The Distribution of Decision Rights within the Workplace: Evidence from Canadian, Australian and UK Establishments[§]

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The allocation of decision rights in an organization reflects a trade-off between the costs of transferring relevant information and the costs that occur when decision-making agents have different objectives than the principal. We analyze the tradeoff between the costs of delaying a decision and delegating decision rights, and use three broad, cross-sectional data sets to study the allocation of decision rights in countries with different labor markets. We compare the decentralization of decision rights within hierarchies, and identify establishment characteristics and human resource practices related to the location of decision rights. The degree of competition, establishment age, and a history of technological change are all closely associated with decentralized decision rights across surveys. The relationship with unions differs by country. A number of workplace practices, many of which are used to define "high involvement" workplaces, also positively correlate with decision rights.

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In a small sole proprietorship, the entrepreneur could know all the details of the business and could make each decision alone without requiring additional sources of information. As the size and scope of the business grows, however, it becomes increasingly difficult for any individual to possess and process all the relevant information and to make all the decisions alone. One solution to this problem is to transport the information to the individual who possesses the decision rights. This can be costly, both in terms of the delays in decision-making and in the actual information transmission costs. Another solution is to grant decision rights to those in possession of the relevant knowledge. This also has costs, since the objectives of those with the knowledge are not necessarily aligned with the objectives of the individual with the decision rights.

Modern companies use both of these solutions. Falling prices in information technology have reduced the costs of information transmission, and the heavy use of IT in many large companies suggests that firms transport more data to those with decision rights. The increased use of teams and quality circles suggests that many firms have begun to decentralize decision rights. Researchers have also documented the accompanying adoption of personnel policies such as training and incentive pay, which are tools to reduce the agency problems of decentralized decision rights.

The choice of solution to this problem is unique to the organization. Various features may facilitate or hinder the transmission of knowledge as well as the transfer of decision rights. For example, firms in a high-tech industry may have a greater amount of specialized or perishable knowledge that is difficult to transport—that is, difficult for a

single decision-maker to process or comprehend. Thus, high-tech firms may be more likely to decentralize decision rights.

In this paper, we develop a framework in the tradition of Jensen and Meckling (1990), to study the optimal location of decision rights in a profit-maximizing firm. We then use three detailed international workplace data sets to analyze the distribution of decision rights within a workplace, using both objective information on specific workplace practices as well as subjective questions dealing with the balance of power in the organization. Our results will show that a number of patterns hold across surveys. The degree of competition, establishment age, a history of innovation, and presence in a high-tech industry are all closely associated with decentralized decision rights. As suggested by theory, incentive pay, formal training and employee monitoring are also positively correlated with decision rights. The effect of unions differs by country. The paper also considers if "high-involvement" practices like teams, work-groups, cross-training or suggestion programs can proxy for decision rights.

Although a large body of empirical research focuses on workplace organization, this study differs from the prior work in a number of ways. First, the vast majority of previous studies focus on only a particular industry.[1] Far fewer studies use broad, cross-industry and nationally representative data on workplace practices. Second, most of the work, at both the industry and cross-industry level, has focused on the use of particular organizational tools, such as teams, quality circles, job rotation and incentive pay data (see Godard 2004, for a survey). We argue that such human-resource practices are only

[1] For example, Womack, Jones and Roos (1990), MacDuffie (1995) and Pil and MacDuffie (1996) examine "innovative human resource practices" in the US and foreign automobile industries. Ichniowski, Shaw and Prennushi (1997) and Ichniowski and Shaw (1995) study the effects of "human resource management practices" on productivity among steel finishing lines. Batt (1999) analyzes the productivity effects of Total Quality Management and self-managed teams using data from a large telecommunications company.

proxies for our underlying question: at what level of the hierarchy do decisions get made? Finally, the prior work has largely ignored international comparisons. By comparing multiple data sets, we can study the allocation of decision rights in three countries with three very different labor markets.

A number of prior studies document the use of various workplace practices in the three data sets underlying this work. Among these, the British Workplace Employment Relations Survey (WERS) is among the most widely used. Blanchflower, Bryson and Forth (2006) estimate that this data set has been used in 165 refereed journal articles, a significant number of which consider the types of workplace practices that may correlate with decision rights. The Canadian and Australian data sets have not been utilized as extensively. Morissette and Rosa (2003), Therrien and Léonard (2003), Mohr and Zoghi (2006), Zoghi, Mohr and Meyer (2007) use the Canadian Workplace and Employee Survey. Drago (1996) and Brown, Geddes, and Heywood (2007) use the Australian Workplace Industrial Relations Survey. None of these papers consider cross-country comparisons and nearly all of the related prior studies identify associations between selected human resource practices and other characteristics of the workplace or its employees.

The fact that much of the literature has focused exclusively on human resource practices may explain some seemingly conflicting results. For example, Black and Lynch (1996, 2001) use matched datasets and to find significant (although sometimes small) effects of workplace practices on productivity and wages, mainly when multiple workplace practices are adopted in combination. Cappelli and Neumark (2001) and Cappelli and Carter (2000) do not find such productivity results, but only find that

workers receive a wage premium when in a workplace that adopts such practices. One reason for the lack of consensus on the effect of workplace practices is that the terms are arbitrarily defined for any given establishment. This is noted in the conclusion of Black and Lynch (1996): "Finally, our results suggest that it is important to move beyond simple measures of the incidence of workplace practices such as training or TQM in order to understand how these types of workplace strategies/investments actually pay off for employers." This study treats these practices as tools that establishments use in the production function — a means to an end rather than the end itself. We focus instead on the location of decision rights and view these practices as tools that can be used to reduce the costs associated with that choice of location.

The motivation for this interpretation comes from the growing literature on organization theory. Hayek (1945) emphasized the importance of knowledge and its distribution in society:

> If we can agree that the economic problem of society is mainly one of rapid adaptation to changes in the particular circumstances of time and place, it would seem to follow that the ultimate decisions must be left to the people who are familiar with these circumstances, who know directly of the relevant changes and of the resources immediately available to meet them. We cannot expect that this problem will be solved by first communicating all this knowledge to a central board which, after integrating all knowledge, issues its orders. We must solve it by some form of decentralization.

The modern literature builds on this same insight to develop specific models of decentralized information processing and analyze the efficiency and delay in different hierarchical structures.[2] However, as Mookherjee (2006) points out, existing formal models fail to provide a complete theory of decision rights that integrates information processing or communication costs with incentive considerations.

[2] See Mookerjee (2006) for a survey.

This paper presents new empirical evidence on decision rights, and interprets the findings in the context of the organization theory emphasized here. The analysis is derived largely from Jensen and Meckling (1990), who discuss how organizations solve the problems of assigning decision rights. In the next section, we will show how their theory of organizational structure offers insight into how firm characteristics affect the degree of decentralized decision-making.

The Optimal Location of Decision Rights

The knowledge of any single decision-maker is limited by both current scientific progress and also by her capacity to absorb, comprehend and process information. At the same time, Jensen and Meckling (1990) point out that "when knowledge is valuable in decision-making, there are benefits to collocating decision authority with the knowledge that is valuable to those decisions." Two methods, used alone or in conjunction, achieve this solution: to move information to the individual who possesses the decision rights; and/or to shift the decision rights to the individual who possesses the knowledge.

Under the first solution, the organization invests in transporting information, normally hierarchically, to those who have decision rights. This has the advantage of letting some individuals, managers, specialize in the making of decisions.[3] Transporting and processing information has costs, however. Radner (1992) defines four aspects of such costs: observation of the environment, capabilities of the processors, the communication network, and the delay between the observation of the environment and the implementation of the decision. The size of these costs will vary depending upon the

[3] Freeman and Lazear (1995), in their theory on works councils, point to a number of other advantages that may be associated with information sharing.

type of knowledge being transferred, current technology, and the organizational structure. As a result, the nature of these costs will be uniquely determined for any given organization.

Under the second solution, the organization grants individuals or teams of workers who have relevant knowledge the right to make decisions. Such a system might produce a variety of advantages. Decentralization can minimize on information processing and information transport costs, thus minimizing the delay in responding to a changing business environment. It also allows for flexibility and creates a potential for innovation. Workers can customize products and processes for particular situations or customers. At the firm level, management can observe numerous different solutions to similar problems. The distribution of observed outcomes might allow for increased organizational learning. The granting of decision rights might motivate effort by meeting employees' psychological needs or by reducing conflicts between management and workers. It might also be used to make workers responsible for outcomes, making it easier to adjust work practices to market conditions.

Despite these advantages, this second solution also comes at a cost. The organization faces agency costs that result from transferring decision rights. "Agency costs include the costs of structuring, monitoring, and bonding a set of contracts among agents with conflicting interests. Agency costs also include the value of output lost because the costs of full enforcement of contracts exceed the benefits." [Fama and Jensen (1983)] Again, various features of the organization determine the size of these costs relative to other organizations.

In making the decision on the optimal location of decision rights, an organization is faced with a trade-off between these agency costs and knowledge transfer costs. Figure 1, reprinted from Jensen and Meckling (1990), demonstrates the intuition behind this argument. On the far left-hand side of the figure, the organization is completely centralized — all relevant information is transferred to a single planner who makes all decisions. This results in zero agency costs, since the principal and the agent are one and the same. A movement toward the right side of the figure indicates decentralization, which increases agency costs and decreases the cost of transmitting information. When all decision rights have been transferred to the individuals in possession of the knowledge, the organization is completely decentralized, as indicated by the vertical line on the far right of Figure 1. At this point, agency costs are at their highest, and information costs at their lowest. The organization would optimally choose a location of decision rights that minimizes the sum of these two costs — the minimum point on the total organizational cost curve.

A simple model helps to clarify this optimization. Consider a single decision and let d represent the (hierarchical) distance between the most senior manager in the firm and the level at which the decision is made. When $d = 0$, the decision is made by an agent at the bottom of the hierarchy, while $d = D$ when the top manager makes the decision. This distance imposes delay costs, but reduces agency costs. Delay costs include lost business, reduced customer satisfaction (and thus future sales), or perishable inputs being lost. These delay costs can be represented by $T(d, \delta)$, where δ represents firm characteristics that increase how long it may take to make the decision. We assume that $T_d > 0$: as d increases, the decision is made farther up the hierarchy, causing

greater delay due to the need to transfer information to and from the decision-maker and the increased queuing for the attention of the decision-maker. By definition, $T_\delta > 0$, and the model implies that $T_{d\delta} > 0$. The incremental cost of distance increases with the number of firm characteristics that that cause delay. Agency costs arise if the objectives of decision-making agents do not match the objectives of the principal. For example, workers might choose to minimize effort, rather than minimize costs. These agency costs are measured by $A(d,\alpha)$ where α represents firm characteristics that increase agency costs. Thus, $A_d < 0$: as the decision is made higher in the hierarchy, the agency costs decrease. By definition, $A_\alpha > 0$, and $A_{d\alpha} < 0$. The benefit of distance (reduced agency costs) becomes even stronger as characteristics associated with agency costs increase.

These tradeoffs imply that the optimal location of decision rights minimizes the sum of agency and transport costs:

$$\underset{d}{Min} \quad T(d,\delta) + A(d,\alpha) \tag{1}$$

This essentially describes the Jensen and Meckling diagram. When the decision is made by the most senior manager, $d = D$ so that agency costs approach zero and the delay costs approach their highest value. When the decision is made by the production-line worker(s), $d = 0$, delay costs approach zero and agency costs approach their highest value. If the decision is made by some middle manager or supervisor, $0 < d < D$, and both *t* and *A* have nonzero values.

The first order condition characterizing this minimum is:

$$T_d(d,\delta) + A_d(d,\alpha) = 0 \tag{2}$$

which shows that the decision can be made by an increasingly higher authority as long as the marginal benefit of doing so in terms of lower agency costs exceeds the marginal cost

that arises from higher delay costs. An interior solution to this problem, where $0 < d < D$, exists when this second order condition is met:

$$T_{dd}(d,\delta) + A_{dd}(d,\alpha) > 0 \qquad (3)$$

While this second order condition may not be met for all possible decisions in every company, the large number of foremen, supervisors and middle managers suggests that an interior solution exists quite often.

There are two comparative static results of interest here: $\frac{\partial d}{\partial \delta}$ and $\frac{\partial d}{\partial \alpha}$.

These give the changes in optimal decision-making location with respect to the organizational characteristics affecting the length of delay, and the organizational characteristics affecting agency costs. They are derived as:

$$\frac{\partial d}{\partial \delta} = \frac{-T_{d\delta}(d,\delta)}{T_{dd}(d,\delta) + A_{dd}(d,\alpha)} \qquad (4a)$$

$$\frac{\partial d}{\partial \gamma} = \frac{-A_{d\alpha}(d,\delta)}{T_{dd}(d,\delta) + A_{dd}(d,\alpha)} \qquad (4b)$$

In each case, the denominator is the second order condition, which must be positive for an interior solution. The signs on the cross partials of $T(d,\delta)$ and $A(d,\alpha)$, ensure that both comparative static results produce the expected results. Organizational characteristics that increase the price of delay cause d to become smaller-- it becomes more likely that the decision will be made by someone closer to the shop floor. Organizational characteristics associated with agency costs provide an incentive for more centralized decisions.

These are intuitively appealing results. A direct test of the model requires identifying organizational characteristics that correlate with δ or α. We offer some

hypotheses here. We expect that δ is associated with establishment size, the degree of competition, and complexity of required knowledge. Larger organizations generally have more hierarchical levels, which may require more complicated information transfer networks, thus adding to the delay required to make decisions. The same might be true for whether the establishment is part of a multi-plant organization. In a more competitive market, the organization must respond to demand and supply changes quickly. In the extreme case of a monopolist, the cost of delay is quite small, since the customers have little choice but to wait. If the establishment is in a high-tech industry, the specialized nature of knowledge possessed by workers is a factor that contributes to δ, since it takes longer to transfer information based on specialized knowledge up one hierarchical level than more information based on general knowledge We expect α to be negatively correlated with a firm's ability to monitor workers, and positively associated with forms of incentive pay.

There are also a number of firm characteristics that may be associate with both δ and α. The age of the establishment may affect the distribution of decision rights. The delay costs should be lower in an older organization, because the decision-makers have more experience and have better established channels for transmitting information. At the same time, however, agency costs should also be lower since workers have had more time to become familiar with the organization's objectives, priorities and manner of doing business. Unions are likely to increase the decision-making delay, since issues must often be negotiated with the union prior to the decision being made. On the other hand, unions may increase agency costs, since the union often has quite different objectives from the management. A high use of information technologies reduces the decision-

making delay by speeding the collection and transfer of information, but IT capital is sometimes used to monitor workers, making agency costs lower.

In the empirical sections that follow, we describe the three data sets used in this study, provide descriptive statistics about the variables that may correlate to δ and α and study the relationship between those characteristics and the distribution of decision rights, in light of the comparative static results produced here.

Sources of Data and Descriptive Statistics

Much of the early research on workplace organization has been based on U.S data. However, there are only a few American cross-industry, establishment-level, data sets, and of these many do not include a large number of firms or numerous questions relating to worker autonomy. Osterman (1994) used a survey to collect data on the use of specific workplace practices at 875 manufacturing establishments. The National Employer Survey (conducted by the National Center on the Educational Quality of the Workforce in 1994 and 1997) and the Survey of Employer-Provided Training (conducted by the Bureau of Labor Statistics in 1993 and 1995) offer nationally representative establishment-level data, but are focused primarily on training with some detailed questions on the use and intensity of specific workplace practices. In order to get richer data, specifically addressing questions related to work organization and decision rights, we turn to three data sets from Commonwealth Countries: British Workplace Employee Relations Survey (WERS), the Australian Workplace Industrial Relations Survey (AWIRS), and the Canadian Workplace and Employee Survey (WES).

The Workplace Employee Relations Survey (and its predecessor the Workplace Industrial Relations Survey), which the United Kingdom has conducted in 1980, 1984, 1990, 1998, and 2004 consists of responses to a face-to-face interview at the establishment with the senior person responsible for industrial relations or employee relations issues.[4] The 1998 sample of 2,191 establishments is drawn from the underlying population of all U.K. establishments with at least ten employees.[5] Of these we use only observations from establishments with 20 or more employees from the private sector and complete data, which produces a sample size slightly of nearly 1100. The survey asks detailed questions about the structure of the organization, the amount of participation in decision-making by individual workers, unions and collective bargaining, and the use of specific workplace practices.

Similar questions were asked in the Australian Workplace Industrial Relations Survey. The survey was conducted once in 1990 and again in 1995. Again, face-to-face interviews were conducted with the senior human resources manager. The 1995 sample consists of 2,001 establishments with twenty or more employees. Excluding the public sector allows us to observe approximately 1000 establishments.

A third source of information on decision-making is the Workplace and Employee Survey, which was conducted in 1999 by Statistics Canada.[6] As in the U.K. and Australian data sets, face-to-face interviews were conducted with the senior person responsible for human resources. The sample of around 6,300 establishments was drawn

[4] Details about the WERS can be found at http://www.data-archive.ac.uk. The data are confidential, but can be obtained through the University of Essex for a nominal fee and by meeting confidentiality requirements.
[5] A subsample of the 1980 (1990) establishments were given a special panel survey and were re-sampled in 1984 (1998) to create two panels of data. We do not use them in this analysis.
[6] Details about the WES can be found at http://www.statcan.ca/english/survey/business/wes.htm.

from a stratified sample of all nonpublic Canadian establishments. Although the survey has no lower limit on the number of employees, we limit our sample to those establishments with 20 or more employees as in the UK and Australian data. Respondents were asked detailed questions about training and technology use, as well as who makes decisions on a number of issues related to the business. Although this is the first wave of the survey, Statistics Canada is now creating additional waves of data that follow the same workplaces in subsequent years.[7]

The three labor markets studied here are well suited for a comparative study. The countries represent three of the four largest English-speaking economies and share a heritage as part of the British Commonwealth. As such, they share some similar characteristics, including legal systems that are based on common law (with the exception of Quebec) and governance through parliamentary democracy.[8] These similarities may make it easier to uncover patterns in the allocation of decision rights that transcend country-specific differences.

The three countries share a number of common labor market trends. There is widespread evidence that, consistent with the U.S. experience, the use of participatory workplace practices has increased significantly in all three countries since the 1970s. This increase has not been uniform, rather is seems to have arrived in waves or cycles (Ramsay, 1977; Marchington and Wilkinson, 2000), where different periods of adoption of workplace practices were triggered by different motivations. For example, Brown, Geddes and Heywood (2007) document the development of employee involvement

[7] Since the allocation of decision rights does not change significantly for most establishments over the observed time period, we focus on cross-sectional results for this study.
[8] Kealy and Patmore (1996), in their introduction to a special joint issue of the Australian journal *Labour History* and the Canadian journal *Labour/Le Travaile* on comparative labor market histories, provide more detail on the literature in comparative economic history between Canada and Australia.

schemes in Australia. Such schemes were initially used to recruit workers in response to a tight labor market in the 1970s. By the 1980s, unions started to support some involvement programs. A final set of changes occurred in the mid 1990s, approximately the time that the AWIRS data was collected. At this time, an increasing number of employers adopted involvement practices in order to improve organizational performance. The practices adopted at this time were more individualistic and generally did not involve decision rights.

Periods of workplace adoption sometimes also coincided with active government promotion of inclusive schemes. Specific examples for Canada and Australia are documented in McDermott (1996) and Brown, Geddes and Heywood (2007) respectively. They include activities like funding pilot programs and best-practice demonstrations. In Australia, legislation also promoted specific forms of involvement. For example, in some establishments, occupational health and safety committees are legally mandated.

However, it is less clear if those practices are explicitly linked to decision rights. In fact, a number of critics argue that workplace practices, as implemented, often fail to offer any real autonomy. These critics argue that workplace practices are instead used to enlarge jobs, or increase incentives for peer surveillance (Delbridge, Turnbull and Wilkinson 1992; Sewell and Wilkinson 1992; Garrahan and Stewart 1992). These arguments are also made in the context of specific labor markets. Brooks (1992) and Naughton (1996) both argue that Australian managers have been particularly reluctant to cede decision-making authority to workers.

The three labor markets differ with respect to the role of unions. Both Australia and the UK have seen significant decreases in union density. In addition, prior waves of

the WERS data reveal that union power, using measures other than density, also declined significantly (see Blanchard, Bryson and Forth, 2006 for a survey). In Canada, union density has remained relatively constant. Some scholars argue that the success of unions in Canada is due in part to the legal framework. Briggs (2007) reviews the statutory framework with respect to union recognition in all three of the labor markets studied here.[9] He asserts that Australian unions are relatively weaker in the sense that the Australian law does not include a system of statutory union recognition.

The objectives of this empirical work are to describe in a detailed way the nature and distribution of decision rights within organizations, to find establishment characteristics that correspond to the theoretical variables δ and α and to determine how they affect that distribution, and finally to consider how decision rights correlate to workplace practices. The most difficult of these tasks is to define the distribution of decision rights. Tables 1a – 1c identify the decision rights variables from each of the three data sets and indicate the proportion of establishments that report using each particular form of decision rights. The complete wording for each included question is shown in the appendix. As the sheer number of questions (54 across the three surveys) indicates, the data sets collectively contain very detailed information about different forms of autonomy that may be available to workers. The included survey questions range from broad indications about employee discretion and involvement with changes, to very specific questions about staffing, training, technology, and planning of work.

The survey responses collectively indicate that workplaces with significantly decentralized decision making processes remain in the minority. Of the 54 questions

[9] Additional institutional details for the UK and Canada can also be found in Card, Lemiux, and Riddell's (2003) comparative analysis of unionization.

considered, for only 5 do the majority of establishments indicate substantially decentralized decision rights. These descriptive statistics also reveal some patterns about the types of decisions that are particularly likely to be decentralized across surveys. Among the most decentralized decisions are those relating to the planning and pace of work. The least decentralized decisions are those that relate to production issues (including production technology) and work practices. Decisions about training are also only rarely delegated to workers. Finally, the WERS highlights the difference between measuring a specific human resource practice—the use of teams—and focusing directly on decision rights. Only 7% of establishments report that teams of workers are allowed to select their own leader and, in the majority of establishments, teams are not permitted to decide how work is done.

Looking across the tables at responses to similar questions does not produce a clear answer as to which country's firms are most likely to decentralize decision rights. Australian establishments appear somewhat less likely to grant authority to front-line supervisors. While about 50% of UK and 25% Canadian firms report that supervisors have authority to plan staffing, only 7% of Australian firms report delegating the rights to set employment levels (in addition 36% give supervisors authority on overtime). Similarly, Canadian establishments are far more likely than Australian ones to report granting supervisors authority over training. This pattern does not hold when looking at the decisions delegated to workers, however. The proportion of Australian establishments reporting that workers influence the pace of work, are involved in changes, or influence work times is roughly equal or slightly larger than the proportion responding affirmatively to similar questions in the Canadian and UK surveys.

One measure of the total decision rights in the establishment is a simple additive index of the relevant questions. Questions requiring a "yes or no" response, where "yes" indicates that decision rights are accorded to employees in groups or individually, are coded with a zero for "no" or one for "yes". Questions that are Likert-scaled are coded so that they range from zero to one, with one representing the answer with the greatest employee decision rights. Therefore, intermediate choices on a Likert Scale with four options would be assigned values of 1/3 and 2/3. Not all questions are relevant for every establishment, however. For example, a question asking whether employees played a role in establishing key performance indicators would be asked only of establishments that employ such indicators. We therefore standardize the index by dividing by the number of relevant questions for each establishment. This results in an index that ranges from zero (if no questions indicated any decision rights for the non-supervisory workers) to one (if all questions indicated the most decision rights for the workers). Finally, we normalize the index, demeaning and dividing by the sample standard deviation in order to standardize the mean to zero across the datasets.

Tables 1a- 1c also highlight two potential limitations of our index measure. First, the three surveys are not directly comparable, which is why we standardize the mean to zero across countries. Second, the index gives equal weight to all survey questions. An alternative approach would be to construct the index using factor analysis. However, since not all establishments within the same survey respond to the same number of questions, creating appropriate factors is difficult. To test if our results are sensitive to the included questions, we create an alternative measure for evaluating decision rights. This measure limits the index to questions that refer specifically to decisions made by

individual employees, rather than teams, committees, groups of employees, or general measures of employee influence. The variables included in this alternative measure, which we call "worker-specific decision rights," are identified in italics in the appendix.[10]

Table 2 shows the mean values of other variables that we hypothesize will correlate to the distribution of decision rights within an organization. A large proportion of establishments are quite small, with about 50% of each sample having employment between 20 and 50 employees. In the Canadian data establishments also tend to be significantly younger. A large share of the establishments -- about 70% in the UK, 40% in the Australian data and 24% in the Canadian survey--face "intense" or "strong" market competition. The degree of unionization varies considerably across these three data sets, with a rate of only five percent of employees in Canadian establishments, 21% in the UK and over 40% in Australia. Establishments across countries also differ significantly in the degree that they report adopting a new technology.

Empirical Methodology and Results

To determine how these establishment characteristics relate the distribution of decision rights, we regress the decision rights index by establishment against the establishment characteristics identified in table 2, along with a set of dummy variables for the establishment's largest occupational group and for the establishment's main industry. The results of separate ordinary least squares estimations for each of the three data sets are given in Table 3. A positively signed coefficient indicates that the independent variable is associated with increased decentralization of decision rights.

[10] In addition, we also study the correlations between questions within each of the surveys. If a particular group of questions correlate very closely, they may indicate that particular forms of decision rights are being weighted more heavily in the indices. Correlation coefficients are available from the authors.

In all three countries, size is strongly related to decision rights -- in larger establishments, where information transmission can be much slower, decisions are more likely to be delegated. Establishments with new technology investments are also likely to use decentralized decision-making. In two of the three data sets, coefficients are negative (and statistically significant) for indicators of low competition, relative to the omitted category, "some/limited competition." Unionization also differs by country: decision rights are more decentralized in highly unionized establishments in Britain, but less decentralized in Australia. This may reflect institutional differences in labor relations. It is important to keep in mind, however, that the survey questions are asked of senior human resources management, whose opinions about the distribution of decision rights may be affected by whether or not the company is unionized. Finally, age seems to have only a small impact on the location of decision rights – even the significant variables have very small coefficients.

Taken on the whole, these results suggest that δ -- as measured by establishment characteristics that increase decision-making delay-- is positively related to decentralized decision-making. With these data it is difficult to identify independent proxies for α. Age, unions and information technologies are all also features of δ, and it is not possible to divide the result into that attributable to agency costs. Thus it is not possible to measure the effect of establishment characteristics that affect agency costs on the optimal location of decision rights. Incentive pay schemes, a workplace practice, might reduce agency costs and are considered in a later section.

One concern with using a dependent variable that indexes a large number of diverse questions on decision-making is that it blends general questions about the culture

of an establishment with specific questions about the delegation of rights to supervisors, teams or individual workers. To address this issue, we check the robustness of our results by limiting the decision rights index to questions about decisions explicitly delegated to workers.[11] We estimate the same model as previously and results are in Table 4. Although less significant, the signs are largely in agreement with those from Table 3. The only striking difference is the results on unionization. When limiting the index to questions that refer explicitly to decisions made by workers, rather than supervisors, the previously positive association in the WERS becomes smaller and insignificant at the 5% level, and the previously insignificant association in the WES becomes negative and significant. This change is not surprising, however. The narrower index excludes consultative committees between groups of workers and management and therefore excludes the types of decentralized decision making that is most likely to involve union representation.

Decision Rights and Workplace Practices

These characteristics of the organization such as size, age, industry and unionization do seem to explain some of the choice of distribution of decision rights. At the same time, researchers have noted that the adoption of other human resource practices can affect the organizational structure of the workplace--in particular, many might be considered components of α. These choices are, however, endogenous to the choice of decision location. As an example, if we observe a correlation between high employee

[11] We have also experimented with breaking down the decision-making questions into four groups: those that pertain to (1) pay-setting, (2) other personnel issues, (3) policies and long-term planning, and (4) production decisions. While there are some differences across types of decisions, the patterns are largely similar. Separate estimations for these indices are available from the authors.

decision rights and adoption of profit sharing, we cannot know whether profit-sharing plans are adopted in order to provide the right incentives to those decision-making employees or whether those employees used their decision rights to obtain a profit sharing plan. Thus we cannot infer causality from an observed correlation between decentralization and any complementary human resource practice. This does not prevent us from exploring which practices are in fact correlated with a particular distribution of decision rights.

Exploring this correlation with decision rights is particularly important because so much of the existing literature uses human resource management practices as an independent variable. In many cases, particular human resource practices, like workgroups, teams, or quality circles are either explicitly or implicitly used as proxies for autonomy. Other practices, like training, incentive pay schemes, or profit sharing, are controversial in the research on "high-involvement" workplaces. They are only sometimes included in these definitions. Understanding if these types of practices typically associate with decision rights would offer some evidence as to whether such practices should properly be included into a definition of high-involvement workplaces. Finally, our theory predicts that particular practices that alleviate agency costs would be particularly valuable, and complementary, to the granting of decision rights. So the association between decision rights and workplace practices offers insight into the relationship between d and α.

The three data sets examined here offer a unique possibility to study this relationship. In addition to detailed questions about decision rights, each survey also asks extensively about workplace practices. We wish to examine these correlations in a

framework that controls for establishment characteristics. To do so, we use the regression coefficients from table 3 to rank establishments according to predicted decision rights. Those establishments in the top quartile according to this measure are labeled high decision rights, whereas those in the bottom quartile are labeled low decision rights.

Table 5 shows the proportion of firms in the top and bottom quartile of predicted decision rights, by workplace practice. For example, among WERS firms that use a joint consultative committee, 46% are in the high decision rights group, and 13% are in the low decision rights group. If there were no correlation between joint consultative committees and decision rights, we would expect to find 25% of the establishments in the high decision rights group, and 25% in the low group. Viewed in aggregate, the results indicate that workplace practices do correlate closely to decision rights – therefore these practices may well be an appropriate proxy. In particular, teams, workgroups and quality circles, which are all used to define "high-involvement" practices, correlate closely to the decision-rights index. The results also lend some support to broad definitions of high-involvement. Training practices and information sharing are both strongly correlated with decentralization of decision-making.

Surprisingly, the correlation between incentive pay plans and decision rights is weaker than expected. In the British data, the correlation between different forms of incentive pay and the share of firms in the top quartile of decision rights exists only for workplace or organizational-level pay schemes. The Canadian and Australian data have a similar pattern, but reveal stronger correlations in the bottom quartile. For all data sets, the data are largely consistent with the theory: incentive pay is generally associated either

with more high decision rights establishments or with fewer low decision rights establishments. These results are consistent with the notion that steps an organization takes to reduce agency costs are complementary with increasing the autonomy and decision rights of individuals who are in the lower rungs of the hierarchical ladder.

Conclusion

This paper develops a simple model of the optimal location of decision rights, loosely based on Jensen and Meckling (1990). The model suggests that there is a tradeoff between the costs of delaying a decision that result if a senior manager must accumulate relevant information and the agency costs that result if someone lower in the hierarchy makes the decision. The extent to which this results in a different optimal choice depends upon the cost of delays, as well as organizational characteristics that affect the length of the delay and the size of agency costs. Using data sets from the UK, Australia and Canada, we created indices to measure the decentralization of decision rights from extensive questions on the decision-making practices of establishments. These questions also allow us to learn about what types of decisions are decentralized in an organization, and what characteristics of the establishment affect the balance of power among agents.

We find evidence that establishment characteristics that increase the length of decision-making delays also increase the decision rights of those at the bottom of the hierarchy. The degree of competition, establishment age, a history of innovation, and presence in a high-tech industry all show some association with decentralized decision rights. The effect of unions differs by country. Finally, we find a clear relationship

between endogenous firm choices over workplace practices, including those that may reduce agency costs, and higher decision rights.

This paper argues that understanding the effect of organizational capital on an establishment's production must be more than counting which workplace practices the establishment uses. Instead, these practices may be tools the organization employs to achieve its optimal distribution of decision rights--whether it will retain greater control at the top of the hierarchical structure or distribute that control to other agents. This is a first attempt to consider what identifiable establishment characteristics affect that optimal distribution and what practices are complements to such a distribution. Understanding this link between decision rights and workplace practices will also allow future work to address some questions raised in the current literature. For example, if decision rights are associated with increased or decreased employment security, or if the interaction between decision rights and unionization is contingent on the use of incentive pay programs

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Figure 1.
The trade-off between costs owing to inconsistent objectives and costs owing to poor information as a decision right is moved further from the CEO's office in the hierarchy.

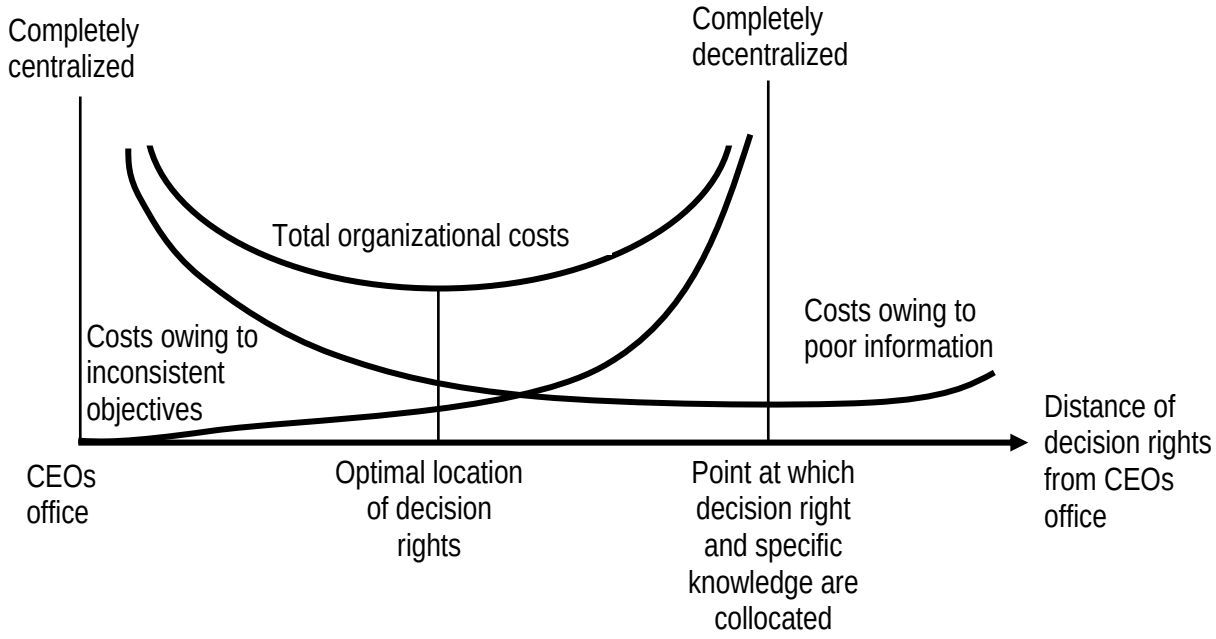

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Table 1a: Summary of decision rights in WERS

	No/ None	A Little	Some	Yes/ A Lot
Supervisors plan staffing	.50			.50
Employees have discretion	.10	.25	.43	.22
Employees control pace	.11	.29	.37	.23
Teams appoint own leaders	.92			.08
Teams decide how work done	.54			.46
Employee involvement in changes	.40	.52	.06	.03
Joint committees discuss training	.83	.03	.09	.05
Joint committees discuss production issues	.83	.03	.08	.06
Joint committees discuss work practices	.80	.03	.10	.07
Joint committees involvement in changes	.46	.43	.07	.03

Table 1b: Summary of decision rights in AWIRS

	No/ None	A Little	Some	Yes/ A Lot
Front-line supervisors help design KPIs	.70			.30
Employees help design KPIs	.68			.32
Employees help develop corporate goals	.69			.31
Employee involvement in changes	.50	.31	.18	.02
Front-line supervisor decides overtime levels	.64			.36
Front-line supervisor decides employment levels	.93			.07
Front-line supervisor decides training	.88			.12
Front-line supervisor decides work practice changes	.85			.15
Joint committees discuss new technology	.80			.20
Joint committees discuss new product/service	.86			.16
Joint committees discuss work organization	.70			.30
Joint committees discuss occupational health & safety	.78			.22
Employees influence on work allocation	.15	.28	.36	.21
Employees influence on how job performed	.05	.18	.38	.39
Employees influence on pace	.09	.18	.35	.39
Employees influence on workplace organization	.42	.27	.17	.14
Employees influence on work times	.18	.36	.34	.12
Group of employees negotiated about work organization	.69			.31
Group of employees negotiated about occupational H&S	.77			.23
Group of employees negotiated about training	.84			.16

Table 1c: Summary of decision rights in WES		
	No	Yes
Workers make decisions re: daily planning of individual work	.638	.362
Workers make decisions re: weekly planning of individual work	.722	.278
Workers make decisions re: follow-up of results	.820	.180
Workers make decisions re: customer relations	.681	.319
Workers make decisions re: quality control	.718	.282
Workers make decisions re: purchase of supplies	.676	.324
Workers make decisions re: machinery/equipment maintenance	.646	.354
Workers make decisions re: setting staff levels	.965	.035
Workers make decisions re: filling vacancies	.941	.059
Workers make decisions re: training	.837	.163
Workers make decisions re: choice of production technology	.930	.070
Workers make decisions re: product/service development	.894	.106
Supervisors make decisions re: daily planning of individual work	.406	.594
Supervisors make decisions re: weekly planning of individual work	.418	.582
Supervisors make decisions re: follow-up of results	.411	.589
Supervisors make decisions re: customer relations	.568	.432
Supervisors make decisions re: quality control	.457	.543
Supervisors make decisions re: purchase of supplies	.575	.425
Supervisors make decisions re: machinery/ equipment maintenance	.601	.399
Supervisors make decisions re: setting staff levels	.738	.262
Supervisors make decisions re: filling vacancies	.628	.372
Supervisors make decisions re: training	.448	.552
Supervisors make decisions re: choice of production technology	.790	.210
Supervisors make decisions re: product/service development	.750	.250

Table 2. Summary statistics: establishment characteristics			
	WERS 	AWIRS 	WES 
Union	11.91	33.85	23.28
Multi-plant	.389	.721	.345
Low Competition	.046	.070	.177
Medium Competition	.287	.102	.312
Medium-High Competition		.409	.269
High Competition	.667	.419	.242
New Technology Introduced	.785	.562	.361
Age	31.11	21.91	19.39
Size	82.73	84.05	81.63
Largest occupation group is managers	.007	.004	.030
Largest occupation group is professionals	.054	.097	.069
Largest occupation group is clerical	.099	.088	.088
Largest occupation group is precision crafts	.215	.150	.203
Largest occupation group is sales/personal service	.300	.303	.088
Largest occupation group is production workers/no trade	.325	.358	.522
Number of observations	1089	1052	3498

Table 3. Effect of establishment characteristics on decision rights index			
	WERS 	AWIRS 	WES 
Union	.005*** (.002)	-.002*** (.0005)	-.207 (.142)
Multiplant	.078 (.116)	.271*** (.092)	.249*** (.094)
Low Competition	-.351** (.156)	-.335** (.160)	.023 (.168)
Medium Competition	-.119 (.114)	-.166 (.134)	.140 (.136)
Medium-High Competition		-.057 (.081)	.049 (.129)
New Technology Introduced	.200 (.159)	.255*** (.079)	.164* (.095)
Age	-.008*** (.002)	-.001 (.004)	-.003 (.006)
Age^2/10000	.288*** (.045)	-.066 (.307)	.348 (.647)
Size/100	.026** (.012)	.209*** (.043)	.033*** (.013)
Size^2/1000000	-.012** (.006)	-.050* (.026)	-.026 (.017)
Managers	1.63*** (.246)	.204 (.252)	-.463** (.208)
Professional	.924*** (.353)	.491*** (.164)	-.059 (.188)
Clerical	.264 (.248)	-.052 (.144)	.085 (.155)
Precision Crafts	.394*** (.160)	-.053 (.114)	.218* (.116)
Sales/Personal Service	-.030 (.139)	-.017 (.123)	.059 (.217)
R2	.1663	.1520	.0745
No. Obs.	1089	1052	3498

Regressions are weighted to account for the sampling framework and to preserve data confidentiality. Regressions include a full set of industry indicators. Standard errors in parentheses. *** = p<.01, ** = p<.05, * = p<.10

Table 4. Effect of estab. chars. on worker-specific decision rights			
	WERS 	AWIRS 	WES 
Union	.003* (.002)	-.002*** (.001)	-.307*** (.118)
Multiplant	.058 (.103)	.029 (.093)	.215** (.099)
Low Competition	-.050 (.167)	-.504*** (.184)	-.232* (.138)
Medium Competition	-.026 (.119)	-.295** (.141)	.028 (.123)
Medium-High Competition		-.025 (.081)	-.021 (.121)
New Technology Introduced	.057 (.130)	.082 (.079)	.264*** (.096)
Age	-.009*** (.002)	-.002 (.004)	.008 (.005)
$Age^2/1000$	.032*** (.004)	.006 (.031)	-.993* (.564)
Size/100	-.014 (.011)	.068 (.042)	.026** (.012)
$Size^2/1000000$	.006 (.005)	.087 (.254)	-.017 (.016)
Managers	.850** (.363)	.655** (.279)	.093 (.155)
Professional	.692*** (.260)	.875*** (.157)	.360** (.186)
Clerical	.190 (.180)	.208 (.156)	.371** (.186)
Precision Crafts	.390*** (.144)	.048 (.112)	.333** (.138)
Sales/Personal Service	.023 (.163)	.346*** (.118)	.115 (.189)
R^2	.1547	.1382	.1284
No. obs.	1089	1052	3498

Regressions are weighted to account for the sampling framework and to preserve data confidentiality. Regressions include a full set of industry indicators. Standard errors in parentheses. *** = p<.01, ** = p<.05, * = p<.10

Table 5: Presence of high/low decision rights, with controls in regression tables						
	WERS		AWIRS		WES	
Recruitment and training	Hi	Lo	Hi	Lo	Hi	Lo
Classroom training high	.389	.182	.436	.176	.282	.197
Classroom training medium	.388	.156			.305	.195
Classroom training low	.239	.323	.399	.224	.133	.387
On-the-job training high					.270	.235
On-the-job training medium					.259	.226
On-the-job training low					.211	.310
Incentive pay						
Profit sharing plan	.358	.187	.340	.100	.265	.184
No profit sharing plan	.319	.248	.430	.200	.247	.264
Individual incentive pay	.392	.186	.425	.195	.257	.220
No individual incentive pay	.322	.231	.422	.191	.246	.268
Group incentive pay	.389	.161	.406	.144	.294	.165
No group incentive pay	.328	.231	.426	.200	.240	.270
Workplace incentive pay	.419	.219	.487	.111		
No workplace incentive pay	.327	.222	.417	.200		
Organization incentive pay	.481	.198	.576	.091		
No organization incentive pay	.318	.225	.402	.206		
Merit pay					.317	.167
No merit pay					.219	.289
Stock sharing plan	.392	.137	.390	.202	.267	.089
No stock sharing plan	.308	.263	.434	.189	.250	.252
Communication and Information Sharing						
Suggestion program	.383	.133	.419	.212	.301	.204
No suggestion program	.319	.252	.425	.183	.222	.275
System of briefings	.350	.201				
No system of briefings	.216	.396				
Communicate via daily walkaround			.391	.205		
Do not communicate via walkaround			.632	.110		
Regular meetings	.392	.187	.454	.164		
No regular meetings	.282	.255	.289	.316		
Communicate via email	.578	.156	.647	.078		
Do not communicate via email	.326	.225	.362	.224		
Newsletters	.393	.163	.507	.147		
No newsletters	.243	.317	.325	.245		
Employee survey	.395	.174	.578	.106		
No employee survey	.277	.269	.379	.217		

Table 5 (continued): Presence of high/low decision rights, with controls						
	WERS		AWIRS		WES	
Teams and Workgroups	Hi	Lo	Hi	Lo	Hi	Lo
Semi-autonomous workgroup			.485	.121	.327	.182
No semi-autonomous workgroup			.396	.224	.240	.258
High use of teams	.384	.175	.469	.154	.321	.184
Medium use of teams	.316	.241				
Low use of teams	.230	.327	.379	.229	.221	.277
Quality circle	.391	.177	.426	.119	.305	.204
No quality circle	.286	.262	.423	.208	.196	.296
Other Work Practices						
JCC	.396	.124	.515	.077	.321	.175
No JCC	.289	.297	.374	.255	.206	.297
Job rotation					.324	.204
No job rotation					.235	.259
TQM			.476	.141		
No TQM			.387	.228		
Just-in-time			.419	.116		
No just-in-time			.424	.202		
Computer integrated mgmt			.479	.146		
No computer integrated mgmt			.411	.202		

Appendix

This appendix lists the full wording of all questions used in creating decision rights indices. Questions in italics are included in the worker-specific decision rights indices. For questions with a Likert-scale type of response, the possible responses, along with the weight given in the indices to particular responses, are shown.

WERS:

1.	Which of these employee relations matters forms part of the job of supervisors at this workplace?...staffing or manpower planning?
2.	*To what extent would you say that individual [employees in the largest occupational group] here have discretion over how they do their work? (a lot=1, some=2/3, a little=1/3, none=0)*
3.	*To what extent would you say that individual [employees in the largest occupational group] here have control over the pace at which they work? (a lot=1, some=2/3, a little=1/3, none=0)*
4.	*Which, if any, of the following statements apply to the way that teamworking operates at this workplace?...Team members are able to appoint their own team leaders?*
5.	*Which, if any, of the following statements apply to the way that teamworking operates at this workplace?...Team members jointly decide how the work is to be done? (a lot=1, some=2/3, a little=1/3, none=0)*
6.	*What type of involvement did the employees likely to be effected have in introducing and implementing [the one change introduced by management here in the last five years with the greatest impact on employees working here]? (they decided=1, they negotiated=2/3, they were consulted=1/3, they were informed=0, there was no involvement=0)*
7.	Generally speaking, how influential do you think [the committee of managers and employees at this workplace primarily concerned with consultation rather than negotiation, which discusses training] is on management's decisions affecting the workforce? (very influential=1, fairly influential=2/3, not very influential=1/3, not at all influential=0)
8.	Generally speaking, how influential do you think [the committee of managers and employees at this workplace primarily concerned with consultation rather than negotiation, which discusses production issues] is on management's decisions affecting the workforce? (very influential=1, fairly influential=2/3, not very influential=1/3, not at all influential=0)
9.	Generally speaking, how influential do you think [the committee of managers and employees at this workplace primarily concerned with consultation rather than negotiation, which discusses working practices] is on management's decisions affecting the workforce? (very influential=1, fairly influential=2/3, not very influential=1/3, not at all influential=0)
10.	What type of involvement did [the committee of managers and employees at this workplace primarily concerned with consultation rather than negotiation] have in introducing and implementing [the one change introduced by management here in the last five years with the greatest impact on employees working here]? (they decided=1, they negotiated=2/3, they were consulted=1/3, they were informed=0, there was no involvement=0)

AWIRS:

1.	Who was involved in the design of these Key Performance Indicators?...first-line supervisors at this workplace?
2.	*Who was involved in the design of these Key Performance Indicators?...employees at this workplace?*
3.	*Who of the following had an input into the development of the current plan [which outlines the workplace's corporate goals and the ways of achieving them]?...employees generally from this workplace?*
4.	*How involved in the decision to introduce [change at the workplace in the last 2 years that has had the most significant effect on employees here] were…employees likely to be affected at this workplace? (Made the decision=1, had significant input=2/3, were consulted=1/3, were informed=0, were not informed=0)*
5.	Which one of these statements best describes who would usually make decision about levels of overtime?...a first-line supervisor or line manager?
6.	Which one of these statements best describes who would usually make decisions about employment levels for the whole workplace?...a first-line supervisor or line manager?
7.	Which one of these statements best describes who would usually make decisions about allocation of resources for in-house training?...a first-line supervisor or line manager?
8.	Which one of these statements best describes who would usually make decisions about changes in work practices?...a first-line supervisor or line manager?
9.	Which of these matters does the [joint consultative committee] have the authority to deal with?...introduction of new technology?
10.	Which of these matters does the [joint consultative committee] have the authority to deal with?...new product or service lines?
11.	Which of these matters does the [joint consultative committee] have the authority to deal with?...work organization?
12.	Which of these matters does the [joint consultative committee] have the authority to deal with?...occupational health and safety?
13.	*How much influence would you say most [workers in the largest occupational group] have over how work is allocated to them? (a lot=1, some=2/3, a little=1/3, none=0)*
14.	*How much influence would you say most [workers in the largest occupational group] have over how they do their job? (a lot=1, some=2/3, a little=1/3, none=0)*
15.	*How much influence would you say most [workers in the largest occupational group] have over the pace at which their work is done? (a lot=1, some=2/3, a little=1/3, none=0)*
16.	*How much influence would you say most [workers in the largest occupational group] have over the time they can stop and start work each day? (a lot=1, some=2/3, a little=1/3, none=0)*
17.	*How much influence would you say most [workers in the largest occupational group] have over the way the workplace is managed or organised? (a lot=1, some=2/3, a little=1/3, none=0)*
18.	Looking back and thinking about the negotiations [that do not involve unions] with employees as a group, what issues were negotiated?...work practices or work organization?
19.	Looking back and thinking about the negotiations [that do not involve unions] with employees as a group, what issues were negotiated?...training?
20.	Looking back and thinking about the negotiations [that do not involve unions] with employees as a group, what issues were negotiated?...occupational health and safety?

WES:

1.	*Who normally makes decisions with respect to daily planning of individual work?...non-managerial employee or work group?*
2.	*Who normally makes decisions with respect to weekly planning of individual work?...non-managerial employee or work group?*
3.	*Who normally makes decisions with respect to follow-up of results?...non-managerial employee or work group?*
4.	*Who normally makes decisions with respect to customer relations?...non-managerial employee or work group?*
5.	*Who normally makes decisions with respect to quality control?...non-managerial employee or work group?*
6.	*Who normally makes decisions with respect to purchase of necessary supplies?...non-managerial employee or work group?*
7.	*Who normally makes decisions with respect to maintenance of machinery and equipment?...non-managerial employee or work group?*
8.	*Who normally makes decisions with respect to setting staffing levels?...non-managerial employee or work group?*
9.	*Who normally makes decisions with respect to filling vacancies?...non-managerial employee or work group?*
10.	*Who normally makes decisions with respect to training?...non-managerial employee or work group?*
11.	*Who normally makes decisions with respect to choice of production technology?...non-managerial employee or work group?*
12.	*Who normally makes decisions with respect to product/service development?...non-managerial employee or work group?*
13.	Who normally makes decisions with respect to daily planning of individual work?...work supervisor?
14.	Who normally makes decisions with respect to weekly planning of individual work?... work supervisor?
15.	Who normally makes decisions with respect to follow-up of results?... work supervisor?
16.	Who normally makes decisions with respect to customer relations?... work supervisor?
17.	Who normally makes decisions with respect to quality control?... work supervisor?
18.	Who normally makes decisions with respect to purchase of necessary supplies?... work supervisor?
19.	Who normally makes decisions with respect to maintenance of machinery and equipment?... work supervisor?
20.	Who normally makes decisions with respect to setting staffing levels?... work supervisor?
21.	Who normally makes decisions with respect to filling vacancies?... work supervisor?
22.	Who normally makes decisions with respect to training?... work supervisor?
23.	Who normally makes decisions with respect to choice of production technology?... work supervisor?
24.	Who normally makes decisions with respect to product/service development?... work supervisor?