIMARY ENTREPRENEURS	MAIN INVESTORS	PRIMARY REGION
TEA	BRITISH	BRITISH IN BRITAIN	CALCUTTA
JUTE	BRITISH	BRITISH IN INDIA	CALCUTTA
COAL	BRITISH	BRITISH IN INDIA	CALCUTTA
COTTON TEXTILES	INDIAN	INDIAN	BOMBAY
NO. OF JOINT STOCK COMPANIES IN THE CITY AND HINTERLAND			
	CALCUTTA	BOMBAY	INDIA
TEA	376	0	385
JUTE	54	0	55
COAL	225	5	232
COTTON TEXTILES	18	178	227

Source: Statistical Abstract of British India.

Table 2: Percentage shares of communities in enterprises: Bombay and Calcutta.

BOMBAY: ALL COMMERCIAL ENTERPRISES¹					
Year	European	Parsi	Hindu	Muslim	Jewish
1911	44	22	26	5	0
1920	19	25	48	6	0
BOMBAY: COTTON MILLS²					
1915	14	30	22	13	20
1925	13	27	23	18	17
CALCUTTA: ¹ ALL COMMERCIAL ENTERPRISES					
Year	European	Bengali	Marwari	Parsi	Muslim
1875	66	03	0	3	1
1890	66	12	2	2	2
1911	55	29	5	2	1
1920	42	36	10	5	1
CALCUTTA: JUTE MILLS³					
1915	100	0	0	0	0
1929	78	0	22	0	0

Note: Shares in total number of enterprises.

Source: ¹Calculated from Bagchi, 1997, pp98 & 105 ²Calculated from Rutnagar 1926, p54, ²Calculated from Goswami, 1992, pp 99-100 &107

Table 3: Sterling and Rupee Investment in 1914-15 (£m)

COMPANIES	STERLING	RUPEE	TOTAL
TEA	19.7	2.9	22.6
COTTON	0.4	13.0	13.9
JUTE	2.7	7.8	10.5
GOLD	2.3	0.3	2.4
COTTON&JUTE PRESS	1.2	1.2	2.4
TOTAL	27.4	29.0	56.9

Source: Chapman(1992) based on Indian Industrial Commission, II, p854, p123.

Table 4: Average Paid-up Capital of Rupee Companies, Rupees ‘000

	Cotton	Tea	Jute	Coal
1881 ^a	688 (28)	244 (113)	958 (8)	649 (6)
1889 ^b	876 (99)			
1891 ^a	852 (57)	253	1071 (11)	560 (11)
1900 ^a	889 (66)	246 (135)	1444 (21)	411 (34)
1910 ^c	1575 (43)	339 (87)	3350 (29)	614 (87)

Source: ^a Based on Rungta's industry level information,

^b Based on firm level information from Bombay Millowners Association Report, 1889,

^c Based on firm- level information from Investors' India Year Book for 1911

Note: figures in parenthesis indicate the number of firms.

Table 5: Looms and Employment in Cotton and Jute Textiles

Year	No. of mills	Average no. of loom equivalent/ looms per mill	Average no. employed per mill
Cotton			
1883-84	79	1043	60
1893-94	142	1067	130
1903-04	191	1121	185
1913-14	271	1210	260
Jute			
1883-84	23	267	2081
1893-94	28	342	2471
1903-04	38	484	3260
1913-14	64	563	3379
1926-27		554	3605
1936-37		621	2765

Source: Loom Equivalent for Cotton has been calculated using data from Morris 1982, p576 Jute is based on Morris 1982, p569, 615.

Notes: For cotton, we aggregate looms and spindles into a loom-equivalent by multiplying spindles by 0.033, and adding the number of looms. See Gupta (2011) for details of the estimation.

Table 6: Average Machinery and Employment by Category of Owner, 1924

	Number of firms	Looms/Loom Equivalent per firm	Workers per firm	Average capital-labour ratio
Cotton firms in Bombay	67	2516		
Indian	55	2615*	1929	1.14
British	12	2061*	1773	1.13
Jute firms in Calcutta	54	961		
Indian	8	823**		
British	46	985** (0.78)		

Notes: * T- statistic for the difference between these numbers is 1.4 (not significant at 5% level). ** T- statistic for the difference between these numbers is 0.8 (not significant at 5% level).

Source: Bombay Cotton Mills' Association Report for 1934, Investors India Year Book for 1934, Jute Mills Review 1935

Notes: For cotton, we aggregate looms and spindles into a loom-equivalent by multiplying spindles by 0.033, and adding the number of looms. See Gupta (2011) for details of the estimation. The regional average in table 5 is computed from the aggregate data. The group averages have been computed by regressing loom equivalent/loom on ownership, within each industry.

TABLE 7: Capital-Labour Ratios by Community, Bombay Cotton Mills, 1924

PARSI	HINDU	MUSLIM	JEWISH	EUROPEAN
1.1	1.1	1.1	1.4	1.1

Source: Calculations based on Rutnagar, 1927, p55.

Table 8: Profit Rate and Dividend across Sectors in 1910

Sector	Profit Rate (%)		Ordinary Dividend (%)	
	Mean	Median	Mean	Median
Cotton	10	4	5	5
Jute	12	10	5.5	5
Tea	16	12	12	10
Coal	4	0	6	0

Source: Investors' India Year Books 1911-1913

Note: Profit Rate is calculated as a ratio of net profit and paid- up capital

Table 9: Bombay cotton mills: Number of Entrants, by Social group

DECADE	PARSI	HINDU	MUSLIM	ENGLISH	JEWISH
1850s	3	0	0	0	0
1860s	5	2	0	0	0
1870s	2	9	0	2	1
1880s	9	5	1	9	2
1890s	7	5	2	3	2
1900s	2	0	1	1	0
1910s	3	1	1	0	0
Total	31	22	5	15	5

Source: Calculations based on Rutnagur, *Bombay Industries* pp9-23.
The difference in

Table 10: Probability of Entry

Dependent Variable: Entry

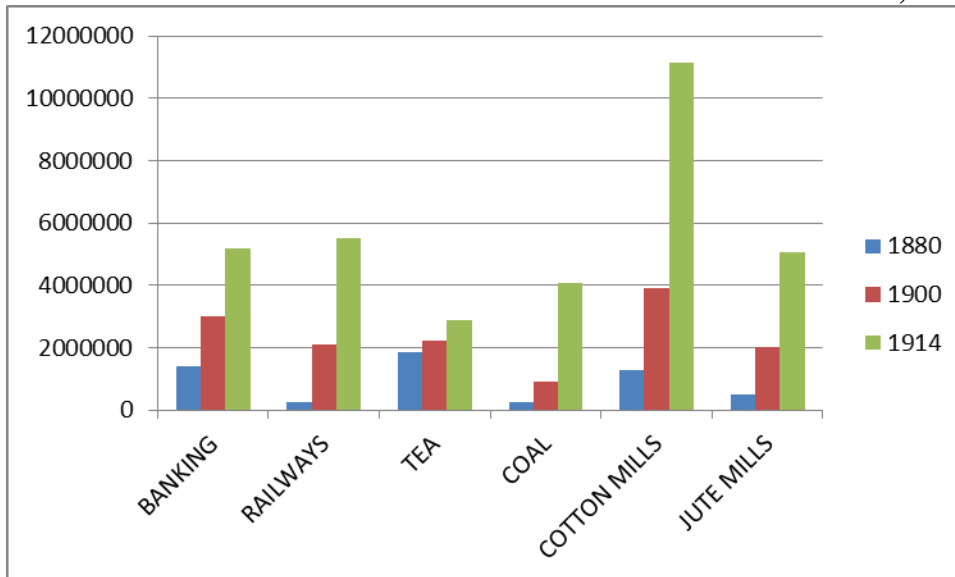
	Specification 1	Specification 2	Specification 3
Cumulative Group Presence	.73 (.07)**		0.54 (.10)**
Total Firms		0.13 (.03)**	0.14 (.04)**
Social Group Effect	Yes		Yes
Year Effect	Yes		Yes
Log Likelihood	-381.1	-386.5	-374.7

Source: Bombay Cotton Mill's Association Reports, Rungta, 1929, and Rutnagur

Note: The model is estimated as an unbalanced panel Probit, Social groups are numbered as follows: 1. Parsi, 2.Hindu 3. English, 4. Jewish and 5. Muslim.

Standard Errors are reported in parenthesis. Cumulative group presence is the total number of firms from the social group.

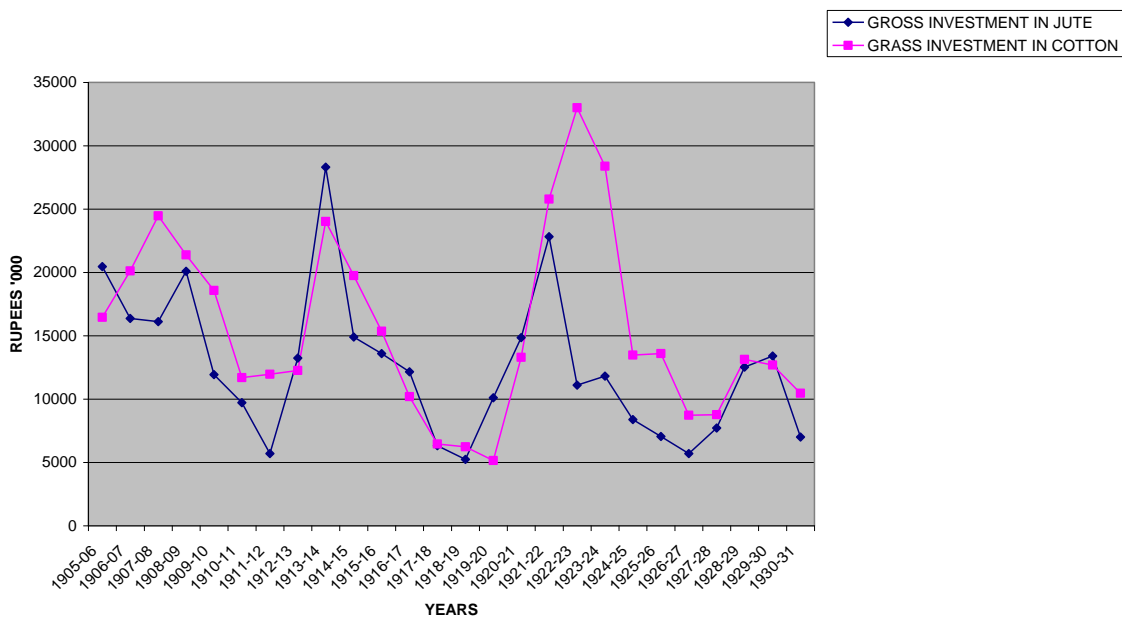
FIGURE 1: RUPEE INVESTMENT IN DIFFERENT SECTORS, 1880-1914



Source: Rungta, *The Rise of Business Corporations*, p 296-29 for 1880-1900 and

FIGURE 2: ESTIMATES OF INVESTMENT IN COTTON AND JUTE MILLS

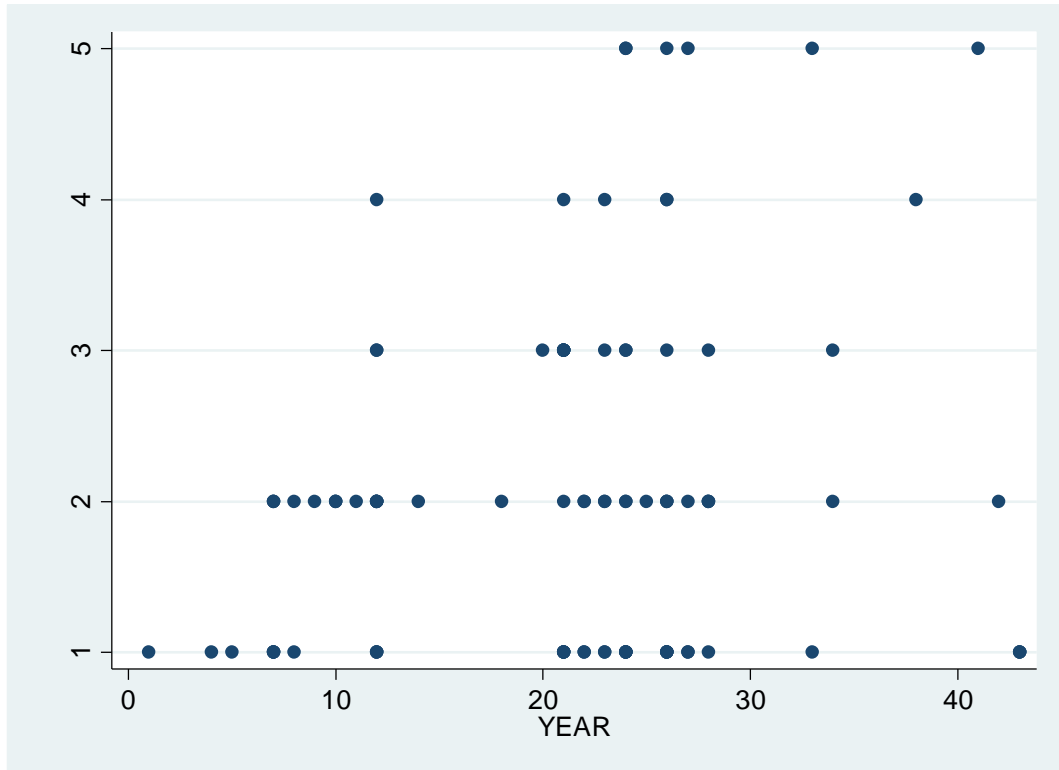
GROSS REAL INVESTMENT IN COTTON IN WESTERN INDIA AND JUTE IN BENGAL



Source: Bagchi, *Private Investment*, pp 258, 273.

Note: Gross investment is calculated by multiplying the real import value by the ratio of the block value of mills to the total value of plant and machinery in those mills. The figures are 1.54 for cotton and 1.72 for jute.

Figure 3: Entry by Social Group



Note: Comm No. lists social groups 1. Parsi, 2. Hindu, 3. English, 4. Jewish and 5. Muslim