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Incentive Pay and Product Market Competition

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Abstract
This paper examines the influence that product market competition has on the use of incentive payment schemes. We use data from a large representative cross-section survey which allows us to control for other influences. We show that the degree of product market competition that an establishment faces has a significantly positive effect on the likelihood that it will use a performance-related pay system. This relates to earlier theoretical results of Holmstrom and Hart among others. Interestingly, this effect holds for non-managers as well as managers.

JEL Classification: D21, J33

Keywords: incentives; variable pay; competition.

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Non-technical Summary

Economists generally give great weight to the importance of competition in reducing inefficiency. Leibenstein (1966) proposed the concept of x-inefficiency to characterise managerial 'slack', and discussed its relationship to competition. Part of the role of competition may be in facilitating performance-related pay for mangers. In fact, theorists have shown that the relationship between competition, optimal incentive schemes and management effort is ambiguous. In this paper we use a large dataset of establishments in Britain[1] to establish the facts on the relationship between competition and incentive pay.

We provide empirical evidence on the influence of product market competition on the use of incentive pay schemes within establishments. Job and workplace characteristics that make performance-related pay (PRP) more suitable for certain jobs than others, and our dataset allows us to control for most of these. The data we use are drawn from the 1998 Workplace Employee Relations Survey (WERS). This is a 3-part cross-section survey which consists of interview responses from managers, from worker representatives and self-completed employee questionnaires. We use solely the management survey for all our analyses. This consists of responses from a representative sample of 2,191 British establishments. The survey represents the majority of the population of establishments in Great Britain. Almost all workplaces with 10 or more employees are eligible; only agriculture, forestry and fishing and coal mining industries are excluded. Our dataset allows us to control for a rich set of other factors, and to examine the influence that product market competition has on the use of incentive payment schemes.

We also look at the PRP schemes faced by non-managers. For occupation groups other than managers, it seems likely that competition does not directly improve the precision of performance information. Hence if workers are always optimally incentivised by their line managers (given the measurement constraints for their job and the characteristics of their workplace) then we should observe incentive schemes

equally as common in both competitive and non-competitive establishments for non-managers. However, if managers are able to incentivise workers but do so only when their own utility depends on the workers' performance then we should observe *ceteris paribus* more incentive schemes for non-managers when there is greater pressure on managers, either from competition directly or from incentive pay.

In this paper, we show that the degree of product market competition that an establishment faces has a significantly positive effect on the likelihood that it will use a performance-related pay system. This effect holds for all occupation groups. Unsurprisingly, because competition is a characteristic of a market not a single establishment, part of this effect is absorbed by industry effects when they are included in the analysis alongside competition, but these industry effects themselves are highly correlated with competition.

These findings relate to previous theoretical work on competition, incentives and efficiency. There appear to be two opposite effects of competition on the likelihood of PRP. On the one hand, a competitive market itself enforces a discipline on managers, rendering a PRP scheme unnecessary. On the other hand, a competitive market in principle provides a lot of comparative information on managerial performance, hence making PRP schemes easier to set up. Our results favour the latter view. It seems that the owners of firms believe that competitive markets do not squeeze out all the scope for managerial slack, and that sufficient comparative information is available to them to implement PRP.

[1] This is the Workplace Employee Relations Survey 1998 (WERS98), a representative, interview-based survey of over 2000 UK establishments.

1. Introduction

Economists generally give great weight to the importance of competition in reducing inefficiency. Leibenstein (1966) proposed the concept of x-inefficiency to characterise managerial 'slack', and discussed its relationship to competition[1]. Part of the role of competition may be in facilitating performance-related pay for mangers. In fact, theorists have shown that the relationship between competition, optimal incentive schemes and management effort is ambiguous (see below). In this paper we use a large cross-section of establishments in Britain[2] to establish the facts on the relationship between competition and incentive pay.

Our dataset allows us to control for a rich set of other factors, and to examine the influence that product market competition has on the use of incentive payment schemes. We find that incentive schemes are *more* likely in establishments facing more competitive environments. As we discuss below, some have argued that competition makes incentive pay unnecessary as the market itself enforces high effort from managers; others have argued that competition facilitates performance pay as it provides more comparative information to base it on. Our result therefore supports the latter view. It suggests that a competitive market is important in generating the information necessary for viable incentive contracts.

Section 2 begins with a brief overview of the theory and an outline of our empirical approach. Section 3 describes the dataset and Section 4 sets out the results. Section 5 summarises and concludes.

2. Theoretical Background

The choice for a firm between straight salary and performance-related pay (PRP) has been analysed extensively by economists[3]. PRP is predicted to be observed where it is feasible to obtain an accurate objective performance measure and the cost is low relative to the costs of direct supervision. Extensions to this general principle have led

[1] For a recent survey of evidence on competition and efficiency see Nickell (1995).
[2] This is the Workplace Employee Relations Survey 1998 (WERS98), a representative, interview-based survey of over 2000 UK establishments.
[3] See Prendergast (1999) for a recent survey, and Lazear (1986) for a good model.

to predictions concerning the sorts of job for which we should expect to observe compensation by PRP. Sales people, for example, are thought to be suitable candidates to be paid PRP because their output, value of sales, is easily measurable whilst their effort in each sales talk is costly to monitor directly. We can also use this framework to predict the variation we would expect across firms. Size of workforce, for example, is predicted to be positively correlated with the use of PRP systems since the cost of directly monitoring individuals' effort is likely to be greater in larger workplaces. This prediction is supported by the empirical evidence, see for example Brown (1990), Drago and Heywood (1995), Burgess and Metcalfe (1999), and MacCleod and Parent (1999)).

The dependence of the optimal incentive contract on product market structure is less often discussed. It is, however, derived in the literature relating product market competition to managerial effort or managerial 'slack'. Leibenstein (1966) first argued the link between 'x-inefficiency' and product market competition. Since then, using the agency framework, a variety of authors have investigated this question. Holmstrom (1982) and Nalebuff and Stiglitz (1983) show that a competitive environment provides more information to counter the moral hazard problem and make optimal incentive contracts more feasible[4]. Other authors, starting with Hart (1983), have argued that managerial slack would be reduced by competitive pressure in the market *per se*, therefore eliminating the need for incentive pay. There appear to be two off-setting effects: assuming the comparative information to be available, competitive product markets may make PRP more feasible but less necessary. Later authors have argued that some of these results are special cases and in a more general context, the results are ambiguous (see Schmidt, 1997, for a discussion). Using a different approach, ignoring the informational value of competition, Schmidt (1997) also finds that the effect of product market competition on the optimal incentive scheme is ambiguous. In this paper, we use data from WERS 98 to establish the facts on this matter for Britain.

Another question we address is the following: when managers have incentive pay, does this have an effect on the likelihood of PRP for other workers within the establishment? Clerical workers, for example, do more or less the same thing

wherever they work: does the product market have an influence on whether they have incentive schemes or is it just measurement issues that determine the jobs that are paid by results?

For occupation groups other than managers, it seems likely that competition does not directly improve the precision of performance information. Hence if workers are always optimally incentivised by their line managers (given the measurement constraints for their job and the characteristics of their workplace) then we should observe incentive schemes equally as common in both competitive and non-competitive establishments for non-managers. However, if managers are able to incentivise workers but do so only when their own utility depends on the workers' performance then we should observe *ceteris paribus* more incentive schemes for non-managers when there is greater pressure on managers, either from competition directly or from incentive pay.

3. Data

In this paper we provide empirical evidence on the influence of product market competition on the use of incentive pay schemes within establishments. Job and workplace characteristics that make PRP more suitable for certain jobs than others, and our dataset allows us to control for most of these. The data we use are drawn from the 1998 Workplace Employee Relations Survey (WERS). This is a 3-part cross-section survey which consists of interview responses from managers, from worker representatives and self-completed employee questionnaires. We use solely the management survey for all our analyses. This consists of responses from a representative sample of 2,191 British establishments. The survey represents the majority of the population of establishments in Great Britain. Almost all workplaces with 10 or more employees are eligible; only agriculture, forestry and fishing and coal mining industries are excluded. Large workplaces are deliberately over-sampled in the survey since, although there are relatively few of them, they make up the majority of employment. To account for this, a set of weights are provided which we use in order to make analyses from the sample representative of the population.

[4] Of course, for this to work, the comparative information has to be available to market participants.

WERS contains data on a broad set of workplace and market characteristics such as size, industry and workforce composition as well as a number of variables describing the payment systems employed and the degree of competition that the establishment faces. The variable we call PRP in our analysis is constructed from the following question which is put to the whole sample:

"Do any employees at this workplace receive payments or dividends from any of the following variable pay schemes?"

There are 5 (non-exclusive) options listed:

1. Profit-related payments or bonuses
2. Deferred profit sharing scheme
3. Employee share ownership schemes
4. Individual or group performance related schemes
5. Other cash bonus

If a manager answers "*yes*" to 4, then we say that the establishment has a PRP scheme. In a subsequent question it is also asked which occupation groups have this PRP scheme. We thus know for each of 8 occupation groups within each workplace whether or not they have performance related pay. We might also think that a cash bonus payment may often be performance-related, however this question is not asked about individual occupation groups and, further, it is ambiguous as to whether or not it constitutes a performance-related scheme. We hence do not include this in our definition. Note also, that we focus on *performance*-related pay, not *profit*-related pay.

Our competition variable is taken from the following question:

"How would you assess the degree of competition in this market? Is it....

1. Very high

2. High

3. Neither high nor low

4. Low

5. Very low

Owing to the skewed distribution of answers to this question towards "*High*" and "*Very high*", we reconstructed this variable into a 3-point scale. The lowest three measures in the original variable were combined to become "*Low*"; "*High*" was relabelled "*Medium*" and "*Very high*" was relabelled "*High*". The unweighted proportions in these categories are: 45% (high), 30% (medium) and 24% (low).

This competition question is put to all "trading sector" workplaces. This base includes establishments producing goods or services both for consumers and for other companies. It does not include establishments supplying goods or services to other parts of the same organisation and it does not include purely administrative offices or other offices that do not produce goods or provide services for sale in the open market. In total, there are 1606 establishments in the analysis sample after excluding non-trading sector establishments and those with missing answers to the PRP question. Some public sector organisations answered the question, including in social work for example, on the grounds that they provided services to consumers. The distribution of these self-reported competition measures across industries matches up quite well with a general preconception of competition intensity (see table 4).

In our multivariate analysis we use the data on workplace size, union density and several dimensions of workforce composition including % full-time, % manual and % women. We also know which industry the establishment is in and whether it is the only establishment within the firm or part of a larger organisation. There appears to be nothing observable about establishments or particular industries that would predict whether the comparative information necessary for the Holmstrom argument is generally available. Therefore, we cannot pursue the idea of differentiating between

competitive establishments where this information is available and competitive establishments where it is not.

4. Results

In this section we first report the overall prevalence of PRP and the variation in the use of it across the main industry groups[5]. We then go on to show the effect of product market competition both on the incidence of any PRP scheme within an establishment and across occupations. Finally we report our findings in a multivariate setting.

Table 1 reports the weighted[6] proportion of establishments in each industry group that operate a PRP system. In total, we find that 18% of establishments in Britain in 1998 operated a PRP system for some of its workers. The table shows clearly that there is considerable variation in the use of PRP systems by industry: 53% of workplaces in finance have a PRP scheme in place while only 2% do in health and social work.

We know from theory and empirical evidence (e.g. Burgess and Metcalfe, 1999) that the nature of the job (ease of measurement etc.) affects the optimal use of incentive schemes. Table 2 shows the use of PRP by occupation and degree of competition. As expected, we find that sales people are the most likely to be paid PRP with 22% of establishments doing so, followed by managers with 15%. The occupation group least likely to be paid PRP in our sample is personal and protective service, which includes, amongst others, police officers, hairdressers and undertakers.

Table 2 also clearly shows that the use of PRP is correlated with the degree of competition for all occupation groups. That is, the higher the degree of competition an establishment faces, the more likely it is that any occupation group will be paid PRP[7]. 22% of establishments reporting a high degree of competition have a PRP system whereas only 9% of establishments do in low competition product markets. This

[5] Establishments are sorted using the Standard Industry Classification of 1992.
[6] See the above Data section for a discussion of the weights used in the tables.
[7] We deal with issues of statistical significance below in the regressions.

provides preliminary support for the hypothesis that the prevalence of incentive pay is related to product market factors. Interestingly, it suggests such a relationship for all workers, not just managers.

In table 3 we report the results of our multivariate analysis. We estimate three logit models using establishment characteristics for the probability that a PRP system is used for each of four occupation groups: any occupation, any manual workers, any non-manuals (including managers), and managers. The main estimation issue arises from the role of industry dummies. Clearly, the degree of competition in a market is a characteristic of an industry, however narrowly defined, not an individual establishment. But there are other features of an industry that may be relevant to the PRP choice, technology for example. These would usually be mopped up by industry dummies, but these will also absorb (part of) the effect of competition. We therefore look at three different models: Model 1 does not include industry dummies, Model 2 does include these dummies and Model 3 includes both industry dummies and industry*competition interaction effects. The table does not report the coefficients on the other regressors, these are available from the author on request. They display no significant departure, however, from those reported in Burgess and Metcalfe (1999) using the 1990 survey. Medium competition is the omitted dummy variable and the *p*-value reported is the probability that the coefficient on high competition is the same as the coefficient on low competition.

Taking model 1 first, the table shows that being in a highly competitive market makes PRP more likely. These positive effects are significant. The coefficients on being in an uncompetitive market are uniformly negative, but not significant. The difference between the high and low coefficients are shown by the *p*-values for all occupation groups to be highly significant. This tells us that highly competitive firms are more likely to use PRP even after controlling for firm and job characteristics: taking the any occupation group, an establishment in a highly competitive market is 1.64 times more likely to have a scheme than an establishment in an uncompetitive market.

Industry dummies are introduced in model 2, and while the estimated effect of competition follows the same pattern as model 1, it does not achieve significance at conventional levels. This suggests that a large amount, but clearly not all, of the

variation in degree of competition is absorbed by the inclusion of the industry dummies. In model 3, including industry dummies and the interaction of industry and the establishment's own competitive environment, we find some evidence of an independent effect of the latter: *p*-values for the difference between high and low competition are 12% for any occupation and 13% for managers.

To summarise, without industry effects, competition effects are strong; with industry effects, as one might expect, the independent effect of the establishment's own competitive environment is weaker. But note that these industry effects themselves are highly correlated with competition. Figure 1 plots them out against the percentage of establishments in the industry reporting highly competitive product markets. Since these dummies are derived from a regression, they reflect industry differences having controlled for differences in size, unionisation, organisational structure and workforce composition. The figure shows a high correlation – a correlation coefficient of 0.59 and a significant regression (a *p*-value of 0.056). The correlation is also shown unconditionally in Table 4 which gives the average degree of competitiveness of each industry, alongside the industry average PRP. So overall, these results provide some support for the idea that product market competition influences the optimal compensation scheme.

Our findings also show that this effect is present for all four occupational groups we consider. This is not an issue that theory has addressed, but a possible line of argument is as follows. It seems likely that PRP schemes for non-managers are instituted by managers not owners. Managers are most likely to use optimal incentive pay for their workers when the organisation-level outcome matters most to them. This is more likely to be the case in competitive environments, either because of the greater likelihood of incentive pay for them, or because of the greater risk of liquidation and their own job loss. Thus we can explain the correlation of product market competition and the use of PRP for non-managers through the direct and indirect (*via* their own PRP) competitive pressure on managers.

5. Summary and Interpretation

In this paper, we show that the degree of product market competition that an establishment faces has a significantly positive effect on the likelihood that it will use a performance-related pay system. This effect holds for all occupation groups as evidenced in both simple cross tabs and multivariate logit regressions. Unsurprisingly, because competition is a characteristic of a market not a single establishment, part of this effect is absorbed by industry dummies when they are included in the analysis alongside competition, but these industry dummies themselves are highly correlated with competition.

These findings relate to previous theoretical work on competition, incentives and efficiency. There appear to be two opposite effects of competition on the likelihood of PRP. On the one hand, a competitive market itself enforces a discipline on managers, rendering a PRP scheme unnecessary. On the other hand, a competitive market in principle provides a lot of comparative information on managerial performance, hence making PRP schemes easier to set up. Our results favour the latter view. It seems that the owners of firms believe that competitive markets do not squeeze out all the scope for managerial slack, and that sufficient comparative information is available to them to implement PRP.

Interestingly, the outliers in table 4 are public administration and utilities (electricity, gas and water). The latter industries are largely regulated by yardstick competition. This form of regulation is designed to simulate the disciplines of competition where real competition between firms does not occur. The fact that this industry makes significant use of PRP where the average degree of market competition is one of the lowest is therefore consistent with the idea that the regulatory system does provide important incentives that mimic the effects of a competitive product market. Thus, just as "exceptions prove rules", one of these outliers[8] in fact gives some further support to our results.

[8] We thank Paul Grout for this point. The other outlier, public administration, has been forcibly encouraged by the British government to increase the use of PRP over the 1990s.

Table 1: Use of PRP by Industry

Industry	**PRP** % with PRP scheme for some occupation	*#obs*
Finance	53	*101*
Wholesale / Retail	35	*321*
Electric / Gas/ Water	34	*80*
Business computing	25	*227*
Transport/Telecoms	22	*136*
Public Administration	21	*183*
Manufacturing	14	*298*
Hotels	14	*127*
Construction	12	*112*
Other Services	8	*111*
Education	6	*244*
Health / Social Work	2	*248*
Total	18	*2188*

Table 2: Use of PRP by Occupation and Degree of Competition

Occupation	Degree of Competition							
	High		Medium		Low		TOTAL	
	%	*# obs*	%	*# obs*	%	*# obs*	%	*#obs*
Sales	26	*418*	24	*233*	3	*65*	22	*805*
Managers	21	*709*	17	*465*	7	*354*	15	*2056*
Skilled manual	15	*395*	13	*288*	3	*187*	11	*1104*
Semi-skilled manual	14	*264*	11	*177*	6	*93*	11	*647*
Clerical / Secretarial	14	*650*	10	*439*	3	*347*	9	*1970*
Technical	12	*338*	9	*271*	4	*212*	9	*1121*
Professional	10	*358*	7	*252*	6	*252*	7	*1239*
Unskilled manual	8	*427*	5	*299*	2	*237*	6	*1281*
Personal / protective service	4	*210*	2	*132*	1	*139*	2	*691*
Any Occupation	25	*730*	19	*491*	9	*385*	18	*2188*

Table 3: Logit regressions for probability of operating PRP schemes

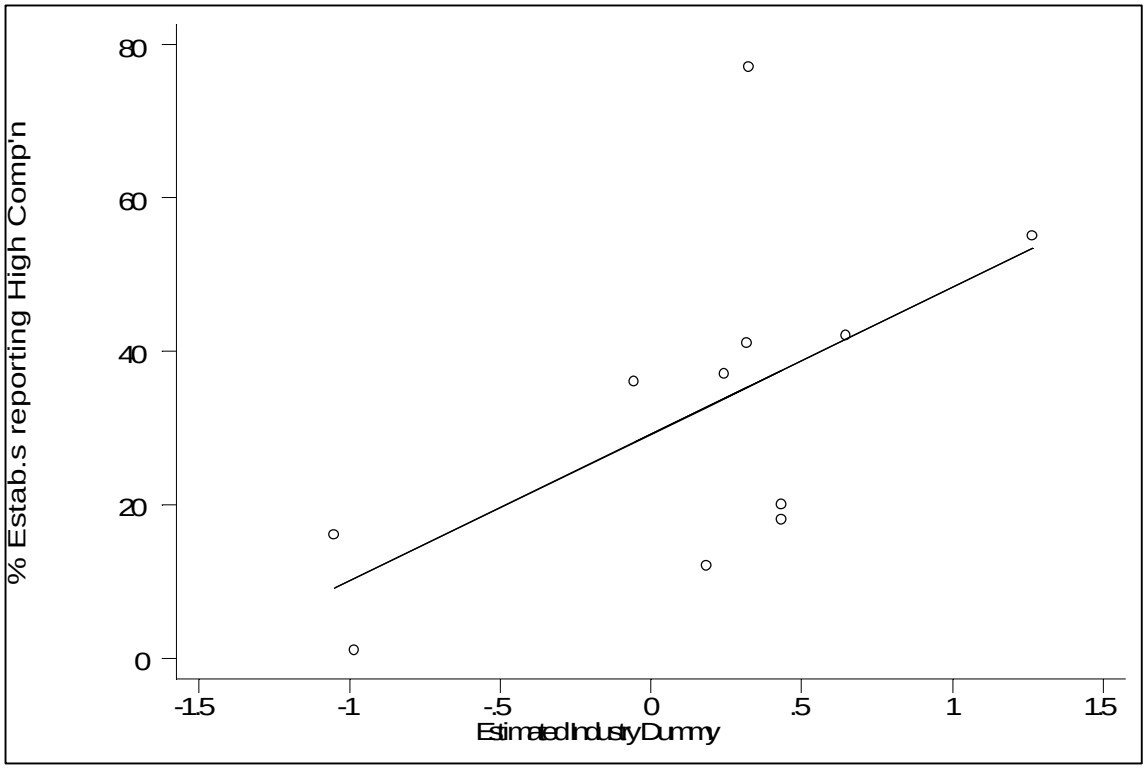
	Model 1			Model 2			Model 3		
PRP for:	High comp	Low comp	p value (hi = lo)	High comp.	Low comp	p value (hi = lo)	High comp.	Low comp	p value (hi = lo)
Any occup.	0.384 (2.32)	-0.106 (-0.52)	0.009	0.266 (1.55)	0.058 (0.25)	0.344	0.523 (1.68)	-0.488 (-0.73)	0.121
Manual	0.424 (2.13)	-0.321 (-1.21)	0.002	0.268 (1.30)	0.011 (0.04)	0.357	0.451 (1.28)	-0.618 (-0.78)	0.169
Non-manual	0.351 (2.02)	-0.324 (-1.47)	0.001	0.226 (1.25)	-0.130 (-0.52)	0.140	0.307 (0.94)	-0.776 (-0.99)	0.161
Managers	0.343 (1.87)	-0.204 (-0.88)	0.010	0.246 (1.29)	-0.037 (-0.14)	0.264	0.289 (0.83)	-1.305 (-1.23)	0.129
Industry dummies?	No			Yes			Yes		
Interactions?	No			No			Yes		

Other variables included in all the regressions are: 6 establishment size class dummies, whether the establishment is part of a larger enterprise, quadratic in union density, percentage of the workforce who are full-time, percentage who are manual workers, percentage who are skilled, and percentage female.

Table 4: Ranking of industries by mean degree of competition

Industry	**PRP**		**Competition**	
	%	*# obs*	Rank	*# obs*
Finance	53	*101*	1	*91*
Wholesale / Retail	35	*321*	2	*282*
Electric / Gas/ Water	34	*80*	10	*52*
Business computing	25	*227*	3	*178*
Transport / Telecom	22	*136*	7	*103*
Public Administration	21	*183*	12	*52*
Manufacturing	14	*298*	4	*273*
Hotels	14	*127*	5	*112*
Construction	12	*112*	6	*74*
Other Services	8	*111*	9	*74*
Education	6	*244*	8	*154*
Health / Social Work	2	*248*	11	*162*
Total	18	*2188*	-	*1607*

Figure 1: Estimated Industry Dummies and Reported Product Market Competition



Estimated industry dummies are from Table 3, model 2,any occupation. Manufacturing is the omitted category in the regression and so is missing from this figure.

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