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Abstract

We argue that social capital as proxied by trust increases aggregate productivity by affecting the organization of firms. To do this we collect new data on the decentralization of investment, hiring, production, and sales decisions from Corporate Headquarters to local plant managers in almost 4,000 firms in the United States, Europe, and Asia. We find that firms headquartered in high trust regions are more likely to decentralize, with trust accounting for about half of the variation in decentralization in our data. To help identify causal effects, we look *within* multinational firms, and show that higher levels of bilateral trust between the multinational's country of origin and subsidiary's country of location increases decentralization, even after instrumenting trust using religious and ethnic similarities between the countries. Trust raises aggregate productivity through two channels: (1) trust facilitates reallocation between firms by allowing more efficient firms to grow as CEOs can decentralize more decisions and (2) trust complements the adoption of new technologies, thereby increasing productivity within firms during times of rapid technological change.

JEL No. L2, M2, O32, O33.

Keywords: decentralization, trust, social capital, theory of the firm

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I. INTRODUCTION

Economists have become increasingly aware of the importance of culture on international performance (e.g. Guiso, Sapienza, and Zingales, 2006). One influential line of research argues that social capital, usually proxied by measures of social trust, fosters faster growth (e.g. Knack and Keefer, 1997 or La Porta, et al., 1997). The mechanisms through which this might happen are not fully understood, however. In this paper we present evidence that high social capital in an area increases decentralized decision making within firms. We show that this decentralization favors productivity through supporting larger equilibrium firm size and by increasing the returns to information technology.

We develop a model building on Garicano (2000) to analyze how trust affects the organization of firms. The CEO can either solve production problems directly or delegate these to plant managers. When trust is high, plant managers tend to solve problems "correctly" (rather than, for example, stealing from the firm) so that CEOs are more likely to delegate. Further, by delegating the CEO can leverage his ability over a larger team which leads to larger firm size. Finally, we show how technologies that aid information acquisition by managers (IT) will make delegation particularly effective. We take these three predictions to the data and find support from the hypotheses that trust increases decentralization, raises firm size, and complements IT to raise productivity.

Our paper subjects the "organizational" view of social capital to rigorous econometric investigation and concludes that trust is critical to the ability of a firm to decentralize. We show that trust in a region (even after controlling for country dummies) is associated with much more decentralized decision making. To probe whether this effect is causal, we exploit the fact that some of our data is drawn from multinational subsidiaries. We find that the level of trust prevalent in the country where the multinational is headquartered has a strong positive correlation with decentralization in the affiliate's foreign location: in California a multinational affiliate from Sweden (a high trust country) would typically be more decentralized than a multinational affiliate from India (a low trust country). We further show this is driven by the level of *bilateral* trust between countries, which seems to affect not only flows of trade and investment between countries (Guiso, Sapienza, and Zingales, 2009), but also the internal organization of multinationals. Crucially, the effect of trust on decentralization is present even when we instrument bilateral trust with measures of religious and somatic distance between countries, which are arguably exogenous to the firm.

Countries that find decentralization more costly may suffer lower welfare for at least two reasons. First, it will be difficult for more efficient firms to grow large. Penrose (1959) and Chandler (1962) argued that decentralization was essential for the creation of large firms, because CEOs are time constrained over the number of decisions they can make. As firms grow large and more complex CEOs need to increasingly decentralize decision making power to their senior management. In our data we find that larger firms are indeed significantly more decentralized and that high trust regions are able to sustain firms of large equilibrium size. This is important because for capital and labor to be effectively reallocated across firms, productive firms need to grow large and take market share from unproductive firms. This reallocation is a major factor driving growth in developed countries like the United States.[1] But in developing countries like India, where firms are typically quite centralized, average firm size is smaller, so that the most productive firms have a smaller market share (see, for example, Hsieh and Klenow, 2009).

The second mechanism linking trust and productivity is that low trust economies will have a larger proportion of centralized firms and industries. If there is a shock that increases the need for decentralization, then such countries will be at a disadvantage. There seems to have been a global trend towards more decentralization, which may be related to increasing competition (Guadalupe and Wulf, 2010), the supply of human capital (Caroli and Van Reenen, 2001), and/or the growth of information technology (Bresnahan, Brynjolffson, and Hitt, 2002). In support of the IT idea we present evidence from production functions that IT is complementary with decentralization. We estimate that the accelerated growth of computer capital since 1995 means that regions with one standard deviation more decentralization have an extra 0.5 percentage point annual productivity growth.

Our analysis is focused on a novel dataset providing detailed information on the internal organization of firms across nations. The economic theory of organization has made great strides in the last two decades in furthering our understanding of activities within the boundary of the firm,[2]

[1] See, for example, Foster, Haltiwanger, and Krizan (2001 and 2006) who show that about 50% of productivity growth in manufacturing and about 90% in retail comes from reallocation.

[2] For a surveys see Bolton and Dewatripont (2005) or Gibbons and Roberts (forthcoming). One branch of the literature investigates conditions under which delegated contracting replicates efficient centralized contracting, for example Baron and Besanko (1992) and Melumad et al. (1995). However, this required complete contracts (see Mookherjee, 2006). A second branch emphasizes information processing and communication costs such as Sah and Stiglitz (1986), Genakopolos and Milgrom (1991), Radner (1993), Radner and Van Zandt (1992), Bolton and Dewatripont (1994), and Garicano (2000). A third branch, closest to our perspective, emphasizes the tradeoff between information and loss of

but empirical research on this has lagged far behind because of a lack of organizational data. The few datasets that exist are either from a single industry or (at best) across many firms in a single country.[3] We address this lacuna by analyzing data on the organization of almost 4,000 firms across twelve countries in Europe, North America, and Asia. We designed and collected this data using a new survey tool and measure the decentralization of investment, hiring, production, and pricing decisions from the central headquarters (CHQ/CEO) to plant managers. This data reveals startling differences in the cross-country decentralization of firms: those in the United States and Northern Europe appear to be the most decentralized and those in Southern Europe and Asia the most centralized. The survey also includes detailed questions on management practices modeled as in Bloom and Van Reenen (2007) which enables us to control for managerial ability, a possible omitted variable that could be correlated with both greater decentralization and higher trust.

Our paper links to several literatures. First, there are papers examining the impact of social capital. La Porta et al. (1997) found in cross-country regressions that the combined size of the largest 25 public quoted firms was positively correlated to trust. Guiso et al. (2009) examine the role of trust in explaining patterns of economic exchange (including FDI flows) between countries. In a similar spirit, Bottazzi et al. (2010) study the importance of cultural factors in explaining flows of venture capital investments across countries. Although our work builds on this literature, a key distinction is the disaggregation of our analysis. To the best of our knowledge, this is the first paper looking at the role of trust (and culture) on the organizational structure of *firms* across multiple countries, as opposed to country level relationships.

Second, we link to an emerging literature in trade on multinationals and comparative advantage. Helpman et al. (2004), Burstein and Monge-Naranjo (2009), and Antras et al. (2008) emphasize the importance of firm-level comparative advantage in multinationals. In these models firms have some productivity advantage, typically deriving from a different managerial or organizational technology, which their multinationals transplant to their overseas affiliates. Our evidence on the transplanting of multinational's domestic organizational practices abroad provides empirical support for this assumption.

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control—see Aghion and Tirole (1997), Rajan and Zingales (2001), Dessein (2002), Hart and Moore (2005) and Alonso, Dessein, and Matouschek (2008).

[3] On single industry studies see Baker and Hubbard (2003, 2004) on trucks or Garicano and Hubbard (2007) on legal services. For cross industry studies of firms see for example, Acemoglu et al. (2007) on France and the United Kingdom; Colombo and Delmastro (2004) and Kastl, Martimort, and Piccolo (2008) on Italy; Marin and Verdier (2008) on Germany and Austria and Rajan and Wulf (2006) for the United States.

Finally, we link to the literature on the "transportation" of culture by individuals across countries. For example, Fisman and Miguel (2007) show that the parking fine behaviour of diplomats in New York is strongly predicted by indices of corruption in their home countries.[4] Our evidence suggests that firms also take part of their "culture" abroad. Interestingly, this holds even in multinationals when all the managers come from the country of location, suggesting that firms offer a mechanism for transporting culture across countries in additional to individual migration.

The paper is organized as follows. Section II sketches a simple model of trust and organizational structure and its empirical implications, Section III details the data, and Section IV has some descriptive statistics. The empirical results on the effect of trust on decentralization (and size) are contained in Section V, and the analysis of productivity is presented in Section VI. Section VII concludes.

II. THEORY

II.A A Model of trust and decentralization

Our starting point is the models of Garicano (2000) and Garicano and Rossi-Hansberg (2007) on the hierarchical organization of expertise. Firms have to solve production decisions to generate output. Decisions are made at the lowest hierarchical level at which an agent is able to make them. In determining their hierarchical organization firms face a trade-off between *information acquisition costs* (*a*) and *communication* ("helping") *costs* (*h*). Making decisions at lower levels implies increasing the cognitive burden of agents at those levels. For example, decentralizing from the CEO to plant managers over the decision whether to invest in new equipment requires training plant managers to discount cash flows using the appropriate cost of capital to compare these to the cost of investment. To the extent that the plant manager is unable to make this decision, it will be passed up to the corporate headquarters. But this increases communication costs in the hierarchy as the plant manager will have to explain some of the details behind the potential investment project and after solving the problem the CEO will have to explain what the manager must do. Thus, the extent of decentralization depends on the optimal trade-off between *knowing* versus *asking* for directions.

[4] In the social domain, Fernandez and Fogli (2009) and Giuliano (2007) show that fertility rates among second-generation Americans are correlated with fertility in the countries of their parents. And Ichino and Maggi (2000) study absenteeism and misconduct of employees at an Italian bank, and find that region of origin within Italy predicts shirking.

We extend the Garicano (2000) model by adding the idea of trust. The CEO may not trust the manager's decision because of misaligned incentives—for example she may worry about the plant manager taking bribes from equipment sellers.[5] If the CEO does not trust the plant manager to take the right action there will be less decentralization. This allows us to analyze the effect of trust on firm size. We show that firm size is increasing in the CEO's trust in the plant manager. This is because a CEO will employ more plants managers when she is able to delegate decision making because for any given plant manager less time needs to be allocated to helping her make decisions.[6]

Production: Firms are comprised of a CEO and an endogenous set of production plants, each with a single plant manager. These production plants draw management problems z from the interval [0,1] each period. Production at each plant only takes place if all of these problems are solved, otherwise nothing is produced. We normalize to 1 the unit of output per plant per time period if production problems are solved. The frequency of these management problems is denoted by f(z) with a corresponding cumulative distribution of F(z). Optimality requires that the plant managers learn the common problems and asks about the exceptions, we thus reverse sort the problems in frequency order, so $f'(z) < 0$.

Managers: All managers have *a priori* the same cost of acquiring information, α, which we label "management skill." So, for example, if the firm trains plant managers to solve z_M (where $0 < z_M < 1$) management problems then this costs αz_M. If a plant manager draws a problem he cannot solve he passes it up to the CEO at a communication cost *h* per problem denoted in terms of management time. Total costs are reduced if employees are trained to deal with the common problems, but pass up the rare problems. This is the "management by exception" model.

Trust: We also assume that even after acquiring formal knowledge plant managers only behave in the "correct way" to perform λ tasks and fail to correctly perform $(1-\lambda)$ tasks. Here λ reflects the fact that the plant manager may have private benefits from doing the "wrong" action. Empirically we will use measures of trust to proxy shifts in the λ parameter. We view variations in λ across countries as reflecting CEO perceptions of differences in the preferences for taking appropriate actions. For example, we assume that CEOs believe that Swedish plant managers would be less likely to accept a

[5] Alternatively, it may be more a question of ability—the plant manager may not be trusted to take the correct decision because even if he has acquired the formal knowledge to do the task (e.g. through training) he might still make a mistake.

[6] Garicano (2000) shows under general conditions a larger span between the CEO and plant manager will be replicated down the hierarchy, so firm size will be monotonically increasing in the number of plant managers per CEO.

bribe (Sweden is a high trust country) to buy an overpriced piece of equipment than Indian plant managers (India is a low trust country). As such the variations in λ reflect variations in beliefs over individual plant manager's utility functions arising from different levels of social capital.

Firm organization: The principal hires some agents who must be trained to deal with tasks up to point z_M and pass the remaining (less frequently occurring) management problems up to the principal, which in this two-layer model is assumed to be the CEO.

In each particular case, production per problem is as follows

(1) $$Production = F(z_M)\lambda + \big(1 - F(z_M)\big)$$
$$= 1 - F(z_M)(1 - \lambda)$$

where the first term $F(z_M)\lambda$ on the top row reflects the share of problems solved by the plant manager times the probability they correctly solve them, and the second term $1 - F(z_M)$ reflects the share of problems passed up to the CEO (who we assume without loss of generality can correctly solve all problems). Thus if λ=1, the plant manager can be trusted and production proceeds correctly with probability=1.

The CEO takes *h* units of time to communicate and solve each referred problem. The problem of the principal is to maximize the firm's profits, *V*, by choosing decentralization (z_M) and the number of plant managers (*n*):

(2) $$V = \max_{z_M, n} [(1 - F(z_M)(1 - \lambda))n - \alpha z_M n - \omega n] \quad]$$

(3) $$st \quad \big(1 - F(z_M)\big)nh = 1$$

where the CEO is the residual claimant and receives the profits obtained after paying wage ω to the plant managers—their outside utility. Equation (3) follows from the time constraint of the CEO, who has 1 unit of time in total to solve all the $(1 - F(z_M))$ referred problems at a time cost of *h* per problem. The cost of delegating more problems is twofold: lower level managers need to be trusted, as they may not perform adequately; and second they need to be trained to deal with more problems.

Decentralization: Solving the constrained maximization problem gives an equation implicitly defining the optimal degree of decentralization:

(4) $$\frac{\lambda - \omega_L}{\alpha} = z_M + \frac{(1 - F(z_M))}{f(z_M)}$$

And from first order condition (4) we derive the main prediction from our model:

Proposition 1: Higher trust leads to more decentralization

An increase in trust (λ rises) is associated with a higher degree of decentralization (z_M), $\frac{\partial z_M}{\partial \lambda} > 0$

where the positive sign is because $f'(z_M)<0$ due to tasks being sorted in reverse frequency order. The intuition for proposition 1 is straightforward—if the CEO trusts plant managers she believes that the marginal returns from letting them handle tasks is greater as more problems are solved correctly.

An interesting corollary of equation (4) is that higher plant manager skill (indexed by a lower value of α, the cost of acquiring knowledge) leads to greater decentralization:

(5) $$\partial z_M / \partial \alpha < 0$$

The intuition here is the more skilled the plant manager is at solving problems, the more decisions the CEO will delegate to him.[7] Although we have no formal test of equation (5) as we do not have an instrument for skill supply, this correlation is present in the data and we generally control for human capital in the estimation of the decentralization equation.

Size: The second key result relates to size. We derive the relationship between the number of plant managers that work with the CEO in equilibrium, which is from equation (2):

$$n^* = 1/[\big(1 - F(z_M)\big)h]$$

By combining this with proposition 1 we can establish our second proposition.

Proposition 2: Higher trust increases firm size

An increase in trust (λ) is associated with a larger firm size n^*

$$\partial n^* / \partial \lambda > 0$$

The intuition is that higher trust allows the CEO to delegate more decisions, so she is able to spend less time helping any individual plant manager. Thus the CEO is able to employ more plant managers and expand the size of the firm. Trust essentially allows talented CEOs to leverage their managerial ability over a greater number of employees, and is similar to increasing the managerial leverage parameter in Lucas (1978).[8]

[7] The complementarity between skills and decentralization is broadly consistent with the findings of Caroli and Van Reenen (2001) and Bresnahan, Brynjolfsson, and Hitt (2002).

[8] LaPorta et al. (1997) also noted that repeated interactions are a substitute for trust and make large organizations harder to sustain in low-trust environments. Hart and Holmstrom (2010) present a model where plant managers may "shade" if they feel aggrieved by the CHQ, which will also tend to reduce delegation in low trust environments.

This result links with the early literature on firm size, which also focused on the issue of decentralization as the key determinant of firm growth. For example, Penrose (1959) developed the "resource based" view of the firm, claiming that managerial capacity was a key resource in determining firm size. If senior management time could be leveraged across a larger group of plant managers, then firm size could be increased. Chandler (1962) examined the growth of large U.S. multi-divisional firms after the 1850s. He argued that these larger firms were created through setting up "local field units," regional factories or sales-outlets, with decentralized power from the headquarters. Again, decentralization was necessary to allow distant units to operate, since limits on communication prevented the CEO from directing managers operating hundreds of miles away. Without decentralization these firms would have not been able to grow.

Productivity and information technology: The maximized surplus in the firm is:

$$V = \max_{z_M, n} [(1 - F(z_M)(1 - \lambda))n - \alpha z_M n - \omega n$$

$$= \left(\frac{1 - F(z_M)(1 - \lambda))n - \alpha z_M n - \omega n}{h(1 - F(z_M))} \right) \tag{6}$$

Applying the envelope condition yields the result that surplus is increasing in firm size.[9]

$$\frac{\partial V^*}{\partial \lambda} = F(z_M)/[h\big(1 - F(z_M)\big)] > 0 \tag{7}$$

In Garicano (2000) information technology (IT) is modeled as reducing the cost of acquiring information, α.[10] Better IT allows plant managers agents to solve problems more easily rather than asking for direction from the CEO. Within our model this suggests that firms in highly trusted regions will obtain greater benefits from a global fall in IT costs since high trust increases the value of decentralization. This can be seen by differentiating equation (7) with respect to α (noting that more IT reduces α):

[9] Note that the surplus will be equal to CEO pay in our model. Although this goes beyond the scope of the current paper it is consistent with Gabaix and Landier (2008) who find that CEO pay is increased by the ability of a CEO to leverage control over a larger number of middle-managers. Our model implies countries with high trust, like the Unites States and the United Kingdom, will tend to have larger firms and higher paid CEOs versus countries with low trust, like Southern Europe and developing countries.

[10] Better communication technology can also be modeled in terms of a reduction in *h*. In Bloom et al. (2010) we consider the distinct impact of these.

Proposition 3: Higher trust increases the marginal value of information technology

$$\frac{\partial}{\partial \alpha}\left(\frac{\partial V^*}{\partial \lambda}\right) = \frac{f(z_M)}{h\left(1-F(z_M)\right)^2}\frac{\partial z_M}{\partial \alpha} < 0$$

where the negative sign results from equation (5), $\frac{\partial z_M}{\partial \alpha} < 0$.

We will proxy the surplus in the firm by examining productivity. The way we will empirically investigate proposition (3) is to examine whether the marginal effect of IT on productivity is greater in high trust environments (which should also be more decentralized according to proposition 1). The intuition is that the globally falling price of IT will benefit regions and countries which have high trust (and are therefore more decentralized) to a greater degree than low trust regions. This identification assumption is that there are adjustment costs to organizational change, so that firms do not immediately switch their organizational form after a technology shock.

We will take all three propositions to the data and find empirical support for them. Propositions 1 and 2 are long-run equilibrium relationships that we examine in the cross section: all else equal exogenously high trust areas will have decentralized and larger firms. Trust is very persistent so we will use long-run cultural and historical instruments for bilateral trust in cross sections of firms and regions. Proposition 3 is more a time series relationship: we examine this relationship using panel data to test whether *increases* in firm IT *increase* productivity by more in high trust areas than in low trust areas.

II.B Other models of trust and decentralization

The model of the previous section focuses on decentralization in a cognitive model of the hierarchy of the firm. Many papers have also focused on our extension to incentive problems such as Aghion and Tirole (1997), Prendergast (2002) and Hart and Moore (2005). For example, Acemoglu et al. (2007) consider the delegation decision in an incentive based model where a firm faces a choice over how to use a new technology with uncertain and heterogeneous returns. The CHQ has a greater interest in maximizing the firm's value than the manager, but the manager has greater local private knowledge than the CHQ. This trade-off determines the optimal degree of decentralization. Thus, characteristics of the environment that increases the congruence of incentives between the CHQ and plant manager, will increase decentralization. If trust reflects a greater congruence of preferences between the parties, this should lead to great delegation.

Even if decentralization was the efficient choice due to the characteristics of the firm's environment, Baker, Gibbons, and Murphy (1999) emphasize that delegation is generally informal because the CHQ must usually sign-off on decisions. The issue is whether the CHQ credibly commits to allowing the plant manager to effectively make the important decisions and does not override the plant manager (in order to establish her reputation not to interfere). Thus, the level of decentralization is the outcome of a repeated game between the CHQ and manager.[11] The agent and principal's preferences and beliefs in these models will of course influence the level of delegation. Trust is emphasized in the social capital and experimental game theory literatures as one factor that leads to co-operation (Putnam, 1993, Fukuyama, 1995, and Glaeser et al., 2000). If there are heterogeneous types in the population with some *ex ante* being more likely to co-operate than others, then the co-operative outcome (decentralization) is more likely with higher trust.

In principle, an alternative to trust in sustaining co-operation is Rule of Law. When the employer (or employee) can successfully sue for breach of contract this will make contracts easier to enforce and sustainable delegation more likely. This will be particularly important in larger firms (Greif 1993). In the analysis where we do not control for country dummies we will also consider the independent influence of Rule of Law alongside trust.

Since there are models other than our extension of Garicano (2000) that would predict a positive relationship between trust and decentralization we do not regard our empirical examination the final word on the model. However, the fact that we naturally generate three simple predictions in this framework, which are supported by the data, suggests it is a useful framework for organizing our thinking.

III. DATA

To investigate the role of trust on decentralization we first have to construct a robust measure of organizational practices overcoming four hurdles: measuring decentralization, collecting accurate responses, ensuring international comparability, and obtaining interviews with managers. We discuss these in turn. We have also posted the full anonymized dataset and do-files to replicate all results (http://www.stanford.edu/~nbloom/org.zip).

III.A Measuring Decentralization

[11] Other models, like Rajan and Zingales (2001), focus on the intangible capital view of the firm, with ownership being structured so that employees cannot easily split off easily to create rival firms.

We asked four questions on plant manager decentralization. First, we asked how much capital investment a plant manager could undertake without prior authorization from the corporate headquarters. This is a continuous variable enumerated in national currency that we convert into dollars using PPPs. We also inquired on where decisions were effectively made in three other dimensions: (a) hiring a new full-time permanent shop floor employee, (b) the introduction of a new product, and (c) sales and marketing decisions. These more qualitative variables were scaled from a score of 1, defined as all decisions taken at the corporate headquarters, to a score of 5 defined as complete power ("real authority") of the plant manager. In Appendix Table A1 we detail the individual questions in the same order as they appeared in the survey.[12]

Since the scaling may vary across all these questions, we converted the scores from the four decentralization questions to z-scores by normalizing each one to mean zero and standard deviation one. In our main econometric specifications, we take the unweighted average across all four z-scores as our primary measure of overall decentralization, but we also experiment with other weighting schemes and also present regressions using the individual questions as dependent variables.

One issue is over measurement of decentralization across different types of firms. Figure 1 provides four examples to help explain how we did this. Example A shows the classic case, where the firm has one CHQ in New York and one production site in Phoenix. The plant manager is defined as the most senior manager at the Phoenix site, with our decentralization measure evaluating how much autonomy he has from his manager in New York. In Example B we depict a firm with multiple plants, in which we would usually survey one plant and assume this represented the degree of decentralization for the firm as a whole (section III.F discusses how we test this assumption). In Example C we have a firm with the production facilities and CHQ on the same site. In this case if the plant manager was the CEO—which occurred in only 4.9% of our interviews—we could not define decentralization (so these observations were dropped).[13] If the plant manager and CEO were different people on the same site we would define decentralization as usual, but we show how our results are weaker in these "same-site" observations (where trust matters less because direct

[12] Some of these four questions are similar to others used in the past to measure decentralization. Acemoglu et al. (2007) use a similar question on hiring in the British WERS data and Colombo and Delmastro (2004) have a question similar to our one on investment for Italian establishments.

[13] These were typically smaller firms (a mean firm employment of 159 for the CEO plant manager firms versus 843 for the rest of the sample), with an insignificant correlation between the share of firms dropped in each country and its average decentralization measure. The country level correlation was 0.345 (p-value of 0.272).

monitoring is easier).[14] Finally, in Example D we show a multinational subsidiary, which we treat the same as domestic firms, defining decentralization as the autonomy of the plant from the global CHQ. We use the multinationals to get closer to the causal effects of trust on decentralization by using bilateral trust information as explained in Section V.

Finally, we collected a large amount of additional data from the survey to use as controls, including management practice information following the methodology of Bloom and Van Reenen (2007) and human resource information (e.g. the proportion of the workforce with degrees, average hours worked, and the gender and age breakdown). We also collected ownership information from the managers, which we cross-checked against the external sample databases (see section III.E for details). From the sampling frame database we also have information for most firms on their basic accounting variables like sales and capital.

III.B Collecting Accurate Responses

In order to achieve unbiased responses to our questions we took a range of steps. First, the survey was conducted by telephone without telling the managers they were being scored on organizational or management practices. This enabled scoring to be based on the interviewer's evaluation of the firm's actual practices, rather than their aspirations, the manager's perceptions or the interviewer's impressions. To run this "blind" scoring we used open questions (i.e. "*To hire a full-time permanent shop-floor worker what agreement would your plant need from corporate headquarters?*"), rather than closed questions (i.e. "*Can you hire workers without authority from corporate headquarters*?"[yes/no]). Following the initial question the discussion would continue until the interviewer can make an accurate assessment of the firm's typical practices. For example, if the plant manager responded "*It is my decision, but I need sign-off from corporate HQ,*" the interviewer would ask "*How often would sign-off typically be given?*" with the response "*So far it has never been refused*" scoring a 4 and the response "*Typically agreed in about 80% of the case*" scoring a 3.

Second, the interviewers did not know anything about the firm's financial information or performance in advance of the interview. This was achieved by selecting medium sized

[14] Empirically, while plant managers with CEOs on site typically have less autonomy (something we control for empirically) it is not the case they have no autonomy. The CEO will typically be involved in a number of other tasks such as finance, strategy, and sales (which could involve other non-production sites), while the plant manager runs the daily production process. An example in a university context would be the University Dean and the Head of the Economics Department—they are usually both on the same campus site, but the Head of Department still has some autonomy.

manufacturing firms and by providing only firm names and contact details to the interviewers (but no financial details). Consequently, the survey tool is "double blind"—managers do not know they are being scored and interviewers do not know the performance of the firm. These manufacturing firms (the median size was 270 employees) are too small to attract much coverage from the business media. All interviews were conducted in the manager's native language.

Third, each interviewer ran 85 interviews on average, allowing us to remove interviewer fixed effects from all empirical specifications. This helps to address concerns over inconsistent interpretation of categorical responses, standardizing the scoring system. Fourth, the survey instrument was targeted at plant managers, who are typically senior enough to have an overview of organizational practices but not so senior as to be detached from day-to-day operations.

Fifth, we collected a detailed set of information on the interview process itself (number and type of prior contacts before obtaining the interviews, duration, local time-of-day, date and day-of-the week), on the manager (gender, seniority, nationality, company and job tenure, internal and external employment experience, and location), and on the interviewer (we can include individual interviewer-fixed effects, time-of-day, and subjective reliability score). These survey metrics are used as "noise controls" to help reduce residual variation.

III.C Ensuring International Comparability

In comparing organizational and management surveys across countries we have to be extremely careful to ensure comparability of responses. To maximize comparability we undertook three steps. First, every interviewer had the same initial three days of interview training, provided jointly by the Centre for Economic Performance (CEP) at the London School of Economics (LSE) and our partnering international consultancy firm. This training included three role-play calibration exercises, where the group would all score a role-played interview and then discuss scoring together of each question. This was aimed at ensuring every interviewer had a common interpretation of the scoring grid. In addition every Friday afternoon throughout the survey period the group met for 90 minutes for training and to discuss any problems with interpretation of the survey.

Second, the team operated from one location, the LSE. The different national survey teams were thus organized and managed in the same way, ran the surveys using exactly the same telephone,

computer, and software technology and were able to directly discuss any interpretation issues.[15] Third, the individual interviewers interviewed firms in multiple countries. The team language was English, so that interviewers were able to interview firms from their own country plus the United Kingdom and the United States. As a result the median number of countries that each interviewer scored firms in was three, enabling us to remove interviewer fixed effects in the cross-country analysis.

III.D Obtaining Interviews with Managers

Each interview took on average 48 minutes and was run in the summer of 2006. Overall, we obtained a relatively high response rate of 45%, which was achieved through several steps. First, the interview was introduced as "a piece of work" without discussion of the firm's financial position or its company accounts. Interviewers did not discuss financials in the interviews, both to maximize the participation of firms and to ensure our interviewers were truly "blind" on the firm's financial position. Second, the survey was ordered to lead with the least controversial questions (on shop-floor operations management), leading on to monitoring, incentives, and organizational structure. Third, interviewers' performance was monitored, as was the proportion of interviews achieved, so they were persistent in chasing firms.[16] Fourth, the written endorsement of many official institutions[17] helped demonstrate to managers that this was an important academic exercise with official support. Fifth, we hired high quality (mainly MBA student) interviewers,[18] mostly with prior manufacturing experience, which helped to signal to managers the high quality nature of the interview.

III.E Sampling Frame and Additional Data

Since our aim is to compare across countries we decided to focus on the manufacturing sector where productivity is easier to measure than in the non-manufacturing sector. We also focused on medium sized firms, selecting a sample of firms with between 100 and 5,000 workers (with a median of 270). Very small firms have little publicly available data. Very large firms are likely to be more heterogeneous across plants. We drew a sampling frame from each country to be representative of medium sized manufacturing firms and then randomly chose the order of which firms to contact (see

[15] See http://www.youtube.com/watch?v=HgJXt8KwhA8 for video footage of the survey team.
[16] We found no significant correlation between the number, type, and time-span of contacts before an interview is conducted and the management score.
[17] The Banque de France, Bank of Greece, Bank of Japan, Bank of Portugal, Beijing University, Bundesbank, Confederation of Indian Industry, European Central Bank, European Commission, Greek Employers Federation, IUI Sweden, Ministero delle Finanze, National Bank of Poland, Peoples Bank of China, Polish Treasury, Reserve Bank of India, Shenzhen Development Bank, Sveriges Riksbank, U.K. Treasury, and Warsaw Stock Exchange.
[18] Interviewers were post-graduate students drawn from the following universities: Berkeley, City of London, Columbia, Harvard, HEC, IESE, Imperial, Insead, Kellogg, LBS, LSE, Lund, MIT, Nova de Lisbon, Oxford, Stanford, and Yale.

Appendix B for details). Since we use two different databases (BVD's Orbis for Europe, the United States, China, and Japan; and CMIE's Firstsource for India) we had concerns regarding the cross-country comparisons so we include country dummies in most of the specifications. Comparing responding firms with those in the sampling frame, we found no evidence that the responders were systematically different on the observable measures to the non-responders. The only exception was on size and multinational status, where our firms were slightly larger and more likely to be multinational than those in the sampling frame (details in Data Appendix).

III.F Evaluating and Controlling for Measurement Error

The data potentially suffers from several types of measurement error. To quantify this we performed repeat interviews on 72 firms, contacting different managers in different plants at the same firm, using different interviewers. To the extent that our organizational measure is truly picking up company-wide practices these two scores should be correlated, while to the extent the measure is driven by noise the measures should be independent. The correlation of the first interview against the second interviews was 0.513 (p-value of 0.000). Furthermore, there is no obvious (or statistically significant) relationship between the degree of measurement error and the decentralization score. That is to say, firms that reported very low or high decentralization scores appeared to be genuinely very centralized or decentralized, rather than extreme draws of sampling measurement error.

III.G Measuring trust

We build trust measures using the World Values Survey (WVS), a collection of surveys administered to representative samples of individuals in 66 countries between 1981 and 2004. These questionnaires contain information on several social, religious, and political attitudes. The World Values Survey aims at measuring generalized trust, namely the expectation of the respondent regarding the trustworthiness of other individuals. The wording of this question is "*Generally speaking, would you say that most people can be trusted, or that you can't be too careful in dealing with people?*" The trust variable that we use in the regressions is the percentage of people choosing the first option in the trust question within the geography where central headquarters of the plant (CHQ) are located. We thought this is most appropriate, because the decision to decentralize is made at the CHQ level, but we also check for the independent importance of trust in the plant's location for firms where the CHQ is located in a different region or country from the plant.

This is the most common measure of trust used in the literature, and appears to be correlated with trusting behavior. Fehr et al. (2003) ran a series of experiments suggesting that the WVS question

does indeed measure trust. Glaeser et al. (2000), by contrast, ran experiments on undergraduates and argued that the WVS trust question better measures the trustworthiness of subjects. Sapienza et al. (2007) reconcile these findings: they provide evidence that the WVS question is driven by what they call the "belief based component of trust." In other words, when you are not extrapolating the trustworthiness of others based on your own trustworthiness (as Fehr et al., 2003), the large sample WVS really does measure trust rather than trustworthiness. In our context we want to measure trust of the headquarters (towards the plant manager), so the WVS question seems appropriate for the task.

Figure 2 plots the trust by country and its regional dispersion. In order to exploit this within country variation for identification, we identify the specific region where the corporate headquarters of each of the plants included in our survey are located, and compute the average level of trust in this area using the WVS. The precise level of aggregation of the trust measure varies according to geographical detail included in our own decentralization survey and in the WVS. Through our survey data, we are able to allocate plants belonging to purely domestic firms and domestic multinationals (2,744 observations in total, or about two thirds of our entire sample) to narrowly defined *regions* within countries (e.g. NUTS3 levels in Europe or individual states in India).[19] However, since the level of geographical detail provided by the WVS varies within countries, we are sometimes forced to work at a higher level of aggregation.[20] In the case of the 881 plants that belong to foreign multinationals, we match the plant with information on the level of trust in the *country* where the global ultimate owner of the plant is headquartered, which was also collected in the decentralization survey.

IV. DESCRIPTIVE STATISTICS

IV. A Decentralization

Our preferred measure of decentralization is an average across four z-scored measures of plant manager autonomy on hiring, capital expenditure, marketing, and product innovations. The resulting variable is what we define as decentralization (or autonomy of the plant manager). The cross country averages of decentralization are shown in Figure 3, revealing some interesting patterns. Firms located in Asia (China, Japan, and India) tend to be much more centralized than firms located in

[19] In the vast majority of cases—93% of the plants belonging to purely domestic firms or domestic multinationals—the plant is actually located within the same region of the headquarters.

[20] For example, in the United States and China the WVS only provides broader geographical markers, which correspond to group of states. See Appendix B for details.

Anglo-Saxon (Germany, the United Kingdom and the United States) and Scandinavian (Sweden) countries. The rest of Europe tends to be in the middle of the decentralization ranking—with the exception of firms located in Greece, which appear to be very centralized. The differences between the three groups of countries are statistically significant at the 1% level, even when we include a full set of firm characteristics and survey noise controls. Table A2 in Appendix provides more details behind these cross-country comparisons and reveals that, while Sweden, the United Kingdom, and the United States are at the top of the decentralization distribution across all four dimensions, for the rest of the countries the ranking varies. For example, Germany tends to be closer to the other Continental European countries included in our sample (i.e. less decentralized) with regards to the hiring and firing autonomy of the plant manager. On the other hand, plant managers working in Japan have limited autonomy because hiring is very centralized due to lifetime tenure. Japanese firms do provide more autonomy over capital expenditures and Japanese workers also have high levels of autonomy.

Figure 4 shows the distribution of the decentralization variable across firms by country. It is clear that there is a huge amount of heterogeneity, even within countries. About 15% of the overall variance in our decentralization measure is across countries, 8% is across three digit industry class, and 81% of the variation is orthogonal to both country and three digit industry.

IV.B External Validation

A possible concern is that the cross country differences in decentralization emerging from our study may reflect the specific characteristics of the firms that participated in the survey (i.e. medium sized manufacturing firms), rather than more general organizational features. Therefore, to validate our decentralization measure, we compared it to two other cross-country decentralization indices that exist in the literature.

The first is the Power Distance rankings created by Hofstede (1980). The Power Distance Index (PDI) is a measure of interpersonal power or influence between a boss and their subordinate, built out of successive attitudinal surveys conducted on more than 70,000 IBM employees across approximately 50 countries in the 1970s and 1980s. While our decentralization variable provides a factual description of the average autonomy allocated to the plant-managers, the PDI measures the *perceptions* of and the *preferences* for hierarchical relationships among non-managerial IBM employees. The PDI measure is based on aggregating questions relating to: (i) non-managerial employees' perception that employees are afraid to disagree with their managers; (ii) subordinates'

perception that their boss tends to make decisions in an autocratic or paternalistic way; and (iii) subordinates' preference for anything but a consultative style of decision making. High PDI values reflect perceptions of and preferences for self-determination. Figure 5 shows that the country level averages of the PDI and our decentralization measure are extremely similar (correlation 0.80, significant at the 1% level). This is reassuring since it suggests that across countries our decentralization variable captures long-lived organizational traits across countries, rather than specific characteristics of our firm sample.

The second cross-country decentralization indices are those created by Arzaghi and Henderson (2005) to evaluate fiscal decentralization across countries. They generated an index on a 0 to 4 scale that averaged over scores for decentralization of Government structure (unitary versus federal) and the degree of autonomy and democratization of state, province, and municipal governments over taxation, education, infrastructure, and policing. A value of 0 denotes the country is fully centralized across every dimension, while a value of 4 denotes a highly decentralized fiscal structure. This measure was calculated for every country with 10 million or more employees in 1995, which includes ten of our twelve countries. Figure 6 shows this fiscal decentralization index is also extremely close to our decentralization index (correlation of 0.827, significant at the 1% level). Thus, countries in our sample with decentralized firms also tend to have decentralized governments suggesting this is a more general phenomenon.

V. TRUST AND FIRM ORGANIZATIONAL STRUCTURE

V.A Trust and Decentralization

Our theory predicts that greater trust of the CEO in the plant manager should lead to increased managerial delegation (Proposition 1). Column (1) of Table 1 presents the results of regressing our decentralization measure against average trust in the area where the plant's headquarters are located, with no other controls. The relationship between decentralization and trust is positive and highly significant—a one-standard deviation in trust (12 percentage points) is associated with a 15% of a standard deviation increase in decentralization. A concern is that high levels of trust could simply proxy for better law enforcement or higher levels of economic development. Column (2) includes an

indicator for country-wide "Rule of Law," [21] GDP per capita, and population. Rule of Law enters with a positive and significant coefficient,[22] but trust also plays an independent role.

Trust may be associated with decentralization because it sustains larger equilibrium organizational size or because skill levels are higher (in Section II). Consistent with this, column (3) shows that larger firms and plants tend to be more decentralized, as do those with more skilled workers.[23] Conditioning on size and skills halves the trust coefficient compared to column (1), but it remains significant. In terms of our other covariates, foreign multinationals are more decentralized relative to both home country multinationals and purely domestic firms. This could reflect the greater complexity of managing across national boundaries and larger global size.

In column (4) of Table 1 we include a full set of country dummies to address the concern that there might still be many omitted unobserved country-level factors like regulation (Aghion et al., 2010) generating a spurious positive correlation between trust and decentralization. We also include three-digit industry dummies, measures of local development (GDP per capita and population at the regional level), and "noise controls" (for measurement error in the decentralization variable) such as interviewer fixed effects. The coefficient on trust remains significant and is similar in magnitude to the simpler specifications in the first three columns.

An implication of our model is that trust should matter more when the CEO is located on a different site from the plant as communication costs will be higher and monitoring is more difficult and so centralization becomes more costly. Column (5) estimates the regressions on the sub-sample where the CEO is offsite (such as Example B in Figure 1)) and column (6) on the sub-sample where the CEO is on-site (i.e. the headquarter building is located at the same site as the factory manager we interviewed, such as Example C in Figure 1). Although the coefficient on trust is positive in both cases, it is much larger and only significant when the CEO is further away from the plant manager as

[21] This indicator was developed by the World Bank and measures "the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, the police, and the courts, as well as the likelihood of crime and violence" (Kaufmann et al., 2006).
[22] GDP per capita and population are insignificant at conventional levels. The coefficient (standard error) on ln(GDP per capita) is -0.082 (0.061), and for ln(population) is 0.042 (0.028).
[23] The results are unchanged when we include measures of regional skills, which is positive but insignificant.

we would expect. When the CEO is onsite presumably monitoring is easier so that trust becomes less important for the decentralization decision.[24]

The magnitude of the association between decentralization and trust is large. As noted above, column (1) implies a one-standard deviation in trust and is associated with a 15% standard deviation increase in decentralization. Including the full set of covariates in column (4) halves this to 7%. These numbers are similar when we run the regression at the level of the headquarter region/country of location, with the regional equivalent for column (1) implying that a one standard deviation in trust increases decentralization by 13% of a standard deviation. Figure 7 plots this result by plotting actual levels of decentralization against those predicted by average trust in the headquarter location. The size of these differences are substantial, for example, moving from the lowest trust region (Assam in India) to the highest trust region (Norrland in Sweden) would be associated with an increase of the decentralization index of 0.38 of a standard deviation.[25] Finally, running instrumental variable regressions, as we do in section V.B below, leads to even larger magnitudes.

V.B Exploiting differences in the location of the plant and its headquarters

About a third of our sample (1,094 observations) has headquarters located in a different geographical area (region or country) from the plant itself, including 881 affiliates of foreign multinationals. This sub-sample is interesting for two reasons. First, we can include fixed effects for the regional location of the plant removing any bias associated with other geographical characteristics spuriously correlated with local trust and decentralization.[26] Secondly, by focusing on the sample of foreign multinationals we can study whether country of origin characteristics—such as trust—have an effect on the multinational's structure. This has long been a pre-occupation of business case studies, and the more recent trade literature on the organization of multinationals.[27] In particular, for 422 of these foreign affiliates we have information on *bilateral* trust between countries, derived from a series of surveys conducted for the European Commission. These surveys asked around 1,000 individuals in each country the following question "*I would like to ask you a question about how much trust you have in people from various countries. For each, please tell me*

[24] This difference is not simply a reflection of size. When we split the sample into firms above and below 250 employees the trust coefficient was significant in both sub-samples and only slightly larger in the smaller firms (0.940 vs. 0.824). See Appendix Table B2.

[25] Using the 0.608 coefficient in Table 1, column (4) and the trust values in Assam and Norrland of 0.13 and 0.76 respectively.

[26] This also includes any potential language or national bias in the interview process, since multinationals are always interviewed in the local language, with the question on the ownership of the firm only asked at the end of the interview.

[27] See, for example, Helpman, Melitz, and Yeaple (2004), Antras, Garicano, and Rossi-Hansberg (2008) or Burstein and Monge-Naranjo 2009.

whether you have a lot of trust, some trust, not very much trust, or no trust at all." This question was asked about all other E.U. countries and a number of non-E.U. countries like the United States, Japan, and Canada. For our purposes, the bilateral trust variable is ideal because it allows us to analyze the role of trust for decentralization controlling for a full set of region of location *and* country of origin dummies.

The results of this analysis are shown in Table 2. These regressions are based on the specification of column (4) in Table 1, where we test the relationship between decentralization and trust.[28] Column (1) simply shows that the coefficient on trust remains positive and significant (0.625 with a standard error of 0.274) in this sub-sample where region of plant and CHQ are different. In column (2) we repeat the specification adding fixed effects for the plant's region of location. Both the magnitude and the significance level of the trust variable remain similar with the inclusion of the regional dummies. From column (3) onwards, we focus exclusively on the sub-sample of subsidiaries of foreign multinationals. Columns (3) and (4) show that the association between decentralization and trust in the country of origin is still positive and significant in the subsample of 881 subsidiaries of foreign multinationals, and the even smaller sample of 422 foreign multinationals with data on bilateral trust. In column (5) we look at the relationship between trust and decentralization using the bilateral trust measure for our foreign multinational sample. We find that multinational subsidiaries located in a country that their parent country tends to trust (like a French subsidiary in Belgium) are typically more decentralized than subsidiaries located in a country that the multinational's parent country does not trust (like a French subsidiary in Britain). This bilateral trust variable drives the coefficient on general HQ level trust to zero. In column (6) we include both a full set of country location and origin dummies, so that we are only identifying the trust effect of the *pairwise* variation in trust. Even in this demanding specification higher bilateral trust is associated with significantly more decentralization.

One concern is that there could still be an endogeneity bias affecting the coefficient on trust. For example, greater decentralization in multinationals might engender home country trust, or there might be an omitted bilateral variable increasing trust and decentralization. To investigate the *causal*

[28] The only difference is that we use two-digit rather than three-digit industry dummies because of the smaller sample size. In the subsample of 422 subsidiaries of foreign multinationals that we analyze in Table 2 columns (4) to (7), for example, there are 83 distinct three-digit industries, but 20% of them are populated only by a single firm (the median number of observation per three digit industry is 3). When we move to a specification with two-digit dummies, we can identify only 18 distinct industries, but of these, only one is populated by a single firm (the median number of observations per two-digit industry is 21).

effect of trust on decentralization, in column (7) we instrument bilateral trust using the approach of Guiso et al. (2009). They develop a set of instruments for trust based on religious and ethnic similarities between pairs of countries.[29] These are likely to be long-standing differences determined many centuries ago and exogenous to other characteristics, and are significant in explaining variations in bilateral trust (F-test p-value of 18.2). These instruments also pass the Hansen over-identification test of the exclusion restrictions (p-value 0.853). However, despite this there could still be some concern that religious and ethnic differences may proxy for broader measures of cultural interaction between countries beyond trust as Guiso et al (2009) discuss. To investigate this we also run a battery of tests in Tables B2 to B4, including in Table B4 gravity measures like geographical distance, colonial links, a common legal origin and a common language, and find the results to be robust.

When trust is instrumented with these religious and somatic distance measures the point-estimates for the impact of trust on decentralization are, if anything, larger than with OLS,[30] This result is suggestive of a causal effect of trust on decentralization in firms and also provides one potential mechanism for the Guiso et al. (2009) FDI results. Multinational firms have a greater need to decentralize to foreign subsidiaries due to the local managers' better private information, but will be reluctant to do so when they do not trust the local management. Being able to decentralize will increase the attractiveness of these locations for FDI as in Guiso et al. (2009). These results also suggest a cross-country selection mechanism for industrial location. Industries requiring greater levels of decentralization should operate in higher-trust countries. In Appendix Table B1 we show these patterns of comparative advantage in action. High trust areas tend to attract industries that are likely to be decentralized (as measured by the degree of decentralization in the United Kingdom or the United States).[31]

[29] Religious differences are calculated as the product of the fraction of individuals in each country in each religion, and genetic distances as the somatic gap between countries in terms of differences in hair color, facial shape, and height (see Appendix for details). The idea is that countries with different religions and different visual appearances are less likely to bilaterally trust each other. Guiso et al. (2009) show these two measures are an important predictor of bilateral trust, and are robust to controls for similarities in law, language, and informational overlap.

[30] The results are qualitatively similar when we enter the instruments individually, although the bilateral trust variable in the IV specification of Table 2, column (7) is significant at only the 10% level when we use the somatic distance variable alone as an instrument. The religious distance alone yields a coefficient that is significant at the 5% level.

[31] These decentralized industries have higher levels of R&D, investment, and education per employee. This may generate a wider distribution of problems as production is more complex, so that greater decentralization is optimal.

V.C Robustness and extensions

We have extensively tested the robustness of the decentralization and trust relationship. We report the main ones in Table 3. Column (1) re-presents the baseline specification of column (4) in Table 1. We were concerned that the relationship could represent unobserved management quality, so we used the management practices measure from the CEP survey as detailed in Bloom and Van Reenen (2007, 2010) in column (2). Firms with better management practices appeared to be significantly more decentralized, but the coefficient on trust was essentially unaltered. Could the effect of trust be proxying for some other mechanism such as incentive pay? Firms adopting high powered incentives (as measured by the percentage of salary linked to individual performance) also appeared to be more decentralized (in line with Prendergast 2002), but this does not affect the coefficient on trust (column (3)). Some authors have stressed the prevalence of family firms (who are usually more centralized) as a result of low trust levels (e.g. Mueller and Philippon, 2011). We found no significant evidence that family management affects decentralization once the trust variable is included (column (4)), however. Column (5) includes the prevalence of "hierarchical religions," defined following La Porta et al. (1997) as the percentage of the population belonging to the Catholic, Islamic, or Eastern Orthodox faiths, with the idea that hierarchical religion reduces (or reflects) the lower taste for autonomy in the local population and so reduces the probability of decentralization. Hierarchical religion does seem negatively associated with decentralization.[32] Column (6) includes a measure capturing the intensity of product market competition (the number of self-reported competitors). Consistently with other papers, competition is associated with decentralization.[33] Finally, in column (7) we include all the extra variables simultaneously. In all these experiments, trust remains positive and significant with only small changes to its coefficient.

We report a more extensive range of robustness checks in Appendix B (see Tables B2–B4). These analyze measurement error in the trust variable and alternative functional forms for decentralization. For example, we show that the trust measure is robust to constructing it from the largest wave of the survey, the latest wave, and dropping the ESS survey completely (see columns (6)–(8) in Table B2). We also include a host of other potentially confounding variables such as indicators for civic responsibility, personal autonomy, and gravity type variables. The results are very robust to all these experiments.

[32] Hierarchical religion could also reduce trust, which would further depress decentralization. Interestingly, it is religion in the plant's region of location which matters rather than in the CHQ: when CHQ religion is used in column (5) it is insignificant. This suggests what matters is plant managers (and perhaps worker) tastes, rather than CHQ preferences.
[33] For example, Guadalupe and Wulf (2010), Alonso, Dessein, and Matouschek (2008) and Bloom et al. (2010).

V.D Trust and firm size

Proposition 2 of our model is that trust should also increase average firm size, since a CEO could manage more plants through increased decentralization. To investigate this we use the population of all public and private firms from our accounting databases (see Data Appendix) to measure average firm size in manufacturing (i.e. we do not use the data from our organizational survey). We focus on the firm size distribution for those with at least 100 employees because this is the group that we targeted in our organizational survey. These firms are likely to require some kind of formal management structure; in smaller firms—say a 10 person factory—the CEO can directly manage all employees, making decisions directly.[34]

In column (1) of Table 4 we show that firms in a given region are much larger when trust is higher and Rule of Law is stronger. This is consistent with the earlier cross-country trust results in La Porta et al. (1997) and Kummar et al. (2005), and cross-region Rule of Law results in Mexico in Laeven and Woodruff (2007). In column (2) we go beyond the prior literature by including a full set of country dummies and exploiting within country variations in trust. The coefficient on trust remains positive and significant. In columns (3), (4), and (5) we re-estimate our specification from column (2), but for a greater range of the total firm size distribution. The coefficient on trust falls to some extent as we include more of the size distribution, which is what we would expect if trust particularly mattered for large firms (from 1.921 for 100+ employee firms in column (2) to 1.668 for all firms in column (4)). Nevertheless, trust remains significant throughout all columns.

The magnitude of the trust coefficient in column (2) is large—a one standard deviation increase in trust (12 percentage points) would be associated with 23% of a standard deviation of firm size. In terms of regions moving from the lowest trust region (Assam in India) to the highest trust region (Norrland in Sweden)—would be associated with a 117 log point increase in firm size. Given the importance of large firms for reallocation and aggregate productivity growth, this highlights a

[34] We also had concerns about the representativeness of the accounting databases for smaller firms in some countries In some countries like India smaller firms are often unregistered. But for manufacturing firms with over 100 employees this is much less likely, given these firms typically operate with a large production facility, which will be hard to keep hidden from the authorities. Given our focus is on the size of firms rather than the size of plants using firm level databases (rather than Census databases on plants) is appropriate.

potentially important role for social capital and culture in explaining aggregate productivity (e.g. Hsieh and Klenow, 2009).[35]

VI. FIRM-LEVEL PRODUCTIVITY AND DECENTRALIZATION

A key question in analyzing firm organizational structures is the impact this could have on firm and national productivity. We have suggested that one route through which social capital matters is by allowing output to be efficiently reallocated to larger firms (sub-section V.C). In this section we examine our survey micro data to examine a second route—the within firm association of decentralization with productivity.

Consider the basic firm production function:[36]

$$(y-l)_{it} = \alpha_K (k-l)_{it} + \alpha_C (c-l)_{it} + \alpha_D D_i + \varepsilon l_{it} + \gamma\ Z_{it} + v_{it}$$

where D = decentralization, Y = sales (deflated by a three digit industry deflator), L = labor, K = non-IT capital and C = IT capital of firm i at time t, and lower case letters denote natural logarithms, e.g. $y = \ln(Y)$. Note under constant returns $\varepsilon = 0$. The Z's are controls such as skills, firm age, industry and country dummies.

In column (1) of Table 5 we run a basic specification with only capital intensity and decentralization, and find a positive and significant coefficient on decentralization. The coefficient suggests a one standard deviation increase in decentralization is associated with an 11% increase in productivity. In column (2) we include the full set of control variables, including education, country, and industry dummies. The coefficient on decentralization falls to 0.009 and is no longer statistically significant. Note that the coefficient on capital is close to its share in revenues (0.355) and the coefficient on ln(employment) is -0.013 with a standard error of 0.014 implying that we cannot reject constant returns (employment is included in all columns).

Although decentralization may only have a small direct association with productivity, it may complement other individual factors of production. To investigate this we augment our estimating equation to include interactions with all factor inputs:

[35] This is consistent with recent field experiments on Indian firms showing improvements in management led to more decentralized decision making, which facilitated growth by allowing firm owners to manage more plants given their fixed supply of time (Bloom et al., 2011).

[36] There is an extensive literature on the interpretation of the coefficients in these equations. In particular, in the absence of firm-specific prices the coefficients on the factor inputs should be interpreted as a mix of "true" productivity parameters and a mark-up term (e.g. Foster, Haltiwanger, and Syverson, 2008).

$$(y-l)_{it} = \alpha_K (k-l)_{it} + \alpha_C (c-l)_{it} + \alpha_D D_i + \varepsilon l_{it} + \alpha_{CD}[D_i * (c-l)_{it}]$$
$$+\alpha_{KD}[D_i * (k-l)_{it}] + \alpha_{LD}(l_{it} * D_i) + \gamma Z_{it} + v_{it}$$

The test of proposition 3 is whether the interaction between decentralization and IT is positive, i.e. α_{CD}>0. This would be consistent with a growing prior literature suggesting that decentralized firms may use Information Technologies (IT) more effectively.[37]

In column (3) we focus on the sample of firms where we have IT data from the Harte Hanks dataset. The coefficients on capital and skills are similar to the larger sample. IT is significantly and positively associated with productivity, but more interestingly, the coefficient on the IT *decentralization interaction is positive and significant. This is consistent with the idea that IT is more effectively used in decentralized firms. In column (4) we re-run this estimation including a full set of firm-level fixed effects to control for any other unobserved cross-sectional factors, and again find a positive and significant coefficient on the interaction term between IT and decentralization (note that the linear time invariant variables like decentralization are absorbed by the firm fixed effects). In column (5) we include the additional interactions of decentralization with capital (which is negative and significant) and employment (which is insignificant). The main interaction of IT and decentralization is robust to this extended model.[38] We also experimented with including an extensive range of additional nonlinearities (to allow for a translog production function) without any qualitative changes to the main result.[39]

The magnitude of the coefficient on the IT and decentralization interaction at 0.052 is quantitatively important. For example, the real IT capital stock has been growing by about 8% a year faster than non-IT capital inputs in Europe and the United States,[40] so that a firm (or country) with one standard-deviation higher decentralization would have about 0.46 percentage points faster annual productivity growth.

[37] See, for example, Bresnahan, Brynjolfsson, and Hitt (2002), Bartel, Ichinowski, and Shaw (2007) and Garicano and Heaton (2010).
[38] We also experimented with adding an interaction between skills and IT which yielded a positive but insignificant coefficient (0.010 with standard error of 0.027) and the interaction with decentralization and IT remained significant (0.068 with a standard error of 0.017).
[39] For example, we estimated a specification including squared terms in labor, capital intensity, IT intensity, interactions between capital and labor, and IT and labor and obtained a coefficient (standard error) on the decentralization*IT interaction of 0.060 (0.016).
[40] Calculated from 1994 to 2004 using the Groningen Growth and Development Centre dataset for Europe and the United States.

Columns (6) and (7) of Table 5 estimate the specification of column (5) solely on multinational affiliates. This is the same sub-sample we use in Table 2 columns (4)–(7) except we also drop observations with missing IT data. Although the sub-sample is much smaller we find reasonably similar coefficient estimates to the larger sample; in particular, there is a still a significant and positive interaction between IT and decentralization.

A major problem with interpreting these estimates is endogeneity of decentralization and the factor inputs. To tackle this we first estimated TFP using a version of the Olley-Pakes (1996) method separately for each two-digit sector.[41] To deal with the endogeneity of trust, our key underlying determinant of decentralization, we exploit the religious and somatic closeness instruments between countries used in Table 2. In column (7) of Table 5 we use TFP as the dependent variable and include bilateral trust interacted with IT as our key right hand side variable (using the interactions of IT with somatic and religious distance as instruments). This directly tests proposition 3 from section II, that trust increases the productivity impact of IT. Despite the rigor of this specification, the coefficient on the interaction between trust and IT is positive and significant at the 10% level.

In summary, Table 5 provides some support for the third prediction of our theory. Trust (and decentralization) matters for productivity when firms are adopting IT at a rapid rate.

VII. CONCLUSIONS

We have argued that social capital as proxied by trust enhances aggregate productivity through affecting the internal organization of firms. More trusted regions are able to sustain more decentralized and larger firms which aids productivity both through reallocation and through better use of new technologies. Trust is even important when we look at subsidiaries of multinational firms—delegation is much more likely for pairs of countries with high bilateral trust. This is consistent with a model of trust under delegation we develop, which predicts that higher trust leads to increased decentralization, larger firm size, and a higher marginal impact of information technologies on firm performance.

A second contribution of our paper is to start to provide data infrastructure for the analysis of firm organization across countries. Despite many theoretical advances, the empirical literature on

[41] We used a third order series expansion for the control function for both the first and second stage of the Olley-Pakes routine.

organizational economics lacks comparable measures of firms' internal organization. By collecting original data on decentralization across many thousands of firms in twelve countries we start to address this lacuna.

Since the importance of decentralization appears to be growing over time (e.g. Rajan and Wulf, 2006) countries with a comparative advantage in decentralization such as the United States and Northern Europe are likely to benefit disproportionately. If the trend towards rapid technical change and greater competition in markets continues this is likely to give large productivity growth advantages to such countries. Our estimates suggest that regions with a one standard deviation higher level of decentralization would have enjoyed about one half a percent higher growth since the mid-1990s.

There are many future directions for this work. One is running field experiments on organizational changes within large firms to obtain further micro organizational evidence. Another is to further investigate the role of changes in information and technology. We have used a composite hardware measure as is standard in the literature but Garicano (2000) and Garicano and Rossi-Hansberg (2007) have stressed that the impact of falls in information costs on delegation are often the opposite of falls in communication. This can be tested using the kind of data developed here (see Bloom et al, 2010).

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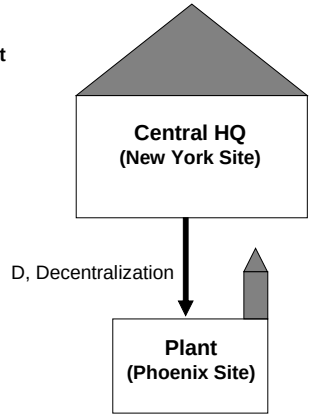
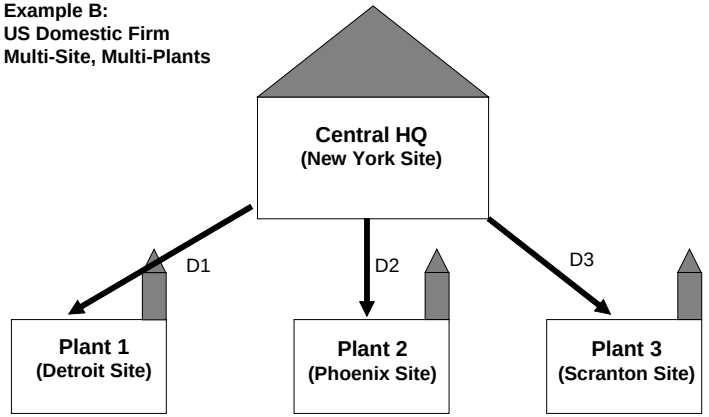
FIGURE 1 – EXAMPLES OF FIRM ORGANIZATIONAL STRUCTURES

Example A:
US Domestic Firm
2 Sites, Single Plant



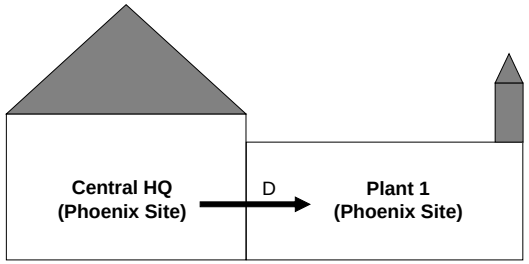
A classic case

Example B:
US Domestic Firm
Multi-Site, Multi-Plants



We typically observe just one plant per firm & assume this is representative, but sometimes we sample more than 1 plant

Example C:
US Domestic Firm
Single site, Single plant



Some firms have a site with multiple "buildings", such as a CHQ and production plants. We only keep these if the plant manager is <u>not</u> the CEO, as decentralization is still possible even if the CEO is on-site (think of Universities, which typically have one-site but Departmental Heads have some autonomy from the Dean). We also test robustness to this assumption in Appendix A.

Example D
Japanese MNE

We have affiliates of multinationals if they are under 5000 workers. We Measure D between the domestic CHQ and the plant manager.

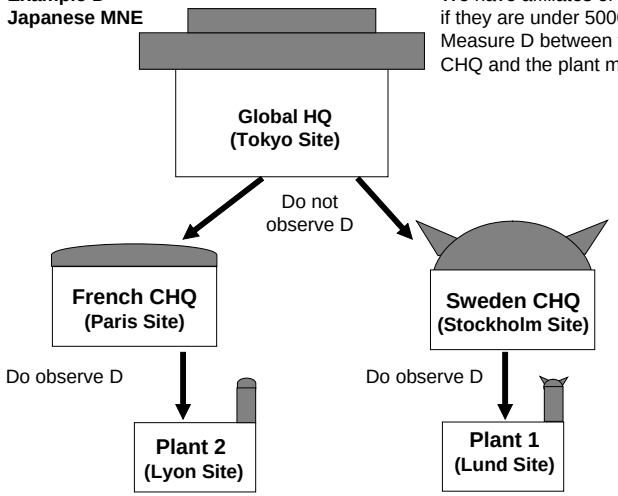
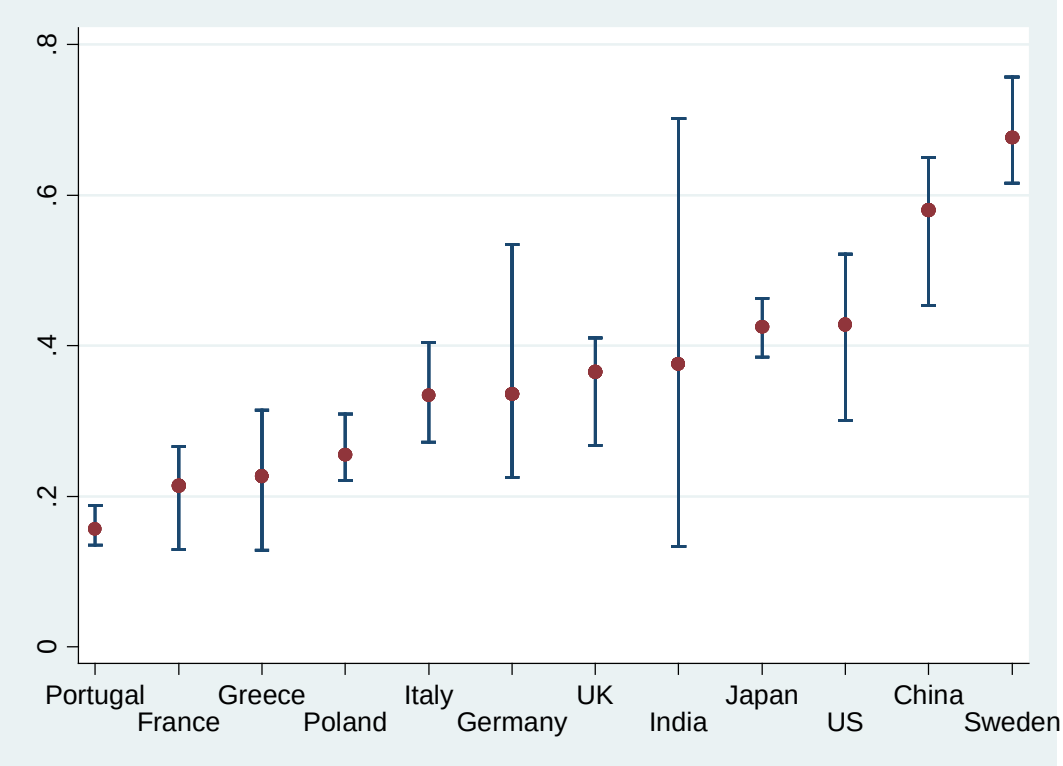
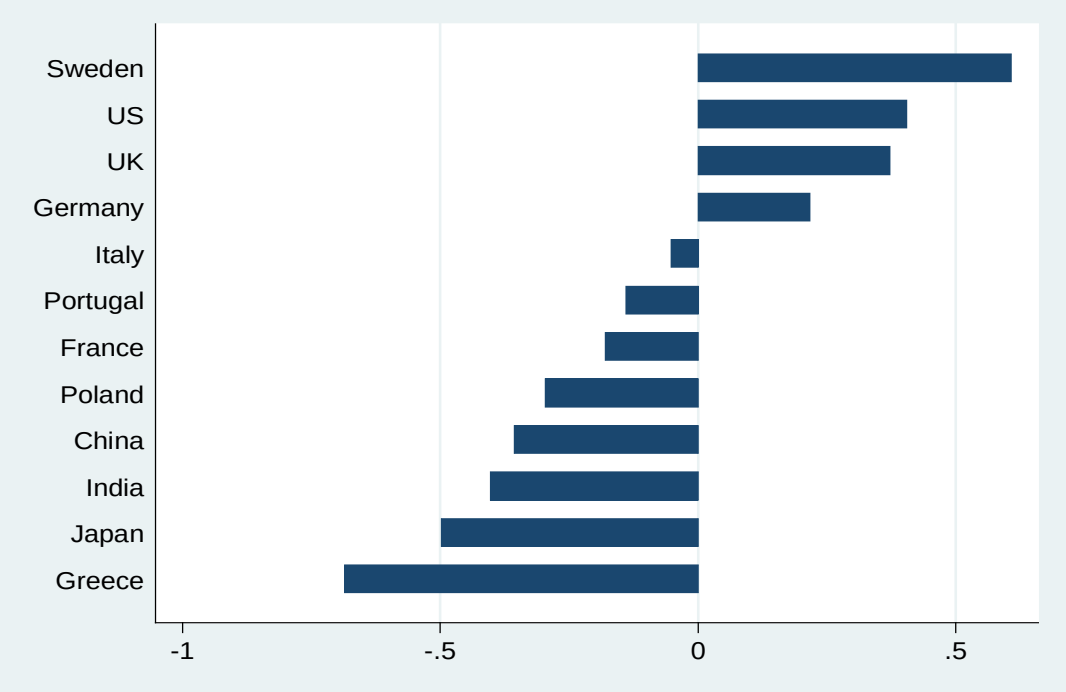


FIGURE 2 – TRUST BY COUNTRY AND REGIONAL DISPERSION



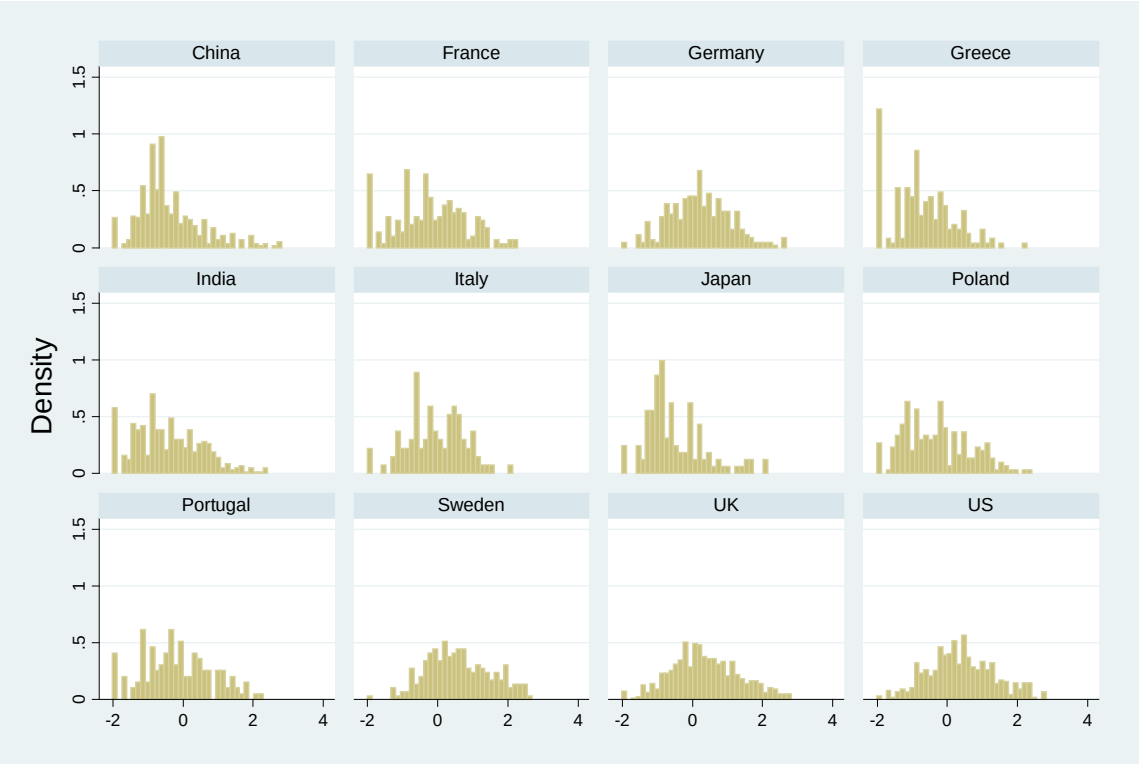
Notes: The graph shows median level of trust. The vertical bars denote minimum and maximum levels.

FIGURE 3 - AVERAGE DECENTRALIZATION BY COUNTRY



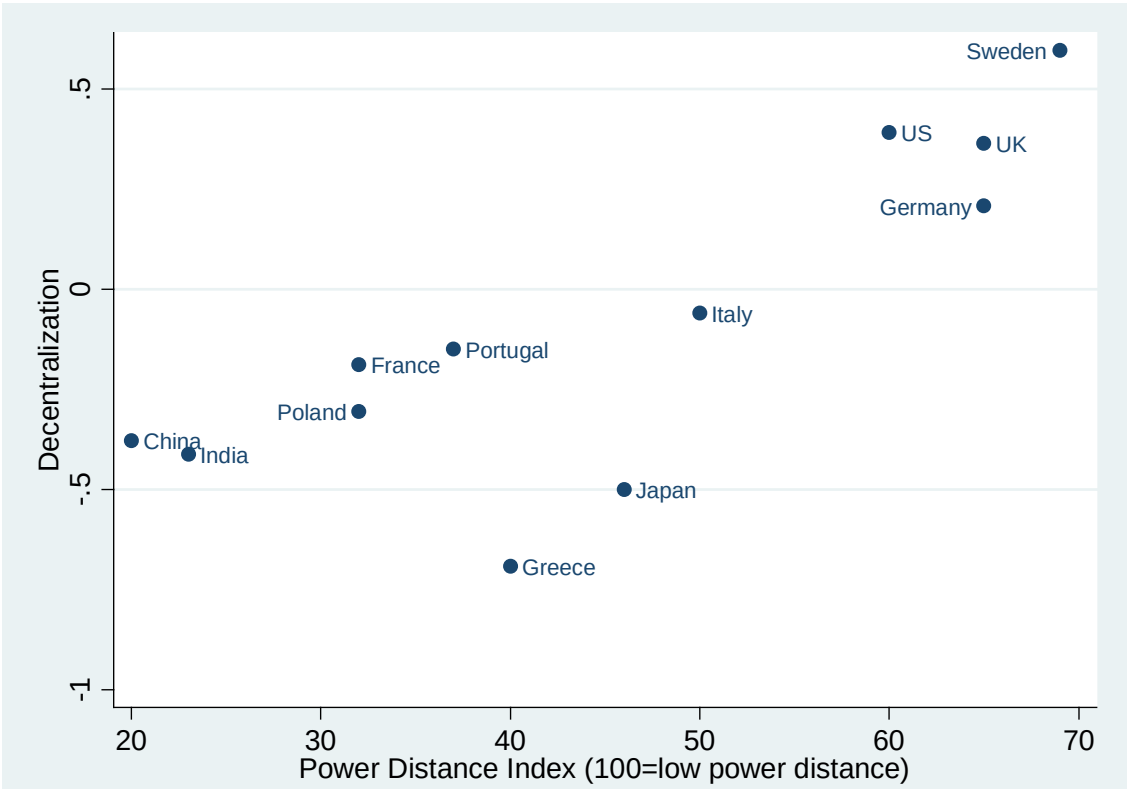
Notes: The graph plots the average z-scored decentralization index by country, measured as the plant manager's degree of autonomy over hiring, investment, products and prices. N=3549. Higher scores indicate more decentralization.

FIGURE 4 – DISTRIBUTION OF THE DECENTRALIZATION VARIABLE BY COUNTRY



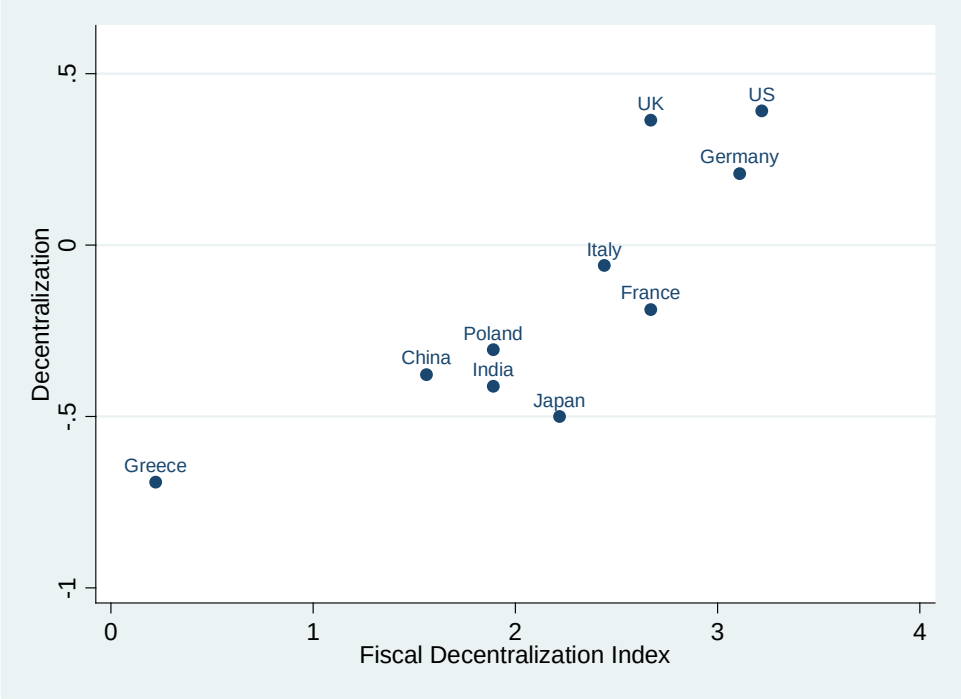
Notes: These are the distributions of the decentralization index, which measures the degree of autonomy of plant managers over hiring, investment, products, and prices. N=3549. Higher scores indicate more decentralization.

FIGURE 5 - DECENTRALIZATION AND POWER DISTANCE INDEX BY COUNTRY



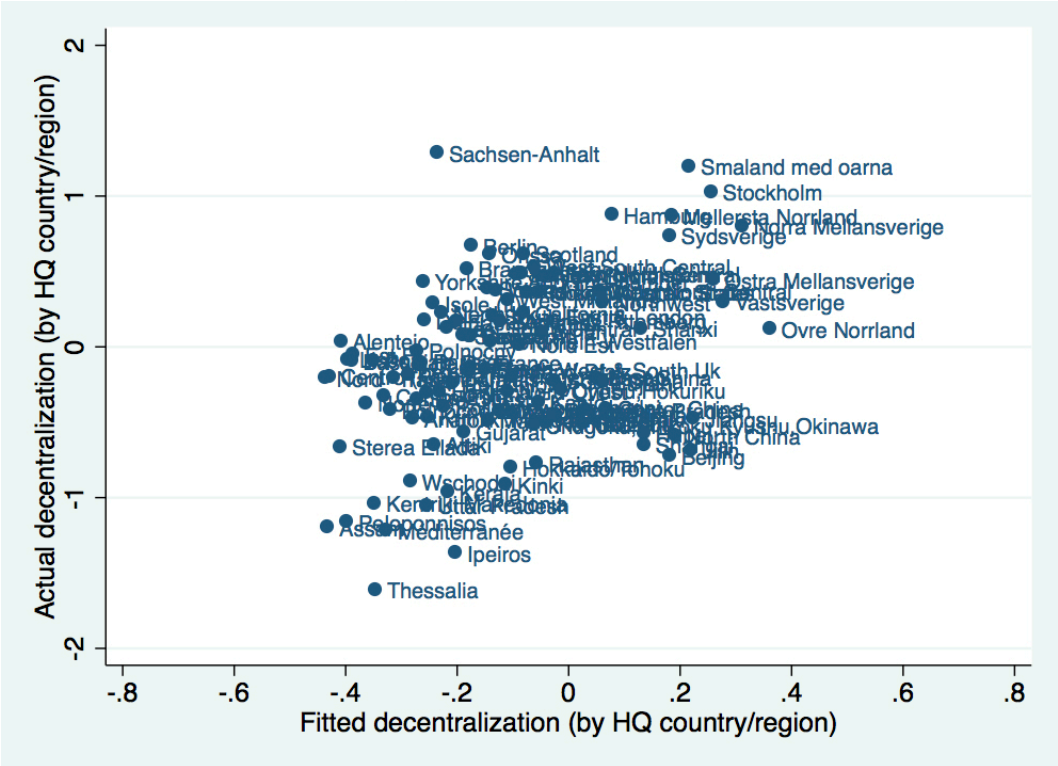
Notes: The y-axis is the average level of autonomy of plant managers over hiring, investment, products, and pricing by country. The x-axis is Hofstede's (1980) Power Distance Index.

FIGURE 6 – FIRM AND POLITICAL DECENTRALIZATION BY COUNTRY



Notes: The y-axis is the average level of autonomy of plant managers over hiring, investment, products, and pricing by country. The x-axis is Arzaghi and Henderson's (2005) Fiscal Decentralization Index.

FIGURE 7 – QUANTIFICATION, BY REGION



Notes: The y-axis is average regional decentralization z-score, measured as the average scores for firms within the region on their plant manager's degree of autonomy over hiring, investment, products, and pricing. The x-axis is regional decentralization z-score predicted from our measures of regional trust and country rule of law. The graph excludes subsidiaries of foreign multinationals and regions with a single observation.

TABLE 1 - DECENTRALIZATION AND TRUST

Dependent variable: Decentralization	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Sample	**All**	**All**	**All**	**All**	**CEO off-site**	**CEO on-site**
Trust	1.231***	0.916***	0.665**	0.608***	0.973**	0.317
Trust measured in CHQ region/country of location	(0.440)	(0.327)	(0.239)	(0.220)	(0.388)	(0.330)
Rule of Law (country of plant location)		0.580***	0.437***			
(-2.5=low, 2.5=high)		(0.071)	(0.113			
Plant Skills			0.106***	0.124***	0.164***	0.092***
% Plant employees with a College degree			(0.033)	(0.030)	(0.039)	(0.030)
Firm Size			0.093***	0.048*	0.051	0.028
ln(Firm employment)			(0.021)	(0.025)	(0.036)	(0.039)
Plant employment			0.133***	0.097***	0.121***	0.058**
Plant employees as a % of firm			(0.027)	(0.025)	(0.043)	(0.029)
Foreign Multinational			0.168***	0.160	0.763	-0.104
Dummy=1 if firm belongs to a foreign multinational			(0.064)	(0.326)	(0.697)	(0.465)
Domestic Multinational			0.027	-0.003	0.030	0.050
Dummy=1 if firm belongs to a domestic multinational			(0.050)	(0.047)	(0.095)	(0.060)
Observations	3655	3655	3655	3655	1375	2280
Country of CHQ location controls (2)	No	Yes	Yes	Yes	Yes	Yes
Country of plant location dummies (11)	No	No	No	Yes	Yes	Yes
Region of plant location controls (2)	No	No	No	Yes	Yes	Yes
Industry dummies (148)	No	No	No	Yes	Yes	Yes
Other controls (56)	No	No	No	Yes	Yes	Yes
Clustering	**CHQ location**	**CHQ location**	**CHQ location**	**CHQ location**	**CHQ location**	**CHQ location**

Notes: * significant at 10%; ** 5%; *** at 1%. Dependent variable is the decentralization z-score index, measured by plant manager's autonomy over hiring, investment, products, and pricing. Estimation by OLS with robust standard errors in parentheses. Standard errors clustered by the firm's headquarter region of location (country of origin if the plant belongs to a foreign multinational). TRUST measures the percentage of individuals who agreed with the statement "most people can be trusted" in the firm's headquarter region of location (country of origin if the plant belongs to a foreign multinational). RULE OF LAW measures extent of confidence in and abide by the rules of society (Kauffman et al., 2007), and ranges between -2.5 and 2.5. "Country of CHQ location controls" are the log of GDP per capita and population in the country of CHQ location. "Region of plant location" controls are the log of GDP per capita and population in the region where the plant is located. "Industry dummies" are 3 digit SIC dummies. "Other controls" include a dummy for whether the firm is publicly listed, a dummy for whether the CEO is on the same site as the plant ("CEO onsite"), and "Noise controls" (these include 44 interviewer dummies, 6 dummies to control for the day of the week the interview took place, an interview reliability score, the manager's seniority and tenure, and the duration of the interview. Regressions weighted by the share of World Values Survey respondents in the region in the country, as survey sample sizes (and thus survey measure error) varied by region. This weight is set to one if the plant belongs to a foreign multinational since we have no region for the multinationals parent.

TABLE 2 - DECENTRALIZATION AND TRUST; EXPLOITING DIFFERENCES IN CORPORATE HEADQUARTERS (CHQ) LOCATION

Dependent variable:	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Decentralization	**CHQ in different region/country**	**CHQ in different region/country**	**Foreign multinationals**	**Foreign multinationals (bilateral trust data available)**	**Foreign multinationals (bilateral trust data available)**	**Foreign multinationals (bilateral trust data available)**	**Foreign multinationals (bilateral trust data available)**
Sample:							
Estimation method	**OLS**	**OLS**	**OLS**	**OLS**	**OLS**	**OLS**	**IV**
Trust	0.625**	0.601**	0.622*	0.619**	-0.195		
Trust measured in CHQ region/country of location	(0.274)	(0.285)	(0.311)	(0.288)	(0.467)		
Bilateral trust					1.744***	1.662**	2.385**
Trust of people from country of origin for people in country of location					(0.617)	(0.804)	(1.106)
Observations	1094	1094	881	422	422	422	422
Country of CHQ location controls (2)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country of plant location dummies (11)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region of plant location controls (2)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies (23)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Other controls (56)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region of plant location dummies (111)	No	Yes	Yes	Yes	Yes	Yes	Yes
Country of CHQ country location dummies (32)	No	No	No	No	No	Yes	Yes
Clustering	**CHQ location**	**CHQ location**	**CHQ location**	**CHQ by plant location**	**CHQ by plant location**	**CHQ by plant location**	**CHQ by plant location**
Instruments							Somatic dist. Religious dist.
First stage F-test							18.19
Hansen overidentification test (p-value)							0.853

Notes: * significant at 10%; ** 5%; *** at 1%. Dependent variable is the decentralization z-score index, measured by plant manager's autonomy over hiring, investment, products and pricing. Columns (1) and (2) include all firms whose CHQ is located in a different region within the same country, or in a different country; Columns (3)-(8) include only foreign multinationals. Estimation by OLS in columns (1)-(6) and IV in column (7). Instruments are "religious diversity" and "somatic distance" between each country pair. Standard errors (in parentheses) are clustered as noted: "CHQ by plant location" indicates clustering within each country origin by country of location cell. TRUST measures the percentage of individuals who agreed with the statement "most people can be trusted" in the geography of firm's CHQ region or country of location. BILATERAL TRUST measures the percentage of people from country of origin who report to "trust a lot" people living in the country of firm's location. "Country of CHQ location controls" are the log of GDP per capita and population in the country of CHQ location. "Region of plant location" controls are the log of GDP per capita and population in the region where the plant is located. "Industry dummies" are 2 digits SIC dummies. "Other controls" include a dummy for whether the firm is publicly listed, a dummy for whether the CEO is on the same site as the plant ("CEO onsite") and "Noise controls" (these include 44 interviewer dummies, 6 dummies to control for the day of the week the interview took place, an interview reliability score, the manager's seniority and tenure and the duration of the interview. Regressions weighted by the share of World Values Survey respondents in the region in the country, as survey sample sizes (and thus survey measure error) varied by region. This weight is set to one if the plant belongs to a foreign multinational since we have no region for the multinationals parent.

TABLE 3 - DECENTRALIZATION AND TRUST; ROBUSTNESS

Dependent variable: Decentralization	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Additional controls:	**No - Baseline**	**Management Quality**	**Individual Pay incentives**	**Family ownership**	**Hierarchical Religion**	**Competition**	**All**
Trust	0.608***	0.575**	0.618***	0.590***	0.689***	0.597***	0.612***
Trust in CHQ region/country of location	(0.220)	(0.224)	(0.218)	(0.217)	(0.182)	(0.218)	(0.175)
Management		0.179***					0.158***
		(0.041)					(0.038)
Bonus			0.373**				0.417***
			(0.172)				(0.120)
Family management				-0.101			0.032
				(0.062)			(0.045)
Hierarchical religion					-0.004***		-0.004**
					(0.002)		(0.002)
Competition						0.152***	0.069**
						(0.044)	(0.027)
Observations	3,655	3,655	3,655	3,655	3,655	3,655	3,655
Country of CHQ location controls (2)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country of plant location dummies(11)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region of plant location controls (2)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies (148)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Other controls (56)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustering	**CHQ location**	**CHQ location**	**CHQ location**	**CHQ location**	**CHQ location**	**CHQ location**	**CHQ location**

Notes: * significant at 10%; ** significant at 5%; *** significant at 1%. Dependent variable is the decentralization z-score index, measured by plant manager's autonomy over hiring, investment, products, and pricing. Estimation by OLS with robust standard errors in parentheses. Standard errors clustered by the firm's headquarter region of location (country of origin if the plant belongs to a foreign multinational). TRUST measures the percentage of individuals who agreed with the statement "most people can be trusted" in the firm's headquarter region of location (country of origin if the plant belongs to a foreign multinational). MANAGEMENT is the firm-level Bloom and Van Reenen (2007) management score. BONUS is the percentage of managerial compensation tied to individual, team, and firm performance. FAMILY MANAGEMENT is a dummy equal to one if the firm is owned and run by family members. HIERARCHICAL RELIGION is the percentage of people belonging to a hierarchical religion in the region of plant location as recorded by the WVS (see text for the definition of hierarchical religions). COMPETITION is a variable measuring the number of the firm's direct competitors, as perceived by the plant manager (0=no competitors, 1=between 1 and 5 competitors; 3=more than 5 competitors). "Country of CHQ location controls" are the log of GDP per capita and population in the country of CHQ location. "Region of plant location" controls are the log of GDP per capita and population in the region where the plant is located. "Industry dummies" are 3 digits SIC dummies. "Other controls" include a dummy for whether the firm is publicly listed, a dummy for whether the CEO is on the same site as the plant ("CEO onsite"), and "Noise controls" (these include 44 interviewer dummies, 6 dummies to control for the day of the week the interview took place, an interview reliability score, the manager's seniority and tenure, and the duration of the interview). Regressions weighted by the share of World Values Survey respondents in the region in the country, with the weight set to one if the plant belongs to a foreign multinational.

TABLE 4
FIRM SIZE AND TRUST

Dependent variable: ln(mean employees per firm)	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
Sample:	100+ employees	100+ employees	50+ employees	25+ employees	All employees
Trust (region)	2.216***	1.921**	1.784*	1.668*	1.659*
Trust measured in firm's region of location	(0.478)	(0.920)	(0.904)	(0.885)	(0.901)
Rule of Law (country)	0.476***				
(-2.5=low, 2.5=high)	(0.079)				
Observations	110	110	110	110	110
Regional controls (3)	No	Yes	Yes	Yes	Yes
Country dummies (11)	No	Yes	Yes	Yes	Yes

Notes: * significant at 10%; ** significant at 5%; *** significant at 1%. The dependent variable is ln(mean employees per firm) in the population of all manufacturing firms in that country region. Standard errors are clustered by the trust in the area where the plant is located. “Sample” reports the size cut off for inclusion in the sample—for example in column (1) all firms with over 100 employees were used to calculate the log mean employees per firm. “Trust” measures the percentage of individuals in the region’s country of location who agreed with the statement “most people can be trusted.” “Rule of Law” measures the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, the police, and the courts, as well as the likelihood of crime and violence in the firm’s country of location. The index is compiled by the World Bank (Kauffman et al., 2007), and ranges between -2.5 and 2.5. Regional controls are ln(GDP per capita), ln(population), and the proportion of employees with a college degree in the region.

TABLE 5: DECENTRALIZATION AND FIRM-LEVEL PRODUCTIVITY

Dependent variable:	**(1) ln(Sales/ employee)**	**(2) ln(Sales/ employee)**	**(3) ln(Sales/ employee)**	**(4) ln(Sales/ employee)**	**(5) ln(Sales/ employee)**	**(6) ln(Sales/ employee)**	**(7) TFP**
Sample	**All**	**All**	**Sub-Sample with IT data**			**Foreign Multinationals**	
Estimation method	**OLS**	**OLS**	**OLS**	**OLS**	**OLS**	**OLS**	**IV**
Decentralization*ln(IT/Employee)			0.077***	0.052***	0.068***	0.107**	
Decentralization*computers per worker			(0.021)	(0.017)	(0.018)	(0.045)	
Bilateral Trust* ln(IT/employee)							0.582*
							(0.313)
Decentralization	0.113***	0.009	-0.009				
	(0.016)	(0.014)	(0.017)				
Ln(IT/Employee)			0.131***	0.091***	0.094***	0.120***	-0.098
ln (computers per worker)			(0.025)	(0.018)	(0.018)	(0.045)	(0.061)
Ln(Capital/Employee)	0.476***	0.355***	0.305***	0.373***	0.376***	0.304***	
ln (capital per employee)	(0.015)	(0.015)	(0.022)	(0.040)	(0.037)	(0.073)	
Decentralization*ln(Capital/Employee)					-0.103***		
					(0.035)		
Ln(Skills)		0.065***	0.055***				
ln (% employees with a degree)		(0.014)	(0.020)				
Firms	2,024	2,024	679	679	679	155	155
Observations	13,826	13,826	3,329	3,329	3,329	759	759
Country and industry controls	No	Yes	Yes	-	-	-	-
Other controls	No	Yes	Yes	-	-	-	-
Firm fixed effects	No	No	No	Yes	Yes	Yes	Yes
First stage F-test							11.89
Hansen overidentification test (p-value)							0.534

Notes: * significant at 10%; ** significant at 5%; *** significant at 1%. Estimation by OLS with standard errors are clustered at the firm level in parentheses. The dependent variable is ln(real sales per employee) in all columns except column (7) where it is TFP estimated by the Olley-Pakes (1996) method separately by two-digit industry. Decentralization is a z-score index, measured by the degree of plant manager's autonomy over hiring, investment, products, and pricing. IT is the number of computers per employee. IT and Decentralization are centered at the mean values of the columns (3)–(5) sub-sample. "Country and industry" controls include a full set of country and three digit industry dummies. All columns control for ln(employment) and column (5) also includes decentralization*ln(employment). "Other controls" includes a full set of noise controls and controls for consolidation status and public listing. The two instruments in column (7) are the interaction of religious distance and IT and the interaction of somatic distance and IT. The bottom row reports the F-test of these two instruments in the first stage. Sample "All" includes firms with accounting information on capital, labour, sales, and CEP organizational data (columns (1) and (2)); columns (3)–(5) are on the sub-sample "All" where we also have IT data (from the Harte-Hanks survey) and columns (6) and (7) is the sub-sample of this which are also foreign multinationals (i.e. as in Table 2 columns (4)–(7)).

NOT INTENDED FOR PUBLICATION

APPENDIX A: DATA

This describes the steps for constructing the data used in the paper. Note that the full dataset is also available on-line with all Stata do-files here http://www.stanford.edu/~nbloom/org.zip

A1. Firm-level Accounting Databases

Our sampling frame was based on the Bureau van Dijk (BVD) Amadeus dataset for Europe (France, Germany, Greece, Italy, Poland, Portugal, and the United Kingdom), on BVD Icarus for the United States, on CMIE Firstsource dataset for India, and on the BVD Oriana dataset for China and Japan. These databases all provide sufficient information on companies to conduct a stratified telephone survey (company name, address, and a size indicator). These databases also typically have accounting information on employment, sales, and capital. Apart from size, we did not insist on having accounting information to form the sampling population, however.

Amadeus and Firstsource are constructed from a range of sources, primarily the National registries of companies (such as Companies House in the United Kingdom and the Registry of Companies in India). Icarus is constructed from the Dun & Bradstreet database, which is a private database of over 5 million U.S. trading locations built up from credit records, business telephone directories, and direct research. Oriana is constructed from Huaxia credit in China and Teikoku Database in Japan, covering all public and all private firms with one of the following: 150 or more employees, 10 million US$ of sales or 20 million US$ of assets.

In addition to using these accounting databases for the sampling frame we also use them to conduct the analysis of firm size in Table 4. Since our measure of decentralization focuses on the delegation of power between the company headquarters and the plant manager, firm size is the appropriate concept to use rather than plant size. Census data do not report firm sizes on a consistent basis across countries, which is why we use the BVD and CMIE datasets. We discuss issues of representativeness below in sub-section A2.

A2. The Organizational Survey

In every country the sampling frame for the organization survey was all firms with a manufacturing primary industry code with between 100 and 5,000 employees on average over the most recent three years of data (typically 2002 to 2004).[42] In Japan and China we used all manufacturing firms with 150 to 5000 employees since Oriana only samples firms with over 150

[42] In the United States only the most recent year of employment is provided. In India employment is not reported for private firms, so for these companies we used forecast employment, predicted from their total assets (which are reported) using the coefficients from regressing ln(employees) on ln(assets) for public firms.

employees, while in Portugal we supplemented the sample with firms with 75 to 100 employees.[43] We checked the results by conditioning on common size bands (above 150 in all countries).

Interviewers were each given a randomly selected list of firms from the sampling frame. This should therefore be representative of medium sized manufacturing firms. The size of this sampling frame by country is shown in Table A4, together with information on firm size. Looking at Table A4 two points are worth highlighting on the sampling frame. First, the size of the sampling frame appears broadly proportional to the absolute size of each country's manufacturing base, with China, the United States, and India having the most firms and Sweden, Greece and Portugal the fewest.[44] Second, China has the largest firms on average, presumably reflecting both the higher size cut-off for its sampling frame (150 employees versus 100 employees for other countries) and also the presence of many current and ex state-owned enterprises (11% in the survey are still Government owned). When we condition on the sample of firms with more than 150 employees in all countries, median employment for Chinese firms is still relatively high, but lower than the United States, the United Kingdom, and Sweden. Third, Greece and India have a much higher share of publicly quoted firms then the other countries, with this presumably reflecting their more limited provision of data on privately held firms. Because of this potential bias across countries will control for firm size and listing status in all the main regressions.

In addition to randomly surveying from the sampling frame described above we also resurveyed the firms we interviewed in the 2004 survey wave used in Bloom and Van Reenen (2007). This was a sample of 732 firms from France, Germany, the United Kingdom and the United States, with a manufacturing primary industry code and 50 to 10,000 employees (on average between 2000 and 2003). This sample was drawn from the Amadeus dataset for Europe and the Compustat dataset for the U.S. Only companies with accounting data were selected. So, for the United Kingdom and France this sampling frame was very similar to the 2006 sampling frame. For Germany it is more heavily skewed towards publicly quoted firms since smaller privately held firms do not report balance sheet information. For the United States it comprised only publicly quoted firms. As a result when we present results we always include controls for firm size. As a robustness test we drop the firms that were resurveyed from 2004. These resurveyed firms were randomly distributed among the relevant country interviewers.

The Representativeness of the Sampling Frame

The accounting databases are used to generate our organizational survey and also used directly in the analysis of the firm size distribution in Table 4. How does this compare to Census data? Table A5 compares the number of employees for different size bands from our sample with the figures for the corresponding manufacturing populations obtained from national Census Bureau data from each of the twelve countries. Unfortunately, figures for the population distributions are not available from every country in the same format, but all our countries do report the number of

[43] Note that the Oriana database does include firms with less than 150 employees if they meet the sales or assets criteria, but we excluded this to avoid using a selected sample.

[44] The size of the manufacturing sector can be obtained from http://laborsta.ilo.org/, a database maintained by ILO. Indian data can be obtained from Indiastat, from the "Employment in Industry" table.

employees in enterprises with over 50 or more employees (except the United States, where the threshold is 20 or 100) so we report this.

Note that there are several reasons for mismatch between Census data and firm level accounts. First, even though we only use unconsolidated firm accounts, employment may include some jobs in overseas branches. Second, the time of when employment is recorded in a Census year will differ from that recorded in firm accounts (see base of each column in Table A5). Third, the precise definition of "enterprise" in the Census may not correspond to the "firm" in company accounts (see notes in table for exact definitions). Fourth, we keep firms whose primary industry is manufacturing whereas Census data includes only plants whose primary industry code is manufacturing. Fifth, there may be duplication of employment in accounting databases due to the treatment of consolidated accounts.[45] Finally, reporting of employment is not mandatory for the accounts of all firms in all countries. This was particularly a problem for Indian and Japanese firms, so for these countries we imputed the missing employment numbers using a sales regression.

Despite these potential differences, the broad picture that from Table A5 is that in eight countries the sample matches up reasonably with the population of medium sized manufacturing firms (being within 17% above or below the Census total employment number). This suggests our sampling frame covers near to the population of all firms for most countries.

In two countries the coverage from accounting databases underestimates the aggregate: the Swedish data covers only 62% of Census data and the Portuguese accounting database covers 72%. This is due to incomplete coverage in ORBIS of these smaller nations. In the United States and Japan the accounting databases appears to overestimate the employment of manufacturing firms compared to Census data, by about 36%. We think this is due to some double counting of the employment of subsidiaries due to imperfect recording of the consolidation markers in Japanese and U.S. accounts.

These issues will be a problem if our sampling frame is non-randomly omitting firms—for example under-representing smaller firms—because it would bias our cross-country comparisons. We try a couple of approaches to try and address this. First, in almost all the tables of results we include country fixed-effects to try to control for any differences across countries in sample selection bias. Hence, our key results are identified by within country and region variation. Second, in our quantification analysis when we compare across countries we control for size, public listing status, and industry. This should help to condition on the types of factors that lead to under/over sampling of firms. Since these factors explain only a limited share of cross country variation in decentralization this suggests this differential sampling bias is not likely to be particularly severe. Finally, we also present experiments where we drop the four possibly problematic countries (Japan, Portugal, Sweden, and the United States) from the analysis to show

[45] Table A5 is built omitting all consolidated accounts to avoid duplications. Still, for some companies the consolidated accounts marker is sometimes missing so that duplications might still be present causing a "double counting" problem.

that the results are robust. In the specification of column (2) in Table 4 the coefficient on trust actually rose to 2.048 (standard error = 0.961) even though we now have only 81 regions.

The Survey Response Rate

As shown in Table A6 of the firms we contacted 44.9% took part in the survey: a high success rate given the voluntary nature of participation. Of the remaining firms 16.8% refused to be surveyed, while the remaining 38.3% were in the process of being scheduled when the survey ended.

The reason for this high share of "scheduling in progress" firms was the need for interviewers to keep a portfolio of firms who they cycle though when trying to set up interviews. Since interviewers only ran an average of 2.8 interviews a day the majority of their time was spent trying to contact managers to schedule future interviews. For scheduling it was efficient for interviewers to keep a stock of between 100 to 500 firms to cycle through. The optimal level of this stock varied by the country—in the United States and the United Kingdom many managers operated voicemail, so that large stocks of firms were needed. In Japan after two weeks the team switched from working Japanese hours (midnight to 8am) to Japanese afternoons and THE UNITED KINGDOM morning (4am till midday), which left large stocks of contacted firms in Japan.[46] In Continental Europe, in contrast, managers typically had personnel assistants rather than voicemail, who wanted to see Government endorsement materials before connecting with the managers. So each approach was more time consuming, requiring a smaller stock of firms.

The ratio of successful interviews to rejections (ignoring "scheduling in progress") is above 1 in every country. Hence, managers typically agreed to the survey proposition when interviewers were able to connect with them. This agreement ratio is lowest in China and Japan. There were two reasons for this: first, the Chinese and Japanese firms did appear to be genuinely more willing to refuse to be interviewed; and second, the time-zone meant that our interviewers could not talk during the Chinese or Japanese morning; which sometimes led to rejections if managers were too busy to talk in the afternoon.

Table A7 analyses the probability of being interviewed.[47] In all columns, we compare the probability of running an interview conditional on contacting the firm, so include rejections and "scheduling in progress" firms in the baseline. The decision to accept is uncorrelated with revenues per worker, firm age and listed status. The probability of being interviewed is also uncorrelated with the average level of trust and the percentage of hierarchical religions in the region. Large firms and multinationals did appear to be more predisposed to agree to be interviewed, although the size of this effect if not large—multinationals were about 11 percentage points more likely to agree to the interview and firms about 10 percentage points more likely for a doubling in size. Firms that were contacted earlier on in the survey were also significantly more likely to end up being interviewed, with firms contacted at the beginning of the survey over 8

[46] After two weeks of the Japanese team working midnight to 8am it became clear this schedule was not sustainable due to the unsociability of the hours, with one of the Japanese interviewers quitting. The rest of the team then switched to working 4am until noon.

[47] Note this sample is smaller than the total survey sample because some firms do not report data for certain explanatory variables, for example U.S. private firms do not report sales.

percentage points more likely to be interviewed than those contacted towards the end (3 months later). The reason is that firms contacted early on in the survey were subsequently contacted many more times as interviewers cycled through their stocks of "scheduling in progress firms." Finally, compared to the United States, France, Germany, Greece, India, Italy, Poland, Portugal, and Sweden had significantly higher conditional acceptance rate—while China had a significantly lower acceptance rate. Column (2) shows that the likelihood of a contacted firm eventually being interviewed is also uncorrelated with return on capital employed, a basic profits measure.

So, in summary, respondents were not significantly more productive or profitable than non-responders. Firms contacted earlier on in the survey process were more likely to end up being interviewed. Respondents did tend to be slightly larger and more likely to be a multinational subsidiary, but were not more likely to be stock-market listed or older. Chinese and Japanese firms were less likely to respond and European firms were more likely to respond. Note, however, that we address this potential source of bias including in all regressions controls for size, multinational status, and country dummies.

Firm-level variables

Our firm accounting data on sales, employment, capital, profits, shareholder equity, long-term debt, market values (for quoted firms), and wages (where available) came from BVD Amadeus dataset for Europe (France, Germany, Greece, Italy, Poland, Portugal and the United Kingdom.), from BVD Icarus for the United States, from CMIE Firstsource dataset for India, and from the BVD Oriana dataset for China and Japan. Sales are deflated by a three digit industry producer price index.

BVD and CMIE also have extensive information on ownership structure, so we can use this to identify whether the firm was part of a multinational enterprise. We also asked specific questions on the multinational status of the firm (whether it owned plants aboard and the country where the parent company is headquartered) to be able to distinguish domestic multinationals from foreign multinationals.

We collected many variables through our survey including information on plant size, skills, organization, etc. as described in the main text. We asked the manager to estimate how many competitors he thought he faced (top-coded at 10 or more), which was used to construct the firm-level competition variable (see next sub-section for the other industry-level competition measures). We also collected management practices data in the survey. These were scored following the methodology of Bloom and Van Reenen (2007), with practices grouped into four areas: *operations* (three practices), *monitoring* (five practices), *targets* (five practices), and *incentives* (five practices). The shop-floor operations section focuses on the introduction of lean manufacturing techniques, the documentation of processes improvements, and the rationale behind introductions of improvements. The monitoring section focuses on the tracking of performance of individuals, reviewing performance, and consequence management. The targets section examines the type of targets, the realism of the targets, the transparency of targets, and the range and interconnection of targets. Finally, the incentives section includes promotion criteria, pay and bonuses, and fixing or firing bad performers, where best practice is deemed the approach that gives strong rewards for those with both ability and effort. Our management measure uses the un-weighted average of the z-scores of all 18 dimensions.

A.3 Industries and Industry level data

Our basic industry code is the U.S. SIC (1997) three digit level—which is our common industry definition in all countries. We allocate each firm to its main three digit sector (based on sales). For the 3,655 firms in the sample we have 134 unique three-digit industries. There are at least ten sampled firms in each industry for 96.9% of the sample.

A.4 Regional and National Data

Trust: the World Values Survey

The regional trust and religion variables have been calculated from the World Values Survey (WVS). The WVS is a cross-country project coordinated by the Institute for Social Research of the University of Michigan, under the direction of Ronald Inglehart. Each wave carries out representative surveys of the basic values and beliefs of individuals in a large cross-section of countries. The questionnaire contains answers to specific questions about religion and social attitudes, including several question on generalized and specific trust (e.g. trust in the family, government etc.), as well as detailed information on the social and education background of the respondents (age, income, and education). The key question we use is the standard one: "*Generally speaking, would you say that most people can be trusted or that you can't be too careful in dealing with people?*"

The WVS data can be downloaded freely from the WVS website (www.worldvaluessurvey.org). For the purposes of our analysis, we use only individual entries with information on the respondents' region of residence. We pool together data relative to four successive waves of data collection (1981–1984, 1989–1993, 1994–1999 and 1999–2004. We use the WVS for all countries with the exception of Greece, for which the regional breakdown provided by the WVS is poor. Luckily, we can build regional aggregates of trust and religion using the European Social Survey (ESS, http://www.europeansocialsurvey.org), a biennial multi-country survey covering over 30 European nations, and including questions on trust and religion. The wording of the trust question is identical to the one used by the WVS, although the answers are coded on a scale from 1 to 10, instead of the discrete 0/1 choices adopted by the WVS. To ensure comparability between countries, we convert into 1s all the answers greater than 5. The first round of the ESS was fielded in 2002/2003, the second in 2004/2005 and the third in 2006/2007. We pool across all waves of the ESS. The frequencies by country and wave are shown in Table A8.

European Commission Bilateral Trust Data

This comes directly from Table 1; panel B of Guiso et al. (2009). They averaged over multiple waves of a Eurobarometer survey carried out for the European Commission from the 1970s onwards. The question is: "I would like to ask you a question about how much trust you have in people from various countries. For each, please tell me whether you have a lot of trust, some trust, not very much trust, or no trust at all." This was asked to all European Union Member States about each other and a number of other countries (including the United States, China, and Japan). We allocated the bilateral trust measure across the multinational subsidiaries included in our sample using information on the country where the parent company is headquartered and on the country where the subsidiary itself is located. So, for example, the measure of bilateral trust reported by

Swedish people towards Italians would be allocated to the subsidiary of a Swedish multinational located in Italy.

Regional Firm Size and Share of Manufacturing Employment

Average regional firm size and the industry share of employment in each region by SIC2 were computed using employment data on the population of all public and private firms included in the BVD and CMIE accounting databases described above. The data refers mostly to 2006 (earlier years of the accounting data have been used whenever 2006 was not available, as long as the firm appeared to be still active). Since the accounting databases did not always provide information on the region of location of the firm, each firm was allocated to a region or state according to the headquarter postcode whenever this was available. If the postcode was not available, information on the city of location was used to map the firm into a specific region or state. With this procedure, we obtained regional information for virtually all firms included in the databases.

GDP per Capita and Population

The regional GDP per capita and population variables are drawn from the following sources: Europe: Eurostat, Regional Statistics,[48] United States: Bureau of Economic Analysis, regional Statistics,[49] Japan: Japan Statistic Bureau, Prefectural Statistics,[50] China: Province data from Chinadataonline.org,[51] and India: State level data from the Central Statistical Organization (CSO).[52] The data refers to 2006 and is expressed in national currencies (country dummies are included in all regressions).

Rule of Law

The Rule of Law variable measures the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, the police, and the courts, as well as the likelihood of crime and violence. The index is compiled by the World Bank (Kauffman et al., 2007), and ranges between -2.5 and 2.5. The data can be downloaded from: http://info.worldbank.org/governance/wgi2007/resources.htm.

Bilateral-trust instrumental variables:

Somatic distance: This is obtained using the data from Guiso et al. (2009) for most of our Europeans countries, and their methodology to extend to the rest of Europe, China, and the United States. Quoting from their paper:

> "*We derive an indicator of somatic distance, based on the average frequency of specific traits in the indigenous population reported in Biasutti (1954). For height, hair color (pigmentation), and cephalic index (the ratio of the length and width of the skull), Biasutti (1954) draws a map of the prevailing traits in each country in Europe. For each trait, European Union countries fall into three different categories. For hair color we have "Blond prevails," "Mix of blond and dark," and "Dark prevails." We arbitrarily assign the score of 1 to the first, 2 to the second and 3 to the third. When one's country somatic*

[48] http://epp.eurostat.ec.europa.eu/portal/page?_pageid=0,1136162,0_45572076&_dad=portal&_schema=PORTAL
[49] http://www.bea.gov/regional/gsp/
[50] http://www.stat.go.jp
[51] http://chinadataonline.org/member/macroyr/macroyrtshow.asp?code=A0101
[52] http://mospi.nic.in/cso_test1.htm

characteristics belong to more than one category, we take the country's most prevalent category. We then compute the somatic distance between two countries as the sum of the absolute value of the difference in each of these traits" (quoted page # here).

We extend this by collecting data for China and Poland from Biasutti (1954), assuming Luxembourg has the average values for France and Germany, and the United States has the values of its European immigrants, weighted by their ancestry shares reported in 1999 U.S. Census. We use only European immigrants because they appear overwhelmingly to be the owners and managers of the types of medium sized manufacturing firms in our survey.

Religious distance: Again, this is obtained from Guiso et al. (2009) for most of our European countries, and their methodology to extend to the rest of Europe, China, and the United States. Quoting from their paper:

"*The first proxy for culture is an indicator of religious similarity equal to the empirical probability that two randomly chosen individuals in two countries will share the same religion. We obtain this measure by taking the product of the fraction of individuals in country j and in country i who have religion k and then we sum across all religions k (k = Catholic, Protestant, Jewish, Muslim, Hindu, Buddhist, Orthodox, no-religion, other affiliation). To calculate this variable we use the percentage of people belonging to each religious denomination from the World Values Survey"* (quoted page # here).

We extend this to all other necessary country-pairs using the World Values Survey.

APPENDIX B: ADDITIONAL ANALYSIS

Industry structure and decentralization

The factors that facilitate greater decentralization within firms should also influence industry composition across regions and countries. If some industries require greater decentralization for efficient production—for example if they are technologically fast moving—then we should see these located in higher trust areas. To investigate this we calculated an "implied industry decentralization," ID_j, for each region as follows:

$$ID_j = \sum_k E_{jk} \times D_k$$

where j denotes region and k denotes two digit industry, E_{jk} is the share of employment in each two digit industry in each region calculated from the population of all public and private firms in that region (see Appendix A), and D_k is the average decentralization value for that industry in our sample in the United Kingdom. We choose the United Kingdom as the base country because (a) it is a high-trust and Rule of Law country where firms are likely to be closer to being optimally decentralized, and (b) we have a large sample of firms in the United Kingdom spread across every industry enabling us to generate industry level decentralization measures.[53] In the regressions we then drop the United Kingdom, so that our survey data used to generate industry implied decentralization does not overlap with the regions in the regression.

In Table B1 we regress ID_k the implied industry decentralization measure against trust in the region in column (1) and obtain a significant and positive impact. This implies that high trust regions tend to specialize in industries that are more decentralized. In column (2) we add Rule of Law, which varies only by country, and find a similar result: strong Rule of Law countries have more employment in decentralized industries. In column (3) we include a full set of country controls, and the trust variable, finding similar point estimates but larger standard errors.

In summary, an interpretation of our results is that trust fosters greater decentralization through enabling countries to specialize in industries where decentralization matters more, through fostering FDI and larger firms. Furthermore, even *conditional* on industry, size, and multinational status, high trust regions have more decentralized organizations. Before linking these relations with productivity in the next section, we will examine other determinants of decentralization.

Further Robustness tests

We present some further robustness tests of the effect of trust on decentralization in Tables B2–B4 as discussed in sub-section V.C. Column (1) of Table B2 has the baseline results which correspond to column (4) of Table 1. As noted in sub-section V.A, the difference in the trust

[53] We have 570 observations in the United Kingdom. The other potential base-country to use is the United States with 643 observations. We choose the United Kingdom as: (i) it has a more even coverage across industries than the United States, which has some industries with small firm numbers; and (ii) it has fewer regions than the United States, so since we drop the base country this allows for a larger regression sample. Re-estimating using the United States numbers also gives significant trust and rule-of-law results, with for example, the standard errors (point estimates) 0.209 (.037) and 0.059 (0.011) respectively in columns (1) and (2).

coefficients between plants where the CEO was on-site and off-site (see last two columns of Table 1) was not simply due to firm size. When we split the sample into large firms (column (2)) and small firms (column (3) the trust coefficient is positive and significant and similar in magnitude both sub-samples. We also tested the robustness of the main results to the inclusion of other variables related to the social capital literature, such as the strength of norms of civic cooperation. To this end, we looked at the correlation between decentralization and the variable CIVIC (Knack and Keefer, 1997), which records the degree to which several "uncivil" behaviors (such as claiming government benefits even if not entitled to, avoiding a fare on public transport, cheating taxes, etc.) are perceived to be justified by the population. We did not find any evidence of a significant relationship between CIVIC and decentralization, and the inclusion of the variable had no virtually no effect on the trust coefficient (see column (4)). Similarly, we tested whether the decision to decentralize could be influenced by local preferences for autonomy, rather than trust per se. For this purpose, we examined the effect of the variable AUTONOMY, which is derived in the World Values Survey from questions assessing the perceived importance of religious faith and obedience vs. independence and perseverance in children education. The variable AUTONOMY had no significant correlation with decentralization, and it also hardly affected the coefficient on trust, which remained substantially unchanged and strongly significant (see column (5)).[54]

Next we analyzed whether the results could be driven by the measurement of trust. In column (6) of Table B2 we use the latest wave of the WVS and in column (7) we use just the largest wave of the WVS.[55] The coefficient remains positive and significant, but is a little smaller in magnitude than when we use the baseline. This is consistent with the fact that we are using less data to estimate trust in the region and this could generate some attenuation bias towards zero. In column (8) we drop Greece as the Greek data were obtained from a different survey from the WVS as the geographical coverage was so poor.[56] The trust coefficient is a little larger than in the baseline results.

In Table B3 we again present the baseline in column (1), but then analyze the extent to which the association between trust and decentralization could be affected by measurement problems in our decentralization variable. We first disaggregate the decentralization measure into its four component parts. Column (2) presents the index in terms of hiring autonomy and column (3) in terms of "budget autonomy" (i.e. the question on the mount a plant manager could spend on capital equipment without getting approval from the headquarters). In both regressions trust is positive and significant. Since there is censoring at zero for autonomy over investment we also present a tobit estimation in column (4), which also shows a significant relationship. Autonomy over marketing is in column (5), and new product introduction in column (6). Only the marketing decentralization indicator is insignificant, but this is an item that plant managers rarely have any control over, so perhaps this is not too surprising. We also considered different binary representations of the dependent variable. In column (7) we defined a binary dummy for

[54] CIVIC and AUTONOMY were not correlated with decentralization even when we omitted trust from the set of regressors.

[55] In these regressions we also included fixed effect for the years in which the WVS waves were conducted, which would differ across countries.

[56] For Greece we used instead the European Values Survey, which provided a richer regional coverage than the WVS. See Appendix A for details.

decentralization if a firm was in the 25th percentile of the autonomy distribution across all four indicators and zero otherwise. Probit estimation of this regression also revealed a positive and significant correlation of this indicator with trust. The final column drops the continuous investment question and uses z-scores solely on the categorical measures, again revealing a positive correlation. In short, Table B3 suggests that the results are not driven by the functional form of our decentralization measure.

Finally in Table B4, we investigated whether the bilateral trust results shown in Table 2 were robust to the introduction of other geographical, historical, and institutional variables specific to the country of origin and country of location match, and that could be correlated with bilateral trust and affect decentralization. We begin by reproducing the baseline OLS estimates from column (6) in Table 2. Column (2) then includes several of the key controls from the trade literature on gravity: physical distance between the country of the headquarters and the subsidiary, whether the countries are contiguous, whether they are tied by a common language and whether they are tied by a colonial past or common legal origin. Column (3) reproduces our baseline IV estimates from column (7) of Table 2 and column (4) then adds in the same controls as column (2).

Table B4 shows that within multinationals, decentralization was not significantly affected by geographical distance, although contiguity between countries was associated with less decentralization perhaps because monitoring was easier. Sharing the same language or the same legal origin (La Porta et al., 1999) appears to be positively but insignificantly correlated with decentralization. We also find that decentralization was significantly higher when the multinational country of origin and the country of plant location shared a colonial tie in the past, a finding that might reflect the importance of long run business ties between countries. Reassuringly, we find that the coefficient on bilateral trust was hardly affected by these additional covariates, both in the OLS and IV estimates, when we included the additional controls individually or all simultaneously.[57]

[57] When we examined the individual effect of the controls for geographical, institutional, or legal proximity, the strongest effect on the significance of bilateral trust was found when we introduced the variables capturing similarities in legal origins and language. This is unsurprising, given the importance of law and language in shaping cultural beliefs, including trust between countries.

APPENDIX TABLE A1
DETAILS OF THE DECENTRALIZATION SURVEY QUESTIONS

For Questions D1, D3, and D4 any score can be given, but the scoring guide is only provided for scores of 1, 3, and 5.

Question D1: *"To hire a FULL-TIME PERMANENT SHOPFLOOR worker what agreement would your plant need from CHQ (Central Head Quarters)?"*

Probe until you can accurately score the question—for example if they say "*It is my decision, but I need sign-off from corporate HQ.*" ask "*How often would sign-off be given?*"

	Score 1	Score 3	Score 5
Scoring grid:	No authority—even for replacement hires	Requires sign-off from CHQ based on the business case. Typically agreed (i.e. about 80% or 90% of the time).	Complete authority—it is my decision entirely

Question D2: *"What is the largest CAPITAL INVESTMENT your plant could make without prior authorization from CHQ?"*

Notes: (a) Ignore form-filling

(b) Please cross check any zero response by asking "*What about buying a new computer—would that be possible?"* and then probe….

(c) Challenge any very large numbers (e.g. >$¼m in US) by asking "*To confirm your plant could spend $X on a new piece of equipment without prior clearance from CHQ?*"

(d) Use the national currency and do not omit zeros (i.e. for a U.S. firm twenty thousand dollars would be 20000).

Question D3: *"Where are decisions taken on new product introductions—at the plant, at the CHQ or both"*?

Probe until you can accurately score the question—for example if they say "*It is complex, we both play a role*," ask "*Could you talk me through the process for a recent product innovation?*"

	Score 1	Score 3	Score 5
Scoring grid:	All new product introduction decisions are taken at the CHQ	New product introductions are jointly determined by the plant and CHQ	All new product introduction decisions taken at the plant level

Question D4: *"How much of sales and marketing is carried out at the plant level (rather than at the CHQ)"*?

Probe until you can accurately score the question. Also take an average score for sales and marketing if they are taken at different levels.

	Score 1	Score 3	Score 5
Scoring grid:	None—sales and marketing is all run by CHQ	Sales and marketing decisions are split between the plant and CHQ	The plant runs all sales and marketing

Question D5: *"Is the CHQ on the site being interviewed"*?

Notes: The electronic survey, training materials and survey video footage are available on http://cep.lse.ac.uk/management/default.asp

TABLE A2
DECENTRALIZATION: INDIVIDUAL COMPONENTS BY COUNTRY

	Hiring (1 to 5)	Marketing (1 to 5)	Product Introduction (1 to 5)	Investment (Median, in $)
	(1)	(2)	(3)	(4)
China	3.20	1.43	1.75	604
France	2.80	1.98	2.21	9,375
Germany	2.93	2.17	2.57	12,500
Greece	2.44	1.39	1.80	1,250
India	2.77	1.79	2.16	220
Italy	2.84	1.93	2.38	6,250
Japan	1.96	1.70	1.91	1,720
Poland	2.86	2.04	2.30	310
Portugal	3.03	1.76	2.37	3,125
Sweden	3.57	2.47	2.83	13,800
United Kingdom	3.46	2.53	2.53	9,150
United States	3.86	2.17	2.58	7,500

Notes: Averages of the individual components of the decentralization variable by country (N=3,380)

TABLE A3
THE SURVEY SAMPLE DESCRIPTIVE STATISTICS

	All	CN	FR	GE	GR	IN	IT	JP	PO	PT	SW	UK	US	Missing, #
Observations, #	4,038	325	323	348	187	470	204	122	239	177	286	649	694	n/a
Firms, #	3,902	319	313	308	187	467	207	121	239	177	259	609	682	n/a
Firms, excluding 2004 resurvey, #			242	225								560	535	n/a
Firm employees (median)	270	700	240	500	230	250	185	310	250	183	267	250	375	0
Firm employees excl. 2004 resurvey			200	325								250	300	n/a
Plant employees (median)	150	500	150	225	120	150	150	150	150	125	150	140	150	0
Production sites (median), #	2	1	3	2	1	1	2	2	1	1	2	2	3	94
Age of firm (median, years)	34	12	39	40	32	22	33	57	31	35	62	34	33	101
Listed firm, %	14.5	6.4	4.6	16.4	18.7	26.2	1.4	28.3	2.3	5.6	1.7	6.5	30.1	121
Share of workforce with degrees %	17.3	8	17.3	14.9	11.9	22	16.3	30.9	20	9.6	19.8	12.9	20.1	436
Management (mean)	2.99	2.61	2.99	3.18	2.64	2.54	3	3.15	2.88	2.73	3.15	3	3.31	0
Trust, %	38	65	17	33	15	39	40	43	31	16	72	36	42	48
1-Lerner index	0.957	0.95	0.965	0.949	0.935	0.923	0.965	0.966	0.967	0.972	0.98	0.968	0.94	111
Foreign multinationals, %	0.25	0.2	0.46	0.31	0.19	0.1	0.25	0.03	0.35	0.18	0.44	0.38	0.14	0
Domestic multinationals, %	0.22	0.01	0.34	0.36	0.13	0.02	0.22	0.32	0.04	0.2	0.39	0.25	0.33	0
Interview duration (minutes)	47.9	48.6	46.3	44.7	49.8	59.8	46.6	58.4	47.8	54.5	56.3	43.5	46.8	34
Trust	0.39	0.54	0.21	0.35	0.23	0.39	0.38	0.42	0.26	0.16	0.66	0.34	0.43	0
Hierarchy	0.34	0.01	0.56	0.38	0.91	0.11	0.79	0.03	0.94	0.82	0.01	0.18	0.27	395
GDP per capita (in 2006 US$)	29,380	333	39,525	40,132	20,871	356	35,812	24,695	7,987	20,926	45,977	49,864	89,968	23
Regional Pop ('000)	41,468	161.445	8,077	10,072	2,325	66,085	12,744	27,369	6,663	2,892	1,284	8,467	34,603	23

Notes: All=All countries combined, CN=China, FR=France, GE=Germany, GR=Greece, IN=India, IT=Italy, JP=Japan, PO=Poland, PT=Portugal, SW=Sweden, UK=United Kingdom, US=United States. 3902 firms with 4038 observations, since 136 firms were interviewed twice.

TABLE A4
THE 2006 SAMPLING FRAME

	CN	FR	GE	GR	IN	IT	JP	PO	PT	SW	UK	US	All
Sampling frame, number of firms (#)	86,733	4,683	9,722	522	31,699	5,182	3,546	3,684	1,687	1,034	5,953	27,795	15,187
Employees (median, sampling frame)	290	201	198	180	175	183	240	200	127	206	219	200	202
Employees (median, conditioning on firms with 150+ employees)	290	291	285	269	229	262	240	260	239	315	311	300	274
Publicly listed (%)	1	4	1	17	11	1	1	3	1	6	4	4	4

Notes: CN=China, FR=France, GE=Germany, GR=Greece, IN=India, IT=Italy, JP=Japan, PO=Poland, PT=Portugal, SW=Sweden, UK=United Kingdom, US=United States. **Sampling frame** is the total number of eligible firms for the survey. The sampling frame includes all firms between 100 and 5,000 employees in the population accounting databases for all countries, excluding China and Japan (for which the employment bracket is 150 to 5,000 employees) and Portugal (for which the employment bracket is 75 to 5,000 employees). **Employees** are the median number of employees in the firm. **Publicly listed** is the percentage of firms which are directly publicly listed (note that some firms may be privately incorporate subsidiaries of publicly listed parents). Indian and Japanese employment numbers are predicted from balance sheet information for privately held firms (India) and unconsolidated accounts (Japan).

TABLE A5
THE COVERAGE OF THE FIRM ACCOUNTING DATABASES

	CN	FR	GE	GR	IN	IT	JP	PO	PT	SW	UK	US
Employees in firms in accounting databases with 50+ employees, 000's	56,742	2,223	6,453	153	6,773	1,754	9,214	1,224	380	331	2,188	15,150
Employees in firms with 50+ employees in the accounting databases as % of Census data	84%	89%	117%	92%	103%	89%	137%	72%	96%	62%	100%	135%
Sample median year	2007	2006	2006	2006	2004	2006	2007	2006	2006	2006	2006	2007
Census year	2004	2006	2006	2006	2005	2006	2006	2006	2006	2006	2006	2006

Notes: CN=China, FR=France, GE=Germany, GR=Greece, IN=India, IT=Italy, JP=Japan, PO=Poland, PT=Portugal, SW=Sweden, UK=United Kingdom, US=United States. This compares total employment in our accounting database (from which the sampling frame was drawn) that should cover the population of manufacturing firms with Census Bureau data (from mandatory government surveys). All census units are firms except India which is plant level. **Employees in firms in the accounting databases with 50+ employees, 000's** reports the number of employees in firms in the accounting databases with 50 or more employees (in thousands). **Employees in firms with 50+ in the accounting databases as % of Census data** reports the share of employees in the accounting databases in firms with 50 or more employees as a proportion of the values reported in national Census data (except for the United States, where we report the share of employees in firms with 20 or more employees as the 50 or more cut-off is not available). Census data is drawn from Eurostat Structural Business Statistics for the European countries, Bureau of the Census for the United States, Statistics Bureau for Japan, Annual Survey of Industries for India, and Chinese Industrial Survey. For China and India, Census calculations done by Albert Bollard on data provided by Pete Klenow. Consolidated accounts are excluded from accounting data to avoid duplications. Eurostat defines an enterprise as the "smallest combination of legal units that is an organizational unit producing goods or services, which benefits from a certain degree of autonomy in decision-making, and an enterprise carries out one or more activities at one or more locations." The Bureau of the Census defines an enterprise as "a business organization consisting of one or more domestic establishments under common ownership or control." The Statistics Bureau of Japan defines an enterprise as "an entity composed of the head office and branch establishments, if any, whose legal organization is a stock company, limited company, limited or unlimited partnership, limited liability company, or mutual insurance company." In the Indian Annual Survey of Industries a factory "refers to any whereon ten or more workers are working, or were working on any day of the preceding twelve months, and in any part of which a manufacturing process is being carried on with the aid of power, or is ordinarily so carried on, or whereon twenty or more workers are working or were working on any day of the preceding twelve months, and in any part of which a manufacturing process is being carried on without the aid of power, or is ordinarily so carried on." In the Chinese Industrial Survey "industrial establishments refer to economic units which are located in one single place and engage entirely or primarily in one kind of industrial activity, including financially independent industrial enterprises and units engaged in industrial activities under the non industrial enterprises (or financially dependent). Industrial establishments generally meet the following requirements: They have each one location and are engaged in one kind of industrial activity each; they operate and manage their industrial production activities separately; they have accounts of income and expenditures separately."

TABLE A6
THE SURVEY RESPONSE RATE

	All	CN	FR	GE	GR	IN	IT	JP	PO	PT	SW	UK	US
Interviews completed (%)	44.9	43.9	59.3	58.6	53.4	61.4	68.2	21.5	37.5	60.5	68.2	32.9	37.2
Interviews refused (%)	16.8	13.7	13.7	27.2	10.7	13.7	20.0	20.1	16.5	15.8	16.9	19.6	13.7
Scheduling in progress (%)	38.3	40.1	27.0	14.2	35.9	25.0	11.8	58.4	46.0	23.7	14.9	47.4	49.1
Survey sample, number firms (#)	8,690	727	528	526	350	761	304	563	637	293	380	1,851	1,833
Interviews completed (#)	3,902	319	313	308	187	467	207	121	239	177	259	609	682

Notes: All=All countries combined, CN=China, FR=France, GE=Germany, GR=Greece, IN=India, IT=Italy, JP=Japan, PO=Poland, PT=Portugal, SW=Sweden, UK=United Kingdom, US=United States. **Interviews completed** reports the percentage of companies contacted for which a management interview was completed. **Interviews refused** reports the percentage of companies contacted in which the manager contacted refused to take part in the interview. **Scheduling in progress** reports the percentage of companies contacted for which the scheduling was still in progress at the end of the survey period (so the firm had been contacted, with no interview run nor any manager refusing to be interviewed). **Survey sample** is the total number of firms that were randomly selected from the complete sampling frame.

TABLE A7
SELECTION ANALYSIS

	(1)	(2)
Sample	**All firms contacted**	**All firms contacted**
Log (Sales/employee)	0.029	
	(0.031)	
Return on Capital Employed (ROCE) §		0.025
		(0.043)
Trust (region)§§	-0.226	0.310
	(0.457)	(0.580)
Hierarchical (region) §§	-0.356	-0.301
	(0.266)	(0.423)
Log (employment)	0.099***	0.073**
	(0.025)	(0.031)
Listed	-0.042	0.060
	(0.075)	(0.106)
Log (Age of firm), in years	0.021	0.029
	(0.028)	(0.034)
Multinational subsidiary	0.118**	0.125**
	(0.051)	(0.056)
Days from the start of the survey until firm contacted§	-0.087***	-0.101**
	(0.023)	(0.041)
Country is China	-1.465***	n/a
	(0.444)	
Country is France	0.886***	0.837***
	(0.219)	(0.247)
Country is Germany	0.902***	1.109***
	(0.171)	(0.216)
Country is Greece	0.512*	0.468
	(0.275)	(0.382)
Country is India	0.583***	n/a
	(0.218)	
Country is Italy	0.955***	0.859**
	(0.276)	(0.359)
Country is Japan	-0.123	n/a
	(0.207)	
Country is Poland	0.726**	0.470
	(0.286)	(0.402)
Country is Portugal	0.905**	1.016**
	(0.369)	(0.445)
Country is Sweden	0.929***	0.597**
	(0.236)	(0.256)
Country is United Kingdom	0.114	Baseline
	(0.105)	
Country is United States	Baseline	n/a
Number of firms	6,679	4,308

Notes: The dependent variable is a dummy for a completed interview. All columns estimated by probit with robust standard errors in parentheses (marginal effects reported). All columns include a full set of 44 interviewer dummies, and 142 three digit industry dummies. The dependent variable takes value one if the firm was interviewed, and zero if the interview was refused, or if scheduling was still in progress as the end of the project. In column (2) firms are dropped if Return on Capital Employed data is available. § Coefficient and standard-errors multiplied by 100. §§ Refers to region where the company is headquartered. Regressions weighted by the share of World Values Survey respondents in the region in the country.

TABLE A8
WORLD VALUES SURVEY SAMPLE

WVS Wave	1981–1984	1989–1993	1994–1999	1999–2004	Total
China	0	983	1,064	0	2,047
France	0	939	0	1,560	2,499
Germany	1,084	2,893	1,956	1,937	7,870
Greece	0	0	0	4.972	4.972
India	0	2,365	1,769	1,898	6,032
Italy	0	1,931	0	1,946	3,877
Japan	1,099	911	990	1,254	4,254
Poland	0	1,709	0	1,059	2,768
Portugal	0	1,149	0	975	2,124
Sweden	0	944	0	974	1,918
United Kingdom	0	1,440	1,073	921	3,434
United States	0	1,764	1,458	1,188	4,410
Total	2,183	17,028	8,310	13,712	41,233

Notes: Number of respondents used to build regional trust and religion aggregates by country and World Values Survey wave. Data relative to Greece are built from the ESS, using all available waves between 2000 and 2005.

TABLE B1
IMPLIED INDUSTRY DECENTRALIZATION

Dependent variable: implied industry decentralization	**(1)**	**(2)**	**(3)**	**(4)**
Trust (region) **Trust measured in plant's region of location**	0.157** (0.043)	0.100** (0.029)	0.100*** (0.031)	0.095 (0.073)
Rule of Law (country) **(-2.5=low, 2.5=high)**			0.027** (0.014)	
Observations	98	98	98	98
Regional controls	no	yes	yes	yes
Country dummies	no	no	no	yes

Notes: * significant at 10%; ** significant at 5%; *** significant at 1%. The dependent variable is "implied industry decentralization," measured as the industry share of employment in each region by SIC2 multiplied by that decentralization value for that SIC2 industry in the United Kingdom. The regression sample is all countries except the United Kingdom. Hence, a high value indicates a large share of employment in the region in industries which are decentralized in the United Kingdom. Estimation by OLS with heteroskedasticity robust standard errors. TRUST measures the percentage of individuals in the region's country of location who agreed with the statement "most people can be trusted." RULE OF LAW measures the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, the police, and the courts, as well as the likelihood of crime and violence in the firm's country of location. The index is compiled by the World Bank (Kauffman et al., 2007), and ranges between -2.5 and 2.5. REGIONAL CONTROLS are GDP per capita, population in the region, Research and Development expenditure in the region, and the % of employees with a degree.

TABLE B2: ROBUSTNESS CHECKS ON THE DECENTRALIZATION REGRESSION

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Experiment	**Baseline**	**Firm Employment >=250**	**Firm Employment <250**	**Adding civic**	**Adding taste for autonomy**	**Trust using just latest wave of WVS**	**Trust using just largest wave of WVS**	**Dropping Greece**
Trust	0.608***	0.824***	0.940**	1.009***	0.578**	0.363*	0.528**	0.628***
Trust measured in HQ region/country of location	(0.220)	(0.293)	(0.462)	(0.351)	(0.225)	(0.184)	(0.232)	(0.230)
CIVIC				0.036				
				(0.024)				
AUTONOMY					0.091			
					(0.230)			
N	3655	2316	1339	3439	3507	3655	3655	3472
Country of CHQ location controls (2)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country of plant location dummies (11)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region of plant location controls (2)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies (148)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Other controls (56)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustering	**CHQ location**	**CHQ location**	**CHQ location**	**CHQ location**	**CHQ location**	**CHQ location**	**CHQ location**	**CHQ location**

Notes: * significant at 10%; ** significant at 5%; *** significant at 1%. The dependent variable is the decentralization z-score index, measured by plant manager's autonomy over hiring, investment, products, and pricing. Estimation by OLS with robust standard errors in parentheses. Standard errors clustered by the firm's headquarter region of location (country of origin if the plant belongs to a foreign multinational). TRUST measures the percentage of individuals who agreed with the statement "most people can be trusted" in the firm's headquarter region of location (country of origin if the plant belongs to a foreign multinational). CIVIC is derived from the WVS and measures the average leniency towards "uncivil" behavior in the region of plant location (country of origin if the plant belongs to a foreign multinational, see text for details). AUTONOMY is derived from the WVS and measures the taste for autonomy in the region of plant location (country of origin if the plant belongs to a foreign multinational, see text for details). In Column 6 TRUST is measured using only the latest wave of the WVS available for the region of plant location (country of origin if the plant belongs to a foreign multinational). In Column 7 TRUST is measured using only the wave of the WVS with the largest number of observations available for the region of plant location (country of origin if the plant belongs to a foreign multinational). "Country of CHQ location controls" are the log of GDP per capita and population in the country of CHQ location. "Region of plant location" controls are the log of GDP per capita and population in the region where the plant is located. "Industry dummies" are 3 digits SIC dummies. "Other controls" include a dummy for whether the firm is publicly listed, a dummy for whether the CEO is on the same site as the plant ("CEO onsite"), and "Noise controls" (these include 44 interviewer dummies, 6 dummies to control for the day of the week the interview took place, an interview reliability score, the manager's seniority and tenure, and the duration of the interview. Regressions weighted by the share of World Values Survey respondents in the region in the country, with the weight set to one if the plant belongs to a foreign multinational.

TABLE B3: ROBUSTNESS CHECKS ON THE DECENTRALIZATION REGRESSION: ALTERNATIVE FUNCTIONAL FORMS OF THE DECENTRALIZATION MEASURE

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Experiment	**Baseline**	**Hiring autonomy (zscored)**	**Budget Autonomy (zscored)**	**Budget Autonomy (levels)**	**Pricing Autonomy (zscored)**	**New product introduction Autonomy (zscored)**	**Defining Autonomy using top 25th percentile across all 4 question**	**Autonomy without budget over investments**
	OLS	**OLS**	**OLS**	**Tobit[#]**	**OLS**	**OLS**	**Probit**	**OLS**
Trust	0.608***	0.562***	0.681**	1.408***	0.053	0.600*	0.122***	0.340**
Trust measured in HQ region/country of location	(0.220)	(0.208)	(0.309)	(0.461)	(0.263)	(0.312)	(0.043)	(0.156)
N	3655	3260	3260	3260	3260	3260	2882	3655
Country of CHQ location controls (2)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country of plant location dummies (11)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region of plant location controls (2)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies (148)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Other controls (56)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustering	**CHQ location**	**CHQ location**	**CHQ location**	**CHQ location**	**CHQ location**	**CHQ location**	**CHQ location**	**CHQ location**

Notes: * significant at 10%; ** significant at 5%; *** significant at 1%. The dependent variable in column 1 is the decentralization z-score index, measured by plant manager's autonomy over hiring, investment, pricing, and product introduction. The dependent variables in columns 2–6 are the individual questions for autonomy over hiring, investment, pricing, and product introduction. The dependent variable in column 7 is a dummy taking value one if the firm appears to be in the 25th top percentile for all individual autonomy questions. The dependent variable in column 8 is the decentralization z-score index, measured by plant manager's autonomy over hiring, pricing, and product introduction. Estimation by OLS with robust standard errors in parentheses in all columns, except for column 4 which is estimated by Tobit, and column 7 estimated by Probit (marginal effects reported in both columns). Standard errors clustered by the firm's headquarter region of location (country of origin if the plant belongs to a foreign multinational). TRUST measures the percentage of individuals who agreed with the statement "most people can be trusted" in the firm's headquarter region of location (country of origin if the plant belongs to a foreign multinational). "Country of CHQ location controls" are the log of GDP per capita and population in the country of CHQ location. "Region of plant location" controls are the log of GDP per capita and population in the region where the plant is located. "Industry dummies" are 3 digits SIC dummies. "Other controls" include a dummy for whether the firm is publicly listed, a dummy for whether the CEO is on the same site as the plant ("CEO onsite"), and "Noise controls" (these include 44 interviewer dummies, 6 dummies to control for the day of the week the interview took place, an interview reliability score, the manager's seniority and tenure, and the duration of the interview.. Regressions weighted by the share of World Values Survey respondents in the region in the country, with the weight set to one if the plant belongs to a foreign multinational.

[#]Coefficient and standard error in column 4 have been rescaled dividing by 10,000.

TABLE B4: ROBUSTNESS CHECKS ON THE DECENTRALIZATION REGRESSION: INCLUDING ADDITIONAL "GRAVITY" VARIABLES IN THE REGRESSIONS USING BILATERAL TRUST

Dependent variable: Decentralization	**(1)**	**(2)**	**(3)**	**(4)**
Sample	**Foreign MNEs**	**Foreign MNEs**	**Foreign MNEs**	**Foreign MNEs**
Estimation method	**OLS**	**OLS**	**IV**	**IV**
Bilateral trust **Trust of people from country of origin to country of location**	1.662** (0.804)	1.649* (0.910)	2.385** (1.106)	3.736** (1.453)
Distance **Log(geographical distance between HQ and plant location country)**		-0.021 (0.109)		-0.049 (0.094)
Geographical contiguity **Dummy=1 if country of origin and location are contiguous**		-0.338* (0.200)		-0.436** (0.189)
Colony **Dummy=1 if country of origin and location share a colonial past**		0.481* (0.251)		0.603** (0.242)
Common Language **At least 9% speaks same language in country of origin & location**		0.050 (0.273)		-0.022 (0.217)
Legal Origin **Dummy=1 if at country of origin and location share legal origin**		0.075 (0.218)		-0.053 (0.205)
N	422	422	422	422
Country of CHQ location controls (2)	Yes	Yes	Yes	Yes
Country of plant location dummies (11)	Yes	Yes	Yes	Yes
Region of plant location controls (2)	Yes	Yes	Yes	Yes
Industry dummies (23)	Yes	Yes	Yes	Yes
Other controls (56)	Yes	Yes	Yes	Yes
Region of plant location dummies (111)	Yes	Yes	Yes	Yes
Country of CHQ country location dummies (32)	Yes	Yes	Yes	Yes
Clustering	CHQ by plant location	CHQ by plant location	CHQ by plant location	CHQ by plant location
Instruments			Somatic dist. Religious dist.	Somatic dist. Religious dist.
First stage F-test			18.19	8.03

Notes: * significant at 10%; ** 5%; *** 1%. Dependent variable is the decentralization z-score index. All columns include only foreign multinationals for which the bilateral trust data is available. Instruments are "religious diversity" and "somatic distance" between each country pair. Standard errors (in parentheses) are clustered by country within each country origin by country of location cell. BILATERAL TRUST measures the percentage of people from country of origin who report to "trust a lot" people living in the country of firm's location. "Country of CHQ location controls" are the log of GDP per capita and population in the country of CHQ location. "Region of plant location" controls are the log of GDP per capita and population in the region where the plant is located. "Industry dummies" are 2 digits SIC dummies. "Other controls" include a dummy for whether the firm is publicly listed, a dummy for whether the CEO is on the same site as the plant ("CEO onsite"), and "Noise controls." Regressions weighted by the share of World Values Survey respondents in the region in the country, with the weight set to one if the plant belongs to a foreign multinational.