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Diversity, Institutions and Economic Outcomes

by

Estefania Santacreu Vasut

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in

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of the

University of California, Berkeley

Committee in charge:

Professor J. Bradford DeLong, Chair
Professor Barry Eichengreen
Professor Benjamin E. Hermalin
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Abstract

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by

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Doctor of Philosophy in Economics

University of California, Berkeley

Professor J. Bradford DeLong, Chair

Why may social diversity be bad for growth? In this thesis, I argue that diversity affects the extent of information asymmetries that determine the design of contracts and institutions. Because information asymmetries generate information rents, these contracts and institutions foster lower economic growth and persist over time. I proceed as follows: First, I model the impact of workforce diversity on the design of contracts and the shape of the firm. I find that diversity decreases the incentives given in principal-agent interactions and multiplies the number of layers bureaucracies need. Furthermore, the relation between diversity and productivity is institution dependent. Second, I compare the spread of industrialization in Japan and British India; and I provide new evidence of the organization, managerial beliefs, and workforce diversity of the three biggest textile centers in Bombay province. I find that workforce diversity was pervasive in British India, but not in Japan, allowing the latter but not the former to introduce organizational improvements and develop. In British India, centers with higher workforce diversity had more supervisors per worker and their managers were the most likely to believe that their workers were lazy.
I would like to thank Bradford DeLong, Barry Eichengreen, Benjamin Hermalin, Gerard Roland and Stephen Cohen for their support and encouragement throughout my studies at UC Berkeley. I also thank my family and friends for their support.
To my parents, Anne and Isidro, and to my sister, Laetitia
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Chapter 1

Introduction

1.1 Introduction

Since Easterly and Levine (1997) first documented the negative correlation between per capita GDP growth and social diversity, the economics literature on the topic has mushroomed.\(^1\) Why is social diversity inversely related to economic growth? What is the role of institutions in this relationship? Understanding these questions has important implications for economic development policies. These are relevant for the implementation of foreign aid policies, the management of globalization, and the design of institutions at the supranational level, among others.

Inspired by Robert Putnam’s (1995) emphasis on the role of social capital, a vast empirical literature has documented that more diverse communities foster lower levels of social capital. Why is this so? Two main arguments have been proposed in the literature. Members of different groups may have different preferences (Alesina et al., 1999) over economic outcomes or may dislike interacting with each other (Alesina and La Ferrara, 2000). These can decrease their willingness to pay for common goods or hamper the enforcement of social norms, among others. In short, the current wisdom is that

\[
\text{Social diversity} \rightarrow \text{preferences} \rightarrow \text{social capital} \rightarrow \text{quality of institutions} \rightarrow \text{economic performance.}
\]

In this thesis, I explore the relation between diversity and economic productivity assuming none of the former. That is, I assume that individuals have identical and standard preferences. Yet, I show that diversity matters. This is so because it imposes a cognitive challenge on societies, which shape their institutions accordingly. I rely on social psychology\(^1\)They measure social diversity as ethnolinguistic fractionalization.
insights about stereotyping phenomena to argue that diversity affects the extent of information asymmetries in economic interactions. I analyze how these information asymmetries affect the design of contracts and institutions. In short, I argue that

Social diversity → information asymmetries → design of contracts and institutions → economic performance

To analyze the implications of my hypothesis, I proceed as follows: First, I build an organization theory model to study how workforce diversity affects the design of contracts and the shape of organizations. I then present evidence about the spread of industrialization in British India and Japan that is consistent with the model’s implications. The emphasis on workforce composition and information asymmetries along the hierarchy sheds light on why low labor productivity persisted in the British India cotton textile industry but not in the Japanese.

The thesis is structured around three chapters that address the following questions:

1. How does workforce diversity affect the design of contracts and the shape of organizations?

In the first chapter, I model the effect of workforce diversity on the design of contracts, the shape of the firm and labor productivity. The model extends a static principal multiple-agent model to encompass the possibility that workers belong to different groups. I merge this extension with the literature on hierarchies and the role of collusion à la Tirole (1986). I assume that managers hold stereotypes over their workers, while supervisors, who spend more time with workers, do not. Relating the extent of informational asymmetries along the hierarchy to the composition of the workforce allows me to derive the shape of the organization endogenously. I find that diversity decreases the incentives given in flat organizations and multiplies the number of layers that bureaucracies need. Furthermore, the relation between diversity and productivity is institution dependent. This has important implications for institutional policies. It explains why identical institutions perform very differently in different countries and why transplanted institutions often fail.

2. Was low productivity in British India textile industry an institutional failure?

In the second chapter, I analyze the labor market institutions of the cotton textile industry in British India. In particular, I present newly collected evidence on the role of the jobber, supervisor and recruiter of the workforce. Jobbers in British India had unprecedented power and persisted over time. Why did they emerge? Was their reliance uniform across India and over time?

While the economics literature has borrowed insights from social psychology regarding identity and prejudice (Becker, 1957) and (Akerlof and Kranton, 2000), little has been said about how stereotyping affects economic outcomes. Stereotyping is a form of categorization that applies to the physical and social environment and attributes group characteristics to individuals.
I compare the labor force diversity, organization structure and managerial policies of the three main textile centers within the Bombay Province from 1857 to 1947. Namely, the cities of Bombay, Ahmedabad, and Solapur. To do so, I collect and digitize evidence from census data, parliamentary papers, and the labour office. I construct measures of diversity along religious, ethnic, caste, and linguistic lines and quantify the extent of supervisors within the mills and their evolution over time. Finally, I analyze managerial policies (housing provision, health policies).

I find that the figure of the powerful jobber cannot be solely attributed to colonization or to India's idiosyncracies, but to a combination of both. In particular, to the pervasive information asymmetries between managers and workers in British India that resulted from colonization and from India's high population and workforce diversity. Centers with higher workforce diversity had more supervisors per mill operative and worse managerial policies. The study of British India industrialization sheds light on the relation between social diversity, colonization and economic development and the essential role of organizations in shaping this relation and its persistence.

3. Why did Japan and British India cotton textile industries productivity diverge in the interwar period?

In the third chapter, I compare the industrialization experiences of Japan and British India. In 1910, one Indian textile mill worker produced as much output as a Japanese worker and one fourth of what a British worker did (Clark, 1987). By 1938, labor productivity had improved dramatically in Japan, but very little in British India; where, by then, workers produced one fourth of what Japanese workers did (Wolcott and Clark, 1999). To understand this puzzle, I analyze the role of labor-market institutions and beliefs in explaining the divergence, using Greif's (2006) methodology.

I show that at the onset of industrialization both countries shared essential structural features and that their managers faced similar initial challenges. Namely, how to attract, retain, and control an originally rural labor force. Two key distinctive features stand out: the diversity of their population and labor force and their state ideology (nationalism versus colonialism). British India society was very diverse. On the contrary, “At the time of Restoration, in spite of internal dissensions, the people of Japan possessed an underlying sense of national unity which was the product of her geographical position, of linguistic uniformity and of her long history,” Allen (1946). I argue that these features determined the extent of information asymmetries in both economies. These affected the design and evolution of labor-market institutions. In British India, labor-market intermediaries were given recruiting and supervisory powers, which persisted over time and prevented organizational improvements. In Japan, intermediaries were only given a recruiting role and were replaced during the interwar period by productivity enhancing institutions. That is, labor

---

3 Probability that two randomly chosen individuals belong to a different group.
4 The share of mill operatives that are supervisors, also called jobbers.
market intermediaries were a *self-reinforcing institution* in British India and an *undermining institution* in Japan. Information asymmetries lie at the root of their different design and dynamics.\(^5\) In the second part of the chapter I analyze managerial beliefs. To do so, I systematize managerial comments expressed in Parliamentary papers. I find that beliefs were shaped by labor market institutions and reinforced their disparate trajectories. In particular, managers of highly diverse workforce were inclined to believe that the reasons behind low productivity were exogenous. Consequently they were the less likely to undertake changes in recruitment and managerial practices and the more likely to continue relying on intermediaries. Finally, the colonial state in British India was a *complementary institution* to labor-market intermediaries while the contrary was true in Japan.

These findings suggest that the reason why social diversity is bad for growth is not necessarily a fundamental conflict of interest arising from diverging preferences. Rather, diversity imposes a cognitive challenge on societies, which shape their institutions accordingly. In highly diverse societies, categorization processes such as stereotyping are pervasive, increasing the extent of information asymmetries with which their members have to deal. Because information asymmetries generate information rents, these institutions provide lower incentives and persist over time, generating lower economic growth.

### 1.2 Contributions

This thesis contributes to several strands of the literature. First, it proposes an alternative to the current emphasis on social capital.\(^6\) Under my hypothesis, diversity matters not only for public goods provisions (Luttmer, 2001, Miguel and Gugerty, 2005) or collective decisions (Alesina and LaFerrara, 2000), but also in standard economic interactions. Second, this research places the firm at the core of the relation between diversity and economic development, as in Bloom (2009). While the organizational behavior literature has focused on the role of diversity in the performance of teams (Kurtulus, 2008, Lazear, 1999) it has taken the shape of the firm as given. The model I present derives the shape of the firm endogenously, and as a function of social factors. Third, it contributes to the research that studies the firm as information processor and metering device by considering the impact of agents cognitive shortcuts when processing information.\(^7\) I draw on insights from the study of hierarchies and the role of collusion between informed parties to derive the optimal structure of the firm as a function of the distribution of social knowledge along the hierarchy.\(^8\)

---

\(^5\)They are a quasi-parameter in terms of Greif (2006).

\(^6\)Costa and Kahn (2004) provides a summary of the vast empirical literature on this topic.

\(^7\)Aghion and Tirole (1997), Milgrom and Roberts (1988) and Radner (1992), among others, view the firm as an information aggregator and processor, while Garicano (2000), argues that coordination and information transmission are the rationale for knowledge-based hierarchies.

\(^8\)Calvo and Wellisz (1978) model the supervision problem and Tirole (1986) studies the role of collusion in three-tier organizations. Prendergast and Topel (1996) model a supervisor who has favorites among workers
Making the shape of the firm endogenous to the distribution of social knowledge and the diversity of the workforce contributes to understanding two historical episodes: first, the divergence of Japanese and British India cotton textile industries during the interwar period; second, the organization of textile mills in British India at the turn of the last century. I provide a rationale for the emergence and persistence of labor-market institutions as a function of the social environment in colonial India.

More broadly, this work contributes to understanding the origin of institutions and their role in explaining the puzzle of underdevelopment. I follow the view that institutions are equilibrium outcomes (Greif, 2006) and are a function of not only technology or initial endowments (Engerman and Sokoloff, 1994) but also of the social world. I depart from the artificial dichotomy between good and bad institutions (Acemoglu, et al., 2001) and from attributing to culture (Tabellini, 2008) an essential role in understanding the differential performance of identical formal institutions. Institutions are a human-devised response to technological and social needs. Understanding these needs is essential when trying to improve their performance and to understand why transplanting institutions is more often than not a failed enterprise.
Chapter 2

Social Determinants of Hierarchies: A Model

How does workforce diversity affect the design of contracts, the shape of organizations and labor productivity? In this chapter, I extend the standard static principal multiple-agent moral hazard model with the possibility that workers belong to different groups. I merge this extension with the literature on hierarchies and the role of collusion à la Tirole (1986). Relating the extent of informational asymmetries along the hierarchy to the composition of the workforce, I derive endogenously the shape of the organization. I find that (1) workforce diversity decreases the incentives given to workers in flat organizations, (2) multiplies the number of layers bureaucracies find necessary and (3) the relation between diversity and productivity is institutionally dependent and non linear. The chapter is organized as follows: First I develop the baseline model, followed by proofs and derivations. Second, I extend the model to consider, among others, the impact of diversity on the size of the firm.

2.1 The Model

2.1.1 Basic Assumptions

1. Social groups are defined on the basis of observable characteristics such as language, religion, ethnicity and birth-place.

2. I fix the size of the workforce, \( N \), and let \( K \) be the number of subgroups. That is, \( N = N_1 + \ldots N_k + \ldots N_K \).

3. Groups are equal sized such that \( K = N/N_k \). Each worker \( i \) belongs to only one group \( k \). The bigger the number of groups the more diverse the workforce is.
4. Workers have identical preferences regardless of the social group they belong to. Workers have constant absolute risk aversion (CARA) preferences, defined over monetary wages \( w \) and effort \( a \), and represented by the following negative exponential utility function:

\[
u(w, a) = -e^{-\eta[w-\tau(a)]}
\]

where \( \eta > 0 \) is the agent’s coefficient of absolute risk aversion. For simplicity, I assume that \( \tau(a) = \frac{1}{2}ca^2 \)

The reservation wage is equal to \( w_o \) for all \( i \).

5. Worker’s effort is unobservable, although both manager and supervisor observe a noisy signal of it. The manager’s signal is noisier than the supervisor’s signal in a way specified in the next section.

6. The manager and the supervisor are risk neutral.

7. Manager’s expected profit is

\[
\sum_{k=1}^{K} \sum_{i=1}^{N_k} (a_i - w_{ik})
\]

8. There is an ex-ante competitive supply of supervisors. I assume that it is not efficient to divide the supervisory job among several supervisors.\(^1\) The supervisor exerts no effort in the supervisory function. He is an information conduit between the workers and the manager. His choice is whether to report truthfully or to manipulate the signal he observes to the manager. In order to manipulate the signal he needs the collaboration of workers.

9. The supervisor reservation utility for the supervisory task is zero.

10. The supervisor lacks either the time or resources required to run the vertical structure. For example he may lack a link with capital markets and government.

### 2.1.2 Information Structure

While Tirole (1986) assumes that the principal (manager) lacks either the time or the knowledge required to supervise the agent, I assume that he may devote part of his time or have some knowledge if he decides to supervise the workforce. A further difference between my

\(^1\)This can be due to duplication costs in the supervisory task or due to potential collusive behavior between supervisors.
information structure and the one in Tirole (1986) is the following. In Tirole (1986), there are two states of nature (high and low productivity) and the supervisor observes the state in some cases while the manager never observes the state of nature. My construction differs in that both supervisor and manager observe a noisy signal of each worker’s effort. The noisiness of the signal increases as one moves up in the hierarchy.

In particular, the manager observes a noisier signal than the supervisor’s signal. Manager’s signal is

$$S_{ik}^M = a_i + \epsilon_i + \mu_k$$ (2.3)

The supervisor’s signal is:

$$S_{i}^J = a_i + \epsilon_i$$ (2.4)

where

- $a_i$ is worker i effort choice
- $\epsilon_i$ is an individual specific noise term such that $\epsilon_i \sim iid N(0, \sigma_{\epsilon}^2)$
- $\mu_k$ is a group specific noise term such that $\mu_k \sim iid N(0, \sigma_{\mu_k}^2)$

This information structure captures circumstances in which the supervisor is a local citizen who knows about local cultures while the manager is a foreigner. Alternatively, it reflects the fact that the supervisor spends more time supervising the workforce while the manager multitasking prevents him from knowing group-specific characteristics. Under both interpretations, the manager is more likely to rely on categorization processes such as stereotyping. Stereotyping is a process by which individuals assign information about the group to the individual. It is a way of simplifying the world and making perceptual and cognitive processes more efficient (Allport, 1954). Categorization processes are widely used when individuals deal with new environments or when they spend limited time interacting with each other.

It follows that the composition of the workforce determines the decision of the Manager to rely on a supervisor. Depending on contracting a supervisor or not, the manager will either observe $S_{ik}^M$ for all i and k, or will rely on supervisor’s communication of his signal, $S_{i}^J$ for all i. The manager cannot observe both signals simultaneously because if he hires a supervisor he fully externalizes supervision and spends no time with workers. Either of the signals is verifiable and can be the basis of the contract. Figure 2.1 summarizes the structure of the game.

I take the extreme assumption that the supervisor’s signal is not contaminated by group noise and workforce diversity to illustrate the key tensions at work. The distributional properties of the signals are common knowledge.

---

2For example in the case of an expatriate CEO in a subsidiary abroad.
Chapter 2. Social Determinants of Hierarchies: A Model

Figure 2.1: Structure of the game

Manager

Hierarchical

Supervisor

Finer signal

Workers

\[ w_i = \alpha + \beta S_{ik}^J \]

Flat

Noisier signal

Workers

\[ w_{ik} = \alpha_k + \beta_k S_{ik}^M + \gamma_k \bar{S}_{-ik}^M \]
2.1.3 Contract space

The Manager can only offer workers linear contracts of the form:

\[ w_{ik} = \kappa_k + \delta S_k \]  

where \( \delta \) is an \( N_k \)-dimensional row vector and \( S_k \) is an \( N_k \)-dimensional column vector.

\( S_k \) is equal to \( S_k^M \) if the manager relies on a flat organization and equal to \( \hat{S}^J \) if he hires a supervisor and operates under a hierarchical organization.

2.1.4 Perfect Information Benchmark

I derive the first-best effort level under the assumption that the manager perfectly observes individual effort and that it is verifiable by third parties. In this case, the manager can contract upon first-best effort, \( a^*_i = \frac{1}{c} \) offering a flat wage that ensures the worker’s participation constraint is satisfied. In particular, \( w^* = w_o + \frac{1}{2c} \).

Manager’s payoff per worker in the first best scenario is:

\[ \Pi^{FB} = \frac{1}{2c} - w_o \]

2.1.5 Flat Organization

In a flat organization the manager does not rely on a supervisor and observes the signal \( S_k^M \) for all \( i \). In that case, he chooses \( (\kappa_k, \beta_k, \gamma_k) \) to maximize expected profits subject to worker participation (IR) and incentive compatibility (IC) constrains:

\[ IR_{ik} : E(-e^{-\eta[w_{ik} - \frac{1}{2}c\alpha_i^2]}) \geq u(w_o); \]

\[ IC_{ik} : a_i \in \arg\max E(-e^{-\eta[w_{ik} - \frac{1}{2}c\alpha_i^2]}); \]

The solution to the manager’s problem under the flat organization is to offer:

\[ w_{ik} = \alpha_k + \beta_k S_{ik}^M + \gamma_k \bar{S}_{ik}^M \]

\(^3\)Under these assumptions, it has been proved that, if the principal can impose extreme punishments, linear contracts are not optimal. Nevertheless, their simplicity and intuitive closed-form solution, together with Holmstrom and Milgrom(1987) result (linear contracts are optimal under dynamic model with CARA preferences of principal and agent), justify my focus on the linear case.

\(^4\)I already impose the fact that the compensation of a worker in group \( k \) will depend on workers signal of his same group but not on the signal of workers from other groups. This is because of the assumption that group noisiness is independent of each other.

\(^5\)F stands for flat organization
where $\bar{S}_{-ik}^M$ is the average signal of worker $i$ coworkers that belong to his social group $k$. The average signal of his group coworkers is a sufficient statistic of the sample under normality assumption.

$$\gamma^F_k = \frac{-\sigma^2_{\mu}}{\sigma^2_{e} + \sigma^2_{\mu}} \beta^F_k$$

$$\beta^F_k = \alpha \left[ 1 + \frac{\sigma^4_{\mu}}{\sigma^2_{e} + \sigma^2_{\mu} (N_k - 1)} \right]$$

$\beta^F_k$ is positive and depends negatively on the cost of effort, $c$, the degree of risk aversion, $\eta$, and the noisiness of the worker’s effort signal, $\sigma^2_{e} + \sigma^2_{\mu}$. $\gamma^F_k$ is negative, as typical in relative performance evaluation with positively correlated common shocks.

Proposition 1: In flat organizations, effort is a decreasing and concave function of workforce diversity.

The intuition behind this result is the classical trade off between incentives and insurance. When diversity is high the manager is less able to filter group cultural noise and infer the cultural characteristics (language, religious practices and festivities, eating habits, etc) of a given worker. In that case, workers are exposed to higher risk. Because workers are risk averse, it is more costly to provide incentives and the manager optimally decreases the steepness of the wage function. The intuition behind the concavity of the function is the following: When diversity is very high, decreasing diversity provides very valuable new information on group characteristics. This decreases worker’s risk exposure and allows the manager to increase incentives significantly. On the contrary, when diversity is very low, the added value of decreasing it further is very small because the manager is already able to filter group noise to a big extent.

Manager’s profit in a flat organization is:

$$\Pi^F = \frac{\beta^F_k}{c} - w_o - \eta \beta^F_k \tilde{\sigma}_f$$

where $\tilde{\sigma}_f$ is the risk to which workers are exposed in a flat organization and is increasing in workforce diversity.\(^6\)

### 2.1.6 Hierarchical Organization

I now derive the optimal contract when the manager decides to rely on a supervisor. Doing so, the manager has access to better information, but needs to ensure this information is truthfully revealed. Because the supervisor can collude with the workforce and manipulate

---

6Per worker of group $k$.

7In particular, $\tilde{\sigma}_f = (\sigma^2_{e} + \sigma^2_{\mu}) + \frac{\sigma^4_{\mu}}{(\sigma^2_{e} + \sigma^2_{\mu})^2 N_k - 1} (\sigma^2_{e} + \sigma^2_{\mu} - 2)$
Chapter 2. Social Determinants of Hierarchies: A Model

the signal, ensuring truth-telling is costly.

I first discuss the benchmark case, in which the supervisor reveals the signal he observes at no cost. Second, I present the solution when the manager needs to take into account the supervisor’s incentives.

**Benchmark case**

In the benchmark case the supervisor reveals the signal he observes at no cost. That is, \( \hat{S}_J = S_J \). In that case, the optimal linear contract is

\[
\hat{w}_i = \alpha + \beta^{HH} S_{ik} \]

where \( \beta^{HH} = \frac{1}{2\nu c\sigma_i^2} \).

**Proposition 2.** In a hierarchical organization, if the supervisor truthfully reveals his signal to the manager, effort is higher than in a flat organization.

That is, the wage function is steeper and effort is higher when the manager relies on a hypothetically honest supervisor. This results from the fact that the supervisor’s signal of workers’ effort is less noisy, decreasing the cost of insuring workers and allowing the manager to give higher incentives.

**Incentive compatible contract**

In reality, the supervisor can collude with the workforce and send a distorted signal. With probability \( p \in (0, 1) \) there is an external inspection of the factory and the manager learns if collusion took place. I assume it is bounded below and above. \(^9\) I also assume that players cannot influence this probability. If the manager could do so, he would try to push \( p \) towards its upper bound to mitigate the informational problem.

Let \( b \) be the bonus per worker that the manager offers the supervisor conditional on not being found colluding with workers. I assume that the manager can give bonuses not penalties. If he could impose penalties, he would be able to ensure truth-telling at no cost by imposing a high enough penalty in the event that untruthful behavior is discovered.

Let \( \theta \) be the amount of distortion in the event of collusion such that the signal sent is \( \hat{S}_i = S_i + \theta \). I assume \( \theta \) is an exogenous constant and is costless. Some types of manipulation can be considered exogenous without much controversy. For example, whether or not a worker attended work. Other instances of manipulation may be costly and/or endogenous.

\(^8\) HH denotes the solution under hierarchical organization and honest supervisor. The signal of worker \( i \) is independent of the signal of the rest of the workforce therefore \( \gamma_k^{HH} = 0 \) is optimal.

\(^9\) In particular, I assume

\[
\frac{\sigma_i^2(\sigma_e^2 + \sigma_\mu^2)c\lambda \theta}{\sigma_\mu^2 + \sigma_i^2(\sigma_e^2 + \sigma_\mu^2)c\lambda \theta} > p > \frac{\sigma_i^2(\sigma_e^2 + \sigma_\mu^2 + \sigma_\mu^4)c\lambda \theta}{\sigma_\mu^2 + \sigma_i^2(\sigma_e^2 + \sigma_\mu^2 + \sigma_\mu^4)c\lambda \theta}. \tag{2.9}
\]
Chapter 2. Social Determinants of Hierarchies: A Model

For example, how late did the worker arrive or how many hours he worked. The appendix extends the model to this latter case.\textsuperscript{10} If the supervisor colludes with workers and he is not discovered doing so, the extra revenue generated is equal to \((\beta + \gamma)\theta\). Let \(\lambda\) be the bargaining power of the supervisor such that he appropriates \(\lambda(\beta + \gamma)\theta\). The workforce appropriates \((1 - \lambda)(\beta + \gamma)\theta\). To ensure truth-telling the bonus offered by the manager must satisfy the supervisor’s truth-telling constraint (SIC): \(pb \geq (1 - p)\lambda(\beta + \gamma)\theta\)

The Manager chooses \((b, \alpha, \beta, \gamma)\) to

\[
\text{Max } E(\sum_{i=1}^{N}(a_i - w_i) - b) \text{ subject to } IR_i, IC_i, SIC \text{ for all } i.
\]

The solution is

\[
\gamma^H = 0, \quad \beta^H = \frac{1}{2\eta\sigma^2} - \frac{(1-p)\lambda\theta}{p\eta\sigma^2}.
\]

When relying on the supervisor’s signal, the manager has a better signal and can provide higher incentives. Because higher incentives imply a greater temptation to collude, the manager will not take full advantage of the informational advantage and optimally revise incentives downward. How much he does so depends positively on the bargaining power of the supervisor with the workforce, \(\lambda\), on the probability that manipulation is not discovered, \(1-p\), and on the extent of manipulation, \(\theta\).

\textbf{Trade-off 1:} In a hierarchical organization, the manager faces a trade-off between providing incentives and ensuring truth-telling from the supervisor.

\textbf{Proposition 3:} In a hierarchical organization, effort is unrelated to workforce diversity. Furthermore, when the Manager has to design an incentive compatible contract, incentives are revised downwards.

Manager’s profit in a hierarchical organization is

\[
\Pi^H = \frac{\beta^H}{c} - w_o - \eta\beta^H \sigma^2 - \frac{1-p}{p} \lambda\beta^H \theta
\]

\textbf{2.1.7 Diversity and the Shape of Organizations}

\textbf{Trade-off 2:} When deciding whether to rely on a supervisor, the manager balances the benefit of relying on better information and the cost of preventing collusion between the supervisor and the workforce.

\textsuperscript{10}The manager’s problem is fundamentally unchanged.
Chapter 2. Social Determinants of Hierarchies: A Model

The manager optimally decides whether to rely on a supervisor or not by comparing $\Pi^H$ and $\Pi^F$. Let $\Delta \Pi \equiv \Pi^F - \Pi^H$ and $\Delta \beta \equiv \beta^F - \beta^H$. Then,

$$\Delta \Pi = \frac{\Delta \beta}{c} - \eta (\beta^F \sigma_f^2 - \beta^H \sigma^2_e) + \frac{1-p}{p} \lambda (\beta^H) \theta, \quad \text{Incentive}$$

$$\Delta \Pi = \frac{\Delta \beta}{c} - \eta (\beta^F \sigma_f^2 - \beta^H \sigma^2_e) + \frac{1-p}{p} \lambda (\beta^H) \theta, \quad \text{Insurance}$$

$$\Delta \Pi = \frac{\Delta \beta}{c} - \eta (\beta^F \sigma_f^2 - \beta^H \sigma^2_e) + \frac{1-p}{p} \lambda (\beta^H) \theta, \quad \text{Supervisor}$$

The sign of $\Delta \Pi$ depends on the interaction of three effects. Namely, the incentive, insurance and supervisor effects.

As Figure 2.2 depicts, the sign of the incentive effect can be positive or negative and depends on the degree of diversity. When diversity is high, relying on the supervisor’s finer signal is very valuable and compensates the need to account for collusion.\(^{11}\) Consequently, the incentives given in a flat organization are lower than those given in a hierarchical one. That is, the incentive effect is negative. On the other hand, when workforce diversity is low, the incentive effect is positive. The reason is that in that case the supervisor’s informational advantage is less valuable and does not compensate the need to account for collusion.\(^{12}\) To sum up, as diversity increases, the incentive effect decrease and the manager will be more likely, ceteris paribus, to rely on a supervisor.

The insurance effect captures the cost of insuring workers against the riskiness of their wages. Ceteris paribus, this cost is higher in a flat organization because $\sigma_f > \sigma^2_e$. Furthermore, the relative exposure to risk, holding incentives constant, increases with diversity as $\sigma_f$ is increasing in workforce diversity.

Finally, given that the manager has to give a bonus to ensure truth-telling, relying on a supervisor cost has an added cost. This is what the supervisor effect captures.

Depending on this three considerations, the manager will decide the structure of the organization.

**Proposition 4:** The optimal organization structure is a function of workforce diversity. Higher diversity increases the value of relying on a hierarchical organization.

### 2.1.8 Diversity and Labor Productivity

**Proposition 5:** The relationship between diversity and effort is non linear and depends on the organization structure.

**Corollary:** Transplanting a flat organization into a highly diverse society will decrease productivity (and viceversa)

---

\(^{11}\)Technically, diversity is high when $\frac{K}{N} > \frac{K^c}{N}$ and it is low when $\frac{K}{N} < \frac{K^c}{N}$

\(^{12}\)The boundary condition (9) and the fact that $\beta^F$ is a continuous and monotonic function ensures that there exists a unique $\frac{K}{N}$ in the domain of $\frac{K}{N}$ such that $\Delta \beta = 0$
Chapter 2. Social Determinants of Hierarchies: A Model

Figure 2.2: The Incentive effect
Chapter 2. Social Determinants of Hierarchies: A Model

The relation between diversity and effort is institutionally mediated. In flat organizations, higher diversity leads to lower effort. In hierarchical organizations, diversity and effort are unrelated. The non-linearity results from the fact that as diversity changes the institutional optimal choice may also change. Finally, although empirically one may observe that hierarchical organizations are less efficient than flat organizations, transplanting less bureaucratic organizations to a highly diverse society may decrease efficiency substantially. In general, this shows how understanding the social determinants of institutions is essential and how damaging can transplantation of institutions be.

2.2 Conclusion

Workforce diversity decreases optimal incentives in flat organizations and multiplies the number of layers that firms and bureaucracies find necessary. Informational asymmetries resulting from cognitive processes such as categorization and stereotyping are behind this result. These have not only organizational effects but economic consequences as well. Studying the social determinants of organizations and institutions is essential to understanding the role of institutions in economic development. This model constitutes a first step towards this understanding and is extended in the appendix to consider, among other issues, the impact of diversity on the size of the firm.

As I show next, the extent of information asymmetries between managers and workers was very high in British India, and determined the heavy reliance on supervisors, also called jobbers, and, I will argue, subsequent failure of the industry to improve productivity. The next chapters discuss this historical case study and compare Japanese and British India labor market institutions and their evolution.

2.3 Appendix 1: Model proofs and derivations

2.3.1 Bounds on external supervision probability

The upper bound on external supervision is obtained by ensuring that when $\frac{1}{N_k} \to 0$, $\beta^F > \beta^H$. The lower bound on external supervision is obtained by ensuring that when $N_k = 2$, $\beta^F < \beta^H$. Merging both conditions one obtains:

$$\frac{1}{\sigma_e^2 + \sigma_\mu^2} > \frac{1}{\sigma_e^2} - \frac{1 - p}{p} \lambda \theta c > \frac{1}{\sigma_e^2 + \sigma_\mu^2 + \sigma_\mu^4}$$

(2.10)

Isolating $p$ one obtains condition (9) on the text.
2.3.2 Proof proposition 1

The worker optimally chooses \( a_i = \frac{\partial_k}{c} \). Given that \( \frac{\delta \beta \Gamma_k}{\delta N_k} > 0 \) and \( \frac{\delta^2 \beta \Gamma_k}{\delta N_k} > 0 \) the result follows.

2.3.3 Derivation of optimal contract in Flat organization

Because of the normal distribution assumption, the worker is effectively maximizing the utility of the certainty equivalent, \( e^{-\eta[\tilde{w}(a_i) - r a_i]} \)

Where

\[
\tilde{w}(a_i) = \alpha_k + \beta_k a_i + \gamma_k a_{-i} - \eta(\beta_k^2 \sigma^2 + \sigma^2) + \beta_k \gamma_k \frac{1}{N_k-1} [\sigma^2 + \sigma^2] + 2 \beta_k \gamma_k \frac{1}{N_k-1} \sigma^2
\]

Where

\[
\alpha_k = \text{w}(a_i) = \frac{\beta_k}{c}
\]

Worker \( i \) takes other workers’ effort as given, and the solution to his problem is:

\[
a_i = \frac{\beta_k}{c}
\] (2.11)

Using the reaction function of workers and reexpressing the IR constraint using the certainty equivalent wage, the problem of the Manager can be rewritten as:

For each \( k \) and each \( i \)

\[
\text{Max } \left( \frac{\beta_k}{c} - (\alpha_k + \frac{\beta_k^2}{c} + \gamma_k \frac{\beta_k}{c}) \right)
\]

s.t \( \tilde{w}(a_i) \geq w_o \)

that is, s.t

\[
\alpha_k = w_o - (\frac{\beta_k^2}{c} + \gamma_k \frac{\beta_k}{c} - \eta(\beta_k^2 [\sigma^2 + \sigma^2] + \gamma_k \frac{1}{N_k-1} [\sigma^2 + \sigma^2] + 2 \beta_k \gamma_k \frac{1}{N_k-1} \sigma^2))
\]

Plugging in and simplifying, the objective function becomes:

\[
\frac{\beta_k}{c} - w_o - \eta(\beta_k^2 [\sigma^2 + \sigma^2] + \gamma_k \frac{1}{N_k-1} [\sigma^2 + \sigma^2] + 2 \beta_k \gamma_k \frac{1}{N_k-1} \sigma^2)
\]

Taking FOC and solving the system of two equations and two unknowns, I obtain the solution under the flat organization.\(^{16}\)

\(^{13}\)Using the independence of the group and individual specific signal, and the iid assumption of individual specific signals.

\(^{14}\)Which optimally binds

\(^{15}\)\( \alpha_k \) is determined for a given reservation wage

\(^{16}\)\( F \) denotes the solution under a flat organization
γ^F_k = \frac{-\sigma^2_k}{\sigma^2_k + \sigma^2} \beta_k

\beta^F_k = \frac{1}{2\eta \sigma^2_k} \frac{1}{1 + \frac{\sigma^2_k H}{\sigma^2_k + \sigma^2(H)}}

2.3.4 Proof of proposition 2

Proof: \beta^{HH} = \frac{1}{2\eta \sigma^2_k} > \frac{1}{2\eta \sigma^2_k + \sigma^2_k} \frac{1}{1 + \frac{\sigma^2_k H}{\sigma^2_k + \sigma^2(H)}} = \beta^F

2.3.5 Derivation of optimal contract under Hierarchical Organization

SIC optimally binds, therefore: \( b = \frac{1-p}{p} \lambda (\beta + \gamma) \theta \)

The manager faces a tradeoff between providing incentives to the workforce and ensuring truth-telling from the supervisor.

The objective function of the manager becomes\(^{17}\):

\[ \frac{\beta}{\epsilon} - w_o - \eta (\beta^2_k \sigma^2_k + \gamma^2 \frac{1}{N-1} \sigma^2_k) \]

Taking FOC the solution follows.

2.3.6 Proof of proposition 3

Proof: It follows from \( \frac{\delta \beta^H}{\delta N_k} = 0 \) that effort is unrelated from workforce diversity in a hierarchical organization. Because \( \beta^H = \beta^{HH} - (1-p) \lambda \theta \frac{\sigma^2}{\sigma^2 + \sigma^2} \), it follows that \( \beta^H < \beta^{HH} \). That is, when the manager has to design an incentive compatible contract incentives are revised downwards.

2.4 Appendix 2: Model extensions

2.4.1 Diversity and the boundaries of the Firm

Does workforce diversity affect the size of the Firm? Does the firm expand intensively (hiring workers of groups present in the workforce) or extensively (hiring workers of groups not present in the workforce)?

The baseline model I assume that the size of the firm is given, and I study how diversity affects the shape of the organization. Crucially, I assume that the composition of the workforce is exogenous to the Firm. This may be a reasonable assumption on average and in the

\(^{17}\)Following the same steps as before and doing the pertinent substitutions
limit but not on the margin. That is, when deciding to incorporate an additional worker to the workforce, what group he belongs to may be important to whether he will be hired. Furthermore, it is essential to know who is recruiting that marginal worker.

**Case I: Flat organization**

Assume the current size of the firm is $N_o$ and let $N_a$ be the expanded size potentially undertaken.

If the manager does an intensive expansion, let’s assume he increases workers in every group in the same proportion, that is $\Delta N = K \Delta N_k$. Diversity of the workforce remains unchanged and the size of every given group increases. The size effect of the expansion gives an extra benefit to the Manager. This extra benefit\(^{18}\) is equal to:

$$\Delta \Pi^F_k = \frac{\delta \Delta H^F \delta N_k}{\delta N_k} = \frac{1}{K (N_k - 1)^2} [\gamma_k^2 \sigma_e^2 + \sigma_\mu^2] + 2 \beta_k \gamma_k \sigma_\mu^2$$

The benefit of intensive expansion is higher for managers when group noisiness is higher.

Assume that due to labor market conditions, Management has to expand extensively if wishes to expand. Adding a group to the workforce carries no extra benefit for the already hired workers and may imply a change in the organization structure. In particular, if group characteristics are such that group noise for this additional group is very high, or that the wished expansion is small enough, Management may decide not to undertake the expansion unless it changes the organizational structure. That is, $\Pi^H_{K+1} < 0$ but $\Pi^L_{K+1} > 0$ for the additional group. Hiring a supervisor may be optimal for the additional group but not for the workforce as a whole, as the organization was two-tier to start with. The cost of changing the organization of the firm may prevent the expansion from taking place, placing a limit on the size of non hierarchical firms. This depends on what type of expansion the manager is able to carry on, and on the level of diversity of the workforce to begin with.

Whenever possible, the Manager will prefer to expand the firm intensively. Doing so he is better able to insure workers against uncertainty and to provide higher incentives without changing the organization of the Firm.

**Case II: Hierarchical organization**

In a hierarchical organization, I assume it is the supervisor who decides on the expansion size and on who to hire. The supervisor will prefer to expand extensively: a more diverse workforce makes him more necessary for Management. If he cannot hire extensively, he will hire intensively up to the point where the Management would not need him anymore. That is, when diversity is very high, supervisors want to protect their information rent and will expand the size of the Firm only insofar this does not jeopardize their job.

There is no clear prediction about the relation between diversity and the size of the Firm. The reason for this ambiguity is that increasing the size of firm can be done by increasing, decreasing or without affecting the degree of diversity. Who hires workers, what is the initial level of diversity and labor supply conditions will define the relation.

Management will prefer to expand the firm intensively. If not possible, extensive ex-
pansion may not be carried on due to suboptimal changes in the organizational structure. In general, I predict that more hierarchical organizations are likely to be more elastic to a diverse workforce, while less hierarchical organizations are likely to be less elastic. *Insofar as increasing the size of the firm implies decreasing/increasing its diversity, flat organizations will be bigger/smaller and hierarchical organization will be smaller/bigger.* Finally, it may be optimal for the Management to separate hiring and supervising functions, despite the complementarities in information these two tasks require, to prevent exacerbating rent seeking attitudes from supervisors.

### 2.4.2 Endogenous manipulation

In the benchmark model I assumed that the extent of manipulation is exogenous and that it is costless. The only decision of the supervisor is whether to manipulate or not. What type of manipulation fits this description? What forms can manipulation take in general? The present extension explores the possibility that the supervisor chooses how much to manipulate, that manipulation is costly or costless, and that it may depend on the composition of the workforce. I analyze whether these possibilities affect the core predictions of the simple model. My preliminary conclusion is that they do not.

Some types of manipulation can be considered exogenous without much controversy. For example, whether or not a worker attended work is a dummy variable. But how late he arrived or how many hours he worked is not. In the historical case study, particular instances of manipulation include false attendance and timing issues including misrepresentation of extraordinary hours worked.

Consider the following testimony from Kazi Zahir-ud-din Ahmad, Kankinara from Calcutta, president of an association composed solely of mill operatives: "When say 2 hours’ overtime is wrought six hours are put in the book, two for the babus\textsuperscript{19}, two for the sirdar\textsuperscript{20}, and two for the worker for actual work. The mill has to pay for all these. A few exceptions are intentionally made. To ward off suspicion the babu generally puts less overtime than what has been worked against some workers..."

Costly and endogenous manipulation:

Assume that, as before, the supervisor may collude with the workforce to send a distorted signal. With probability $p$ there is an external inspection\textsuperscript{21} and the manager learns whether collusion took place or not. Let $b$ be the bonus per worker that the manager may offer to honest supervisors.

Let $\theta$ be the amount of distortion in the event of collusion such that the signal sent is

\textsuperscript{19}South Asian term of respect (meaning 'boss' or 'father')

\textsuperscript{20}In India, in Punjabi, Hindi and other Indian languages, the word often refers to a male follower of the Sikh faith. Often, the -ji is added to the word to denote respect, resulting in the word "Sardarji". The word may convey several meanings, often associated with military authority.

\textsuperscript{21}In the Indian case external inspectors visited the factories giving a statement on the causes of inefficiency.
$\hat{S}_i^J = S_i^J + \theta$. But now assume that the supervisor chooses $\theta \in \mathbb{R}_+$ balancing the marginal benefit and the marginal cost of manipulation. In particular, let $c(\theta)$ be a strictly convex function. That is, it is increasingly costly to manipulate the signal. Then the supervisor chooses $\theta$ such that $c'(\theta) = \lambda(\beta + \gamma)$ Assuming $c(\theta) = \theta^2$ we get $\theta^* = \frac{\lambda(\beta + \gamma)}{2}$. That is, the bigger the incentives given to workers, the higher the incentive to increase the amount of manipulation and bear its cost. Recall that the extra surplus generated, given the wage offered, is: $(\beta + \gamma)\theta$ and that $\lambda$ is the fraction of it appropriated by the supervisor.

To ensure truthtelling the bonus offered by the manager must satisfy the supervisor truthtelling constraint, given $\theta^*$ that is:

$$pb \geq (1 - p)\lambda(\beta + \gamma)\theta^* \quad \text{(SIC)}$$

such that $b = \frac{(1-p)\lambda^2(\beta+\gamma)^2}{p}$

The problem of the manager is fundamentally unchanged.

### 2.4.3 Diversity and discrimination

What if groups size differ?

Minorities receive lower incentives and consequently exert lower effort not because they are less able but because they are minorities and the cost of insuring them against uncertainty is higher.\(^ {22}\)

Under what organization structure is discrimination more likely?

The model’s answer is that de facto discrimination is more likely to take place in flat organizations. Further, the model predicts that minorities are less likely to be paid for performance as the cost of insuring them against group noisiness is higher than for majorities.

\(^{22}\)This framework may shed some light on the economics of discrimination debate
Chapter 3

The Jobber in British India Textile Industry: Evidence 1857-1947

It seemed surprising that to the jobber/worker what mattered more was not so much 'efficiency' as social skill.\(^1\)

Clark (1987) argues that the low labor productivity in British India textile mills cannot be explained by: “input substitution, and differences in technology, management, and workers’ training or inherent abilities do not explain this. Instead local culture seems to have determined worker performance.” Similarly, Wolcott and Clark (1999) argue that “The problem instead was one factor they could not change: the effort levels of Indian workers.” Nevertheless, as pointed out by Mira Wilkins, Clark’s analysis treats the firm as a black box. Among others, Wilkins (1987) suggests that “Perhaps labor was inefficient in less-developed countries because managers (domestic and foreign) did not know how to cope with (to manage) the differences.” In this chapter, I argue that managerial policies and worker’s effort levels were part of an equilibrium outcome that resulted from particular labor market institutions. More specifically, from the reliance on jobbers (recruiters and supervisors of the workforce). Information asymmetries between managers and workers, resulting from the high social diversity and colonial regime, were specially salient in British India and shaped the emergence and persistence of jobbers.

The chapter is organized as follows: First, I discuss the existing literature on the role of the jobber in British India textile industry. Second, I present the data sources and methodology used. Third, I provide new measures of diversity and organizational structure of the cotton textile industries in Bombay, Ahmedabad and Sholapur. I finally discuss managerial policies in these three centers and how they relate to the diversity and organization of their industry.

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\(^1\)Anonymous English observer. Cited in British India History of Science, Philosophy and Culture in Indian Civilization, Volume VIII
Chapter 3. The Jobber in British India Textile Industry: Evidence 1857-1947

3.1 Introduction

In 1854, the first cotton spinning mill was established in Bombay. Due to transportation advantage and moist atmosphere, Bombay province became the major mill center in British India. By August 1929 the province located 219 out of the 344 mills in British India. Mill building was undertaken by English, Parsee, Hindu, and Muslim managers. The three biggest cotton textile centers in the province were the cities of Bombay, Ahmedabad and Solapur. In 1925 they employed 149,609, 52,745 and 16,975 workers respectively. In 1934, Bombay lost predominance to the advantage of Ahmedabad while Solapur remained stable. By then, their cotton mill industries employed 95,367, 80,866 and 18,198 workers respectively. As many as fourteen other textile centers had developed a cotton textile industry, although none of them reached the 3000 workers cap.

Historians of British India textile industry have for long pointed out at the pervasive role of jobbers to explain overstaffing and inefficiency in the cotton textile industry. Tirthankar Roy (2008), suggests that the jobber had its roots in the traditional economy and represented an incorporation of the putting-out system and the authority of the headman. That is, it involved the application of a traditional authority in a modern setting. Throughout the 19th century, and beyond, it became an indispensable part of the labor organization in the mills, mines, ports, plantations in India and in tropical colonies. Similarly, Balachandran (1996) suggests that the jobber system was an extension of contemporary models of labor organization, such as the institution of village headman and the putting-out master-artisan relation. On the other hand, Morris (1960) suggests that it was the result of imitating old forms of recruitment in Great Britain and in New England. Bombay mills developed long after British and New England mills, at a time when these had transferred virtually all main recruitment from the foremen to management. He attributes this imitation to old methods to the linguistic barriers present in British India. According to Morris, the early labor force in New England was almost entirely native in origin and, like the employers, Yankee in background. Not until Irish migration after 1846 did cultural and social differences appear. Still, there was no linguistic problem. “Nevertheless, in Bombay there was an immediate linguistic problem arising from the fact that owners, managers and the first skilled workers spoke either Gujarati or English but not Marathi and thus were rather effectively cut off from efficient communication with the workforce.” Similarly, Lancashire was virtually empty before the Industrial Revolution. The bulk of the new proletariat was from the Celtic fringe, Ireland, West Scotland, and North Wales.

Why jobbers performed both supervisory and recruiting tasks in British India? Was the reliance on jobbers uniform across India and over time? How costly were jobbers? This chapter presents new quantitative evidence on the organization of mills and its relation to the social background of managers and workers in the three biggest textile centers in Bombay.

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2Report on an Enquiry into Family Budgets of Cotton Mill Workers in Sholapur City
3.2 Data sources and methodology

Data sources

I collected and digitized data from British India Censuses, General wage census, and other reports from the Labour Office. To construct measures of the social diversity of the population at the district and city level, I used the decennial Census of the cities of Bombay and the Census of Bombay Presidency from 1872 up to 1941. To assess social diversity within the cotton textile industry, I relied on the “Report on an Enquiry into Working Class Family Budgets in Bombay city” and similar ones for Cotton Mill Workers in Ahmedabad and Solapur during the 1920s and 1930s. I also relied on Census data to assess the social diversity of managers and jobbers for certain years and locations. To quantify the burden of jobbers in the organization of mills I relied on reports from the Labour Office in 1921, 1923 and 1925. In particular, I used “The Report on an Enquiry into Wages and Hours of Labour in the Cotton Mill Industry” for 1921, 1923 and 1925.

3.2.1 Methodology

I next describe how I construct the measures of diversity and how I quantify the burden of jobbers.

The diversity measure I use captures the probability that two randomly drawn individuals in a given location belong to a different group. Formally,

\[ \text{Diversity}_j = 1 - \sum_{ij} (\text{group}_{ij})^2 \]

where \( \text{group}_{ij} \) is the share of the population belonging to group \( i \) and \( j \) is the dimension along which groups are defined (religion, caste, language). Measuring social diversity, particularly in India, is, nevertheless, intellectually challenging. Furthermore, as individuals belong simultaneously to different groups that are not necessarily exclusive, these measures have conceptual limitations as well. For the purpose of the current enquiry, nevertheless, these measures are useful. They capture the diversity perceived by the colonial administration and its categorization of the social environment. Finally, I do not construct measures of

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3 Copies of the original sources are available in the appendix
4 The following quote from Amartya Sen in “The Argumentative Indian” illustrates the practical limitations of these measures “India is an immensely diverse country with many distinct pursuits, vastly disparate convictions, widely divergent customs and a veritable feast of viewpoints.”
5 For a discussion of this issue refer for example to “Identity and Violence” by Amartya Sen
Chapter 3. The Jobber in British India Textile Industry: Evidence 1857-1947

caste diversity of the population due to conceptual and practical limitations. I do provide measures of workforce diversity along caste divisions. In the Census of Bombay of 1871, more than 300 sub-divisions of castes are reported!

To quantify the burden of supervision, I compute the fraction of mill operatives, $M_i$, in a given production unit, $i$, that are jobbers, $J_i$. Formally:

$$\text{Burden}_i = \frac{\sum J_i}{\sum M_i}$$

(3.2)

3.3 The evidence

In this section, I present evidence that is consistent with the hypothesis developed in the model developed in the previous chapter. Namely, that more diverse workforce leads to more hierarchical organizations. In particular, I show evidence that, within Bombay province, textile centers with higher diversity had higher supervisory burdens. This is true both over time and disaggregated by occupation within the mills.

3.3.1 Social diversity and characteristics of the population

In this section, I discuss the social diversity and characteristics of the inhabitants of the cities of Bombay, Ahmedabad, and Solapur. Table 3.5 in the appendix summarizes the following discussion. The predominant religions in British India were Hinduism, Islam, Jainism, Zoroastrianism, Christianity, and Judaism. Religious diversity remained pretty stable over time. Bombay city and Solapur were the more and less religiously diverse cities respectively. Solapur had a predominantly Hindu population. Ahmedabad had higher proportions of Muslims and Jains than Solapur. Bombay had higher proportions of Zoroastrians and Christians than the other two cities. Regarding linguistic diversity, in 1911, the Census of Bombay specified as many as 22 different languages spoken in Bombay. Although districts were effectively defined along linguistic lines, linguistic diversity was very high in the cities of Bombay. Their polyglot character was largely due to the immigrant origin of their populations. Migrants were coming from a variety of locations. In 1881, the probability that two migrants into the city of Bombay came from different districts was slightly lower than nine out of ten, a cap that was attained in 1921. As for the bulk of migrants going to Ahmedabad, they were also a highly diverse group. In 1921, for example, the probability

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6In particular, 94 percent of the population in the Gujarat spoke Gujarati, 93 percent of the population in Konkan spoke Marathi and 89 percent in the Deccan spoke Gujarati as well. The extent of bilingual individuals was quite small. As late as 1931, out of the speakers of the main ten languages in Bombay city, 9.2 percent were bilingual while the rest spoke only their mother tongue.

7In fact, the proportion of the population born outside the city is a good proxy of linguistic diversity in urban centers.
that two randomly chosen migrants into the city came from different districts was three out of four. Migration flows were mainly the result of labor opportunities emerging in the cities, among others from the developing mechanized textile industry. These opportunities drove cities growth from 1891 up to 1941. Bombay city, characterized by the Census as a city of workers, remained the biggest city by far, followed by Ahmedabad while Solapur population size lagged behind.

The source of cities growth helps explaining their characteristics. Migration flows increased not only the city size but also their density, the proportion of foreign born and decreased the relative size of the female population. The number of female for every hundred males also indicates the extent of temporary migration, because temporary migrants were almost exclusively young adult male. The highest proportion of females in Solapur indicates that its population was much more stable, as the Census of the cities of Bombay 1911 pointed out “Sholapur operative is not a mere bird of passage during the slack season in this village but has come with his family to settle there for good.”

Finally, literacy rates and English literacy were higher in Bombay city, followed by Ahmedabad and Solapur that exhibited the lowest literacy rates. Literacy in urban centers was higher than in rural areas and varied along religious and gender lines.\(^8\) English literacy was much lower for all groups but improved over time. Excluding non Indian Christians, English education was commonest among Parsees, with 34.5 percent able to read and write in English. English literacy was smaller than average among Hindus and Muslims and about average among Jains. In 1911, it reached 1.7 percent of males and 0.3 percent females. By 1941, four percent of the presidency population were English literate. In Bombay city it attained sixteen percent of the population. Ahmedabad and Solapur also improved in that respect, but did not reach the five percent cap. Literacy differences may be explained, in part, by the age profile of urban centers. In Bombay city children and older people represented a smaller share of the population than in Ahmedabad and Solapur, as Table 3.11 in the appendix shows.

### 3.3.2 Social diversity of the working class

Table 3.1 provides diversity measures in terms of religion, caste and place of birth of the three cities working class. In Solapur, the working class was solely composed of cotton textile workers. In Ahmedabad, they represented ninety percent of factory workers as of 1934. Bombay working class was composed of both textile and non textile workers. As these measures show, and the narrative evidence discussed later confirms, Ahmedabad working class stands out as the most diverse. Although to a lesser extent, Bombay city working

\(^8\)The cities of Bombay literacy levels reached almost thirty percent among male population as soon as 1911, while the whole presidency counted seven percent of literate. Literacy rates were higher among men and among Christian and Parsee. Muslims followed by Hindus had very low literacy rates. Jains and Jews were in between.
class was also diverse and migratory in character. On the contrary, Solapur working class was local and relatively less diverse.\textsuperscript{9} The differences in the extent of diversity are notable. For example, going from birthplace diversity of 0.52 in Solapur to 0.66 in Ahmedabad can be interpreted as follows: If groups were equal sized, it would mean that Solapur workers were born in two different locations versus three in Ahmedabad. Under this assumption, birth-place diversity of 0.82 in 1933 in Ahmedabad would mean that workers were born in five different locations.

\begin{table}[h]
\centering
\begin{tabular}{|c|c|c|c|}
\hline
 & Bombay 1932 & Ahmedabad 1933 & Ahmedabad 1926 & Sholapur 1925 \\
\hline
Place-birth & 0.65 & 0.82 & 0.66 & 0.52 \\
Caste & 0.61 & 0.87 & na & 0.71 \\
Religious & 0.12 & 0.33 & na & 0.31 \\
Local\textsuperscript{*} & 62 & 49 & 80 & 93 \\
\hline
\end{tabular}
\caption{Diversity of the working class}
\end{table}

\textit{Diversity:} measured as the probability that two randomly chosen workers belong to the same group (defined along religious, caste or place of birth lines)


\textit{Note:} *Percentage of workers from the city’s district

Regardless of the diversity dimension considered, Ahmedabad working class was the most diverse.\textsuperscript{10} It is also the working class with a smaller proportion of workers born in the city’s district. In fact, three out of four families reported expenditures on traveling to and from their native place. The “Report on an enquiry into working class family budgets in Ahmedabad” of 1933 stresses the migratory character of its working class, “over three fourths of the industrial population of Ahmedabad is migratory in character.” The “Report on an enquiry into working class family budgets in Ahmedabad” of 1926 points out that unlike in Bombay and Solapur, there is not any one caste from whose member the bulk of the working class is drawn. No fewer than seventy different castes were distinguished among Hindu working classes. Chamars, Dheds, Thakerdas, Patidars and Waghris are said to be the predominant castes.

Similarly, the migratory character of Bombay’s working class is reflected by the fact that in 1933 no less than 84 percent of its population reported spending on traveling to and from their native place, yearly or more frequently. In that same year, the probability that two randomly chosen workers were born in different places was of two out of three. While the majority of workers were Hindus, they did not belong to a single caste. In particular, the

\textsuperscript{9} I include 1926 and 1933 for Ahmedabad because the city industrial expansion implied an increasingly diverse working class. Bombay city industry did not expand and to some extent decrease over the period while Solapur expansion was modest

\textsuperscript{10} The appendix includes the distribution of the cities working class according to caste and religion
probability that two randomly chosen cotton textile workers belonged to a different caste was of two out of three.

In contrast with the working classes of Ahmedabad and Bombay, Solapur’s workforce was relatively local and less diverse. In 1921 the Census Superintendent noted that “In the matter of birth-place Sholapur is not at all cosmopolitan inspite of its industrialized conditions. It draws its labour from the immediate neighborhood.” Similarly, the “Report on an Enquiry into Family Budgets of Cotton Mill Workers in Sholapur city” noted that this view was “...completely borne out by the results of the present enquiry. It will be seen that over 60 percent of the workers come from the City itself or the surrounding villages. A little over 32 per cent, hail from the Deccan, particularly from Hyderabad territory which is very close to the Sholapur district.” The report further emphasizes the contrasting condition with respect to Bombay city working class. “This proximity of the native places of the cotton mill workers in Sholapur is in contrast with the conditions in Bombay City.” In terms of caste, as many as twenty different castes were distinguished. Yet, Marathas represented the biggest share, in particular, forty percent of workers.

In light of the social diversity of the population and working classes of the cities of Bombay province, the following quotes acquire special relevance:

> It is also necessary that we realize the factory as something more than a place of employment, that has both a social and education background, that industrial establishments are social units\(^\text{11}\)

> It seemed surprising that to the jobber/worker what mattered more was not so much ‘efficiency’ as social skill\(^\text{12}\)

### 3.3.3 Organization and Diversity

Labor market intermediaries in British India cotton textile industry, also called jobbers, performed two tasks: recruitment and supervision. While the literature has widely discussed the figure of the jobber (Roy, 2008), no quantitative assessment of their importance over time and across space has been undertaken. This quantification is essential, nevertheless, to assess the importance of jobbers in the organization of mills. It is also needed to assess whether jobbers persisted and whether local conditions and not India’s uniqueness led to their reliance.

Table 3.2 provides new measures of the burden of jobbers, measured as the percentage of male mill operatives that are jobbers. Ahmedabad, the center with higher workforce diversity had the highest burden of supervision, followed by Bombay city and Solapur, which had both low workforce diversity and low burden of supervision.

\(^{11}\)Report 1950, P.Kanji Chairman

\(^{12}\)Anonymous English observer. Cited in British India History of Science, Philosophy and Culture in Indian Civilization, Volume VIII
Chapter 3. The Jobber in British India Textile Industry: Evidence 1857-1947

### Table 3.2: Burden of jobbers of Male Mill operatives

<table>
<thead>
<tr>
<th>Year</th>
<th>Bombay city</th>
<th>Ahmedabad</th>
<th>Solapur</th>
</tr>
</thead>
<tbody>
<tr>
<td>1921</td>
<td>4.6</td>
<td>5.6</td>
<td>3.8</td>
</tr>
<tr>
<td>1923</td>
<td>4.4</td>
<td>5.4</td>
<td>4.6</td>
</tr>
<tr>
<td>1926</td>
<td>5.1</td>
<td>5.8</td>
<td>2.8</td>
</tr>
</tbody>
</table>

**Burden of jobbers measure:** Percentage of operatives that are jobbers

**Source:** The Report on an Enquiry into Wages and Hours of Labour in the Cotton Mill Industry 1921, 1923 and 1926. In 1923 all mills are surveyed. In 1921, 99, 100 and 61 percent of mills were surveyed in Bombay, Solapur and Ahmedabad respectively. In 1926, these dropped to 25, 40 and 28 percent respectively.

These differences in the burden of supervision persisted over time and were not due to a different organization of production within the mills. Jobbers performed supervisory tasks and were consequently assigned to specific rooms. Table 3.3 shows the disaggregated burden of jobbers in specific production units within the cotton textile mill. Within production units, Ahmedabad consistently had higher burden of supervision than Bombay, and Solapur had the lowest.

### Table 3.3: Burden of supervision Male Mill operatives, 1923

<table>
<thead>
<tr>
<th>Production Unit</th>
<th>Weaving</th>
<th>R.Spinning</th>
<th>M.Spinning</th>
<th>Winding</th>
<th>Reeling</th>
<th>Warping</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bombay city</td>
<td>6</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Ahmedabad</td>
<td>12</td>
<td>5</td>
<td>9</td>
<td>6</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Solapur</td>
<td>7</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

**Burden of jobbers measure:** Percentage of operatives that are jobbers

**Source:** The Report on an Enquiry into Wages and Hours of Labour in the Cotton Mill Industry 1923 and 1926. In 1923 all mills are surveyed. R stands for ring, M. stands for mule

Workforce diversity was not the only determinant of information asymmetries within the mills. Managerial and jobbers social background also contributed to the extent of the latter. Table 3.4 provides measures of the diversity of workers, jobbers and managers. Ahmedabad had the highest workforce, jobbers and managerial diversity. As this paper hypothesis predicts, it is the city where the burden of jobbers was the highest. The contrary is true of Solapur.

The burden of jobbers measure captures the burden of supervision in terms of employment. To assess the direct cost of supervision, jobbers relative wages needs to be taken into account. In fact, jobbers wages were substantially higher than mill operative wages. In particular, in 1921 a jobber in Bombay costed 2.5 times as much the cost of an average male operative. In Ahmedabad, the relative cost was of 2 and in Solapur it was of 2.2.\(^{13}\) Consequently, jobbers represented 11 percent of the wage bill destined to pay operatives in Bombay city and Ahmedabad, and 8.36 percent in Solapur. That is, the direct cost of supervision captured

\(^{13}\)From “The Report on an Enquiry into Wages and Hours of Labour in the Cotton Mill Industry, 1921
supervision and not only the burden of jobbers was lower in Solapur, the city with lower workforce diversity.

Due to their key position between workers and managers, jobbers supposed indirect costs for the mills. These resulted from their ability to extract information rents, as the following quote reflects:

When say 2 hours’ overtime is wrought six hours are put in the book, two for the babus two for the sirdar, and two for the worker for actual work. The mill has to pay for all these. A few exceptions are intentionally made.

In addition to short term indirect costs, such as information rents, jobbers also supposed long term indirect costs. In particular, they separated managers from workers. This separation was blamed by authorities. “The reproach has repeatedly been made to the Bombay mill owners by Government and private investigators that they are out of touch with their workpeople” (Arno Pearse, 1930). Furthermore, it shaped managerial beliefs over workers aptitudes and their policies. The impact on managerial policies will be investigated in detail in the next section. The role of beliefs will be analyzed in the next chapter.

14 Kazi Zahir-ud-din Ahmad, Kankinara from Calcutta, president of an association composed solely of mill operatives. Babus and sirdar are different expressions for jobber.

15 Why then did Managers not anticipate the long term costs of relying on jobbers? Managers working in a colonial state may be particularly myopic. Furthermore, many British managers had short term appointments in India and had other duties to attend in England as the following quote illustrates: “some of whom are taking their turn of duty in India while the others attend to the firm’s affairs in London or elsewhere” (ibid.).
3.3.4 Managerial policies

Housing conditions and the provision of health services were much better in Solapur than in Bombay and Ahmedabad. More active policies from employers and a more gradual growth of its industrial population explain this fact.

In Bombay city, housing provision was highly done through informal channels, in the hands of jobbers or relatives. Overcrowding and bad housing conditions were described as paramount among the working class. Water supply and sanitation were deficient. Jobbers provided housing to newly arrived workers. Housing conditions in Ahmedabad were no better than those in Bombay, by virtue of absent employers policies and rapid industrial expansion. The Royal Commission on Indian Labour in 1930 described them as follows: “The areas occupied by the working classes in Ahmedabad present pictures of terrible squalor...badly built, insanitary, ill-ventilated and over-crowed, whilst water supplies are altogether inadequate and latrine accommodation is almost entirely wanting.” By contrast, housing conditions were much better in Solapur. Accommodation was more spacious and cheaper, as consequence of two factors. First, Solapur was less congested. Second, all mills in Solapur city provided housing for their employees. Similarly, health services provision varied across textile centers. By 1934, seventy percent of the mills of the province of Bombay that did not provide hospitals or dispensaries were located in Ahmedabad, while only seven percent in Bombay and none was located in Solapur. Not surprisingly, the following was said of Solapur workers “average cotton mill worker in Sholapur appears cleaner and more robust than his prototype in Bombay and Ahmedabad.” Clima\tic conditions, but also housing and welfare provisions from employers were said to contribute to the better shape of Solapur working class. Not surprisingly, by 1934, turnover rates were significantly higher in Ahmedabad and Bombay relative to Solapur.

The extent of separation between managers and workers surely contributed to the variation in managerial policies. In Solapur, where information asymmetries and reliance on jobbers was the smallest, managers implemented policies to improve their workers welfare. As the inquiry into managerial beliefs that I discuss in the next chapter suggests, managerial beliefs also shaped their policies. Furthermore, these beliefs were influenced by the diversity of the workforce.

3.4 Conclusion

In this chapter, I compared the organization of the cotton textile industries of Bombay, Ahmedabad, and Sholapur cities and the social background of their populations, managers and workers. I measured their diversity in terms of religion, ethnicity and birthplace. This new evidence sheds light on the role and determinants of jobbers. As the model in chapter

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\[16\] Report on an Enquiry into Family Budgets of Cotton Mill Workers in Sholapur city
one predicts, I find that textile centers with higher workforce diversity, namely Ahmedabad, had bigger supervisory burdens. The reliance on jobbers was an institutional response to informational needs. These in turn resulted into higher organizational costs and influenced managerial policies. Understanding the motives behind the institutional choice of British India managers contributes to understand the trajectory of these institutions over time and the persistence of low labor productivity. In the next chapter, I analyze the evolution of labor market institutions in British India industrialization processes and how it compares to the Japanese case.

### 3.5 Appendix

<table>
<thead>
<tr>
<th></th>
<th>Ahmedabad</th>
<th>Bombay</th>
<th>Solapur</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Population</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1891</td>
<td>144</td>
<td>821</td>
<td>61</td>
</tr>
<tr>
<td>1901</td>
<td>181</td>
<td>776</td>
<td>75</td>
</tr>
<tr>
<td>1921</td>
<td>271</td>
<td>1175</td>
<td>119</td>
</tr>
<tr>
<td>1931</td>
<td>310</td>
<td>1161</td>
<td>145</td>
</tr>
<tr>
<td>1941</td>
<td>591</td>
<td>1489</td>
<td>213</td>
</tr>
<tr>
<td><strong>Religious diversity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1871</td>
<td>0.47</td>
<td>0.54</td>
<td>0.4</td>
</tr>
<tr>
<td>1921</td>
<td>0.43</td>
<td>0.46</td>
<td>0.35</td>
</tr>
<tr>
<td>1931</td>
<td>0.43</td>
<td>0.5</td>
<td>0.37</td>
</tr>
<tr>
<td>1941</td>
<td>0.44</td>
<td>0.49</td>
<td>0.34</td>
</tr>
<tr>
<td><strong>City born</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1881</td>
<td>82</td>
<td>27</td>
<td>84</td>
</tr>
<tr>
<td>1911</td>
<td>64</td>
<td>20</td>
<td>81</td>
</tr>
<tr>
<td><strong>1911</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Density</td>
<td>21</td>
<td>43</td>
<td>10</td>
</tr>
<tr>
<td>Female</td>
<td>85</td>
<td>53</td>
<td>92</td>
</tr>
<tr>
<td>Literacy M</td>
<td>21</td>
<td>28</td>
<td>9</td>
</tr>
<tr>
<td>Literacy F</td>
<td>3</td>
<td>12</td>
<td>0.5</td>
</tr>
<tr>
<td>English Literacy M</td>
<td>2</td>
<td>10</td>
<td>0.7</td>
</tr>
<tr>
<td>English Literacy F</td>
<td>0.1</td>
<td>4</td>
<td>0.07</td>
</tr>
</tbody>
</table>

Table 3.5: Characteristics of the population of Bombay, Ahmedabad and Solapur

Sources: British India decennial Census  
Note: Population and density are in miles. Density is the number of persons per square mile. Females is the number of female per 100 males. Literacy is in percentages. M and F stand for male and female. City Born refers to those born in the city (percentage)

Religious diversity: Probability that two randomly chosen individuals belong to a different religion
### TABLE VI

<table>
<thead>
<tr>
<th>District and Met.</th>
<th>Bihar Number One</th>
<th>Bihar Number Two</th>
<th>Bihar Number Three</th>
<th>Bihar Number Four</th>
<th>Bihar Number Five</th>
<th>Bihar Number Six</th>
<th>Bihar Number Seven</th>
<th>Bihar Number Eight</th>
<th>Bihar Number Nine</th>
<th>Bihar Number Ten</th>
<th>Bihar Number Eleven</th>
<th>Bihar Number Twelve</th>
<th>Bihar Number Thirteen</th>
<th>Bihar Number Fourteen</th>
<th>Bihar Number Fifteen</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>11,000</td>
<td>12,000</td>
<td>13,000</td>
<td>14,000</td>
<td>15,000</td>
<td>16,000</td>
<td>17,000</td>
<td>18,000</td>
<td>19,000</td>
<td>20,000</td>
<td>21,000</td>
<td>22,000</td>
<td>23,000</td>
<td>24,000</td>
<td>25,000</td>
</tr>
<tr>
<td>2</td>
<td>21,000</td>
<td>22,000</td>
<td>23,000</td>
<td>24,000</td>
<td>25,000</td>
<td>26,000</td>
<td>27,000</td>
<td>28,000</td>
<td>29,000</td>
<td>30,000</td>
<td>31,000</td>
<td>32,000</td>
<td>33,000</td>
<td>34,000</td>
<td>35,000</td>
</tr>
</tbody>
</table>

Figure 3.1: British India Census 1901, Indian Office Records V.15.6.8 Part II
### Table No. IV.

**Average Earnings and Attendance in the Textile Cotton Industry in the Ahmedabad City Area.**

*(Figures for average monthly earnings are given in respect of only those occupations in which workers are paid on the monthly basis.)*

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Time or pieces</th>
<th>Number of workers</th>
<th>Percentage attendance</th>
<th>Average daily earnings</th>
<th>Average monthly earnings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process Operations,</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Head Jobbers—Spinning Side</td>
<td>T</td>
<td>199</td>
<td>23.4</td>
<td>2.13</td>
<td>23.71</td>
</tr>
<tr>
<td>&quot; Weaving Side</td>
<td></td>
<td>134</td>
<td>26.2</td>
<td>1.48</td>
<td>18.04</td>
</tr>
<tr>
<td>Jobbers—Spinning Side</td>
<td>T</td>
<td>10</td>
<td>22.2</td>
<td>7.52</td>
<td>90.24</td>
</tr>
<tr>
<td>&quot; Weaving Side</td>
<td></td>
<td>325</td>
<td>34.5</td>
<td>1.82</td>
<td>34.51</td>
</tr>
<tr>
<td>&quot; &quot; Women</td>
<td></td>
<td>273</td>
<td>31.6</td>
<td>1.19</td>
<td>22.99</td>
</tr>
<tr>
<td>Fancy Jobbers</td>
<td>T</td>
<td>1</td>
<td>86.3</td>
<td>0.14</td>
<td>1.85</td>
</tr>
<tr>
<td>Hemstitch Attendants</td>
<td></td>
<td>263</td>
<td>91.5</td>
<td>1.10</td>
<td>12.15</td>
</tr>
<tr>
<td>Erector Fitters</td>
<td></td>
<td>320</td>
<td>94.6</td>
<td>2.78</td>
<td>64.32</td>
</tr>
<tr>
<td>Opener Attendants—Men</td>
<td></td>
<td>260</td>
<td>92.8</td>
<td>0.14</td>
<td>1.59</td>
</tr>
<tr>
<td>&quot; Women</td>
<td></td>
<td>8</td>
<td>83.3</td>
<td>0.15</td>
<td>0.19</td>
</tr>
<tr>
<td>Informers</td>
<td></td>
<td>92</td>
<td>82.8</td>
<td>0.18</td>
<td>0.01</td>
</tr>
<tr>
<td>Single Machine Scatters—Men</td>
<td></td>
<td>284</td>
<td>99.9</td>
<td>0.15</td>
<td>0.10</td>
</tr>
<tr>
<td>Women</td>
<td></td>
<td>1</td>
<td>30.3</td>
<td>0.15</td>
<td>0.30</td>
</tr>
<tr>
<td>Two Machine Scatters—Men</td>
<td></td>
<td>53</td>
<td>93.3</td>
<td>0.16</td>
<td>0.90</td>
</tr>
<tr>
<td>Women</td>
<td></td>
<td>19</td>
<td>94.4</td>
<td>0.18</td>
<td>0.35</td>
</tr>
<tr>
<td>Thread Extenders—Men</td>
<td></td>
<td>13</td>
<td>98.3</td>
<td>0.32</td>
<td>0.42</td>
</tr>
<tr>
<td>&quot; Women</td>
<td></td>
<td>7</td>
<td>85.4</td>
<td>0.11</td>
<td>0.09</td>
</tr>
<tr>
<td>Strippers</td>
<td></td>
<td>129</td>
<td>94.6</td>
<td>0.15</td>
<td>0.19</td>
</tr>
<tr>
<td>Grinders</td>
<td></td>
<td>45</td>
<td>99.1</td>
<td>0.17</td>
<td>0.16</td>
</tr>
<tr>
<td>Flat Grinders</td>
<td></td>
<td>27</td>
<td>99.9</td>
<td>0.14</td>
<td>0.17</td>
</tr>
<tr>
<td>Lap Carriers</td>
<td></td>
<td>169</td>
<td>92.8</td>
<td>0.14</td>
<td>0.19</td>
</tr>
<tr>
<td>Carding Machine Attendants—Standard Types—Men</td>
<td></td>
<td>514</td>
<td>95.3</td>
<td>0.14</td>
<td>0.10</td>
</tr>
<tr>
<td>Women</td>
<td></td>
<td>2</td>
<td>100.0</td>
<td>0.14</td>
<td>0.00</td>
</tr>
<tr>
<td>Carding Machine Attendants—Efficiency System</td>
<td></td>
<td>21</td>
<td>95.8</td>
<td>0.14</td>
<td>0.16</td>
</tr>
<tr>
<td>Fly Collectors—Men</td>
<td></td>
<td>67</td>
<td>94.9</td>
<td>0.14</td>
<td>0.46</td>
</tr>
<tr>
<td>Women</td>
<td></td>
<td>13</td>
<td>94.0</td>
<td>0.14</td>
<td>0.00</td>
</tr>
<tr>
<td>Silver Lap Machinemen</td>
<td></td>
<td>23</td>
<td>98.9</td>
<td>0.14</td>
<td>0.33</td>
</tr>
<tr>
<td>Ribbon Lap Machinemen</td>
<td></td>
<td>22</td>
<td>99.9</td>
<td>0.14</td>
<td>0.33</td>
</tr>
<tr>
<td>Condenser Tenders</td>
<td></td>
<td>3</td>
<td>89.2</td>
<td>0.15</td>
<td>0.03</td>
</tr>
<tr>
<td>Needlers</td>
<td></td>
<td>6</td>
<td>92.1</td>
<td>0.11</td>
<td>0.09</td>
</tr>
<tr>
<td>Combing Van Boys</td>
<td></td>
<td>4</td>
<td>95.3</td>
<td>0.10</td>
<td>0.22</td>
</tr>
<tr>
<td>One Hand Drawing Tenders—Men</td>
<td></td>
<td>1,062</td>
<td>91.0</td>
<td>0.14</td>
<td>0.10</td>
</tr>
<tr>
<td>Women</td>
<td></td>
<td>29</td>
<td>90.1</td>
<td>0.13</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Figure 3.2: Example of Occupation Tables for Ahmedabad
# Chapter 3. The Jobber in British India Textile Industry: Evidence 1857-1947

## Table 3.6: Social origin of the working class, 1933 (percentages)

*Source:* Report on an Enquiry into working class family budgets in Bombay City, 1933

<table>
<thead>
<tr>
<th>Caste or Religion</th>
<th>Bombay city</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maratha</td>
<td>56</td>
</tr>
<tr>
<td>Bhandari</td>
<td>3</td>
</tr>
<tr>
<td>Agri</td>
<td>2</td>
</tr>
<tr>
<td>Padma-Sali and Koshti</td>
<td>2</td>
</tr>
<tr>
<td>Vani</td>
<td>1</td>
</tr>
<tr>
<td>Others excluding depressed classes</td>
<td>9</td>
</tr>
<tr>
<td>Mahar depressed class</td>
<td>13</td>
</tr>
<tr>
<td>Chamar and Mochi</td>
<td>4</td>
</tr>
<tr>
<td>Others</td>
<td>3</td>
</tr>
<tr>
<td>Muslims</td>
<td>5</td>
</tr>
<tr>
<td>Christians</td>
<td>1</td>
</tr>
<tr>
<td>Jews</td>
<td>0.3</td>
</tr>
</tbody>
</table>

## Table 3.7: Social origin of the working class, 1933

*Source:* Report on an Enquiry into working class family budgets in Ahmedabad city, 1933

<table>
<thead>
<tr>
<th>Caste or religion</th>
<th>Ahmedabad city</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patidar</td>
<td>10</td>
</tr>
<tr>
<td>Thakerda</td>
<td>10</td>
</tr>
<tr>
<td>Rajput</td>
<td>4</td>
</tr>
<tr>
<td>Waghri</td>
<td>4</td>
</tr>
<tr>
<td>Lavar and Lohar</td>
<td>2</td>
</tr>
<tr>
<td>Padmasali and Koshti</td>
<td>2</td>
</tr>
<tr>
<td>Garashia</td>
<td>2</td>
</tr>
<tr>
<td>Kumbhar</td>
<td>2</td>
</tr>
<tr>
<td>Maratha</td>
<td>2</td>
</tr>
<tr>
<td>Bhavasar</td>
<td>1</td>
</tr>
<tr>
<td>Thakore and Thakur</td>
<td>1</td>
</tr>
<tr>
<td>Others excluding depressed class</td>
<td>2</td>
</tr>
<tr>
<td>Vankar and Dived depressed class</td>
<td>1</td>
</tr>
<tr>
<td>Mochi and Chamar dep class</td>
<td>7</td>
</tr>
<tr>
<td>Bhangu dep class</td>
<td>1</td>
</tr>
<tr>
<td>Others</td>
<td>0.5</td>
</tr>
<tr>
<td>Muslims</td>
<td>18</td>
</tr>
<tr>
<td>Christians</td>
<td>1</td>
</tr>
<tr>
<td>Jains</td>
<td>0.6</td>
</tr>
</tbody>
</table>

35
### Table 3.8: Social origin of the working class, 1925

*Source:* Report on an Enquiry into Family Budgets of Cotton Mill Workers in Sholapur City 1925

<table>
<thead>
<tr>
<th>Caste or Religion</th>
<th>Solapur</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marathas</td>
<td>40</td>
</tr>
<tr>
<td>Padmasalis</td>
<td>7</td>
</tr>
<tr>
<td>Dhangars</td>
<td>8</td>
</tr>
<tr>
<td>Mahars</td>
<td>7</td>
</tr>
<tr>
<td>Kolis</td>
<td>3</td>
</tr>
<tr>
<td>Mochis</td>
<td>2</td>
</tr>
<tr>
<td>Lingayat, Vanis</td>
<td>2</td>
</tr>
<tr>
<td>Rajputs</td>
<td>2</td>
</tr>
<tr>
<td>Other castes</td>
<td>9</td>
</tr>
<tr>
<td>Muslims</td>
<td>19</td>
</tr>
<tr>
<td>Unspecified</td>
<td>0.2</td>
</tr>
</tbody>
</table>

### Table 3.9: Population of major cities in Bombay Presidency (in miles)

<table>
<thead>
<tr>
<th>City</th>
<th>1891</th>
<th>1901</th>
<th>1911</th>
<th>1921</th>
<th>1931</th>
<th>1941</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ahmedabad</td>
<td>144</td>
<td>181</td>
<td>214</td>
<td>271</td>
<td>310</td>
<td>591</td>
</tr>
<tr>
<td>Bombay</td>
<td>821</td>
<td>776</td>
<td>979</td>
<td>1175</td>
<td>1161</td>
<td>1489</td>
</tr>
<tr>
<td>Karachi</td>
<td>-</td>
<td>-</td>
<td>151</td>
<td>216</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Poona</td>
<td>126</td>
<td>120</td>
<td>127</td>
<td>164</td>
<td>198</td>
<td>258</td>
</tr>
<tr>
<td>Sholapur</td>
<td>61</td>
<td>75</td>
<td>61</td>
<td>119</td>
<td>145</td>
<td>213</td>
</tr>
<tr>
<td>Surat</td>
<td>109</td>
<td>119</td>
<td>115</td>
<td>117</td>
<td>99</td>
<td>171</td>
</tr>
</tbody>
</table>

### Table 3.10: Age distribution of urban population 1921

<table>
<thead>
<tr>
<th></th>
<th>-15</th>
<th>15-50</th>
<th>50-</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bombay</td>
<td>21</td>
<td>72</td>
<td>07</td>
</tr>
<tr>
<td>Ahmedabad</td>
<td>32</td>
<td>58</td>
<td>10</td>
</tr>
<tr>
<td>Sholapur</td>
<td>35</td>
<td>54</td>
<td>11</td>
</tr>
</tbody>
</table>

Table 3.10: Age distribution of urban population 1921
Chapter 4

Beliefs and Institutions in Japan and British India Industrialization

The reproach has repeatedly been made...Bombay mill owners are out of touch with their workpeople (Arno Pearse, 1930)

The first cotton spinning mill in Bombay was set up in 1854 and, a decade latter, the first one was erected in Isonohama, Japan. While managers in both countries were adopting identical foreign technology, their reliance on labor market intermediaries varied. In particular, British India managers externalized recruitment and supervision on labor market agents, also called jobbers, while Japanese managers only externalized recruitment. This initial institutional disparity set both industries in different institutional trajectories and shaped managerial beliefs on the quality of their workers. Why were Japanese managers able to decrease their reliance on intermediaries, and develop, while British India managers were not? In this chapter, I analyze the interplay between institutions and beliefs to understand the diverging industrialization experiences of Japan and British India. I apply Avner Greif (2006) framework to the study of institutions and argue that labor market intermediaries were a self-reinforcing institution in British India, while an undermining institution in Japan. Dealing with evidence from the early twentieth century, I analyze the beliefs of contemporaries on the causes of low labor productivity in British India Cotton Mills. I find that in British India the labor market was stuck in an inefficient equilibrium resulting from self realized cultural beliefs, to which agents were reacting optimally. Labor market institutions contributed to the formation and persistence of such beliefs. Understanding the interplay between institutions and beliefs in the adoption of foreign technology challenges culture based explanations of underdevelopment. It further provides new insights on the mechanisms behind institutional persistence.

This chapter is organized as follows: First, I apply the model developed in chapter one and Avner Greif (2006) framework to explain the heterogeneous institutional design and
trajectories of British India and Japanese cotton textile industries. Second, I present new systematic evidence on contemporaries beliefs on the causes of low labor productivity in British India. Third, I present evidence on the interplay between managerial beliefs and institutional dynamics.

4.1 The Institutions of Industrialization in Japan and British India

4.1.1 Institutional Design

In this section I apply the model developed in chapter one to understand the heterogeneous institutional response at the onset of industrialization in British India and Japan. I show that Japan and British India shared a number of essential features but had two key predetermined differences when they adopted the mechanized textile industry: their workforce social diversity and their state ideology. As a result, information asymmetries were much higher in British India than in Japan. As the model predicts, this led to a widespread reliance of supervisors within the mills in the former but not in the later, where management dealt directly with their workers.\(^1\)

At the onset of industrialization, Japan and British India were at similar developmental stages. Both were agrarian economies that had developed a traditional hand spinning and weaving industry over the centuries. In 1888 Japan, the contribution of manufacturing to GNP was 12 percent and by 1938, industry provided 28.7 percent of total employment (Hunter, 2003). In 1911, 13 percent of all working classes in Bombay Presidency were industrial workers (British India census, 1911). The following table compares essential features of both economies at the onset of industrialization.

In both countries managers faced similar fundamental challenges, namely how to attract, retain, and control an originally rural labor force. To attract workers to the mills, managers initially relied on labor-market intermediaries jointly with informal channels of recruitment. Expanding, but incomplete, transport networks, and illiteracy among potential workers were factors shaping this initial institutional response to the recruitment struggle in both countries. The recruiter acted as a channel of information and communication.\(^2\) Frequent abuses of his position generated complaints from the authorities and the public. As early as 1890, abuses where highlighted in the Japanese press and by authorities (Hunter, 2003) as well as in British India. The rural connection of their workforce meant that workers went back to

\(^1\) Hunter(2003) in Japan “in the textile industries intermediaries were rarely engaged in labour management.”

\(^2\) As Morris points out “in Bombay there was an immediate linguistic problem arising from the fact that owners, managers and the first skilled workers spoke either Gujarati or English but not Marathi and thus were rather effectively cut off from efficient communication with the workforce.”
Chapter 4. Beliefs and Institutions in Japan and British India Industrialization

<table>
<thead>
<tr>
<th></th>
<th>Japan</th>
<th>British India</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agrarian economies</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Hand weaving and spinning</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>First textile mill</td>
<td>1867</td>
<td>1854</td>
</tr>
<tr>
<td>Urban large scale</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Transport network</td>
<td>Developing and incomplete</td>
<td>idem</td>
</tr>
<tr>
<td>Female participation</td>
<td>high</td>
<td>low</td>
</tr>
<tr>
<td>Literacy</td>
<td>low</td>
<td>low</td>
</tr>
<tr>
<td>Unionization</td>
<td>1920s</td>
<td>1920s</td>
</tr>
<tr>
<td>Main imports from</td>
<td>Great Britain</td>
<td>Great Britain</td>
</tr>
<tr>
<td>Use of tariffs</td>
<td>low</td>
<td>low</td>
</tr>
<tr>
<td>State</td>
<td>Nationalism</td>
<td>Colonialism</td>
</tr>
<tr>
<td>Social diversity</td>
<td>low</td>
<td>high</td>
</tr>
</tbody>
</table>

Table 4.1: Japan and British India at the onset of industrialization

their villages regularly, resulting in low retention rates. Turnover rates in Bombay and Osaka mills were very high in the 1890s. The third challenge managers faced was how to control their workers. Although many have argued that Japanese workers were better by nature of their preferences and by virtue of their nationalist pride (Pearse, 1930), in 1898 Japanese employers perceived them as being illiterate, uneducated, and undisciplined (Hunter, 2003). Similarly, in 1903 American missionary Sidney Gulick observed that many Japanese “give an impression of being lazy and utterly indifferent to the passage of time”. In 1907 the majority of British India managers believed that low effort was a cause of low productivity, as an analysis of managerial opinions from Parliamentary Papers reveals. These beliefs influenced early managerial policies: poor working conditions and long hours of work were paramount in both countries’ incipient textile industries. The labor force was unprotected with respect of these conditions. In fact, unionization movements were slow to appear. In Japan, the first union appeared in 1916, while in the province of Bombay unionization emerged in the 1920s.

Two key distinctive features of these societies stand out. First, the social diversity of their population and labor force. Second, their state ideology. Social diversity of the population in Japan was much lower than in British India: “at the time of Restoration, in spite of internal dissensions, the people of Japan possessed an underlying sense of national unity which was the product of her geographical position, of linguistic uniformity and of her long history” (Allen, 1946) Japanese managers heavily and increasingly relied on young female workers. In the 1880s, 70 percent of cotton spinning workers in Japan were female and a few decades
later, in 1914, their share reached 80 percent (Hunter, 2003). They focused their recruitment on particular regions leading to “very high concentrations of workers from the same region in individual mills” (Hunter, 2003). In addition, the focus on the gender, age and agricultural background of workers acted as a homogenizing factor in employers’ perception of their workforce. According to Takahashi Kamekichi (1937), Japanese women workers “were an organic whole, consisting of the existence of many young, unmarried farmers’s daughters working.”

In British India, textile workers were mainly young adult men. In 1901, female workers were 25 percent of cotton spinning, sizing and weaving workers. A decade later, they were still less than a third of the workforce. In 1921, only 21 percent of cotton spinning factory workers in Bombay city were female (British India Census, 1921). This state of affairs persisted, as the following quote from 1933 illustrates: “Unlike such important textile centres as Lancashire and Japan, the bulk of the labour employed in the cotton mill industry of Bombay City continues to be male labour and only about 20 per cent of the total labour force is female.”

One of the reasons behind such a disparate gender composition of factory workers is the female labor force participation in both economies. Women participation in manufacture and agriculture was higher in Japan than in British India. While 57 percent of spinning and weaving workers in the traditional home industry were female, only 23 percent were so in factories in Bombay city in 1921. Japanese workers were also younger than their British India counterparts. They were mainly in their teens and early twenties. In 1921, Bombay city cotton textile workers younger than 18 represented only 11 percent of the workforce.

Two key questions arise. First, why did managers in British India not hire a single group of workers? The high turnover of the workforce at the onset of industrialization and the high search costs involved in finding workers as well as managers fear of workers cooperation limited their practical ability or willingness to discriminate workers. Consequently, the diversity of the population permeated the mill walls. And second, why did supervisors in British India not run the vertical structure? The lack of resources, the need to deal with the colonial power, and the need to have access to capital markets meant that the locally developed skills and information were of little use to manage the mills.

While Japanese managers perceived their workforce as an homogeneous group, British India managers often relied on stereotypes to note the existence of differences among the different groups they employed. For example, an inspector in Calcutta in 1907 was informed that “the up-countryman was a more careful worker.” These categorization processes are to be expected given the highly diverse British India society, as social psychology insights

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3 “Textiles employers, while sensitive in some respects to the different local backgrounds of their workforces, seem in some respects to have completely ignored it, assuming that all workers from agricultural backgrounds acted and thought the same” (Hunter, 2003)

4 The Report on an Enquiry into working class family budgets in Bombay city, 1933.

5 Report on an enquiry into the wages and hours of labour in the cotton mill industry, 1921.

6 Parliamentary papers 1907
predict, (Stangor, 2000):

social categorization is more likely to occur in situations that demand our cognitive resources, for example, when there is a lot of information about others available to be processed, a lot of different people to learn about, or are other things that need to be done at the same time (emphasis added)

In addition to the disparate labor force diversity in both countries, state ideology contributed to increase information asymmetries in British India. The contrary was true in Japan. In particular, the colonial state was a complementary institution to jobbers, as it crystalized social diversity in the systematic categorization undertaken in population census and its laissez-faire policies. These policies relied on establishing close relations with high castes in India at the local level, reinforcing its effective diversity. On the contrary, Japanese state policies fostered nationalism and reduced the reliance on labor market intermediaries. In 1750, Japan was a patchwork of baronies, militarily at peace but economically at war. Two hundred sixty separate domains were united under the suzerainty of the Tokugawa Shogun. During the middle of the 19th century, western powers established commercial treaties with Japan, opening its market to imports. The traditional Japanese warrior-elite, the samurai, rose to challenge. The new regime converted the alliance of competing fiefdoms into a unified industrial and imperialist state and involved a transformation of the peripheries into a Tokyo-centered national economy.

Consequently, information asymmetries were pervasive in British India while not in Japan, shaping the design and subsequent dynamics of labor market institutions. To understand institutional dynamics I rely on Greif (2006) methodology.

4.1.2 Institutional Trajectories

While labor market intermediaries persisted in British India they did not in Japan, where the cotton textile industry took the lead in implementing managerial changes during the interwar period (see Hunter, 2003, for a description).

Greif (2006) defines institutions as an interface between the rules of the game defining a concrete economic interaction and decision makers. This interface is necessary to generate a common cognitive system, information, and coordination. Institutions are, therefore, part of an equilibrium outcome. How do institutions change? To explain institutional dynamics, Greif introduces the concept of quasi-parameters. That is, features of the game that are exogenous in the short run, but endogenous in the long run. A self-reinforcing (undermining) institution is an institution that generates a regularity of behavior such that it is an equilibrium on a wider (smaller) set of parameter values than the initial parameter set. Therefore, as time passes the former is more likely to persist than the latter.

In British India, intermediaries persisted because they were a self-reinforcing Institution. In particular, the high diversity of the workforce that led managers to rely on supervisors, also
called jobbers, prevented direct communication between employers and workers, decreased the incentives of employers to learn about their workers characteristics, and made stereotypes more likely to be maintained.\(^7\) That is, the jobber effectively increased, or at least maintained, information asymmetries, making himself even more valuable to the manager.

In contrast, intermediaries were replaced in Japan by productivity enhancing institutions because they were an *undermining institution*. The small informational advantage of intermediaries prevented managers to rely on supervisors. This meant that as employers and workers became familiar with each other information asymmetries decreased. This allowed managers to introduce managerial changes that addressed each of the three basic labor-related challenges.\(^8\) Namely, they reduced the reliance on labor-market intermediaries in favor of more direct labor management policies. In particular, direct recruitment efforts spread during the interwar years and the number of registered recruiters decreased over time. Furthermore, managerial changes that improved retention and control of workers implied lower turnover rates, thus decreasing the need to recruit new workers. Better retention rates were also achieved, by increasing the involvement of women workers in contractual matters, and the use of monetary and non-monetary incentives. Turnover decreased substantially in Japan during interwar years while it remained high in Bombay.\(^9\) The development of the dormitory system in Japan was another innovation that contributed both to decreased turnover and to increased control over workers. It became a key element in the relation between employer and employee. It was the cotton spinning industry that most consistently promoted the dormitory system as an integral part of its labor management policies. In 1914, 76 percent of Japanese female cotton spinning workers were housed in company dormitories, an increase from 50 percent in 1890s. The percentage was 86 in 1948. By contrast, British India textile industry managers provided limited housing to their workforce. Jobbers did provide housing to newly recruited workers.\(^10\)

In Japan, absentee rates decreased among workers housed in dormitories. After World War I, integrated cotton spinning and weaving mills also improved their conditions. Dormitories improved living conditions and helped to reduce absenteeism and improve workforce satisfaction. Managerial changes were also aimed at improving the education of workers. While skill requirements were not very high for average textile operatives, they were seen as an element of labor control both by managers and by the state.\(^11\) By 1924 a labor force survey documents that two out of three Japanese female factory workers completed the standard six

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\(^7\) Chandavarkar (2007) argues that “by operating through the jobber system, these groups perpetuated their own position and tried to exclude other. In these ways, the caste, communal and linguistic differences were, in some measure, reproduced within the labour process.”

\(^8\) The three basic challenges were how to recruit, retain, and control workers.

\(^9\) In 1931 the Royal Commission on Labour in British India pointed out “continuous turnover of employees, many of whom may be entirely new to the particular factory and to its machines and methods of working”

\(^10\) Report on an Enquiry into working class family budgets in Bombay City 1933

\(^11\) “a tool for inculcating disciplined behavior and desired social values” (Hunter, 2003).
years of primary education (Hunter, 2003). The highly educated workforce that Arno Pearse observed in his trip to Japan was not the result of improvisation, but rather of managerial and state efforts. In British India education efforts remained limited. The interwar period also saw the improvement of worker health and safety as well as shorter hours of work in Japan. “By 1930 the large cotton firms had an estimated one doctor and five nurses per 1000 workers” (Hunter, 2003). Finally, organizational changes came hand in hand with changes in attitudes and opinions regarding the quality of workers. These managerial changes surely account for part of the productivity divergence between British India and Japan industries.

In 1929, Arno Pearse noted that

essential necessity for welfare work as a means for attracting labour from the country districts to the mills...The Japanese employers, by skillfull organization, have turned it into an advantage to themselves and to their operative. (emphasis added)

4.2 An Inquiry on Contemporaries Beliefs in British India

In addition to the labor market institutions, as I argue in the previous section, what other factors may have blocked organizational improvements in British India textile mills? One possibility is that British India managers considered that better policies would be useless, for example, if they believed that workers were lazy. In this section, I investigate contemporaries beliefs over the causes of low productivity in British India. To do so, I systematize the evidence from the Factory Labour Commission of 1907. I use the Indian Industrial Commission of 1916-18, the Royal Commission on Labour in India of 1929 and the Report of Conditions in the Textile Industry of India of 1927 to enrich and contextualize the evidence from 1907.\footnote{From the National Agriculture Library}

The appeal of this approach stands on the fact that to understand inefficient labor one needs to understand the views of those who could have get rid of it. It may well be that contemporaries were not aware of such inefficiency, or that inefficiency resulted from managers, owners, inspectors and operatives having different perceptions. I emphasize the analysis on managerial beliefs, as these are crucial in shaping their labor policies. Just as Orphanides (1997) analyzes historical monetary policy based on real time data, the present approach is to analyze workers’ inefficiency in British cotton mills based on real time beliefs and views of economic agents.

4.2.1 Sources and Methodology

I systematize the qualitative evidence contained in Parliament papers: Evidence taken by the Factory Labour Commission 1907-08 to asses the views of contemporaries regarding
labor inefficiency. Such evidence contains a total of 833 witnesses, from which 105 are inspectors, 3 are government official, 164 are managers or owners and 537 are operatives.\textsuperscript{13} I categorize contemporaries opinions in eight potential causes of low labor productivity. The concern of the Commissions regarding factory labor reveals that contemporaries were aware of labor inefficiency. For instance, the Royal Commission on Labour in India 1929 reports that “...the need for increased efficiency is generally recognized by all who have given serious consideration to Indian industrial conditions...” Since the evidence considered is qualitative (witnesses’ comments), I provide examples of such comments to illustrate witnesses views.

1. Effort decision: A coordination problem (H1)

“They had nearly half their staff Cawnpore men...and followed the example of the Delhi men, and became just as idle.” Rai Bahadur Lala Sheo Parshad, 1907 Delhi.

“...he considered that the overcrowding was largely the result of the idling habit.” Mr. J.D.F. Engel, 1st Inspector of Factories, Bombay.

The first hypothesis is that factories in India suffered a strong under-provision on effort from workers, resulting from overcrowding and worker’s free riding behavior.

2. Working culture: Social valuation of effort (H2)

“It is said that Indians as a nation do not understand the significance of the holy word “duty”, and this is particularly applicable to the Indian laborer.” Mr. B.A. Dessai, managing agent of the Jafur Alee Spinning and Weaving Company, Limited, Surat, Bombay.

The second hypothesis is that the overall Indian cultural attitude towards effort was low and prevented workers from being more productive.

3. Trade-off between consumption goods and quality of life (H3)

“...it was the rule in India that when a man had got more than sufficient for his bare subsistence, he left work” Mr. A.L Saunders, I.C.S, Commissioner of the Lucknow Division, United Province.

“...find easier occupation...even if he gets less money...earned sufficient for his month...” Mr. J.B. Sunderland, Cawnpore

The third hypothesis is that workers low productivity may be the result of individuals optimizing decision between quality of life and consumption goods. Low income individuals may have a lower substitutability between both, requiring huge increases of material welfare to compensate for decreases in the quality of life that factory work implies.

\textsuperscript{13} Represented by 15 witnesses on total.
4. Climate (H4)

“Some factories, indeed, suggest that they might have been constructed by cold weather visitors, for they show little respect for the sun in their orientation and elevation” Royal Comission on labour in India Report of 1929\(^\text{14}\).

“Because it was very hot, and the hands were not able to continue at work.” Rai Bahadur Lala Sri Krishn Das, Delhi.

“...idling habits of the workers were partly connected with the questions of temperature...” Mr. B.H. Saklatvala, manager of the Dinshaw Petit Mill, Bombay.

The fourth hypothesis is that the climate and working environment affected workers strength.

5. Human capital: health and education (H5)\(^\text{15}\)

“The physical development of children in India is bad.” Lieutenant-Colonel J.F Drury,I.M.S., Civil Surgeon, Howrah, Calcutta.

“...their physique, as far as I can judge, has not been affected by the present working hours.” Mr. B.H. Saklatvala, manager of the Dinshaw Petit Mill, Bombay.

“In India nearly the whole mass of industrial labour is illiterate, a state of affairs which is unknown in any other country of industrial importance.” Royal Comission on labour in India Report 1929\(^\text{16}\).

The fifth hypothesis is that British India workers had low human capital. I distinguish two elements of human capital: health and education (H5C). Indian workers may have poor health exogenously (H5A) or endogenously (H5B), that is, as a result of the work itself.

6. Long working hours (LH)

“...employers, who now complain of these dawdling habits of the workpeople. The long hours are really the cause of such habits, rather than the effect.” Mr. Bazanji Dadabhoy, Nagpur.

“I do not consider it necessary that the hours of adult males should be limited...” Mr. W.Dodoret, I.C.S.,District Magistrate of Ahmedabad.

“Operatives in England were more attentive to their duty, because they had shorter hours, and they could not expect the Indian worker to put as much zeal and energy into his work when he was employed for such long hours.” Mr. A. Rockley, Manager from Madras.

\(^{14}\)Page 54

\(^{15}\)I distinguish three subcategories

\(^{16}\)Page 27
The six hypothesis is that low productivity resulted from long hours of work. Witnesses’ comments in favor or against limiting long hours accounts for this hypothesis.

7. Working conditions (WC)

“The suffocating, impure and artificial atmosphere in the factory... cruel and inhuman.”
Mr. K.A. Keluskar, Secretary of the Maratha Aikyeckhoo Subba, Bombay.

The seventh hypothesis is that working conditions led to workers’ low productivity. Comments in favor or against improving working conditions, referring to hygienic accommodation (urinals, air improvement,...) account for this hypothesis.

8. Effort provision complain: discontinuous work (EPC)

The last hypothesis considered is that workers were lazy, independently of the number of hours worked or wages paid. Witnesses’ comments referring to workers individual effort provision, neither as a group nor as a nation feature, account for this hypothesis.

To categorize contemporaries opinions I construct a table with hypothesis (factors) as columns and witnesses as rows. Each cell can contain three values: 1 if the witness refers to the factor as explaining inefficient labor, 0 if the witness does not mention the factor or cannot say and -1 if the witness considers that the factor is not a source of inefficiency. The information contained in the tables is aggregated for each witness type (inspectors, managers, etc...) In addition, a constructed indicator, the Sum Sign Measure is discussed. This indicator captures the aggregate view on each factor for each witness type. A confidence interval to determine whether the Sum Sign Measure per type and factor is significant is constructed.

How reliable is the opinion contemporaries express? The British intervention in Colonial India took mainly the form of legislation. The enforcement of legislation was very unsuccessful, partially due to the lack of resources. This was common knowledge. Consequently, the views expressed by contemporaries in Parliamentary papers are likely to reflect the sincere opinion of contemporaries, given that the outcome of legislation would not be binding. Furthermore, the opinions were collected in India, where the influence of British officials in Great Britain was likely to be remote. The variety of opinions within each group shows how individuals felt free to express their opinion without being forced to sustain an official version of the facts.
Figure 4.1: All Witnesses
4.2.2 Findings

At the aggregate level, figure 4.1, the view that long hours caused inefficiency was the most popular one. Three quarters of witnesses agreed on that view, while fifteen percent disagreed. Six percent of witnesses did not express an opinion on this factor. The popularity of long hours is consistent with the fact that some years later, in 1911, a Factory Act was approved limiting the daily hours of work for textile factories to twelve hours. The view that health deterioration at work caused inefficiency was the second most popular one, even if fifteen percent of witnesses disagreed. Nevertheless, dropping Operatives (figure 4.2) changes the overall picture. This comes from the fact that operatives views are very homogeneous because they were expressed through representatives. Long hours are no longer overwhelmingly viewed as a cause of inefficiency. In fact, half of the remaining witnesses considered they were not. In addition, their view was that effort provision and cultural inclination explained inefficiency and they gave less importance to health.

The analysis on the views of each group of witnesses follows. The first result is that such views were heterogeneous. Based on this fact the first conclusion is that heterogeneous views on the causes of inefficiency was itself a cause of inefficiency. The second result is that the hypotheses that the economic agents (witnesses) considered as relevant are Long hours, Working Conditions, Human Capital and Effort Provision. They largely ignore the rest of hypotheses, and therefore no conclusion is drawn on their regard.

4.2.2.1 Governments

Only 3 witnesses belong to this group. Therefore, no conclusion on local and provincial governments views on the sources of inefficient labor is drawn. Figure 4.3 is included for completeness. The Factory Acts passed on 1881, 1891, 1911, 1922, 1923 and 1926, and that involved hour restrictions are more indicative of governments’ views than the present evidence. The existence of such acts reveals the concern of contemporaries about labor inefficiency and manifest the inability of private agents to coordinate among themselves to decrease such inefficiency. This fact will be more obvious as inspectors, managers, owners and operatives’ views are analyzed.

4.2.2.2 Inspectors

The inspectors’ view was that working conditions were the main cause of labor inefficiency (figure 4.4). Almost half of them considered it so. This is not surprising, as sporadic and external agents are more likely to focus on working conditions than those who permanently observe and work in such conditions. Surprisingly, inspectors do not reach the same consensus regarding health deterioration in the work place. This largely results from their lack of

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17See the appendix for the format of the tables and other details regarding the methodology employed in this section. Tables and original sources are available upon request.
Figure 4.2: All Witnesses except Operatives
Chapter 4. Beliefs and Institutions in Japan and British India Industrialization

Figure 4.3: Governments

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<thead>
<tr>
<th>Factor</th>
<th>Source of Inefficiency</th>
<th>Not Source of Inefficiency</th>
<th>No Opinion</th>
</tr>
</thead>
<tbody>
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<td></td>
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<tr>
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<td>Factor 5</td>
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</tbody>
</table>

50
Chapter 4. Beliefs and Institutions in Japan and British India Industrialization

Figure 4.4: Inspectors
consensus on the effect of long hours. Thirty-nine percent of inspectors considered that long hours affected performance negatively while forty-four percent considered they did not. The following comment, from an inspector from Nagpur, illustrates the views of the former ones: “the long hours are ..cause of such habits”. Nevertheless, this perception was far from unanimous, as mentioned before. Other inspectors considered that long hours and the overcrowding of factories were the consequence of workers’ habits and that hours should not be limited. Finally, almost one third of the inspectors considered work discontinuity (laziness) as source of inefficient labor, even if the rest of inspectors did not express an opinion about it. Human capital as a whole was not viewed as a source of inefficiency.
4.2.2.3 Managers and Owners

Almost forty percent of the managers and owners considered that the main source of inefficiency was effort under-provision among the labor force (figure 4.5). This is mainly attributed to a cultural low inclination towards work. In particular, twenty percent of the managers and owners considered that such cultural disposition explained inefficiency. Half of the managers and owners considered that long hours were not the source of inefficiency, while one third considered they were. Half of them rejected health deterioration in the work place as being a source of inefficiency. The majority of managers and owners did not consider that long hours were the cause of inefficient labor. They argued that shorter hours would represent a loss for them, since no better work could be expected from the operatives. For example, the managers from The Muir Mills Company, Limited, from Cawnpore, argued that “..shorter hours means less production:...machinery that production depends,..hand in India does not work any the more vigorously for shorter hours...”. In fact, managers such as Mr. H.R. Greaves, a firm’s partner from Bombay, argued that they overcrowded factories because of workers laziness: “Owing to the idling habit he was obliged to employ from 30 to 40 per cent more hands...”. Those arguing that long hours were the source of inefficiency were mainly referring to the benefits for the industry as a whole if such hours were shortened. They were demanding legal regulation to shorten working hours. Both facts reveal the inability of managers to improve efficiency by unilateral restriction of hours. Mr. Sorabi Cooverji, a factory owner from Bombay, argued that he could not restrict the hours owing to the competition of the other factories.” Comments such as “…beneficial to the industry in general” and “…can only be done..by legislation.”, from a manager from Bombay and from Mr. H.E.E Proctor illustrate this view.

In short, the majority of managers and owners took workers habits and quality as given, did not view long hours as source of inefficiency and opposed any limitation of working hours. Only a minority expressed the view that such habits and the ensuing inefficiency were in fact the consequence of long hours. Nevertheless, they could not attempt a unilateral reduction given others’ actions, as their demand for legislation measures reveals.

4.2.2.4 Operatives

Operatives’ evidence is reported either directly and anonymously or via a spokesman. This explains the homogeneity of their views in the evidence presented (figure 4.6). Operatives reached consensus on the view that long hours and health deterioration at work were the main sources of inefficiency. Much less overwhelmingly, workers preferences were also mentioned. Surprisingly, workers did not complain about working conditions while they did complain about climatological conditions. The following comments illustrate and summarize operatives’ understanding of the interaction between long hours, effort and earnings.

In particular, an anonymous worker from Bombay comments that “We understand...shorter hours will mean less earnings..., unless we work harder, but we are prepared for that.” And
Chapter 4. Beliefs and Institutions in Japan and British India Industrialization

Figure 4.6: Operatives
Chapter 4. Beliefs and Institutions in Japan and British India Industrialization

Cawnpore operatives argue that they “are all desirous that Government … restrict work to 12 hours. We would work harder and earn the same...”, reflecting their awareness of the need of external legislation to solve the inefficiency resulting from long hours.

4.2.2.5 The Sum Sign Measure

Table 4.2 summarizes the evidence discussed so far in a single measure: the Sum Sign Measure.\textsuperscript{18}

<table>
<thead>
<tr>
<th>Witness type</th>
<th>EPC</th>
<th>H1</th>
<th>H2</th>
<th>H3</th>
<th>H4</th>
<th>H5A</th>
<th>H5B</th>
<th>H5C</th>
<th>LH</th>
<th>WC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inspectors</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td>Governments</td>
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<td>0</td>
<td>0</td>
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<td>-</td>
<td>-</td>
<td>*</td>
<td>0</td>
<td>+</td>
</tr>
<tr>
<td>Managers</td>
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<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Operatives</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

Table 4.2: Qualitative sum sign measure: Witnesses views on why labor was inefficient

Note: * sum sign is significant (see appendix for details)

Overall view:
+ :Factor explaining inefficiency
- :Factor not explaining inefficiency
o :No opinion. (none of the witnesses expressed an opinion about the factor.)

Long hours and Health deterioration are by far the factors on which more significant results are drawn. Operatives’ and governments’ view was that long hours were a source of inefficient labor. On the contrary, Managers and Owners view (also significant) was that long hours did not explain inefficiency. Such opinion was shared by inspectors, although their view on that factor was not significant (that is, if all inspectors who did not express an opinion had considered long hours as source of inefficiency, the sign for such factor would have been reversed). Health deterioration in the workplace is the factor for which all views are significant. Inspectors’, Governments’, Managers’ and Owners’ view was that it was not a source of inefficient labor, while Operatives believed it was. It is worth noting that most of the witnesses link long hours and health deterioration. They argue whether such hours affected workers health negatively and so efficiency, or wether they did not. The rest of signs measures are not significant, as defined by our criterium, exemplified above and explained in detail in the appendix.

4.2.2.6 Conclusion

The analysis on contemporaries opinions reveals that heterogeneous cultural beliefs were an essential contributing factor to the low labor productivity. It prevented coordinated measures

\textsuperscript{18}see appendix for details
Chapter 4. Beliefs and Institutions in Japan and British India Industrialization

to be taken. Furthermore, it helps explain why British India managers did not introduce organizational improvements over time. As a majority of managers and owners took Indian workers’ propensity to effort and inherent quality as low and, perhaps more important, as given they implemented long working hours and overcrowded the factory. Workers reacted optimally to these working conditions, taking the number of workers, wages and hours as given, and exerted low levels of effort, confirming managers’ initial views. Such low effort resulted also from the physical strain that such hours supposed for workers. To overcome this bad equilibrium, a minority of managers, aware of the situation expressed the need for an outside regulation from the government. Neither single agent (manager or worker) could seriously attempt to unilaterally change their behavior and benefit from it.

I now discuss the evidence from the Indian Industrial Commission 1916-18, from Royal Comission on labour in India Report 1929-1930 and from Conditions in the textile industry of India 1927 by the United Textile Factory Workers Association. As some managers called for in 1907, in subsequent years several Factory Acts imposed restrictions on hours of work, as the Factory Act of 1911. In 1916-18, some years after the Factory Act of 1911 passed, there was still an unclear opinion among inspectors about their effect. The Indian Industrial Commission of 1916 concludes that “We are, therefore, hardly in a position to make any definite recommendation regarding the hours of employment...”. They did so on the basis that the were unable to determine whether some witnesses were right when arguing that “if the hours were reduced, workmen would still waste so much time as seriously to reduce the present rate of production.” In 1929 probably because of experience with shorter hours, the commissioners of Royal Commission on Labour in India 1929 stated as follows: “Suggestions were made to us by some witnesses that the limitation of 60 hours was not in the best interests of India and one or two employers advocated a longer week...these employers were not representative...twenty years ago strenuous opposition was offered to the principle, which was then novel, of limiting hours for men...we are satisfied that such limitations are desirable...” Further hours reduction followed and a new reduction of hours was under consideration. The Commission focused specially on the cotton textile industry because “...most important of the industries which still work most of their operatives for 60 hours a week.” In fact, employers in cotton mills were still arguing by the same lines as twenty years ago, that long hours were the consequence of workers’ idling habits. The Commission saw such habits as “... a form of self-defense” and they considered it an optimal reaction: “...their leisurely mode of work, counteracted to a considerable extent the evil results which would naturally follow from excessive hours.” The difference between nominal and actual work, as they pointed out “... mainly confined to the cotton mill industry.” They considered that “Shorter hours should supply both an incentive and an enlarged opportunity for raising the general standard of work.” Similarly, they claimed that “if there were cooperation between employers and employed, easy not merely to maintain but to increase the average production per operative employed.” Although legislation addressed the issue by restricting hours, which proved beneficial over time, further cooperation was needed among market
participants. The instability of the labor force and the existence of jobbers as intermediaries between them turned such cooperation into a tremendous challenge contributing to reinforce mental barriers.

4.3 The Interplay between Beliefs and Institutions

As the previous section shows, British India managers were blaming workers for the low labor productivity in the mills. How were these beliefs shaped and why did they persist over time? Were these beliefs related to the diversity of their workers? In Japan, managers initially held similar beliefs towards their workers but eventually revised them and introduced organizational improvements. This came hand in hand with a decrease in their reliance of labor market intermediaries, as discussed previously. How did the interplay between beliefs and labor market institutions influenced managerial policies and labor outcomes?

Although it may have been an optimal institution in the short run, jobbers reinforced the extent of information asymmetries by separating workers from managers. This separation allowed them to preserve their information rents. It influenced the formation of managerial beliefs, leading to the persistence of stereotypes and the development of prejudice, as the following quote reflects:19 “It is said that Indians as a nation do not understand the significance of the holy word “duty”, and this is particularly applicable to the Indian laborer.”20

In what follows, I briefly synthesize managers beliefs and analyze how they relate to the diversity of their workforce. I find that a majority of managers attributed the causes of low labor productivity to factors they could not change. More interestingly, managers of highly diverse workforce were the more likely to do so. Both findings shed light on the role of beliefs in explaining the persistence of jobbers and, in general, of institutions. I distinguish between exogenous and endogenous factors. That is, factors that managers could have not, or could have, changed with their policies. Figure 4.7 summarizes the information discussed next.

The majority of managers and owners attributed the causes of low productivity to exogenous causes. In particular, they took habits, inclination towards work and inherent worker’s quality as given. In particular, almost forty percent of the managers and owners considered that the main source of inefficiency was low effort levels. This is mainly attributed to a cultural low inclination towards work. In particular, twenty percent of the managers and owners considered that such cultural disposition explained inefficiency. Similarly, the majority of managers considered that endogenous causes did not explain low productivity. In

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19How do stereotypes change? Two approaches in social psychology offer different answers. From the cognitive approach, the information acquired via intergroup contact offers the best means of change (Hewstone and Brown, 1986). The collective and value-based approach identify the following indirect sources of learning stereotypes: language, mass media, and social norms and their change takes place via institutional change (Reicher 1986), leadership (Bartal 1989), and education.

20Mr. B.A.Dessai, managing agent of the Jafur Alee Spinning and Weaving Company, Limited, Surat, Bombay.
Chapter 4. Beliefs and Institutions in Japan and British India Industrialization

particular, half of the managers and owners considered that long hours were not the source of inefficiency, while one third considered they were. Half of them rejected health deterioration in the work place as being a source of inefficiency. The majority of managers and owners did not consider long hours were a cause of inefficient labor. They argued that shorter hours would represent a loss for them, since no better work could be expected from the operatives. In fact, managers mention that they overcrowded factories because of workers’ effort under-provision:

21 “Owing to the idling habit he was obliged to employ from 30 to 40 per cent more hands...”

Not only did managers exhibit beliefs that prevented them from undertaking organizational changes, but these beliefs are correlated with the diversity of their workforce. Managers of highly diverse workforce were particularly inclined towards attributing the causes of labor inefficiency to exogenous variables, such as the absenteeism and laziness of the workforce. In particular, no manager with a highly diverse workforce argues that low effort is not a cause of inefficiency. Approximately ten percent more of managers argue that low effort and culture explain inefficiency relative to the sample with low workforce diversity and the whole sample. Among the high workforce diversity managers, no manager argues that health problems, due to working conditions, are the cause of inefficiency. On the contrary, 13 and 9 percent in the low workforce diversity and full sample respectively argue it is so. With respect to long hours, half of the managers in the full sample argues it is not the cause of inefficiency, compared to 62.5 in the high workforce diversity sample and 40 percent in the low workforce diversity sample. In short, managers of highly diverse workforce are more likely to argue that exogenous causes explain low productivity. Similarly, they are the more likely to argue that endogenous causes do not explain low productivity. Despite the small size of the sub-sample, these results are remarkable. Furthermore, they highlight the role of beliefs in explaining institutional persistence. Managers of highly diverse workforce, and so with stronger incentives to rely on supervisors, were inclined to believe that inefficiency was the result of workers laziness and culture. Consequently, they were the less likely to undertake changes in the recruitment and management of the workforce and the more likely to continue relying on jobbers.

4.4 Conclusion

In this chapter, I argue that the spread of Industrialization was successful in Japan but not in British India because information asymmetries between managers and workers were pervasive in the later not in the former. Using the model developed in chapter one, I explain the heterogeneous institutional response in Japan and British India. Namely, the hierarchical organization of textile mills in British India, where middle managers, also called jobbers, were given and retained strong powers in labor relations. I apply Greif’s (2006)
methodology to explain why jobbers persisted in British India while Japanese managers implemented managerial improvements and came to dominate world textile markets. I find that jobbers were a \textit{self-reinforcing} institution in British India. I present newly collected evidence from Parliamentary papers on contemporaries beliefs in British India and find that managerial beliefs contributed to institutional persistence. They did so by attributing the causes of low productivity to factors they could not change. Furthermore, managers of highly diverse workforce, and so with stronger incentives to rely on supervisors, were the more likely to do so. Consequently, they were the less likely to undertake changes in the recruitment and management of the workforce and the more likely to continue relying on jobbers.

4.5 Appendix

4.5.1 Example of Summarized Tables per Witness

Governments:

<table>
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<th></th>
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<th>H1</th>
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</table>

Table 4.3: Governments

Legend:
N.: Number of
CCI: Constructed Confidence Interval
WEO: Number of Witnesses expressing opinion
TW: Total number of witnesses
P.: Proportion of
A.P: Adjusted Proportion, relative to WEO

All proportions are rounded up to two decimals.
### 4.5.2 Tables Format

<table>
<thead>
<tr>
<th>Witness</th>
<th>Location</th>
<th>WT*</th>
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<td>1</td>
<td>-1</td>
<td>-1</td>
<td>-1</td>
</tr>
</tbody>
</table>

Table 4.4: Tables format (extracted from the actual tables)

*Note: *WT*: o-Governments, 1-Operatives, 2-Inspectors, 3-Managers and Owners

**Cell values:**
- 1: Factor viewed as explaining inefficiency
- -1: Factor explicitly not viewed as explaining inefficiency
- 0: No opinion or ambiguous

### 4.5.3 Sum Sign Measure

Sum Sign Measure (SSM) is an indicator of overall opinion for a given witness type and factor. It can be positive, negative or null. Formally,

\[ SSM(i_k, j) = Sign \left( \sum_i (X_{ikj}) \right) \]

where \( i = 1...N_k \) and \( X_{ij} \epsilon (-1, 0, 1) \) for witness type \( k \) and factor \( j \).

Rationale: All witnesses’ opinions \( X_{ikj} \) have the same weight and we consider a factor to be viewed as source of inefficiency (or not) by a whole group if the majority of the group thinks so. The indicator follows a majority voting rule principle. We consider it an appropriate approximation given that we deal with qualitative evidence. We narrow down any conclusions based on it using a constructed confidence interval, that we discuss in detail next.

### 4.5.4 Constructed Confidence Interval

The Constructed Confidence Interval (CCI) is calculated as follows for factor \( j \) among witness type \( k \):

\[ CCI_{k,j} = [\sum_i (X_{ij}) - (\sum_i |X_{ikj} = 0|), \sum_i (X_{ij}) + (\sum_i |X_{ikj} = 0|)] \]

Rationale: A zero value in the tables means that the witness did not express an opinion
on the factor. It could be that he thought it was positive or negative but did not say it. The interval gets bigger (smaller) as the number of unexpressed opinions increase (decrease). A significant sum sign is one that would still conserve its sign, no matter what those who did not expressed their opinion believed.
Figure 4.7: Managerial beliefs and workforce diversity
Chapter 5

Conclusion

5.1 Contributions of this thesis

This thesis has proposed an alternative hypothesis to improve our understanding of the relation between social diversity and economic growth. Namely, that social diversity affects the extent of information asymmetries economic agents face in their interactions. I have analyzed the implications of this hypothesis modeling how workforce diversity affects the design of contracts and organizations. The main finding is that workforce diversity decreases the incentives given in principal agent interactions and multiplies the number of layers bureaucracies find necessary. Furthermore, the relation between diversity and productivity is institutional dependent. Stressing that institutions are endogenous not only to the technological but also to the social environment, I have analyzed the industrialization of India and Japan at the beginning of the XX century. I collected Census data, Parliamentary papers and Labour Office reports to provide evidence consistent with the main implications of the model. Namely, jobbers emerged and persisted in British India as a response to the cognitive challenge that colonization and social diversity imposed on labor market agents. Better positioned to recruit and supervise workers, jobbers extracted information rents that curbed the incentives given from managers. Labor market intermediaries did not persist in Japan, where the workforce was culturally homogeneous and where state policies and nationalism eroded their power. The present research sheds light on the nature of institutions, their dynamics and the role of the firm as a development actor. It contributes to understand a vast array of relevant issues for the welfare of human beings. At the macroeconomic level, this research will foster the understanding of economic development and will enrich our understanding of the impact of colonization. At the microeconomic level, emphasizing the interaction between social characteristics and the design of contracts and organizations may contribute to understand the nature of the firm. In our increasingly globalized world, these have notable public policy and business implications. At the public policy level, these questions have direct implications for migration related policies, labor market regulations
such as positive discrimination and the use of quotas, the design of foreign aid programs and the fight against corruption oriented institutions, among others. At the business level, it may help guiding business expansions and the design of subsidiaries in new markets and environments.

5.2 Directions for future research

This thesis research opens the following directions for future research projects. They have in common an emphasis on understanding the determinants of institutions and their impact on economic performance. I next discuss each of the five research projects that are part of my current research agenda.

5.2.1 Beliefs and Institutional Persistence

One of the hypothesis of the current thesis is that managerial beliefs were shaped by the hierarchical organization of cotton textile mills. Furthermore, these beliefs contributed to the persistence of this organizational form. More broadly, one of the most fascinating questions in institutional economics is to understand institutional persistence. To this end, Avner Greif (2006) developed the concept of quasi-parameters. These are features of a game that are given in the short run but are endogenous in the long run. This concept is useful to explain why institutions persist, that is, remain an equilibrium, or do not. Yet, institutional dynamics is generated in an ad-hoc fashion, given that institutions are defined as equilibrium outcomes. In this project, I wish to contribute to explain the mechanisms behind institutional persistence. To do so, I analyze the role of managerial beliefs and how their updating process is a function of the institutional environment. In particular, I model how hierarchical organizations are more prone to persist because they slow down the belief updating process of the principal. I use concepts such as credibility and correctness developed by Moscarini (2007) and Morris (2003).

More concretely, I envision a dynamic version of this thesis model, where the principal agent interaction is characterized by both moral hazard and career concerns. If the principal has some initial biased belief over workers ability, and relies on a flat organization, he will update his beliefs after every period using his own information. If he relies on a supervisor, he will update his beliefs using the supervisor communication of the signal. If the manager initial bias is high enough, the supervisor may want to distort the signal he sends in order to be credible. This credibility concern may slow down the manager’s belief updating process and lead to suboptimal career concern policies. In this way, hierarchical organizations may be more prone to persist because intermediate layers have incentives to transmit information that is consistent with managerial beliefs. In fact, the case of the US South textile industry in the 1960s is illuminating. As Minchin (1999) points out, supervisors were blocking the
integration and promotion of black workers into the workforce. This certainly contributed to the persistence of racial discrimination up until the civil rights act movement became stronger. “The attitudes of supervisors were crucial because the company relied upon information from them when it drew up its affirmative action program”. These attitudes were close to those of management: “It was supervisors who told...no “promotable minority employees”” and “Management made similar claims”.

5.2.2 Leadership meets Culture: Multinational’s Subsidiaries CEOs

This thesis studies the spread of industrialization, and its leading industry, the cotton textile industry. A major appeal of doing so is that virtually all textile industries in the world used the same machinery and, when needed, imported technicians. Managers traveled across oceans to run mills far from home, becoming predecessors of today’s multinationals CEOs. In British India, firms faced a dual informational need. Upwards, towards the technicians and colonial rulers, and downwards, towards the culture of a highly diverse population and workforce. More generally, international firms are increasingly concerned with the decision of who is going to manage business expansion, and the concept of managerial cultural competence is becoming common. According to Black et al.,(1999) the expatriate failure rate of US managers returning home prematurely is estimated between 40 and 55 percent, involving significant cost to US firms, ranging from 250,000 to 1 million per occurrence (Hill, 2001). In this project, I analyze the determinants and consequences of Multinational’s choice of their subsidiaries CEOs and their entry related decisions in foreign markets. I find that multinationals have to choose between who is the best leader and who is the best supervisor. This choice depends on the relative importance of corporate culture and the cultural distance between the host and the parent country. The paper is organized as follows: First, I motivate this research by presenting examples of blunders in international business, based on Ricks (1999). Second, I model multinationals choice of their subsidiaries CEOs and the trade-off they face in terms of leadership and culture. To do so, I extend Hermalin (1998) model of leadership. I analyze multinationals entry decision in a given market and how their entry mode may affect the pool of managers from which they can choose. I finally present a definition of what a cross cultural competent manager is based on the model’s framework. Third, I analyze dynamic aspects of multinationals choice, such as manager’s training, reputation and learning. I finally discuss how these choices may affect investment in human capital in the subsidiaries location and their economic development. These issues have consequences for guiding today’s business expansion and for economic development.

Who Should Manage Business Expansion?

A precarious balance seems to exist between the number of foreign managers and the number of U.S managers needed for a successful operation. Imperial-Eastman
experienced problems by relying too heavily on inexperienced local managers, but General Electric encountered troubles by its placement and retention of U.S employees in most managerial positions.¹

In this section, I analyze a multinational choice of its subsidiary CEO. To do so, I extend Hermalin (1998) static model of leadership. I present the key trade-offs faced by multinational firms along two related dimensions: leadership and culture. I use information-based definitions of these dimensions. Business expansion always involves an exchange of information from the headquarter to the subsidiary. When deciding who to chose as CEO of the subsidiary, the headquarter must evaluate the cost of transmitting information on the value of the project but also the cost of understanding the culture of the subsidiary’s environment, that is, on acquiring information on the cost of executing the project. Because the CEO of the subsidiary must design the project with its workforce and supervise its execution, leadership meets culture. That is, when choosing who will be the CEO Multinational Firms face a trade-off between who is the best leader and who is the best supervisor.

Definitions


Leadership: A Leader is someone who induces a voluntary following.

I take the economics point of view that followers follow because it is in their interest to do so. One of the reasons this may be so is that they believe that the leader has an information advantage and they are convinced he will not fool them. Convincing its followers will, if interests are not perfectly aligned, be costly to the leader. The leader can signal information either by giving or by doing, that is, can lead by sacrifice or by example. Why is it conceptually sound to consider Leadership and this definition in particular, for the study of Business Expansion Managerial decisions? Business expansion involves exchange of Information from the Headquarter(HQ) to the Subsidiary. The HQ would like to transmit information relevant to the value of the project(from corporate culture to technological aspects of the it, among others). In order to do so the HQ may wish to make payments that signal this value, that is, lead by sacrifice. Alternatively, the HQ may decide to send a manager from the HQ as CEO of the Subsidiary. Because of its physical presence, he can expend effort before the rest of the subsidiary’s workers, that is, he can lead by example. The decision of who must manage the expansion is, therefore, partially linked to the decision of how to transmit information on the value of the project. The assumption in Hermalin(1998) that the leader may or may not be able to expend effort before its followers find a natural real world analogy in the choice of the Subsidiary CEO.

Culture: The knowledge relevant for the execution of a given project in the country where the business expansion is taking place.

¹David A. Ricks “Blunders in International Business”
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The reason to label this definition as culture and not as information is because to execute the project successfully the HQ must not only know the economic environment they enter but also understand the preferences, norms and dispositions of its people.

The structure of the Game

I now describe the structure and timing of the game.

Stage O: Nature. Nature chooses two productivity parameters, one relative to the HQ and the other relative to the potential subsidiary.\(^2\)

Stage I: Entry Decision. HQ choose if expand or not (install a subsidiary).

Stage II: CEO Appointment. If decides to expand, the HQ appoints the CEO of the subsidiary. To do so the HQ can use internal promotion or external hiring. We call the former an expatriate and the latter a local CEO.

Stage III: Production. Production process takes place in the subsidiary: "project design" stage followed by "execution" stage.

Stage IV: Payoff realized

Basic Assumptions

Technology

Let V be the total value of production in the subsidiary. Let D and X denote the contributions to V from the design and the execution stages. Let \( \theta \) and \( \lambda \) be productivity parameters related to these processes respectively.

There are \( N_d \) and \( N_x \) identical workers in the design and the execution stages respectively. Let \( e_n \) denote the effort of worker n. Each worker works in only one of the stages.

A1: \( V = F(D, X, \theta, \lambda) \) s.t \( F_i > 0 \) for \( i = D, X, \theta, \lambda \). In words, improvements in design and execution, as well as higher productivity parameters in either stage, increase the value of the subsidiary’s production.

A2: \( F_{DX} > 0 \) or \( F_{DX} < 0 \) or \( F_{DX} = 0 \). The design and execution stages can be complementary, substitutes or independent.\(^3\)

A3: Team production technology: \( D = \sum_{n}^{N_d} \theta e_n \) and \( X = \sum_{n}^{N_x} \lambda e_n \)

A4: The CEO in the subsidiary exerts effort in the design stage but not in the execution stage.

Information

A5: \( \theta \in [0, 1] \) and \( \lambda \in [0, 1] \). The former can be interpreted as HQ corporate culture and the later as the local culture.\(^4\)

A6: The expected values \( E(\theta) \) and \( E(\lambda) \) are common knowledge.

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\(^2\)The assumptions on who observes those follow in the next subsection

\(^3\)Different functional forms will be assumed as required.

\(^4\)From now on local refers to the location of the subsidiary.
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A7: The realization of $\theta$ is only known to the workers of the HQ. To be sure, if the CEO of the subsidiary is an expatriate, that is, chosen via internal promotion, he knows $\theta$.

A8: The realization of $\lambda$ is only known to the local workers. To be sure, if the CEO of the subsidiary is chosen from the local labor market, he knows $\lambda$. If he is an expatriate he ignores $\lambda$.

A9: D and X are verifiable.

A10: $e_n$ is unobservable for all n in either team. Efforts are simultaneously provided, except when I explicitly say on the contrary. Simultaneity of efforts is equivalent to workers not observing each others effort prior to their own decision.

Preferences

Workers in either team are identical and enjoy utility: $w - d(e)$ where $w$ is a wage and $d(.)$ is an increasing, convex and thrice differentiable function s.t $d(0)=0$, $d'(0)=0$. I assume $d(e)=1/2e^2$ and I normalize reservation utilities $U_r$ of every worker to zero. 5

Contracts in Design Team

A contract in the design team is a set of contingent wages $w_n(D,\hat{\theta})$ for all $n\in N_D$ where $\hat{\theta}$ is the announced value of $\theta$. I restrict attention to renegotiation proof and feasible contracts, that is, such that $\sum_{n}^{N_D}w_n(D,\hat{\theta})=D$ and $\sum_{n}^{N_X}w_n(X,\hat{\lambda})=X$. I assume that each worker holds the same beliefs on $\theta$ conditional on the announcements. By proposition 1 on Hermalin(1998) this allow me to consider only affine shares contract. I restrict contracts to be equal shares contract. I do so because the Design Value is likely to be nonmonetary or indivisible.

Contracts in the Execution Team

A contract in the execution team is a set of contingent wages $w_n(X,\hat{\lambda})$ for all $n\in N_X$ where $\hat{\lambda}$ is the announced value of $\lambda$.

An example of these different stages and the type of information they require is captured in the following quote from of General Motors blunder in one of its operations in the middle east: “General Motors of Canada experienced major technical problems with one of its cars in Iraq. It shipped 13,500 Chevrolet Malibu automobiles there only to discover that the cars were mechanically unfit for the hot and dusty climate. Iraq refused delivery of the remaining 12,000 autos, which had been ordered, until GM modified the vehicles so that they performed more reliably. GM tripled its number of engineers and mechanics in Baghdad, but by the time the company figured out the supplementary air filters and different clutches would eliminate the mechanical failures, it began to encounter political problems. Thus 12,000 automobiles specially designed for desert driving collected snow in Canada while GM waited for the political dust to settle.”

5These assumptions satisfy condition (1) on Hermalin(1998)
Local CEO: Send the Recipe and the Ingredients

It may be wise to hire most, if not all, top-level managers of the foreign subsidiary from the available host country management pool. Not only will these individuals project a more local image, but also they usually understand local problems well and can often help the company avoid blunders.

What are the consequences of relying on local managers? Is it wise to rely on them rather than on expatriates as the quote argues? By assumption, the local CEO knows local conditions $\lambda$ but ignores the corporate culture and other technical aspects related to the design of the project, $\theta$. Note that this information structure implies that the local CEO is a boss, not a leader, in the design stage.

Design Stage

In the design stage, the Local CEO has the same knowledge as the rest of workers in the subsidiary, and provides effort at this stage. There is, therefore, no real distinction between him and any other worker at this stage. This is an example of how leadership is something different from formal authority. Given that the HQ have chosen a local CEO they have two options to influence the outcome of the design stage. First, they can send information about the value of the project, $\hat{\theta}$, what I call “send the Recipe”. Because higher value leads to higher individual effort, the HQ have incentives to fool the workers. Anticipating this workers will optimally disregard any announcement made by the HQ. To convince workers, HQ may transfer payments to the design team workers to convince them they are being truthful. That is what I refer to as “send the ingredients” which corresponds to leading by sacrifice in Hermalin (1998). When Ford expanded to Great Britain, British newspaper headlines such as “Local Ford plans can’t even build a bathroom without permission from Detroit” were common.\(^6\)

The optimal contract is derived in Hermalin (1998). In particular, restricting to direct revelation mechanism by the Revelation Principle, I apply the result presented in Proposition 3:

Proposition 3: The affine-shares contract that sets $s_n(\hat{\theta}) = 1/N_d$ for all $n$ and defines transfers by $t_n(\hat{\theta}) = -\frac{\theta}{N_d-1}$ for $n \neq L$ and $t_L(\hat{\theta}) = T - \int_0^{\hat{\theta}} \frac{N_d}{N_d-1} z' e(z) \, dz$ for $L = HQ$ where $T$ is an arbitrary constant is second best efficient.

That is, the HQ sends unconditional monetary transfers that are only

Execution Stage

The CEO does not exert effort and knows $\lambda$. It is optimal for the HQ to give the CEO as compensation for the Execution stage value a proportion $\eta > 0$ of $X$. To maximize his

\(^6\)ibid
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compensation, the optimal contract set by the CEO to the workers of the Execution Team is:

For all \( n \), \( w_n = 0 \) if \( X < X^* \) and \( w_n = s \) if \( X \geq X^* \) where \( s = d(e^*) \).

\( X^* = (\lambda^2)N_x \) and \( e^* = \lambda \) \(^7\) denote First Best Execution value and individual effort respectively. Workers incentive compatibility and participation constraints are binding in the Nash Equilibrium characterized by \( e_n = e^* \) for all \( n \). We assume that when a worker is indifferent between deviating or not he does not. Note that, given the Local CEO knows the local culture, \( \lambda \), he can chose the value of \( X \) to be contracted upon, which is verifiable. The Local CEO, because he does not work in the Execution stage but knows the local culture, can be given incentives to achieve the first best value in the execution stage at the cheapest cost.

**Expatriate CEO: Help Cooking**

By Assumption the Expatriate CEO ignores \( \lambda \) and knows \( \theta \). Workers in either team have the opposite knowledge. Note that this information structure implies that the Expatriate CEO can Lead in the Design Stage and must deal with hidden information and individual action in the Execution Stage.

**Design Stage**

Now the CEO is not only a Boss but can act also as a Leader in the Design Stage. Because of his physical presence in the Subsidiary, we find it plausible to assume that the CEO can exert effort prior to the rest of the Team. This effort is observable but not verifiable. Therefore, choosing an Expatriate CEO the HQ have an additional tool to transmit their corporate culture or more generally, information relevant to the value of the Project: the CEO’s effort in the Design Team. This tool is valuable because CEO’s effort can be used as a signal and boost Team’s effort. This is valuable because of the Team’s problem of effort under provision. In particular, higher effort by the Leader induces higher effort to the rest of the Team, which is an additional motive for the CEO to increase his effort. Recall we restrict ourselves to equal-shares contracts because of the public good nature of the Design Value.

We apply Proposition 6 from Hermalin(1998):

*Proposition 6: Assume an equal-shares contract. Then the Expatriate CEO works harder in a separating equilibrium than any individual worker of the Design Team and the Design Value is greater. If \( d(e) = 1/2e^2 \), then Leading by Example yields greater aggregate welfare than Leading by Sacrifice or than the outcome under symmetric information*

\(^7\) given \( d(e) = 1/2e^2 \)


**Execution Stage**

In the Execution Stage the CEO optimally designs the following direct revelation mechanism:

For all \( n \), \( w_n(\hat{\lambda}) = 0 \) if \( X(\hat{\lambda}) < X^*(\hat{\lambda}) \) or \( \hat{\lambda}_n \neq \hat{\lambda}_j \) for some \( n \neq j \)
and \( w_n(\hat{\lambda}) = s \) if \( X(\hat{\lambda}) \geq X^*(\hat{\lambda}) \) and \( \hat{\lambda}_n = \hat{\lambda}_j \) for all \( n,j \).

where \( s = d(e^*) \) and \( \hat{\lambda}_n \) for \( n = 1...N_x \) are the simultaneous announcements by the members of the Team and \( \hat{\lambda} \) is the vector of announcements.

Again, \( X^* = (\hat{\lambda}^2)N_x \) and \( e^* = \hat{\lambda} \) \(^8\) denote First Best Execution value and individual effort respectively but now contingent on the announcements. Workers incentive compatibility and participation constraints are satisfied in a truth-telling Nash Equilibrium characterized by \( e_n = e^*(\lambda) \) for all \( n \). Given announcements are simultaneous and assuming there is no ex ante communication between execution workers, truth-telling is a focal point.

The CEO is, in principle, able to obtain the First Best value in the Execution Stage. We say in principle because the solution is not robust to collusion if the workers can communicate ex ante. Collusion risks in announcing the productivity parameter will depend on the nature of the Execution Production process and on the size of the Team.

We conclude that the Expatriate CEO cannot do better than the Local CEO in the Execution Stage and may do worse.

**Which cake tastes better? Stage II. Comparative Statics and Predictions**

We now give some insights on how to choose CEO’s Subsidiaries based on Technological and Social Considerations. We then comment on Carrefour’s policy\(^9\) of always choosing Expatriates for their Business Expansions.

Choosing the CEO of its Subsidiary the HQ must balance his abilities as Leader and as Supervisor. An Expatriate is a better Leader while a Local CEO is a better Supervisor. In particular, those abilities depend on whether the CEO knows the corporate culture of the Firm or the Local Culture as well as on how important are those in the Design and Execution Stages of Production. Ceteris Paribus, if the Corporate Culture importance increases in the Design Stage MNC will rely more on Expatriates. Similarly, if the Local Culture becomes more important for a successful Execution MNC will tend to rely more on Local CEOs. Those ability considerations must be weighted by how important are the contributions to Total value of the Design and of the Execution processes. Industries with highly standard production are likely to have a bigger weight on Execution than Design. Those are likely to rely more on Local CEOs. Those weights must take into account potential complementarities or substitutability between Design and Execution. Finally, Social Considerations in the Local country must be considered to assess collusion risks in the Execution process. The homogeneity of the labor market workforce, the levels of corruption and the minimum  

\(^8\) given \( d(e) = 1/2e^2 \)

\(^9\) Personal source
technological size of the Team must be considered. Collusion risks in the Execution Stage may prevent expansion from taking place when Corporate Culture is important.

**Dynamic Considerations: Training, Reputation, Learning and Development**

It is usually easier to change management practices than radically alter local work habits.

**Training**

Although in the short run managers have a fixed information set, multinationals can, and often do, invest in training their managers. Training programs can improve managers knowledge or their ability to understand the messages they receive. Either way, training programs increase human capital. What is best? Training an expatriate CEO to adapt to the local environment or training a local CEO to learn about the company’s corporate culture?

**Reputation**

“Imperial-Eastman Corporation encountered numerous problems in the operations of its various overseas enterprises. In at least one instance, the company experienced unexpected difficulties when it failed to retain its overseas U.S personnel for a long enough period of time. Before the operation’s critical start-up period was completely over, the company relieved its U.S personnel and relied solely on its locally hired staff to continue running the operation. However, as critical problems developed, Imperial-Eastman discovered that the local staff was not sufficiently experienced to handle the difficult problems resulting from the new operation”

**Learning**

“Consider the trade magazine that promoted giftware and launched a worldwide circulation effort. The magazine used the world gift in its title and as part of its name. When it was later revealed that gift is the German word for poison, a red-faced publishing executive supposedly retorted that the Germans should simply find a new word for poison!”

“In addition, a member of the Muslim organization wanted Nike to also participate in a sensitivity-training programs about Islamic Culture”

The value of political connections and the limitations of training or cross cultural competence: “Even though a managers maintains the right attitude and speaks the language, a successful performance is not assured. Raytheon hired Italian-Americans to manage operations in Sicily but found that the strategy was not as effective as hoped. In this case the
trouble lay in the origins of the managers. Because their family ties were with the mainland and not Sicilian, these men were not trusted or accepted.

The Impact of Subsidiaries CEOs for Human Capital Investment

Who do multinationals choose as their subsidiaries CEO may help or hamper the economic development of the subsidiary location. This can happen via its impact on the human capital investment decisions of its potential managers.

5.2.3 Unions and the Shape of the Firm

One of the assumptions of the model developed in this thesis is that the workforce diversity of British India textile mills was given to its managers. Why did managers in British India not hire a single group of workers? One of the possibilities is that managers did not discriminate workers by fear of workers cooperation. That is, to minimize unionization concerns. This remark leads to the following question: How do unionization concerns affect the shape of the firm and the allocation of human capital? In the 1940s the textile industry in the US South was hiring exclusively white workers (Minchin, 1999). How did managers fight unionization risks? Minchin (1999) remarks that “Even in the 1940s, when the textile workforce was all white, companies had fought unions effectively by promoting promising union leaders into supervisors”. Does the union threat concern hampers or help the productive allocation of human capital in the firm? Does it affect manager’s choice between using joint performance evaluation or relative performance evaluation compensation schemes? How do national laws on the nature of union and collective bargaining shape the trade-off managers face within the firm?

5.2.4 Diversity, Education and Economic Growth

In this thesis I argue that diversity may hinder economic growth because it increases information asymmetries in principal-agent interactions. These lead to lower incentives and more hierarchical organizations, resulting in lower growth. I presented evidence from the spread of industrialization in Japan and British India consistent with this hypothesis. A question I often encountered in seminars was: How do you explain the USA experience of high diversity and high economic growth? A second comment I encountered was that primary education was a complementary institution that may be essential in turning diversity into an asset not a burden. Certainly, primary education in British India was extremely low, while it increased in Japan as it developed.

This current research proposes to study why and when diversity may be good or bad for economic development in a common framework. Again, I assume that diversity matters
because of an information related argument. In particular, although individuals have identical preferences over outcomes and have no prejudice towards interacting with each other, they do have different ideas resulting from their difference experiences and backgrounds. In a sense, individuals can be seen as living stocks of ideas, that is: information. Innovation is the result of new ideas. New ideas are a function of preexisting ideas. This research proposes to model the impact of diversity on economic growth by analyzing the trade off between innovation and communication. Education, specially primary education, is an institution that can alleviate how tight is this trade off by decreasing the cost of transmitting ideas across people. This trade-off will be a function of the production function of the economy. If the production function is inelastic to innovation, diversity will only come at a cost. If the production function is very elastic to new ideas, it will be worth assuming the cost of diversity as it will enhance the potential for discoveries and economic growth. In this project I do two things. First I present evidence on the impact of diversity interacted with education and research and development expenditures. Is diversity good when education levels are high but bad when education levels are low? Is diversity beneficial in economies where RD is high and detrimental where RD is low? Is the impact of diversity on growth a function of the sectorial composition of economic activity? Second, I model the impact of diversity on growth assuming that growth is an idea driven process and individuals are stocks of ideas. From these ideas individuals will generate new ones. The likelihood that a very good idea is discovered increases with diversity, but the cost of transmitting this idea and making its adoption widespread is higher too. Depending on the sensitiveness of production to new ideas, diversity will be beneficial or detrimental.

5.2.5 Diversity and Supervision: Evidence from the US

The Bureau of Labor Statistics (BLS) surveys firms all around the United States and provides employment statistics by occupation at the metropolitan statistical area level of disaggregation. It also provides information on wages and productivity measures. I use the data for 2007, the latest available. Occupations are defined consistently across locations which ensures comparability. Earlier data is available although because of the methodology changes over time the BLS recommends not to use the data for time comparisons. The BLS categorizes 22 broad occupations (Management occupations, Personal care and service occupations,...) and those are disaggregated. In some broadly defined occupations there are first line supervisors, defined as workers that spend at least 80 percent of their time performing supervisory tasks. The main hypothesis I will test with this data is whether higher diversity of the population leads to higher supervisory burdens, measured as number of supervisors per worker in a given occupation category.
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