

# Evidence from Multiple Employees per Establishment on Trust, Credibility and Delegation\*

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## Abstract

Using a unique establishment-level survey of employees, we examine the relationship between delegation of decision-making authority and workers' trust of management. Using fixed effects to control for unobserved management quality and establishment characteristics, we find that delegation of authority is more likely if a worker trusts management. This result is consistent with the theoretical literature on delegation; in particular, when contracts are incomplete (as in a relational contract), trust between a principal and an agent can sustain delegation when it would not otherwise have been possible. We consider several extensions to the base model. First, we instrument for trust using worker satisfaction with their OH&S training, their safety and comfort at work, and whether they received OH&S training. Second, we examine average workplace trust and delegation practices, using between-firm estimates. Both extensions yield results qualitatively consistent with the base model.

*Key words:* decision-making authority, decentralization, trust.

*JEL classifications:* D23, L23, L29.

*“It shall be the policy of this nation to regard any nuclear missile launched from Cuba against any nation in the Western Hemisphere as an attack by the Soviet Union on the United States, requiring a full retaliatory response upon the Soviet Union.”* — President John F. Kennedy.

## 1 Introduction

As the Cuban Missile Crisis so starkly illustrates, alignment of interests is not necessary in order to trust what someone says. Moreover, if trust exists, people's actions can be directed to more positive equilibria, even in the absence of formal commitments.<sup>1 2</sup> In the context of firms, delegation of

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<sup>1</sup>*“It's not mad! Mutual Assured Destruction is the foundation of deterrence.”* — Secretary of Defense Robert S. McNamara.

<sup>2</sup>Although of course, at the psychological level it is harder for us to trust when our experiences are negative. This effects goes beyond the obvious Bayesian conclusions about a person's character from their actions. The 'halo' effect means that we tend to want our views of people to be consistent in all dimensions even if there is no logical reason to connect the dimensions; an example of this would be thinking of physically attractive people as more talented.

authority is a key management practice that is complicated by the inability to formally contract over the associated actions and payoffs. If workers trust management to make truthful statements, then mutually beneficial delegation might be achieved even though formal arrangements are impossible. This paper is the first individual-level investigation of this conjecture.

Management practices determine the routines, structure and ultimately the performance of an organization. By legal definition, the problem of management falls in a formal sense to the owners of an organization; they are ultimately responsible for dealing with all the issues that the organization faces. Thus a fundamental question of management practice is who, if anyone, is delegated authority by the owners? There is emerging empirical evidence of the importance of delegation. Bloom et al. (2012) suggest that failure to delegate, due to lack of trust, limits firm growth and they find evidence to support this in a range of manufacturing firms across a number of countries. Boedker et al. (2011) find that, of 32 management practices, a measure of delegation has the highest correlation with their High Performing Workplace Index.<sup>3</sup>

What drives allocation of decision making in firms? Economists have posited several alternatives, including: a tradeoff between delegation to a biased agent and costly communication (Dessein, 2002); information processing (Radner (1993), Bolton and Dewatripont (1994), Van Zandt (1999) and Meagher (2003)); and providing incentives (Aghion and Tirole (1997), Acemoglu et al. (2007), Zabojnik (2002) and Bester (2004)). The relational-contracting literature, exemplified by Baker et al. (1999), emphasizes the on-going nature of the principal-agent relationship in firms. This literature suggests that delegation is possible provided future costs (punishment) outweigh the short-term gain from breaking an implicit agreement, even if a formal contract cannot be enforced in relation to the allocation of decision-making rights.<sup>4</sup> Interpreting the adherence to an implicit contract as trust, an implementable relational contract requires that workers trust management; consequently, with this trust comes greater scope delegation.

As noted, Bloom et al. (2012) find that decentralization is more likely in organizations in countries with higher levels of trust and in subsidiaries that belong to businesses that are based in high trust countries. Our paper is a natural extension of their analysis; we empirically investigate the relationship between delegation and trust at the individual level within an organization using matched establishment-level data. Having multiple observations (workers) per establishment allows us to estimate establishment level fixed effects using ‘panel’/hierarchical/multi-level techniques.<sup>5</sup> Our basic finding is that there is a positive relationship between workers’ trust of management and greater decentralization in workplaces, and that this result is robust to unobserved establishment characteristics such as management quality, organizational culture or practices.<sup>6</sup>

This paper adds to the growing empirical literature on the allocation of decision-making rights. Colombo and Delmastro (2004) find that decisions relating to labor (as compared with capital related decisions) are more likely to be delegated. Acemoglu et al. (2007) find that decentralization is more likely the closer a firm is to the technology frontier. Bloom et al. (2010) find a positive relationship

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<sup>3</sup>The index is based on 18 dimensions covering financial performance, customer focus, innovation and employee experience.

<sup>4</sup>Also see Baker et al. (2002), Gürtler (2012) and Goldlücke and Kranz (2012).

<sup>5</sup>The panel of observations here is a cross sections of workers per establishment not repeat observations of a subject across time, as is more common in economics.

<sup>6</sup>Bloom et al. (2012) also suggest that trust allows for larger firms, as these firms require a greater degree of delegation than their smaller counterparts. This result is also present in our results; we find a positive relationship between workplace size and decentralization.

between competition and delegation. Similarly, Meagher and Wait (2014) emphasize the relationship between delegation and external factors, such as product-market uncertainty, competition and participation in export markets.

A strength of the current paper is the close ties it has with the relational-contracting literature that typically emphasizes implicit contract (or trust) between the principal and an individual agent. We have information on precisely this; our data measures an employee’s trust of management at their place of work. In Bloom et al. (2012), country-level trust is exogenous to an organization. Given our focus is at the establishment level, the trust/delegation relationship is potentially endogenous. The first potential source of endogeneity, omitted establishment characteristics are addressed first through establishment fixed effects. The robustness of these results are investigated through two main extensions: an instrumental-variables approach to individual within establishment effects and the estimation of a between model of establishment level effects.

## 2 Conceptual framework

Here we outline a simple reduced-form framework of a relational-contracting model framework to clarify the economic issues relating to individual trust of management.

Assume a principal  $P$  has an interest in delegating action  $a$  to agent  $A$ . The payoffs for each individual are  $\pi^i$ ,  $i \in \{P, A\}$ . We assume the action involves no effort cost but the agent’s private benefit is  $b(a)$ . Thus  $b(a)$  summarizes the incentive conflict between the principal and the agent.

Obviously, to deal with the incentive conflict the principal would like to chooses an explicit menu  $m(a)$  that compensates/rewards the agent for taking an appropriate action. We assume that while the action and any reward schedule are observable and communicable they are non-contractible (as are the payoffs).<sup>7</sup>

As a reduced form for a relational contract we simply assume the agent’s *trust* in the principal to tell things honestly as they are is  $\tau \in \{0, 1\}$ . Then the agent’s optimization problem becomes

$$\arg \max_a \pi^A = \tau(m(a) + b(a)) + (1 - \tau)(0 + b(a)). \quad (1)$$

With the principal’s problem being

$$\max_{m(\cdot)} \pi^P(a^*(m, \tau)) - m(a). \quad (2)$$

In this non-contractible setting, the principal is able to influence the agent only if the agent trusts (and understands) the reward schedule announced by the principal.

Now extend the framework to think of the agent being better informed than the principal about the payoffs of the action (as in Prendergast (2002) and Dessein (2002)). In this case, the principal has to choose between taking the action herself with poor information (centralization) versus delegating the action to the better informed agent. Clearly if the principal can influence the agent’s choice of action through the menu  $m$  then delegation will become relatively more attractive. *Thus, if workers*

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<sup>7</sup>By not contractible we also exclude the various mechanisms which might be employed to circumvent the contracting problem. Recent experimental and theoretical research indicates that these mechanisms are not robust and tend not to work in practice.

*trust (and understand) the payoff relevant statements by management, delegation is relatively more attractive.*

This very simple framework could be generalized following the modern contracting literature to include effort, trust as a probability, risk aversion and most importantly some equilibrium enforcement measure for the ‘trust’ based on repeated interaction etc. An alternative, and perhaps more obvious, perspective on trust in an organization might be to consider whether a principal can trust an agent to take the ‘right’ action. This has been formalized through payment congruence and has generated a large literature (see Aghion and Tirole (1997), for example). However, the main point we want to make with this simple framework would remain; ‘trust’ that an implicit agreement will be adhered to by a principal allows for greater delegation of decision-making rights than would otherwise be feasible.

### 3 Data Set and Variables

We use the Australian Workplace Industrial Relations Survey 1995 (AWIRS 95) to investigate the relationship between delegation of decision-making rights and worker trust of management. AWIRS 95 is a cross-industry survey (excluding agriculture, forestry and fishing and defence) of 2001 workplaces (that is, plants or establishments) with 20 or more employees in Australia. The AWIRS 95 contains several complementary surveys.<sup>8</sup> This paper uses the General Management Questionnaire, which was conducted by personal interview and completed by the most senior manager at the workplace, and the Employee Questionnaire, a sample of 19 155 employees selected randomly from the General Management survey of workplaces. It is worth noting several advantages of this data. First, this data is a matched establishment-worker survey, allowing for a detailed examination of worker trust at the workplace. Second, this study – along with Acemoglu et al. (2007) and Colombo and Delmastro (2004) – is one of the first cross-industry studies of delegation of decision-making using novel and interesting data.<sup>9</sup> Third, AWIRS 95 has information on the key factors of interest, delegation of decision making and employee’s trust of management. Third, like the United States, Australia has a flexible labor market and relatively little interference from unions in the way firms are managed. This means that the observed allocation of decision making is (more) likely to arise from a profit-maximizing choice on behalf of the firms, as opposed to being externally imposed by regulation or industrial-relations agreements.

#### 3.1 Centralization of decision-making: dependent variables

The Employee Questionnaire asks ‘[i]n general, how much influence or input do you have about the following? The type of work you do; How you do your work; When you start and finish work; The pace at which you do your job; The way the workplace is managed or organised; Decisions which affect you at this workplace. For each of the six questions, employees can respond: (1) a lot; (2) some; (3) a little; or (4) none.’<sup>10</sup>

Each of these questions captures related, but different, aspects of decentralization of decision authority. Figure 3.1 shows the differ influence employees have over these various aspects of their

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<sup>8</sup>The survey and the data are described in detail in Morehead et al. (1997).

<sup>9</sup>Guadalupe and Wulf (2007) use cross-industry data to investigate delayering rather than delegation.

<sup>10</sup>There was also another possible answer of ‘Don’t know’, but only 0.1 percent of employees gave this response.

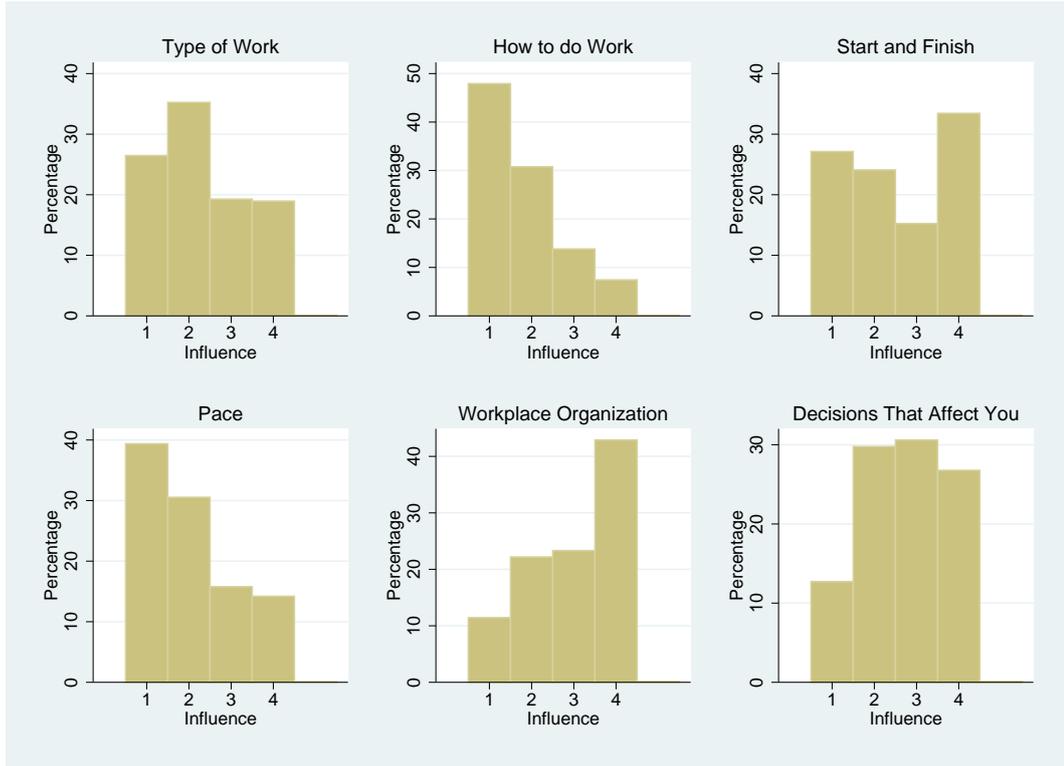


Figure 1: Delegation of decision authority. Key: 1 - A lot, 2 - Some, 3 - A little, 4 - None

work. In general, employees have more influence over how they do their job and the pace of work than they have over the way the workplace is organized or about workplace decisions that affect them.

To make use of this information, we generate a variable *Centralization(Z-score)*, by summing the scores across all six questions and creating a *Z*-score with a mean of 0 and a standard deviation of 1 – lower values of this variable indicate greater decentralization or employee influence. Bloom et al. (2012) utilize an equivalent index of decentralization. Moreover, a comparison with the literature is aided as the questions we used to create our decentralization measure have similarities to questions about decentralization used by Colombo and Delmastro (2004), Acemoglu et al. (2007) and Bloom et al. (2012).

As an alternative measure of the level of centralization, we estimate the principal factor analysis of the six aspects of decision-making autonomy; the first factor has an Eigen value of 2.986, whereas the other factors have Eigen value of 0.303 or less. We retain the first factor, denoted as *Central PF*, so as to use it as a dependent variable for centralization of decision making. The pairwise correlation between *Centralization(Z-score)* and *Central PF* is .995.

### 3.2 Explanatory variables

Table 1 provides summary statistics for the main variables of interest, including the dependent variables *Centralization(Z-score)* and *Central PF*.

*Employee characteristics.* Employees were asked whether ‘[m]anagement at this workplace can

Table 1: Summary statistics of basic sample (N = 14091)

VARIABLE	MEAN	STD DEV.
DEPENDENT VARIABLE		
Centralization(Z-score)	-.012	.991
Central PF	-.013	.916
KEY EXPLANATORY VARIABLES		
Trust	.330	.470
Male	.579	.494
Tenure	6.452	6.902
INSTRUMENTS		
Satisfied with OH&S Training	1.937	.815
Satisfied Safety & Comfort	1.563	.783

Notes: a. Source AWIRS 95.

be trusted to tell things the way they are'. Using this information, we generate a measure of *Trust* equal to 1 if the employee agrees with the statement and 0 if, instead, they neither agree or disagree or if they disagree.

There is a potential endogeneity issue, between the explanatory variable *Trust* and delegation. It is conceivable that an employee who has been delegated authority might have greater trust in management. As an empirical strategy to address this potential endogeneity, we use two instruments for *Trust*. The first instrument is whether an employee is satisfied with the training they received relating to OH&S (*Satisfied with OH&S Training*), to which an employee can either be: satisfied (coded as 1); neither satisfied nor dissatisfied (2); or dissatisfied (3). In a similar manner, in regards to *Satisfied Safety & Comfort* an employee can either be: satisfied (1); neither satisfied nor dissatisfied (2); or dissatisfied (3). A worker's satisfaction with the OH&S training they received at the workplace is separate from the principal's choices about productive decisions. Similarly, a worker's feelings with regards to their comfort and safety of a workplace is not directly related to the way decisions about production are made. However, a worker's belief about their comfort and safety or the the OH&S training they received could affect his or her trust of management. Consequently, both variables appropriate instruments. That is, while the provision of adequate OH&S training and a satisfactorily safe and comfortable work environment will most likely affect a worker's trust of management, it is not directly related to the choice regarding the allocation of delegation of decision-making rights. As an alternative instrument, we also estimate the model using a variable indicating whether the employee received OH&S training (*OH&S Train*), defined as 1 if yes and 0 if not.

A dummy variable is created if a worker is *Male* (1) or otherwise (0). The variable is also created indicating each employee's *Tenure* at the workplace. Similarly, a series of dummies are generated for the employee's age and their highest level of educational. These two sets of dummy variables are included in all of the estimates. Dummy variables for the worker's occupational group were also

constructed.

*Workplace characteristics.* In some of the estimates below we include variables for the size of the *Workplace* (number of employees) and seven dummy variables to represent the size of the *Firm* to which the workplace belongs (number of employees). Dummy variables for included in some models indicating whether a workplace faces intense, strong or moderate product-market competition (*Competition*) and if the firm *Exports* most of its output. Also, dummy variables were constructed for industry, based on the two-digit (standardized) ANZSIC industry codes.

## 4 Trust and Delegation within Workplaces: Fixed Effects Estimation

The basic proposition we explore in this paper is the relationship between an employee’s trust of management and the delegation of decision making. We propose, following the relational-contracting literature, that if parties believe that an implicit contract is self-enforcing – or in other words, whether management can be trusted – this can allow for a greater level of delegation to be feasibly sustained in equilibrium, even when a formal contract on the allocation decision making rights cannot be written.

Table 2: Centralization of decision-making: panel estimation coefficients (standard errors in parentheses)<sup>a</sup>

	(1) OLS Coeff (SE)	(2) PANEL FE Coeff (SE)	(3) PANEL FE Coeff (SE)
DEP. VARIABLE	<i>Z-score</i>	<i>Z-score</i>	<i>Central PF</i>
Trust	-.501*** (.017)	-.501*** (.018)	-.469*** (.017)
Male	-.050*** (.019)	-.029 (.021)	-.028 (.019)
Tenure	-.005*** (.001)	-.006*** (.001)	-.006*** (.001)
OTHER VARIABLES			
Education DVs	Yes	Yes	Yes
Age DVs	Yes	Yes	Yes
Occupation DVs	Yes	Yes	Yes
No. of obs.	14091	14091	14091

Notes: a. Clustered standard errors for 1804 workplaces estimated in parentheses.  
\*\*\* Significant at 1% level, \*\* significant at 5% level, \* significant at 10 % level.

Table 2 presents the estimation results for the allocation of decision making, as measured by *Centralization(Z-score)*, against an employee’s *Trust* of management. While care needs to be taken not to imply causality, we argue that our results provide insight into the relationship between trust and delegation.

Column (1) shows the OLS estimation results; these estimates suggest higher levels of trust are associated with more decentralization (lower values of our *Z-score* dependent variable). The estimated coefficients for *Male* and *Tenure* are also negative and significant. Taking tenure as a measure of firm specific capital it is not surprising that more tenure is associated with greater decentralization.

To account for unobserved establishment effects, such as managerial ability, practices etc we estimate fixed effects for each establishment. The results, reported in column (2), show a consistent result for *Trust*: greater trust is associated with greater decentralization. Interestingly the omitted establishment variables have very little impact on the estimated coefficients for *Trust* and *Tenure*, although the coefficient on *Male* decreases in both magnitude and significance.

Columns (3) of Table 2 reports the estimation results using our alternative dependent variable. The first principal factor (*Central PF*) is used in place of the *Z-score* of delegation; the results are very similar to the estimated coefficients in the first two columns.

Overall, these results give very strong support to the relational contracting literature and its prediction that the benefits of decentralization can be reaped in establishments where virtuous type equilibrium, as measured by trust, obtains. The conditions which produce this virtuous, trust based equilibrium remain an open question.

It is also worth noting the estimated coefficients for our education, occupation and age categories. Across the three specifications, employees between 25 and 49 years of age are more likely to have greater authority than the omitted category (20 years of age, or less). It is interesting, however, that the estimated coefficients for an employee’s age between 50 and 54 and over 54, respectively, are not significant. In terms of education, employees with a postgraduate degree or an associate diploma have greater authority relative to the omitted educational group (less than Year 10 high school). Finally, relative to laborers, most occupational groups have greater delegated authority – this is particularly true for professionals and managers, with both groups have large and significant estimated coefficients.

## 5 Endogeneity: Instrumental Variables

The fixed-effect specification of the proceeding section controls for the impact of unobserved establishment level variables such as managerial quality, management practices or culture. There has been much discussion in the literature about the potential importance of such variables but we find they are orthogonal to the relationship between trust and decentralization.

Having controlled for establishment fixed effects it is natural to proceed further and investigate if the identified within establishment effect of trust, that is the impact of the individual deviations of trust from the establishment mean, are endogenous. In particular we need to be concerned about omitted variable bias, which we investigate through instrumental variables.

Unfortunately no quasi experimental controls for trust present themselves in the data set so we are left with the standard issue of utilizing less than ideal instruments. Ideally we would like

instruments indicating a randomly applied shock which would affect the attitude of a worker to management. Our two instruments are: (i) whether a employee is satisfied with the Safety and Comfort of the workplace (*Sat. Safety & Comfort*); and (ii) whether the employee is satisfied with the occupational, health and safety training they receive (*Satisfied OH&S Training*). We will consider both the instruments' suitability conceptually and with a battery of standard tests.

Having controlled for occupation, establishment, age and education it seems unlikely that whatever determines a workers satisfaction with safety is related either directly or indirectly through omitted variables with the delegation-trust process. However being dissatisfied with safety is very likely to be associated with a negative effect on a worker's trust in management telling the truth. A similar argument can be made about satisfaction with occupational health and safety training.

These instruments perform well in a range of standard tests, reported in Table 4. As Table 3 shows, the impact on the estimated coefficients is significant.

Table 3: Centralization of decision-making: IV estimation coefficients (standard errors in parentheses)<sup>a</sup>

	(1) IV Coeff (SE)	(2) PANEL IV FE Coeff (SE)	(3) TREATMENT FE Coeff (SE)	(4) PANEL IV FE Coeff (SE)
DEP. VARIABLE	<i>Z-score</i>	<i>Z-score</i>	<i>Z-score</i>	<i>Central PF</i>
Trust	-2.063*** (.075)	-1.990*** (.065)	-1.889*** (.068)	-1.867*** (.067)
Male	-.091*** (.024)	-.032 (.025)	-.044*** (.017)	-.030 (.023)
Tenure	-.016*** (.002)	-.011*** (.002)	-.004*** (.001)	-.011*** (.002)
OTHER VARIABLES				
Education DVs	Yes	Yes	Yes	Yes
Age DVs	Yes	Yes	Yes	Yes
Occupation DVs	Yes	Yes	Yes	Yes
INSTRUMENTS				
Satisfaction Safety & Comfort	Yes	Yes	Yes	Yes
Satisfaction OH&S Training	Yes	Yes	Yes	Yes
First-stage <i>F</i> -test	585.993			
No. of obs.	14091	14091	14091	14091

Notes: a. \*\*\* Significant at 1% level, \*\* significant at 5% level, \* significant at 10 % level. Clustered standard errors for 1804 workplaces estimated in Columns (1) in parentheses. Bootstrapped standard errors based on 1804 workplace clusters shown in parentheses for Column (2), (3) and (4).

Columns (1), (2)) and (4) offer instrumental variables variations on the models in Table 2 while

column (3) estimates the ‘treatment effect’ model.<sup>11</sup> Although there are potential technical issues which could cause significant differences between the IV and treatment models we find in our case the results are very robust to the various specifications. Column (1) presents the estimated coefficients when *Trust* is instrumented with satisfaction with OH&S training and satisfaction with workplace safety and comfort. The estimates indicate that these instruments significantly explain employee trust of management (the first-stage *F*-test is 585.99). Table 4 shows this approach performs well on a range of conventional test statistics for the instruments used in the instrumental variables model estimated in Column (1). The estimated coefficients show a positive relationship between delegation and worker trust, significant at the 1% level.

Column (3) shows the estimates obtained using *Trust* as a treatment using the same instruments. The results remain largely unchanged from the other IV results – the coefficient on *Trust* -1.889 rather than -1.990 in Model (2), and both are significant at the 1% level. The other coefficients of interest are also largely unchanged.

Table 4: Test statistics for the IV model (1)

FIRST-STAGE <i>F</i> TEST	
Angrist-Pischke multivariate F test	$F(2, 1803) = 585.99$
UNDER-IDENTIFICATION	
Kleibergen-Paap rk LM statistic	$\chi^2 = 606.96$
WEAK-IDENTIFICATION	
Kleibergen-Paap rk LM statistic	$\chi^2 = 585.99$
OVER-IDENTIFICATION	
Hansen J statistic	$\chi^2 = 1.044$

The estimates in Columns (2) and (4) make use of the panel of workplaces, using within estimates (fixed effects). Again, *Trust* is instrumented for using worker satisfaction with OH&S training and safety and comfort of the workplace. The estimates from both of these models indicate that *Trust* is significantly associated with more decentralization.

To ensure that our results do not depend on the specific way our dependent variable is constructed, we re-estimate the model using the first factor (*Central PF*) as the dependent variable. The results shown in Column (4) indicate that the estimated relationship between trust and delegation holds, and remains significant at the 1% level. The other estimated coefficients remain largely unchanged, notably for *Male* and *Tenure*, for this alternative dependent variable. This indicates that the estimated relationships are robust to alternative specifications.

As a further robustness test Column (4) of Table 6 in the Appendix details estimates using an alternative instrument, which is whether the employer provided OH&S training last year. This instrument has the advantage that it is an objective measure regarding management’s attention to

<sup>11</sup>The traditional instrumental variables model assumes linearity in the endogenous variable. To account for the binary nature of *Trust*, we estimate the ‘treatment effect’ model which explicitly describes the endogenous variable as a binary treatment.

matters relating to workplace safety. Using this instrument in a fixed-effects panel regression yields very similar results obtained using the original instruments – *Trust* is positively and significantly related to higher levels of decentralization.

## 6 Workplace Level Analysis: Between Effects

To check the robustness of the results presented in the previous sections, here we explore an alternative perspective focusing on variables aggregated at the workplace level. By using a fixed effects estimation strategy the analysis above focuses on the role of trust in explaining differences in delegation *within* a workplace. Here, in Table 5 we consider the between-effects panel estimates.

The between-effects estimates are essentially workplace-level comparison using workplace averages of the individual characteristics considered in Tables 2 and 3 plus the inclusion of invariant workplace characteristics that are suppressed in the fixed effects framework, such as workplace size.

Again, we instrument for *Trust* using workers’ satisfaction with the safety and comfort of the workplace and their satisfaction with the OH&S training they were provided with. Column (1) uses the same specification as estimated in Column (4) in Table 2 for the fixed effects, or within workplace estimates. Columns (2) adds instrumental variables to the model of Column (1). Column (3) adds organizational characteristics to Column (2): workplace size, organization size dummy variables, industry dummies (at the 2-digit level); dummy variables indicating the number of other workplaces undertaking the same task, and finally two product-market controls as to whether the workplace faces: strong, intense or moderate product-market competition; and whether it exports.

The results across the three different specifications illustrate a qualitatively consistent relationship between average worker trust of management in a workplace and the amount of decentralization.<sup>12</sup> The results also show that there are greater levels of decentralization in larger workplaces and in larger organizations. This result is consistent with the findings of Bloom et al. (2012) that country level trust is associated with larger plant size.

Second, as a further check we re-estimate using random effects the relationship between trust and decentralization including workplace size and 2-digit industry dummies (Column (1) in Table 6 shown in Appendix), and organization size dummy variables (Column (2)). Again, in these estimates *Trust* is instrumented for by employee satisfaction regarding OH&S training and workplace safety/comfort. Consistent with findings in other papers, (Bloom et al. (2012), Meagher and Wait (2014) and Colombo and Delmastro (2004) for example), larger workplaces are more likely to decentralize, as are workplaces in larger organizations. The estimated relationship between *Trust* and our measure of decision making, *Centralization(Z-score)* remains significant and of the same order of magnitude as the previous estimates. This provides some confidence that the relationship between trust and decentralization we have estimated is robust to the inclusion of other workplace and firm characteristics.

Another potential issue relating to trust and delegation is a potential difference in the between effect of trust (between workplaces) and the within effect. For example, if two employees both trust management (so both are potential candidates to be part of an implicit agreement), there might be a lower probability that any one decision is delegated to a particular individual (as the principal could

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<sup>12</sup>The instrumental variables approach again yields a coefficient of greater magnitude on trust.

Table 5: Workplace Level Analysis of Centralization of decision-making: between estimates (standard errors in parentheses)<sup>a</sup>

DEP. VARIABLE	(1)	(2)	(3)
	PANEL BE Coeff (SE)	PANEL IV BE Coeff (SE)	PANEL IV BE Coeff (SE)
	<i>Z-score</i>	<i>Z-score</i>	<i>Z-score</i>
AVERAGE EMPLOYEE CHARACTERISTICS			
Mean Trust	-.523*** (.058)	-2.01*** (.210)	-1.793*** (.260)
Mean Male	-.085 (.056)	-.139** (.060)	-.070 (.074)
Mean Tenure	-.005 (.003)	-.022*** (.006)	-.009* (.005)
ORGANIZATION CHARACTERISTICS			
Workplace size*1000		-	-.135*** (.046)
Competition		-	-.020 (.056)
Export		-	-.111 (.089)
OTHER CONTROLS			
Education Categories (proportions)	Yes	Yes	Yes
Age Categories (proportions)	Yes	Yes	Yes
Occupation Categories (proportions)	Yes	Yes	Yes
Org. size DVs	No	No	Yes
Other wps same output DVs	No	No	Yes
Industry DVs	No	No	Yes
INSTRUMENTS			
Satisfaction Safety & Comfort	No	Yes	Yes
Satisfaction OH&S Training	No	Yes	Yes
No. of obs.	14091	14091	12245

Notes: a. Bootstrapped standard errors based on 1804 workplace clusters shown in parentheses for (1). Bootstrapped standard errors based on 1493 workplace clusters shown in parentheses for (2), 1489 workplace clusters for (5). \*\*\* Significant at 1% level, \*\* significant at 5% level, \* significant at 10 % level.

choose either person). To investigate the potential difference of the *within* and *between* estimates, we have included the mean of employees trust at each workplace (*Mean WP Trust*) in the estimates displayed in Column (3) in Table 6. *Trust* and *Mean WP Trust* are instrumented for using worker satisfaction regarding OH&S training and workplace safety and comfort (as above) and workplace averages of worker satisfaction regarding OH&S training and workplace safety and comfort. Also

included in the estimates are the mean of employee tenure at a workplace (*Mean WP Tenure*) and the proportion of employees who are male at the workplace (*Mean WP Male*).

The estimated within effect of *Trust* is -1.959, which is significant at the 1% level. The estimated difference in the between and within effects is insignificant and equal to -.130. While both *Male* coefficients are insignificant, the coefficients for *Tenure* and *Mean Tenure* are both negative and significant.

Overall, these results are consistent with the estimates in our preferred fixed-effects estimates in the previous sections. Taken together, these results are suggestive of a strong relationship between worker trust of management and delegation.

## 7 Concluding comments

All of our results tell the same story: there is a very significant positive relationship between delegation and an individual worker's trust of management. This is consistent with relational contracting views of delegation in organizations.

The relation between trust and delegation becomes stronger when we instrument for the possible endogeneity of trust. Furthermore the results are robust to a variety of different approaches including establishment fixed effects and random effects. The establishment fixed effects produce a 'within' model so that differences in delegation within an establishment are positively related to differences in individual trust, controlling for establishment level effects like management quality or culture.

Looking at the differences between establishments in average delegation (the 'between' estimates) we find the relationship with average trust is statistically the same size as the average individual effect. Thus establishment level trust effects seem to be best understood as the average of the individual level effects and there is no special aggregate effect.

From a practical perspective this last finding is significant because it suggests that a manager need only work on improving trust with individual employees to whom they want to delegate rather than develop a general culture of trust.

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## Appendix

Table 6: Centralization(Z-score) of decision-making for alternative models: estimation coefficients (standard errors in parentheses)<sup>a</sup>

	(1) PANEL IV RE WORKPLACE VARS Coeff (SE)	(2) PANEL IV RE ORG VARS Coeff (SE)	(3) PANEL IV RE WP MEANS Coeff (SE)	(4) PANEL IV FE Coeff (SE)
Trust	-1.979*** (.077)	-2.011*** (.087)	-1.959*** (.071)	-2.707*** (.289)
Mean WP Trust	-	-	-.130 (.209)	-
Male	-.036 (.022)	-.032 (.023)	-.037 (.025)	-.027 (.029)
Mean WP Male	-	-	.010 (.085)	-
Tenure	-.012*** (.002)	-.011*** (.002)	-.011*** (.002)	-.017*** (.002)
Mean WP Tenure	-	-	-.006*** (.005)	-
Workplace size*1000	-.197*** (.036)	-.169*** (.032)	-.203*** (.043)	-
OTHER VARIABLES				
Education DVs	Yes	Yes	Yes	Yes
Age DVs	Yes	Yes	Yes	Yes
Occupation DVs	Yes	Yes	Yes	Yes
Industry DVs	Yes	Yes	No	No
Organization size DVs	No	Yes	No	No
INSTRUMENTS				
Satisfaction Safety & Comfort	Yes	Yes	Yes	Yes
Satisfaction OH&S Training	Yes	Yes	Yes	Yes
WP mean OH&S Train	No	No	Yes	No
WP mean Safety/Comf	No	No	Yes	No
No. of obs.	14091	12265	14091	14091

Notes: a. \*\*\* Significant at 1% level, \*\* significant at 5% level, \* significant at 10 % level. Bootstrapped standard errors based on 1804 workplaces shown in parentheses for Columns (1), (2) and (4) and on 1492 workplace clusters in Columns (3).