THE ORGANIZATION OF FIRMS ACROSS COUNTRIES

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Abstract

We argue that social capital as proxied by regional trust can improve aggregate productivity through facilitating greater firm decentralization. We collect original data on the decentralization of investment, hiring, production and sales decisions from Corporate Head Quarters to local plant managers in almost 4,000 firms in the US, Europe and Asia. Anglo-Saxon and Northern European firms are much more decentralized than those from Southern Europe and Asia. Firms located in high trust regions are more likely to decentralize, even after controlling for country dummies. Trust together with the Rule of Law (which operates in a similar way to social capital) account for about half of the variation in decentralization in our data. To help identify causal effects, we look within multinationals and show that (countrywide) bilateral trust between the head quarter's country of origin and affiliate's country of location increases delegation, even after instrumenting. Further, we analyze how social capital raises aggregate productivity: (1) trust allows more efficient firms to grow in scale and sustains larger more productive enterprises; and (2) decentralization complements the adoption of new technologies and increases TFP within firms.

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Keywords: decentralization, trust, Rule of Law, 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 as indicated by measures of trust fosters faster growth (e.g. Knack and Keefer, 1997 or La Porta, Lopez-de-Silanes, Shleifer and Vishny, 1998). 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 that decentralization favors productivity through supporting a larger equilibrium firm size and is complementary with information technology.

Trust can be seen as a reflection of the congruence of preferences as in Aghion and Tirole (1997), or as a mechanism for obtaining co-operation in relational contracts as in Baker, Gibbons and Murphy (1999). If a CEO can trust his senior managers he will be more willing to decentralize decision making – for example, the threat of theft is lower. Rule of Law should operate though a similar mechanism: there is more chance of getting stolen money back (and also a lower chance of theft in the first place) if contracts are well enforced and respected.

This 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 higher decentralization. To probe whether this effect is causal, we exploit the fact that some of our data is drawn from multinational subsidiaries where country of origin trust increases decentralization in the affiliate's foreign location, particularly if the bilateral trust between the two nations is high. This trust-decentralization relationship is robust to instrumenting bilateral trust with religious and somatic distance.

Countries that find decentralization more costly may suffer lower welfare for at least two reasons. First, it will be difficult for markets to effectively allow the 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 constrained over the number of decisions they can make. As firms grow 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 US.[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.[2] The difficulties faced by firms in developing economies to grow reduces aggregate productivity by limiting the ability of productive firms to expand their market share, thereby reallocating resources away from less productive firms.

Second, economies with low trust will specialize in industries where decentralization is less important. There has been a global trend towards more decentralization which is plausibly related to increasing competition (Guadalupe and Wulf, 2008), the supply of human capital (Caroli and Van Reenen, 2001) and the growth of information technology (Bresnahan, Brynjolffson and Hitt, 2002). In support of the latter idea we present evidence from production functions that information technology is complementary with decentralization[3]. If these trends continue, low trust nations with a comparative disadvantage in decentralization will concentrate in low trust industries with less complementarity with IT, suffering lower productivity growth than those with greater social capital. We estimate that the fast growth of ICT capital since 1995 means that regions one standard deviation higher on trust would have an extra quarter point growth per annum in productivity.

To tackle these issues we need 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[4], but empirical research on

[1] See, for example, Foster, Haltiwanger and Krizan (2000 and 2006) who show that about 50% of productivity growth in manufacturing and about 90% in retail comes from reallocation.

[2] See, for example, Hsieh and Klenow (2009). One potential explanation is CEOs in countries like India are less likely to delegate, for example because of the fear of theft by their senior management, constraining the growth of firms.

[3] Bloom, Garicano, Sadun and Van Reenen (2009) present a model of a cognitive hierarchy where middle level employees (e.g. plant managers) will gain more power relative to the CEO when the cost of information acquisition falls (IT enables them to solve more problems without asking central "experts").

[4] For a survey see Bolton and Dewatripont (2005) or Gibbons and Roberts (2008). 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 trade off between information and loss of control – see Aghion and Tirole (1997), Rajan and Zingales (2001), Dessein (2002), Hart and Moore (2005) and Alonso, Dessein and Matouschek (2008).

this has lagged far behind because of a lack of organizational data. The few datasets that exist are either from a single industry[5] or (at best) across many firms in a single country[6]. 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 Head Quarters (CHQ/CEO) to plant managers. This data reveals startling differences in the cross-country decentralization of firms: those in the US and Northern Europe appears to be the most decentralized and those in Southern Europe and Asia the most centralized.

Empirically, we find that trust and Rule of Law[7] are strongly associated with more decentralized firms. Trust is measured at the regional level using individual responses in the World Value Survey, and the positive relationship between trust and decentralization is even true for multinationals by country of origin: in California a multinational affiliate from Sweden (a high trust country) would typically be more decentralized than a multinational affiliate from Portugal (a low trust country). We further show this is driven by bilateral trust which seems to affect not only trade and investment (Guiso, Sapienza and Zingales, 2008), but also the internal organization of multinationals.

Apart from the organizational economics and social-capital and development literature, our paper is also related to two other strands of the literature. One is on multinationals and comparative advantage. A recent body of theoretical work, such as Helpman, Melitz and Yeaple (2004), Burstein and Monge (2007) and Antras, Garicano and Rossi-Hansberg (2008) emphasizes 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 ability of multinationals to take their domestic organizational practices abroad provides empirical support for this assumption.

Second, there is the literature on the transportation of culture by individuals across countries. For example, Fisman and Miguel (2008) show that the parking fine behavior of diplomats in New York

[5] See, for example Baker and Hubbard (2003, 2004) on trucks or Garicano and Hubbard (2007) on legal services.
[6] See for example, Acemoglu, Aghion, Lelarge, Van Reenen and Zilibotti (2007) for France and the UK, Colombo and Delmastro (2004) and Kastl, Martimort and Piccolo (2008) for Italy, and Rajan and Wulf (2007) for the US.
[7] Rule of Law is measure from the World Bank index developed by Kauffman, Kray and Matruzzi (2006), and we find that firms in strong Rule of Law countries tend to be more decentralized even after controls for a range of other country-level factors like skills and levels of development.

is strongly predicted by indices of corruption in their home countries[8]. Our evidence suggests that firms also take part of their "culture" abroad. Interestingly, we find this holds even in multinationals when all the managers come from the country of location, suggesting that firms offer an additional mechanism for transporting culture across countries.

The paper is organized as follows. Section II sketches our models 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 in Section VI. Section VII concludes.

II. THEORETICAL CONSIDERATIONS

II.A A cognitive model of trust and decentralization

Our starting point is the analysis in Garicano (2000) on the hierarchical organization of expertise. Decisions are made at the lowest level at which an agent is able to make them. In determining this hierarchical level firms face a trade-off between information acquisition costs and communication costs. Making decisions at lower levels implies increasing the cognitive burden of agents at those levels. For example, decentralizing from the corporate head quarters (CHQ) to plant managers over the decision whether to invest in new equipment requires training plant managers to discount cash flows to compare these to the cost of investment. To the extent that the plant manager is unable to take this decision, it will be passed up to the corporate head quarters. But this increases communication costs in the hierarchy as the plant manager will have to explain the details behind the potential investment project. Thus, the extent of decentralization depends on the optimal trade-off between *knowing* versus *asking* for directions.

We extend this model to add in another dimension, which is trustworthiness of the plant manager. The CHQ may not trust the plant manager's decision because of misaligned incentives – for example they may worry about the plant manager taking bribes from equipment sellers. In either case, the trustworthiness of the plant manager will be a key factor determining decentralization.

[8] In the social domain, Fernandez and Fogli (2007) 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.

To formalize this assume that firms draw problems (tasks) from the interval [0,1] each period. Production only takes place if these problems are solved, otherwise nothing is produced. We normalize to 1 the unit of output per agent per period of time if production problems are solved. The frequency of these production problems is denoted by f(z), where the problems have been reverse sorted in frequency order, so that f'(z)<0.

Agents (the plant manager) can only deal with problems if they have acquired knowledge do so, where the costs of acquiring knowledge (e.g. through training) is *a* per unit interval. So, for example, if the firm trains agents to solve z_0 (where $0<z_0<1$) problems then this costs az_0. If agents draw a problem they cannot solve they pass it up to the CEO, but at a communication cost *h*. Clearly total costs are reduced if the agents are trained to deal with the common problems, but pass up only the rare problems. This is sometime called the "management by exception" model.

We also assume that even after acquiring formal knowledge agents only behave in the "correct way" to perform λ tasks and fail to correctly perform $(1- \lambda)$ tasks. λ reflects either the fact that the plant manager may have private benefits from doing the "wrong" action.

Note that an alternative interpretation of λ is that it reflects low ability rather than malfeasance. 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 mess up ("the trembling hand").

Empirically we will use measures of trust to proxy shifts in the λ parameter. We view variations in λ across countries as reflecting differences in the preferences for taking appropriate actions. For example, we assume employees in a high trust region like Sweden would be less likely to accept a bribe to buy an overpriced piece of equipment than employees in a low trust region like Southern Italy. As such the variations in λ reflect variations in individual utility functions arising from different levels of social capital.[9]

[9] There is a disutility for taking and giving a bribe in some areas rather than others. The underlying reasons for these differences could also arise from different outcomes in multiple equilibria (e.g. Greif, 1993).

Suppose a team must deal with *N* problems per unit of time, so that the team needs *N* plant managers and n_m senior managers at CHQ. Plant managers solve all problems up to z_0 and CHQ managers solve all remaining problems. The profit generated by this hierarchy is then

$$\pi = N - N(az_0 + w) - NF(z_0)(1- \lambda) - n_m (a + w_m) \quad (1)$$

where N is total output[10], $N(az_0 + w)$ is the training and wage cost of the plant managers, $NF(z_0)(1-\lambda)$ is the lost production from failed tasks calculated as total output (N) times the share of tasks solved by plant managers ($F(z_0)$) times the share of failed tasks ($1- \lambda$), and $n_m(a+w_m)$ is the knowledge acquisition cost of CHQ managers (they have to be trained for the full unit interval of tasks) and their wages (w_m).

Since CHQ managers spend *h* units of time on communicating each problem referred to them the total number of managers is defined as $n_m=N(1-F(z_0))h$ inserting equation (2) into equation (1) generates

$$\pi = N[1 - (az_0+w) - F(z_0)(1- \lambda) - (1-F(z_0))h(a+w_m)] \quad (2)$$

Equation (2) can be solved for the optimal level of decentralization z_0^* which is implicitly defined by the first order condition $f(z_0^*)=a/(ah+hw_m-1+\lambda)$. Totally differentiating this first-order condition we find that (recall that $F'(z_0) = f(z_0) < 0$).

Proposition 1: Higher trust leads to more decentralization
An increase in trust (λ up) is associated with a higher degree of decentralization (z_0^*).

The intuition is straightforward – if agents are more trustworthy the marginal returns from letting them handle tasks increases as more problems are solved correctly. If we also assume a binding constraint on the supply of senior management time, for example $n_m<n^*$ because only family members are able to take management decisions, we can derive a second proposition on firm size.

Proposition 2: Higher trust increases firm size
An increase in trust (λ) is associated with a larger firm size (*N*).

[10] We assume that potential output depends on the number of plant managers. More precisely it will depend on the production workers who are under the plant manager, but this will be proportional to the number of managers, so we can normalize this to unity without loss of generality (see Garicano, 2000).

The intuition is again straightforward. With a fixed supply of senior management time higher trust allows a greater leverage across agents. Since many firms in Southern Europe and developing countries are family owned, often without any non-family senior management, we would also expect to see this relationship between firm size, decentralization and trust in the data.

II.B Other models of trust and decentralization

We also examine other possible theories of decentralization within a given firm holding size constant, and then the joint determination of decentralization and firm size.

A number of papers such as Aghion and Tirole (1997), Prendergast (2002), Hart and Moore (2004) and Acemoglu et al (2007) consider the delegation decision in the context of an information-based approach. They motivate their models with a choice that a firm faces, for example over how to use a new technology. The principal is the Central Head Quarters (CHQ) and the agent is the plant manager. 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: (i) the value of local information; and (ii) 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 rather than formal 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 his 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; Glaeser, Laibson, Scheinkman and Soutter,

[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.

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 the 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). So throughout our main analysis we will also consider the independent influence of Rule of Law alongside trust (in the specifications without country dummies).

II.C Endogenizing firm size

The early literature on firm size focused on the issue of decentralization, arguing this was essential for creating large firms due to the time constraint on the number of decisions a CEO can take. 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 – and in particular CEO time – could be leveraged across a larger group of middle managers, then firm size could be increased.

Chandler (1962) examined the growth of large modern multi-divisional firms in the US after the 1850s. He argued that these larger firms were created through setting up "local field units", which were regional factories or sales-outlets, with decentralized decision making power from the CHQ. Again, decentralization was necessary to allow distant units to operate, since limits on communication meant that the CHQ can never hope to direct managers operating hundreds of miles away. Without decentralization these firms would have not been able to grow.

What naturally arises from this literature is the prediction that factors which facilitate decentralization, such as greater trust will encourage the creation of larger firms. This could then play a key role in increasing aggregate productivity through enabling more productive firms to increase their size and market share.

One way to illustrate the impact of decentralization on firm size and aggregate productivity is through the Lucas (1978) model of firm size. In the Lucas model individuals have a spread of managerial talent, denoted x. High ability individuals (above some cut-off x^*) act as managers and

all other individuals (those with ability below x^*) work for them as employees. Managerial ability can be leveraged across many employees, but with a diminishing return. A manager of ability x managing a firm with n employees and k capital produces output of $xg(f(n,k))$, where $f(.)$ is a standard production function, and $g(.)$ is the managerial control function where $g'(.) > 0$ and $g''(.)<0$. The decreasing returns in $g(.)$ comes from the assumption of a finite span of control for managers, arising from their limited managerial supply of time. Increasing the ability of managers to effectively decentralize decisions in the Lucas (1978) model would be represented by a reduction in the concavity of $g(.)$. For example, if $g(.)$ were a Cobb-Douglas production function, $g(z)=z^{\alpha}$, where $0<\alpha<1$, this would be equivalent to increasing α. The impact of this would be to increase average productivity by raising the number of workers employed by the best managers. Simultaneously, it would increase the average firm size as the lower quality managers become workers (the ability threshold x^* would increase) reducing the number of firms. The predictions of this are that: (i) trust should be associated with higher aggregate productivity, which the social capital literature discussed above provides prior empirical support for; and (ii) that firm size should be positively linked with trust.[12]

III. DATA

To investigate these theories 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.

III.A Measuring Decentralization

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 (CHQ). This is a continuous variable enumerated in national currency which 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 shopfloor employee, (b) the introduction of a

[12] Related to this is La Porta et al. (1997) who found in cross-country regressions that the combined size of the largest 25 public quoted firms was positively correlated to trust and the Rule of Law. Kumar, Rajan and Zingales (2003) also looked across countries, again finding the average size of enterprises was significantly correlated with Rule of Law. Laevan and Woodruff (2007) looked at the impact of rule of law on firm size across regions within Mexico, finding larger firms where rule of law is better. We extend this work by: (i) looking at variations of trust within countries; and (ii) using the population of all firms which allows us to control for differences in coverage, listing, industry and enterprise definition across countries.

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 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.

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 Columbo and Delmastro (2004) have a question similar to our one on investment for Italian establishments[13].

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 un-weighted average across all four z-scores as our primary measure of overall decentralization, but we also experiment with other weighting schemes and also the individual questions.

One issue is over measurement of decentralization across different organizational structures. 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 assumed this represented the degree of decentralization for the firm (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 4.9% of our interviews – we could not define decentralization (so these observations were dropped).[14] If the plant manager and CEO were different people on the same site we would define decentralization as usual, but we also confirm in that all our results are robust to dropping these "same-site" observations.[15] Finally, in Example D we

[13] Marin and Verdier (2007) use a count of a series of decentralization variables scaled between 1 and 5 in German and Austrian firms.

[14] 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).

[15] 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

show a multinational subsidiary, which we treat the same as domestic firms, defining decentralization as the autonomy of the plant from the domestic CHQ. Again, we also confirm robustness of our results to dropping these multinational subsidiaries[16].

Finally, we collected a large amount of additional data from the survey to use as controls: management practice information following the methodology of Bloom and Van Reenen (2007); 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 sample database we also have information for most firms on their basic accounting variables such as sales and capital.

III.B Collecting Accurate Responses

An important issue on our survey methodology is the extent to which we can obtain unbiased responses to our questions. In order to achieve this we took a range of steps to obtain accurate data. 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

daily production process. An example in a university context would be a Dean of Humanities and the Head of the Economics Department – they are both on the same site, but the Head of Department still has some autonomy.

[16] We also asked two questions on decentralization from plant managers to workers over their allocation of tasks across teams and the determination of pace on the shop-floor (see Bloom et al, 2009).

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. The interviewers were incentivized on the number of interviews they ran and so had no interest in spending time researching the companies in advance of running the interview. 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 at the London School of Economics (LSE) and our partnering international consultancy firm. This training included 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.[17] 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 UK and US. 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 four steps. First, the interview was introduced as "a piece of work"[18] 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.[19] Fourth, the written endorsement of many official institutions[20] helped demonstrate to managers this was an important academic exercise with official support. Fifth, we hired high quality (mainly MBA student) interviewers[21], 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. Very small firms have

[17] See http://www.youtube.com/watch?v=HgJXt8KwhA8 for video footage of the survey team.
[18] We avoided using the words "research" or "survey" as many firms link these to market research surveys.
[19] We found no significant correlation between the number, type and time-span of contacts before an interview is conducted and the management score.
[20] 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
[21] Interviewers all 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.

little publicly available data and 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 Appendix B for details). Since we use different databases in Europe (Amadeus), the U.S. (Icarus), China and Japan (Oriana) and India (Firstsource) 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 any of the performance measures to the non-responders. They were also statistically similar on all the other observables in our dataset. 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 variable that we use in the main regressions is the percentage of people choosing the first option in the trust question within the region where the plant is located.

This is the most common measure of trust used in the literature, and appears to be correlated with trusting and/or trustworthy behavior. Glaeser et al (2000), for example, ran a series of experiments using Harvard undergraduate students to see if individual subject's answers to the WVS trust questions are correlated with their trusting or trustworthy behavior. They find evidence that this WVS trust question is significantly correlated with the trustworthiness of subjects, even though they are not very good at predicting trusting behavior. They conclude that "While attitudinal trust surveys at best weakly predict any individual's level of trust, they may be good at predicting the overall level of trustworthiness in society". Sapienza et al. (2007) run another series of experiments using Chicago MBA students and find again this WVS question is correlated with individual behavior, although in their case significantly more with trusting behavior rather than trustworthiness. Since we are using these answers grouped to the level of the community as a whole, it is exactly the "society level" variation that we are using, so these papers are reassuring that this WVS trust question does appear to pick up variation in trust.

Figure 2 plots the trust by country and its regional dispersion. In order to exploit this within country variation for identification, we allocate each plant to a well specified geographical region, and use the relevant WVS aggregate for our analysis[22].

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 Anglo-Saxon (Germany, UK and US) and Scandinavian (Sweden) countries. The rest of Europe tends to be in the middle of the decentralization ranking – with the exception of firms

[22] The level of aggregation of the WVS variables is dictated by the level of regional detail provided in the survey which varies somewhat across countries. For example, in the US, China and India a region is a group of states, while in Europe a region is narrower coinciding with a NUTS2 or NUTS3 region. To correct for these cross country differences in the regional definition, we weight each regression by the ratio of the number of respondents in the region and the overall number of respondents in the country. Weighting by total number of respondents gives similar results, but this gives larger weight to the countries where the WVS covers more individuals. See Appendix B for details.

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 UK and the US 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 countries. 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 3 digit industry class, and 81% of the variation is orthogonal to both country and 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 which 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 (2001). The Power Distance Index (PDI) is a measure of interpersonal power or influence between a boss and its subordinate, built out of successive attitudinal surveys conducted on more than 70,000 IBM employees across approximately 50 countries in the 1970s and 1980s. Where 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 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 take 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. SOCIAL CAPITAL AND DECENTRALIZATION

V.A Trust and Decentralization

Main Results

As discussed in Section III, incentives to delegate are likely to be diminished in low trust environments. Column (1) of Table 1 presents the results of regressing our decentralization measure against average trust in the region of the country where the plant is located, with no other controls. The relationship between decentralization and trust is positive and highly significant. A possible concern is that high levels of trust could simply proxy for better law enforcement, which in turn may facilitate decentralization even in low trust areas. Therefore, in column (2) we include "Rule of Law"[23] that enters with a positive and significant coefficient and reduces the coefficient on trust to

[23] 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, 2007).

0.857. This suggests that Rule of Law is likely to play a role in encouraging decentralization directly, but that trust also plays an independent role since it remains significant at the 1% level.[24]

As shown in the next sub-section, trust is partially associated with decentralization because it sustains larger equilibrium organizational size. Consistent with this mechanism, column (3) shows that larger firms and plants tend to be more decentralized. Conditioning on size reduces the coefficient on trust, but it remains positive and significant, suggesting that even for firms of a given size, trust facilitates decentralization.

Country level indices such as Rule of Law are problematic because they could be correlated with many omitted unobserved country-level factors like regulation (e.g. Aghion, Algan, Cahuc and Shleifer, 2008). In column (4) we include country level fixed effects to control for these, so that the trust coefficient is identified only from variation across regions within a country. We also control for regional-level observables (GDP per capita and population) and a general set of firm controls. We find that the coefficient on trust falls slightly to 0.699, but remains positive and significant at the 5% level.

In terms of our key covariates in column (4) we find larger firms tend to be more decentralized. This is consistent with the predictions of Alfred Chandler and Edith Penrose, that because CEOs have limited management time, they will delegate more in larger firms. We also find that foreign multinationals are more decentralized relative to both home country multinationals and purely domestic firms. This could reflect the grater complexity of management due to the larger information gap over greater distances as Chandler emphasized. Finally, more skilled firms are more likely to be decentralized consistent with Caroli and Van Reenen (2001). An interpretation of this association is that high human capital managers and workers are less likely to make mistakes (one of the interpretations of λ in the theory model).[25]

[24] Interestingly, we also find that decentralization regressed on family management (and nothing else) is negative and significant (coefficient of -0.194, standard error of 0.039). If we also include trust and Rule of Law these are highly significant and the family management variable becomes insignificant (coefficient of -0.042 and standard error of 0.030). This suggests that family managed firms are more hierarchical, but potentially because they are formed in areas of low trust and weak rule of law where family ownership is a response to the inability to separate ownership and control.

[25] The results are unchanged when we include measures of regional skills, which is positive but insignificant.

We also split our sample of firms into those plants at which the firms CEO is off-site (the headquarters is located at another location from the factory manager we interviewed, such as Example B in figure 1) and those where the CEO is on-site (the headquarter building is located at the same site as the factory manager we interviewed, such as Example C in Figure 1). Reassuringly we find in column (5) that trust is significantly important for off-site CEOs – those were the remote location of the CEO should mean trust is important in facilitating decentralized decision making. In column (6) we find that for on-site CEOs trust seems less important, presumably because the proximity of the CEO means they can more effectively monitor the plant manager directly.

We also checked whether the trust result may simply capture more general social capital effects. We included "CIVIC", a variable constructed from the World Value Survey and widely adopted in the Social Capital literature[26], with higher values signifying a higher leniency towards "uncivil" behaviors. In the baseline specification of column (4) the coefficient on regional CIVIC was insignificant, and left the coefficient on trust practically unchanged.

The magnitude of the association between decentralization and trust is large. Figure 7 plots the level of decentralization across regions and its predicted value from trust and rule of law, showing a good match with 47% of the variation explained. The size of these differences are also 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 0.44 of a standard deviation.[27]

Using multinationals to identify the effect of trust on decentralization

Our sample includes a substantial number of multinational subsidiaries. Looking more closely at the multinational subsidiaries is interesting for two reasons. First, we are interested in whether characteristics (like trust) in the multinational's country of origin have an association with the organizational structure in the multinational's foreign affiliate. This has long been a pre-occupation

[26] Respondents were asked to assign a score between one and ten as to whether they agreed that certain behaviors were justified, with a one indicating the behavior was never justified and a ten indicating that the behavior was always justified. The five behaviors are (1) claiming a government benefit to which you are not entitled, (2) avoiding a fare on public transport, (3) cheating on taxes if you have the chance, (4) buying something that you knew was stolen and (5) accepting a bribe in the course of one's duties. The CIVIC variable is the sum across the five different questions and may range between 5 and 50. The average value of CIVIC in the regression sample is 9.60, and the correlation of the variable with trust is -0.56, significant at the 1% level.

[27] Using the 0.699 coefficient in column (4) and the trust values in Assam and Norrland of 0.13 and 0.76 respectively.

of business case studies, and the more recent trade literature on the organization of multinationals.[28] Second, we can include regional fixed effects when conducting this type of analysis, thereby removing any bias associated with other regional characteristics correlated with local trust that could be driving decentralization[29]. Third, we can exploit bilateral trust between the head quarter's country of origin and the country of location of the subsidiary and include both region of location and home country dummies.

The key hypothesis that we want to study is whether the organization of these types of plants is influenced by the level of trust prevailing in their country of origin (i.e. where the headquarters of the multinationals are located). The results of this analysis are shown in Table 2. These regressions are based on the specification of column (3) in Table 1, where we test the relationship between decentralization and trust (measured in the region of the plant's location), except with two digit rather than three digit industry controls because of the smaller multinational sample. Column (1) shows that in the full sample, the coefficient on trust remains positive and significant (0.627 with a standard error of 0.309). In column (2) we repeat the specification constraining the sample to be only foreign multinationals. Although the magnitude of the coefficient on trust is broadly comparable to column (1), the variable is not significant at conventional levels. To examine whether the organizational structure of foreign subsidiaries is influenced by the level of trust prevailing in their country of origin, we add to the baseline specification the average level of trust in the country where the headquarters of the firm owning the plant are located.[30] Column (3) shows that subsidiaries of firms headquartered in high-trust countries tend to be significantly more decentralized (coefficient 0.767, standard error 0.298). Working with the trust variable measured in the country of origin allows us to include as additional controls a full set of regional dummies. In column (4), the inclusion of the regional dummies does not affect the significance and the magnitude of the country of origin trust coefficient, which remains significant at the 5% level.[31]

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

[29] 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.

[30] Note that the clustering is now based on region-country or origin pairings.

[31] We experimented by including the Rule of Law index from the multinational's home country, and find that this variable is insignificant (point estimate -0.108 and standard-error 0.092). This suggests that not every factor in the multinational's home country is important for local decentralization, but only those that are likely to be transplanted abroad in the multinational's managerial and organizational structure.

A second measure of trust we use is the bilateral trust measure from a series of surveys conducted for the European Commission. These 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 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 EU countries and a number of non-EU countries like the US, Japan and Canada. In column (5) we restrict the sample to European multinationals for which the have a measure of bilateral trust between their country of origin and their country of location[32]. This measure of bilateral trust is significantly associated with decentralization – subsidiaries of firms in countries the multinational's parent country tends to trust (like French subsidiaries in Belgium) are typically more decentralized than subsidiaries in countries the multinational's parent country does not trust (like French subsidiaries in Britain). 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 pair wise variation in trust. Even in this demanding specification higher bilateral trust is associated with significantly more decentralization.

Finally, in Columns (7), (8) and (9) we instrument bilateral trust using the approach developed by Guiso et al. (2009). They examine the impact of trust on cross-country trade and investment and find that greater trust appears to encourage both. They develop a set of instruments for trust based on religious and ethnic similarities between pairs of countries[33]. When trust is instrumented with these religious and somatic distance measures – either jointly in column (7), or individually in columns (8) and (9) - our point-estimates for the impact on decentralization remain virtually unchanged. This result is suggestive of a causal effect of trust on decentralization in firms. Interestingly, it 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. This also suggests a cross-country selection mechanism for industrial location. Industries requiring greater levels of

[32] If we re-run the column (4) specification with the column (5) sub-sample the results are very similar, with a point-estimate (standard-error) on the key trust (country of origin) variable of 0.872 (0.677). This suggests that this sub-sample of European multinationals is representative of the larger sample.

[33] 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 and language, informational overlap and geographic distance.

decentralization should operate in higher-trust countries, something we will confirm in sub-section V.C.

V.B Trust and firm size

In Table 1 we showed that larger firms are more decentralized - in this sub-section we examine whether trust fosters larger average firm size, suggesting an additional route by which social capital fosters decentralization.

To do this we use the population of all public and private firms from our accounting databases detailed in the Data Appendix to measure average firm size in manufacturing (i.e. we do not use the variables in our organizational survey). These databases appear broadly comprehensive for firms with 100 or more employees.[34] Because of this we use the average size of the population of manufacturing firms with over 100 employees as our main dependent variable. These larger 100+ employee firms are also the group we targeted in our organizational survey. One reason we surveyed this group of 100+ employee firms is because they 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, taking all decisions directly.

In column (1) of Table 3 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, Raghuram and Zingales (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 only within country variation in trust which allows us to control other cross country factors that could be generating these results. 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 1.851 for 100+ employee firms in column (2) to 1.540 for all firms in column (4)). Nevertheless, trust remains significant throughout all columns.

[34] 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.

The magnitude of the trust coefficient in column (2) is large – for example 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 potentially important role for social capital and culture in explaining aggregate productivity.

V.C Trust and Industry structure

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), and D_k is the average decentralization value for that industry in our sample in the UK. We choose the UK 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 UK spread across every industry enabling us to generate industry level decentralization measures.[35] In the regression we then drop the UK, so that our survey data used to generate industry implied decentralization does not overlap with the regions in the regression.

In Table 4 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.

[35] Re-estimating using the US 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).

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.

V.D Robustness

To investigate the robustness of the decentralization results, Table 5 reports results where we re-estimate our most general specification (column (4) in Table 1) on various sub-samples, with other controls and different measures of decentralization. In general, the results are stable.

The first column of Table 5 simply reproduces the results from column (4) in Table 1 for ease of comparability. The second and third columns re-estimate this on the sub-sample of larger (>=250 employee) and smaller (<250 employee) firms. The results while no longer statically significant because of the smaller sample size display very similar overall point estimates. In columns (4), (5) and (6) we look at privately held, domestic and multinational firms only and again find similar point estimates. In column (7) we add the Bloom and Van Reenen (2007) management score to see if the effect of trust is simply to raise managerial quality. Management quality is positively correlated with decentralization, but trust has a strong independent influence. Column (8) includes a control for competition (the number of self-reported competitors) as competition may increase the importance of time sensitive action, encouraging decentralization (see Bloom et al, 2010). Competition is indeed, positively correlated with decentralization but trust is still significant even when we also include management in the final column.

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VI. FIRM-LEVEL PRODUCTIVITY

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 through allowing more output to be allocated to larger firms. 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]:

$$y_{it} = \alpha_L l_{it} + \alpha_K k_{it} + \alpha_C c_{it} + \alpha_D D_i + \gamma\ 'Z_{it} + v_{it}$$

where Y = deflated sales, 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. $y = \ln(Y)$. The Z's are a number of other controls that will affect productivity such as workforce characteristics (the proportion of workers with a degree) and firm characteristics (firm age, whether the firm is listed), a complete set of three digit industry dummies and country dummies. The crucial variable for us this basic specification is the decentralization index, denoted D.

In column (1) of Table 6 we run a basic specification with only capital, labor and decentralization, and find a large significant coefficient on decentralization. The coefficient suggests a one standard deviation increase in decentralization is associated with a 10% increase in productivity. In column (2) we include the full set of control variables, including the education of the workforce, country and industry controls. In this case the coefficient on decentralization falls substantially to 0.023 and is now significant only at the 10% level. This suggests that there is weak *direct* association of decentralization with higher productivity.

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

$$y_{it} = \alpha_L l_{it} + \alpha_K k_{it} + \alpha_C c_{it} + \alpha_D D_i + \alpha_{LD}(l_{it} * D_i) + \alpha_{KD}(k_{it} * D_i) + \alpha_{CD}(c_{it} * D_i) + \gamma' Z_{it} + v_{it}$$

We do this because of a growing prior literature suggesting that decentralized firms may use Information Technologies (IT) more effectively.[37] One rationalization is that to effectively use new technologies they need local flexibility to experiment. In a decentralized organization that can be achieved locally, while in a centralized organization this will have to be enforced from the centre which may be much harder to do. We also include interactions with employment and non-IT capital because the organization of the firm may also influence the productivity of these factors.

[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).

[37] See, for example, Bresnahan et al (2002) and Bartel, Ichinowski and Shaw (2007).

In column (3) we see the IT *decentralization interaction is positive and significant, consistent with this prior literature 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 (note that the linear time invariant variables are not separately identified from the firm specific effects). In column (5) we add an interaction between decentralization and non-IT capital and find a significant negative coefficient, suggesting more traditional non-IT capital may actually be better utilized in a more centralized firm. Similar experiments with employment and skills interactions with decentralization were not significant.[38]

The magnitude of the coefficient on the IT and decentralization interaction at 0.032 is quantitatively important. The reason is the real IT capital stock has been growing by about 8% a year faster than non-IT capital inputs in Europe and the US[39], so that a firm (or country) with one standard-deviation higher decentralization would have about 0.26 percentage points faster annual productivity growth.

VII. CONCLUSIONS

The focus of our paper is analyzing the argument that social capital enhances macro-economic performance through affecting the internal organization of firms. High trust and strong rule of law regions are able to sustain larger firms and industrial sectors that require decentralization. Furthermore, companies in these regions also have a higher degree of delegation given their size and industry. 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. Trust and rule of law enhance national productivity because efficient firms need to decentralize when they grow, and recent work has suggested that such reallocation is a key factor in aggregate productivity both for developed and developing countries.

A second contribution of our paper is to provide some data infrastructure for the analysis of firm organization. Despite many theoretical advances, the empirical literature on organizational economics lacks comparable measures of firms' internal organization across countries. By collecting

[38] For example, the point estimate (standard-error) on running a similar regression for employment interacted with decentralization was 0.0188 (0.0389), and for skills interaction with decentralization was -0.153 (0.105).
[39] Calculated from 1994 to 2004 using the Groningen Growth and Development Centre dataset for Europe and the US.

original data on decentralization across many thousands of firms in twelve countries we start to address this lacuna. We find that American and Northern European firms are much more decentralized than those from Southern Europe and Asia, and these cross country differences can be largely accounted for by differences in trust and the Rule of Law.

Since the importance of decentralization appears to be growing, countries with a comparative advantage in decentralization (whether through high trust or stronger Rule of Law) such as the US and Northern Europe are likely to have benefit disproportionately. If the trend towards rapid technical change and greater competition in markets continues this is likely to give productivity advantages to such countries.

There are many future directions for this work. First, some of the findings need to be matched up with new developments in theory. Second, the role of changes in information technology needs to be unpacked. We have simply used a composite hardware measure as is standard in the literature but Garicano (2000) and Garicano and Rossi-Hansberg (2008) have correctly stressed that the impact of falls in information costs on delegation are often the opposite of falls in communication costs in "cognitive" models of the firm. This model can potentially be empirically tested using the kind of data developed here (see Bloom, Garicano, Sadun and Van Reenen, 2010).

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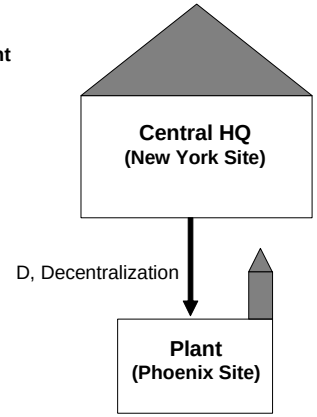
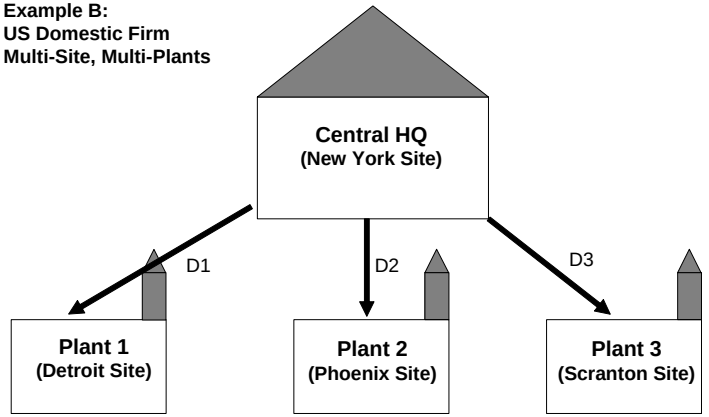
FIGURE 1 – EXAMPLES OF FIRM ORGANIZATIONAL STRUCTURES

Example A:
US Domestic Firm
2 Sites, Single Plant



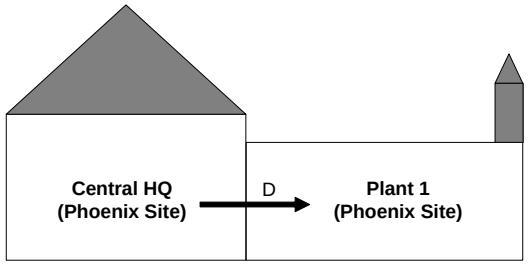
A classic case

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.

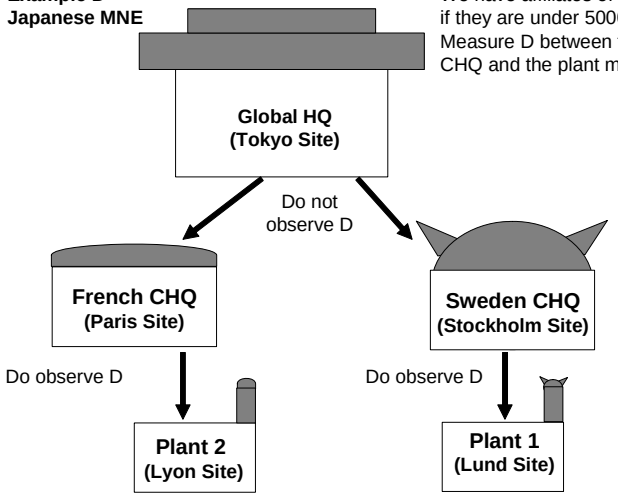
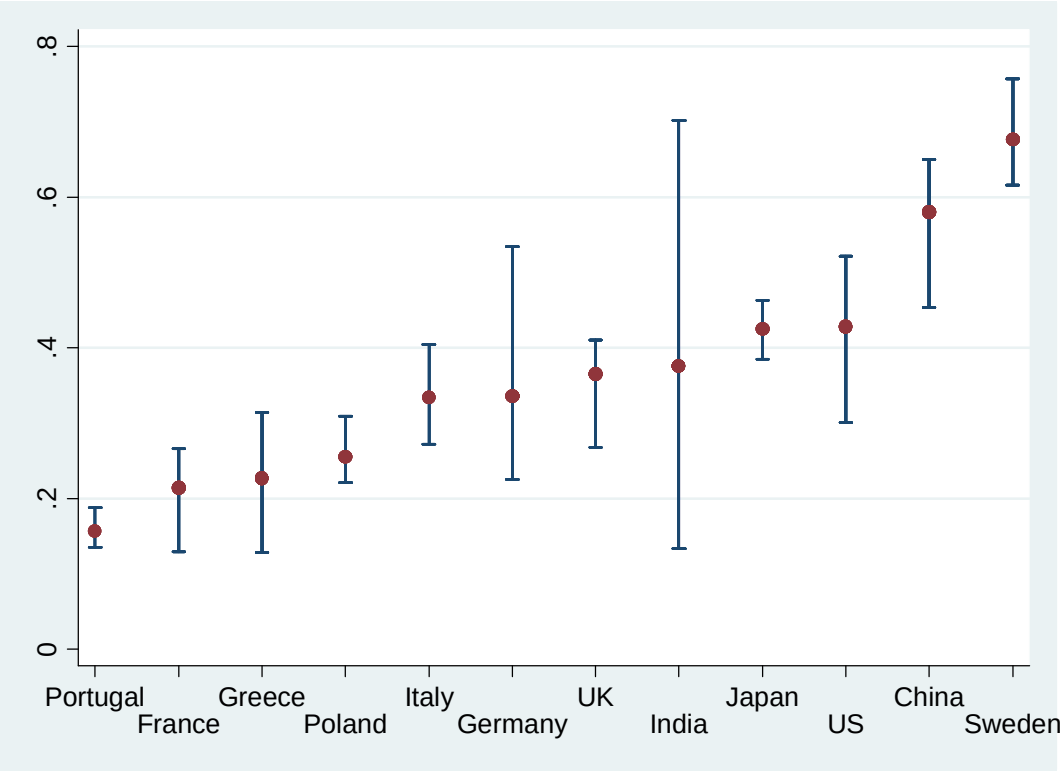
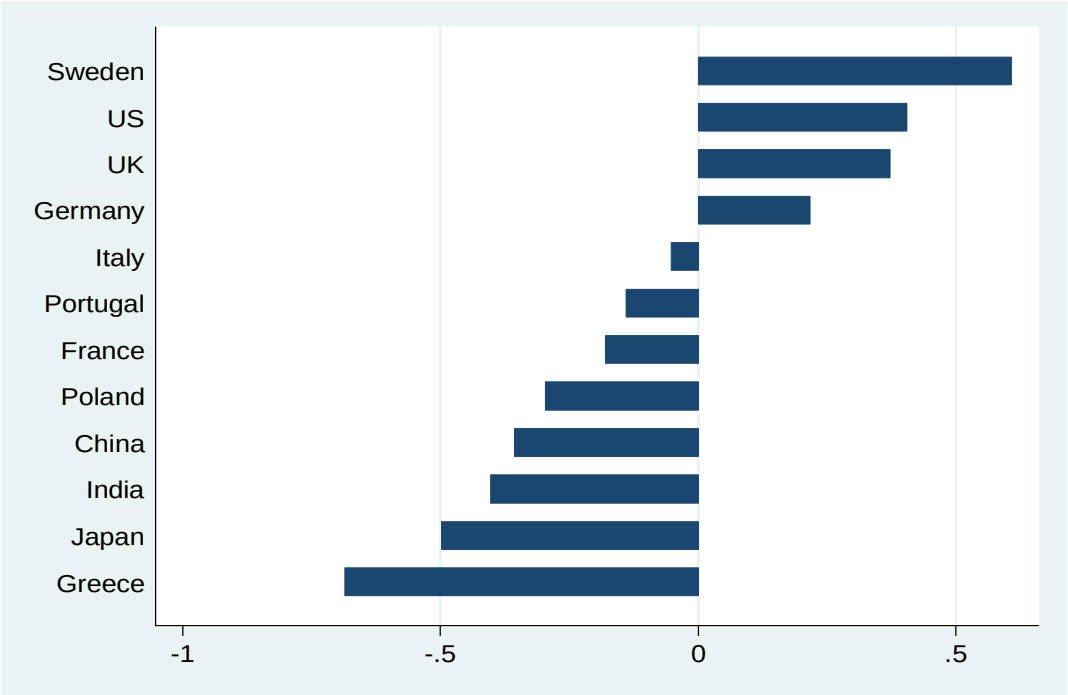


FIGURE 2 – TRUST BY COUNTRY AND REGIONAL DISPERSION



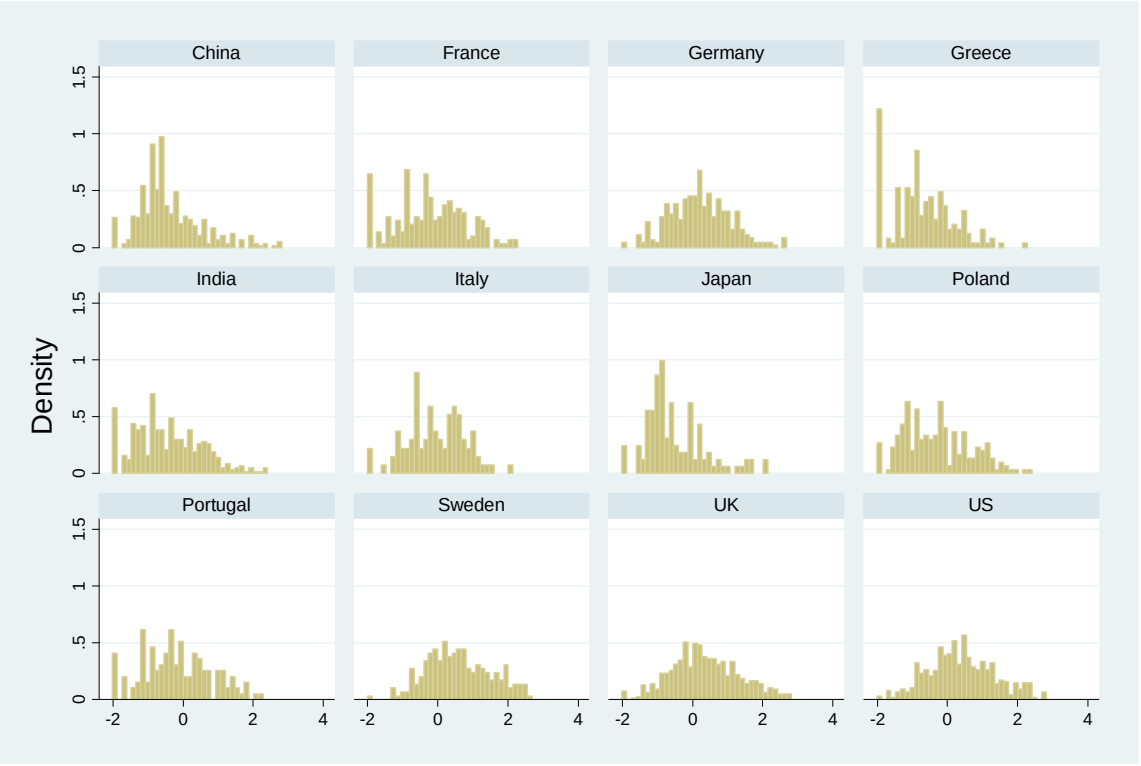
Notes: The graph shows median level of trust. The vertical bars denote minimum and maximum levels.

FIGURE 3 - AVERAGE DECENTRALIZATION BY COUNTRY



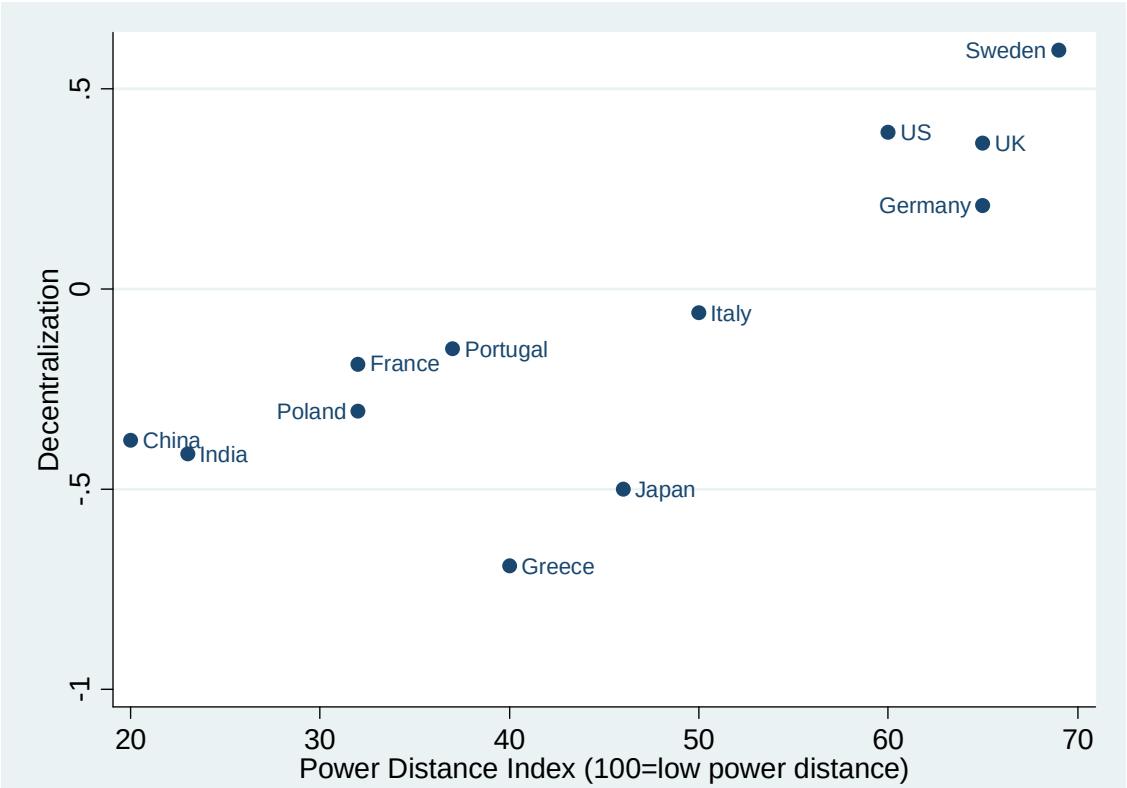
Notes: The graph plots average the z-scored decentralization index by country, measured as the plant manager's degree of autonomy over hiring, investment, products and prices. N=3549. Higher scores indicate more decentralization.

FIGURE 4 – DISTRIBUTION OF THE DECENTRALIZATION VARIABLE BY COUNTRY



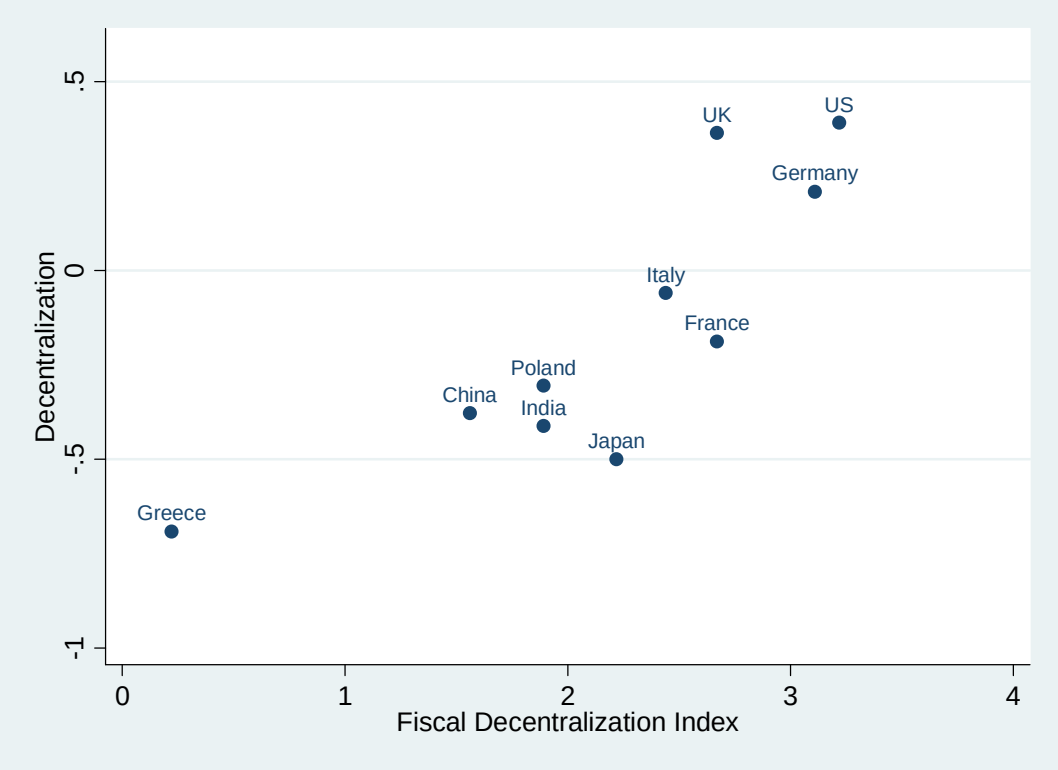
NOTES: These are the distributions of the decentralization index, which measures the degree of autonomy of plant managers over hiring, investment, products and prices. N=3549. Higher scores indicate more decentralization.

FIGURE 5 - DECENTRALIZATION AND POWER DISTANCE INDEX BY COUNTRY



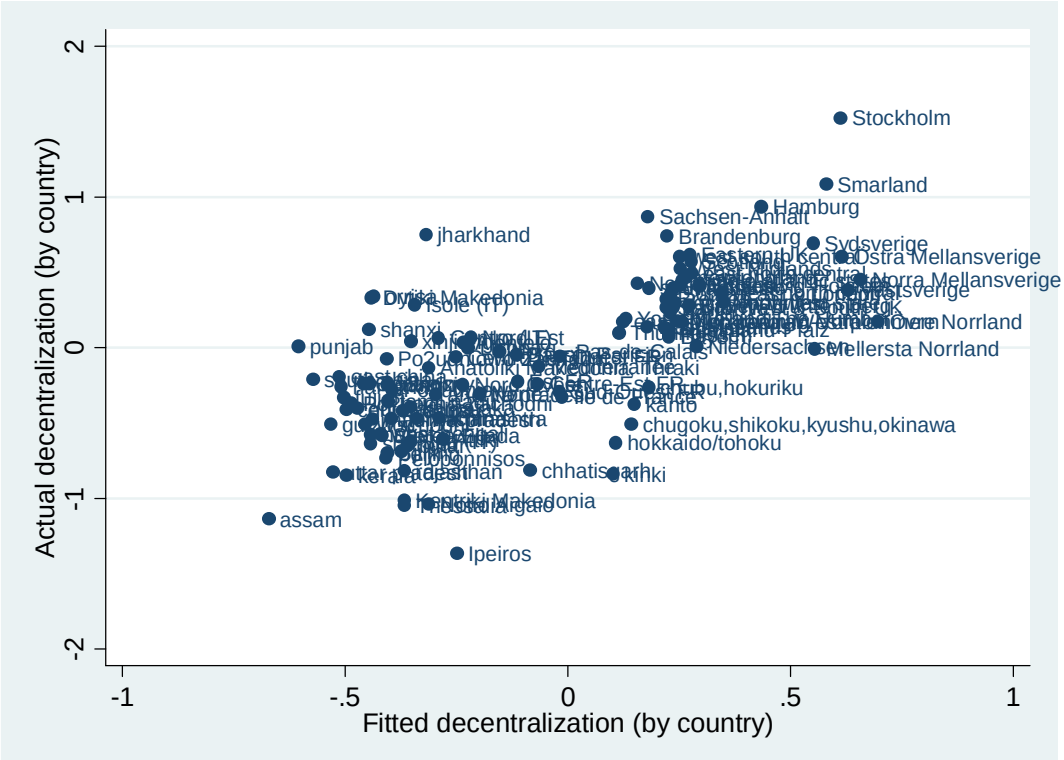
Notes: The y-axis is the average level of autonomy of plant managers over hiring, investment, products and pricing by country. The x-axis is Hofstede's (1980) Power Distance Index.

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 (2003) 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.

TABLE 1
DECENTRALIZATION AND TRUST

Dependent variable: Decentralization **Sample**	**(1)** **All**	**(2)** **All**	**(3)** **All**	**(4)** **All**	**(5)** **CEO off-site**	**(6)** **CEO on-site**
Trust (region)	1.115**	0.857***	0.732***	0.699**	1.239**	0.291
Trust measured in plant's region of location	(0.437)	(0.303)	(0.214)	(0.317)	(0.486)	(0.379)
Rule of Law (country)		0.515***	0.449***			
(-2.5=low, 2.5=high)		(0.125)	(0.112)			
Plant Skills			0.083***	0.085***	0.135***	0.066***
% Plant employees with a College degree			(0.015)	(0.015)	(0.026)	(0.023)
Firm Size			0.045**	0.052**	0.051	0.046
ln(Firm employment)			(0.020)	(0.022)	(0.037)	(0.031)
Plant employment			0.088***	0.089***	0.109**	0.085**
Plant employees as a % of firm			(0.031)	(0.030)	(0.046)	(0.040)
Foreign Multinational			0.186***	0.157***	0.128	0.125
Dummy=1 if firm belongs to a foreign multinational			(0.059)	(0.058)	(0.078)	(0.082)
Domestic Multinational			0.027	0.018	0.007	0.025
Dummy=1 if firm belongs to a domestic Multinational			(0.042)	(0.040)	(0.064)	(0.054)
Observations	3,660	3,660	3,660	3,660	1380	2280
Country controls (2)	no	Yes	Yes	-	-	-
Regional controls (2)	no	No	No	yes	yes	yes
Industry dummies (112)	no	No	No	yes	yes	yes
Country dummies (12)	no	No	No	yes	yes	yes
Other controls (60)	no	No	No	yes	yes	yes

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 region of location. TRUST measures the percentage of individuals who agreed with the statement "most people can be trusted" in the firm's region of location. 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. The index is compiled by the World Bank (Kauffman et al, 2007), and ranges between -2.5 and 2.5. "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, the duration of the interview, and 4 dummies for missing values in seniority, tenure, duration and reliability). Country controls are GDP per capita and population. Regional controls are GDP per capita and population in the region. Regressions weighted by the share of World Values Survey respondents in the region in the country.

TABLE 2
DECENTRALIZATION AND TRUST – USING MULTINATIONALS

Dependent variable: **Decentralization**	**(1)** **OLS**	**(2)** **OLS**	**(3)** **OLS**	**(4)** **OLS**	**(5)** **OLS**	**(6)** **OLS**	**(7)** **IV**	**(8)** **IV**	**(9)** **IV**
Trust (region) **Trust measured in plant's region of location**	0.627** (0.309)	0.451 (0.602)	0.362 (0.858)		0.131 (1.999)				
Trust (country of origin) **Trust measured in firm's country of origin**			0.767** (0.298)	0.729** (0.332)	0.206 (0.556)				
Bilateral trust **Trust of people from country of origin for people in country of location**					1.711** (0.721)	2.025* (1.112)	3.280** (1.392)	3.420** (1.574)	3.013** (1.418)
Instruments							Somatic dist. Religious dist.	Somatic dist.	Religious dist.
First stage F-test							16.67	29.03	22.01
Observations	3,660	866	866	866	282	282	282	282	282
Regional controls (2)	yes	yes	yes	yes	yes	-	-	-	-
Industry dummies (21)	yes	yes	Yes	yes	yes	yes	yes	yes	yes
Country dummies (12)	yes	yes	yes	yes	yes	yes	yes	yes	yes
Other controls (60)	yes	yes	yes	yes	Yes	yes	yes	yes	yes
Country of origin controls (2)	no	no	yes	yes	Yes	yes	yes	yes	yes
Regional dummies (105)	no	no	no	yes	Yes	yes	yes	yes	yes
Country of origin dummies (25)	no	no	no	no	No	yes	yes	yes	yes
Clustering	Region	Region	Cty origin	Cty origin	Cty origin by location	Cty origin by location	Cty origin by location	Cty origin by location	Cty origin by 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 degree of autonomy over hiring, investment, products and pricing. Column (1) includes all firms; Columns (2)-(7) 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: "cty origin by location" indicates clustering within each country origin by region of location cell. TRUST measures the percentage of individuals who agreed with the statement "most people can be trusted" in the region of firm's location or country of origin. 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. "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, the duration of the interview, and 4 dummies for missing values in seniority, tenure, duration and reliability). Regional controls are GDP per capita and population in the region. Country of origin controls are GDP per capita and population. Weighted by the share of World Values Survey respondents in the region in the country.

TABLE 3
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	No	yes	Yes	Yes	Yes
Country dummies	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. SAMPLE reports the size cut off for inclusion in the sample – for example in column (1) all firms with 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 GDP per capita, population in the region and % of employees with a degree. Standard errors are clustered as detailed in the table.

TABLE 4
IMPLIED INDUSTRY DECENTRALIZATION

Dependent variable: implied industry decentralization	**(1)**	**(2)**	**(3)**
Trust (region)	0.100**	0.099***	0.095
Trust measured in plant's region of location	(0.029)	(0.031)	(0.073)
Rule of Law (country)		0.027**	
(-2.5=low, 2.5=high)		(0.014)	
Observations	98	98	98
Regional controls	yes	yes	yes
Country dummies	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 UK. The regression sample is all countries except the UK. Hence, a high value indicates a large share of employment in the region in industries which are decentralized in the UK. 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 and % of employees with a degree.

TABLE 5
DECENTRALIZATION REGRESSION ROBUSTNESS CHECKS

Sample/Experiment:	**All**	**Larger firms (>=250 emp)**	**Smaller firms (<250 emp)**	**Privately held firms only**	**Domestic firms only**	**Multi-nationals only**	**Adding management**	**Adding competition**	**Adding competition and management**
Dependent variable: decentralization	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
Trust (region)	0.699**	0.670	0.598	0.763**	0.728*	0.755	0.671**	0.713**	0.683**
	(0.317)	(0.404)	(0.563)	(0.347)	(0.425)	(0.501)	(0.311)	(0.317)	(0.311)
Management							0.188**		0.180***
							(0.040)		(0.039)
Competition (#rivals)								0.096**	0.068**
								(0.030)	(0.028)
Observations	3,660	2,319	1,341	3,112	1,974	1,686	3,659	3,660	3,659

Notes: Robust standard errors clustered by region in parentheses. Dependent variable is decentralization. * significant at 10%; ** significant at 5%; *** significant at 1%. TRUST measures the percentage of individuals in the firm's country of location who agreed with the statement "most people can be trusted". COMPETITION is taken from the survey and is the number of rivals the manager perceives he faces. MANAGEMENT is the firm-level Bloom and Van Reenen (2007) management score. 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, the duration of the interview, and 4 dummies for missing values in seniority, tenure, duration and reliability). Regional controls are GDP per capita and population in the region. Standard errors are clustered as detailed in the table. All columns weighted by the share of World Values Survey respondents in the region in the country. All columns include a full set of country dummies (12) and industry dummies (112).

TABLE 6
DECENTRALIZATION AND FIRM-LEVEL PRODUCTIVITY

Dependent variable: ln(Sales)	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
Decentralization **Firm level decentralization z-score**	0.100*** (0.015)	0.023* (0.014)	0.046** (0.021)		
Ln(Employment) **ln(number of employees)**	0.594*** (0.023)	0.665*** (0.021)	0.705*** (0.031)	0.445*** (0.076)	0.438*** (0.074)
Ln(Capital) **ln (net tangible fixed assets)**	0.406*** (0.017)	0.336*** (0.016)	0.297*** (0.022)	0.373*** (0.044)	0.390*** (0.043)
Ln(Skills) **ln (% employees with a degree)**		0.060*** (0.013)	0.049** (0.019)		
Ln (IT) **ln (number of PCs per employee)**			0.126*** (0.024)	0.073*** (0.021)	0.070*** (0.021)
Decentralization*ln(IT) **Decentralization and IT interaction**			0.047*** (0.017)	0.032* (0.017)	0.035** (0.017)
Decentralization*ln(Capital) **Decentralization and Capital interaction**					-0.046* (0.026)
Firms	1,674	1,674	713	713	713
Observations	11,690	11,690	3,509	3,509	3,509
Country and industry controls (122)	no	Yes	Yes	yes	yes
Other controls (62)	no	Yes	Yes	yes	yes
Firm fixed effects	no	No	No	yes	yes

Notes: * significant at 10%; ** significant at 5%; *** significant at 1%. Estimation by OLS with robust standard errors in parentheses. The dependent variable is log (sales). DECENTRALIZATION z-score index, measured by the degree of plant manager's autonomy over hiring, investment, products and pricing. Standard errors are clustered at the firm level. "Country and industry" controls include a full set of country and three digit industry dummies. OTHER CONTROLS includes a full set of noise controls (the day of the week the interview took place, an interview reliability score, the manager's seniority and tenure, the duration of the interview, and 4 dummies for missing values in seniority, tenure, duration and reliability) and controls for accounts consolidation status and public listing.

DATA APPENDIX

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 U.K.), on BVD Icarus for the US, 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 UK and the Registry of Companies in India). Icarus is constructed from the Dun & Bradstreet database, which is a private database of over 5 million US 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 3. 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 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)[40]. In Japan and China we used all manufacturing firms with 150 to 5000 employees since Oriana only samples firms with over 150 employees, while in Portugal we supplemented the sample with firms with 75 to 100 employees.[41] 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

[40] In the US 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 log (assets) for public firms.

[41] 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.

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 US and India having the most firms and Sweden, Greece and Portugal the fewest[42]. 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 US, UK 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 UK and the US, 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 UK 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 US 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 3. 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 employees in enterprises with over 50 or more employees (except the US 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 included 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

[42] 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.

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[43]. 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 US 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 US 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 (sub-section VI.C) 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 US) from the analysis to show that the results are robust. In the specification of column (2) in Table 3 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.

[43] 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.

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 US and UK 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 UK morning (4am till midday), which left large stocks of contacted firms in Japan.[44] 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 run 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.[45] In all columns, we compare the probability of running an interview conditional on contacting the firm, so including 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 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 US, 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

[44] 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.

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

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 less likely to respond and European firms 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 U.K.), on BVD Icarus for the US, on CMIE Firstsource dataset for India, and on the BVD Oriana dataset for China and Japan.

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 3,601 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.

The "Lerner index of competition" constructed, as in Aghion et al. (2005), as the mean of (1 - profit/sales) in the entire database (excluding the surveyed firms themselves) for every country industry pair. Profits are defined as EBIT (earning before interest and taxation) to include the costs of labor, materials and capital but exclude any financing or tax costs. The five year period 2000 to

2004 is used in every country to ensure comparability across countries (since earlier data is not available in Oriana). In the US and India private firms do not provide profits data so the index was constructed from the population of all publicly listed firms, obtained from Compustat for the US and the CMIE Prowess dataset for India.

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, 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 respondent' 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 US, 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[46]; United States: Bureau of Economic Analysis, regional Statistics[47]; Japan: Japan Statistic Bureau, Prefectural Statistics[48]; China: Province data from Chinadataonline.org[49]; India: State level data from the Central Statistical Organisation (CSO)[50]. 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 US. 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 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*"

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

We extend this be collecting data for China and Poland from Biasutti (1957), assuming Luxembourg has the average values for France and Germany, and the US has the values of its European immigrants, weighted by their ancestry shares reported in 1999 US Census. We use only European immigrants because they appear to overwhelming 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 US. 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"*

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

APPENDIX TABLE A1
DETAILS OF THE DECENTRALIZATION SURVEY QUESTIONS

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

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 US 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"*?

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
UK	3.46	2.53	2.53	9,150
US	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 US, 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 US, 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
RESPONSE RATES TO THE SURVEY

	(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 UK	0.114	Baseline
	(0.105)	
Country is US	Baseline	n/a
Pseudo R^2	0.162	0.138
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.