Performance-Related Pay:
The Expected and the Unexpected

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Abstract

Performance-related pay (PRP) is one of the most widely researched areas in labor economics given its intuitive allure at giving incentives for high productivity. While firms have used a variety of types of PRP, there are some well-known, and other less well-known, effects and distortions that PRP systems encounter in practice. This chapter reviews the basic theory of PRP and covers some of the recent empirical research on the effects of PRP on a number of different economic outcomes. Importantly, PRP is framed in a new light, by discussing some of the actions that firms take to counteract the distortions that PRP can generate.

Forthcoming: Handbook of Labor, Human Resources and Population Economics, ed by Klaus F. Zimmermann

Introduction

It is the purpose of this chapter to give a brief theoretical and empirical overview of performance-related pay (PRP) and further discuss some of the distortions PRP causes and the remedial measures taken to counteract these. This chapter will not provide an extensive literature survey of the area, rather it will concentrate on some select aspects of behavior, distortions and remedies.

PRP is a powerful tool at the firm's disposal it can use to combat low levels of effort in what might otherwise be a poorly motivated workforce. A firm like a doctor could seek to cure its patient, the worker, of the malady of low effort. But though a firm may set off in the best intention to cure a lethargic worker by devising a payment scheme designed to elicit high levels of effort, there are sometimes serious side effects to the cure which may require further attention. And it is these side effects and remedies that ultimately are the focus of the discussion below, focusing on primarily the recent literature from 2015.

Whilst workers may respond favorably to incentives by increasing effort to the task he/she is being rewarded, it may also result in some unfavorable strains of worker behavior, where the worker may, for instance, neglect other duties, sabotage others, take excessive risks and also game the system and mis report. It may even result in self-harm, where the worker works 'too' hard with all the adverse health consequences it implies. There is a further possibility that the incentives might crowd out some intrinsic value to the worker. All these issues are to the firm cause for concern, and some ways are discussed regarding how the firms can address such unfortunate side effects.

There are two important distinctions to make in relations to both the distortive actions of workers but also in terms of the conduct of firms. First, the actions of employers whether they are shop floor workers or CEO's can be subdivided into two

groups: These can be referred to, by borrowing from public economics, as avoidance and evasion. Whereas avoidance simply is the reduction or withholding of effort from some or all parts of the job, that will increase the imperfect performance measure without increasing actual performance, evasion is the willful gaming and misrepresentation of the performance measure itself. Distinctive between avoidance and evasion is the possible sanctions that follow. Whereas avoidance may simply be associated with a lower pay if found out, evasion may result in a disciplinary procedure and/or dismissal and, if serious enough, legal actions being taken. Second the strategies of the firm can similarly be subdivided into two subgroups: above board legally compliant measures and malignant measures such as coercive practices.

Whilst all pay in the widest possible sense can be said to be performance-related, with workers being dismissed if certain lower bound performance standards are not met, the discussion is restricted to where wages vary with performance. PRP comes in many different versions such as piece rates, promotions, commission on sales, stock options, profit sharing and cash and share bonuses. Approximately 20 per cent of U.S. workers and 40 per cent of Dutch and U.K. workers receive some form of PRP (Gittleman and Pierce 2013; Gielen et al. 2010; Bell and Van Reenen 2014). Bryson et al. (2013) found 10-15% of European employees receive some form of performance-related pay. Markridis and Gittleman (2020) estimated non-wage compensation has grown from 10.9% in 1966 to 18.7% in 2018, indicating an increase in the use of PRP. Nevertheless, whilst the remuneration premium of workers on PRP compared to fixed pay workers is substantial in general, care needs to be taken as this difference falls substantially when the heterogeneity of the workforce is controlled for (Bryson et al. 2018).

Section 1 to gives a broad-brush overview of the theoretical background for why performance pay works. Next, Section 2 reviews the empirical effects and evidence of

PRP on workers in Section 2, with Section 3 examining the distortions in more detail and remedial measures. Section 4 offers brief concluding comments.

Section 1. The Theory of PRP

Asymmetric information has been at the heart of labor market studies for most of the last half century. Sub areas such as search theory, contract theory, adverse selection and signaling are all products of such an approach. Economic analysis that has dealt with PRP is no exception. A typical starting point is the principal-agent framework. Here an agent; the worker whose actions and efforts cannot be directly observed acts on behalf of a principal, here the firm. To align the worker's interest to the firm's objectives, the firm uses pay as a method to incentivize the worker to the benefit of the firm and (usually) to the benefit of the worker. Such payment for performance can in some cases yield efficiency of effort as is the case in the standard rank-order tournament theory. However efficiency does not automatically follow for all PRP schemes, some of which cause distortion and joint surplus loss to the firm and worker.

An early exploration of asymmetric information into principal agent wage setting can be found in the efficiency wage literature. Here firms offer wages above and beyond the market clearing wage to incentivize workers. A higher wage leads the workers to exert effort instead of the shirking at work the workers engage in when simply offered the market clearing wage (see e.g. Shapiro and Stiglitz 1984). With effort inducing wages being above the market clearing wage, unemployment is then generated. In a strict sense the theory of efficiency wages is a theory that links performance at work to pay.

The equilibrium efficiency wage is nevertheless not usually considered to be PRP. Typically, PRP refers to a situation where there is little employment risk but where

wage varies in response to performance. Such performance-related pay is sometimes referred to as variable pay-for-performance, of which the most basic type is piece rates. Piece rates simply reward the worker(s) with a payment or a rate per unit of output produced or supplied.

Consider a version of the piece rate remuneration system and how the worker responds to such a payment scheme in terms of effort. Let the worker receive a fixed wage, W_1, and a piece rate, α_1, for every unit of output, q, the worker supplies. Total remuneration under such a system is given by: $W_1 + \alpha_1 q$. With risk neutral workers caring about remuneration less cost of supplying output, $C(q)$, the worker's objective function is given by $W_1 + \alpha_1 q - C(q)$. Assuming the cost function is a well-behaved convex function, the worker will maximize her/his objective function by choosing an output that satisfies $\alpha_1 = C'(q)$; The marginal benefit, α_1, of supplying an additional unit of output is, therefore, set equal to the marginal cost, $C'(q)$, of supplying the output.

Figure 1 here.

The worker's optimization can be given a diagrammatical representation in Panel A, Figure 1. The straight line in Panel A represents the piece rate scheme with a fixed wage. The worker seeks to maximize the difference between the remuneration and the cost of supply. This occurs when the slope, α_1, of the remuneration line equals the slope, $C'(e)$, of the cost function. Some very simple comparative statics follow. In Panel B the worker increases her/his effort when the firm offers higher incentives, that is when the firm increases the piece rate α_1, whereas in Panel C the rather obvious effect on effort of reducing the cost of effort is illustrated.

As is apparent from Panel B of Figure 1, effort increases monotonically with the piece rate. Maximum effort exerted therefore arises when the piece rate, α_1, is set as high as possible and equal to unity. A well-known result from the sharecropping literature in development economics (Bardhan and Srinivasan 1971; Bell and Zusman 1976; Braverman and Srinivasan 1981; Braverman and Stiglitz 1982, 1986; Shaban 1987; Stiglitz 1974) finds sharecropping inefficient (with $\alpha_1 < 1$), whereas productive efficiency holds in tenancy contracts where in a PRP context, this would imply $\alpha_1 = 1$ and $W_1 < 0$. They argue efficiency arose when the workers, by signing a tenancy agreement with the landlords, paid a rent to the landlords and kept all residual profits. Whilst such tenancy contracts are common in agriculture, they remain less common outside the farming context.

With a tenancy contract being an extreme form of a piece rate scheme, and piece rates being better for incentives, a question arises. Why are not all workers on piece rate contracts rather than on salary contracts? The standard reasons given (Lazear 1986) are that piece rates are more common when monitoring costs are low, though other considerations such as sorting of a heterogenous worker supply - with salary workers being of lower quality may also be a factor of importance.

In addition there is the basic trade-off between risk and incentives (Prendergast 1999). Consider a situation where the firm cannot observe worker effort directly but only the output supplied by the worker. Let output in addition to effort be a function of some random variables only observable to the worker. The worker will now, if paid by piece rates, bear considerably more risk than he/she would if he/she was a salary worker. The bearing of risk is not costless, and the firm will have to face higher wage costs to compensate the worker for the additional risk. As such the firm faces a trade-off between 1) the higher-powered incentives of piece rates with higher output but higher

compensation and 2) the lower compensation but also lower production from a salary worker. Such trade-off considerations between incentives and risk are not isolated to piece rates alone but are relevant for all types of PRP.

As already noted, PRP comes in many different forms and guises of which piece rates are the simplest. Piece rates do, however, have the drawback of not being applicable to all types of work arrangements and are thereby not necessarily optimal in all circumstances. The optimal reward system is shaped by the type of evaluation system available to the firm and the quality of the information on worker performance. The Informativeness Principle (Holmstom 1979) implies that the optimal reward scheme should make use of all available information which could in some cases be objective measures, such as output in the case of piece rates but also in other cases subjective measurements such as for instance evaluation reports by supervisors.

A widespread type of reward for performance is the use of bonuses. Bell and Van Reenen (2014) find bonuses especially widespread in the UK finance and banking industry sector. In the UK financial sector 84% of workers received bonuses in 2008, with bonuses becoming increasingly more important higher up the hierarchy, whereas only 40% of all UK workers across the economy received some form of bonus payment. In the US, Li and Wang (2016) find the proportion of S&P 500 firms adopting multiyear accounting-based performance (MAP) incentives increased from 16.5% in 1996 to 43.3% in 2008, where the target value was roughly two times the CEO base wage.

Typically, bonuses are binary rewards paid only when certain thresholds or standards are reached. The theoretical literature has nevertheless usually treated bonuses as a continuous variable for modelling purposes either as a function of individual performance or as aggregate or team performance (Kampkötter and Sliwka

2018).[1] Bénabou and Tirole (2016), in the tradition of bonuses being continuous functions of individual performance, seek to explain the trend of increasing bonuses and salaries at the top of the hierarchy of firms. The rise in bonuses came despite evidence in some cases of poor actual performance, sometimes leading to losses to firms and beyond that highly adverse spillovers to society as evidenced in bank bailouts. They offer a model of competition for high ability workers interacting with PRP to undermine work ethic within the firm. Central to their argument is that highly competitive labor markets make it difficult for firms to find the right balance between benefits and costs of their pay structures - leading to an excessive bonus culture. Ekinci et al. (2019) look at bonuses within tournaments. They treat bonuses and wages distinctively and argue that wages and bonuses are negatively correlated and the bonuses should rise throughout a hierarchy.

One advantage of bonuses whether cash or equity or options is that they do not require a promotion. They are, therefore, particularly suited to CEO remuneration, who have reached the top of the hierarchy or rewards or in flat hierarchies such as the financial sector (Sessions and Skåtun 2022). For firms bonuses have the advantage that they are usually not observed by a rival to the firm and are, therefore, not likely to provide the same signal of worker quality as a promotion provides. Thus, firms face fewer hostile raids on their workforce by rival firms under bonuses than promotions.

In contrast to bonuses, that are often afforded when an absolute standard or threshold has been achieved, other performance related mechanisms depend instead on the relative performance of workers. Such a mechanism is found in tournament theory. Instrumental in the development of the theory of tournaments was the Rank Order

[1] Whilst in many cases this may not matter, it does matter from a gaming perspective discussed later.

Tournament Theory. Rank Order Tournament Theory was first developed by the seminal work of Lazear and Rosen (1981), who look at promotions as a type of reward. In the tournament tradition the workers compete for a prize, the promotion. The prize is set and known in advance, as is the number of participants - typically modelled as two participants. Like in a sports tournament, it is not the absolute performance that matters. One may, in a professional tennis match for instance, have a match where both players perform at an exceptional level, yet there is ever only one winner. Conversely the standard match may be poor, yet the winner's reward remains the same. Relative performance is what matters in tournaments, the winner only has to out-compete the losers. Thus tournament theory uses Relative Performance Evaluation (RPE) to rank competitors. An advantage of RPE is that it is useful in filtering out common shocks. There are two further striking features of tournaments. First, they are vested promises that only pay out to successful workers but have the potential to incentivize losers as well as winners. The second feature is that they are deferred payments incentivizing workers to exert effort to potentially reap future pay.

Consider the implications of a, for simplicity, two-person tournament setup in more detail. The winner of the tournament receives a wage, W_2, whereas the loser remains at the current hierarchical level of the firm with the lower wage, W_1. With the probability, p, of winning depending on effort, e, and where winning and losing are mutually exclusive events, the expected income, $E(W)$ of participating is: $E(w) = pW_2 + (1-p)W_1$. The probability of winning depends on two variables, on the luck, sometimes termed noise in the tournament, and on the effort the worker exerts. Firms who cannot make the promotion of the winner a function of effort directly, promotes the individual with the highest performance measure. Winners of tournaments can, therefore, be promoted either because of high effort or because of luck or because of a

combination of both. The worker choice of effort is associated with a cost of effort function, $C(e)$, where the cost function inhabits the standard characteristics of convexity. The optimal choice of effort then follows: $\frac{\partial p}{\partial e}(W_2 - W_1) - C'(e) = 0$. The first order condition therefore indicates that the marginal benefit of effort, $\frac{\partial p}{\partial e}(W_2 - W_1)$ equals the marginal cost of effort $C'(e)$. Note that the marginal benefit of effort affecting the optimal choice of effort is the product of the effect on effort on the probability of winning the tournament, $\frac{\partial p}{\partial e}$, and the spread $(W_2 - W_1)$ between winning and losing. Both elements have been given substantial attention the literature. A somewhat strangely and mostly neglected element governing workers exertions of the optimal choice, however, is the marginal cost of effort, $C'(e)$, itself. It is an issue about which will be further discussed below.

Figure 2 here.

Further understanding can be garnered by viewing the four panels of Figure 2. Panel A simply represents the worker's optimal choice of effort maximizing the difference between the expected income, $E(W)$, and the cost of effort, $C(e)$ - occurring when the slopes of these two functions are equalized, that is when $\frac{\partial p}{\partial e}(W_2 - W_1) = C'(e)$. The remaining three panels show comparative static effects.

Panel B shows the effect of a rise in the wage spread $W_2 - W_1$ between the winner and the loser of the tournament. This effectively both shifts the $E(W)$ curve up for 'winners' with high effort levels and decreases it for 'losers' with low efforts, thus increasing the slope of the $E(W)$ line at any point. Intuitively, it follows that the

workers are incentivized to exert higher levels of effort, with the higher wage spread, to seek to gain the potentially higher salary increase from a winning promotion.

Panel C represents an increase in noise. An increase in noise acts to reduce both the probability of winning at any given effort level as well as the marginal probability of winning with respect to increases in effort. The $E(W)$ curve, therefore, flattens and lies below the initial $E(W)$ curve. Since the return to effort through the reduced marginal probability of winning with respect to effort has now fallen, the workers respond by reducing their effort. Noise effectively reduces the return to effort. So in very noisy and uncertain environments, workers may rely more on luck rather than effort to gain promotion and the higher wage, whereas, conversely, in quiet environments where performance is influenced mainly by effort the workers return to exertion is enhanced.

Panel D finally gives the effect of a reduction in the marginal cost of effort. As can be seen from the panel this will induce the workers to exert more effort. Comparing two firms with similar wage structures but different marginal cost of effort will in other words imply a lower level of effort when the marginal cost of effort is high.

Panels A - D illustrate the optimal supply-side response of workers competing for a promotion. On the demand side, the firm will choose the wage spread to optimize profits. The firm's profit from a given worker in a two-worker tournament is simply, $\pi = q - {}^{1}/_{2}\,(W_2 + W_1)$. Where output/revenue, q, is determined by effort and a noise element ε; $q = e + \varepsilon$. In a symmetric two worker tournament each worker has an equal chance of winning the tournament. Normalizing the outside opportunity to zero shows that the firm will have to satisfy the participation constraint: ${}^{1}/_{2}\,(W_2 + W_1) - C(e) \geq 0$. As this will hold to equality the firm's constrained optimization reduces to, $\pi = q - C(e)$. To maximise its profits the firm chooses a wage spread such that $C'(e) = 1$. Thus

tournaments are socially efficient incentive schemes with optimal levels of effort being applied to maximise the joint surplus of firms and workers.

It is through the firm's instrument of the wage spread the literature has concentrated upon when looking at firm behavior in tournaments. The riskiness of the environment is typically viewed as being exogenous and outside the control of the firm. In response to an increase of noise in the work environment, Lazear and Rosen (1981) show firms would optimally respond to the reduction in the workers effort level, in noisy environments, by increasing the wage spread. More neglected is any influence firms may have with regards to the cost of effort. Most firms devote some time to HR practices which create a supportive and conducive environment. Other firms also spend time making sure the physical work environment is of a good standard, which includes not only spending resources on office furniture workstations, computers but also on items such as canteen facilities, water coolers and coffee stations and in-work fringe benefits. All these measures may, of course, be beneficial in worker-firm relationships, and reflective of some form of gift exchange, but may also be used as a way to decrease the (marginal) cost of effort making it easier for the worker to exert more to the benefit of the firm.

Section 2. Empirical Research on Expected Behaviors

While the previous section review the basic theory of various forms of incentive pay based on performance, from piece rates through to tournaments, much of the literature is empirical – examining data to document the extent of such payment schemes, what kinds of workers and firms are attracted to the schemes, and what the effects (both intended and unintended) that such schemes have on workers and firms. This section will focus on the more standard literature on PRP while the following section will

discuss more unexpected relationships between PRP and various outcomes. Thus, the initial focus is on who are those in PRP jobs. Then, the pay and productivity of those in PRP jobs is examined. Finally, there is a discussion of how workers subjectively evaluate PRP jobs – namely, are workers in PRP jobs more satisfied with their work than those in non-PRP jobs?

Who are PRP workers? Empirical and Experimental Evidence

The particular characteristics of workers who work in PRP jobs vary considerably over time and across countries (see, for example, the chapters on Australia, Canada, Germany, Japan, UK, and the US as well as others in Brown and Heywood 2002) and has been recently found in Bechter et al. (2021) to be higher in local collective bargaining systems compared to aggregate bargaining systems. Rates of PRP seem to be falling, at least in some countries such as the US (Gittleman and Pierce 2013) and the UK (Forth et al. 2016). Central to any PRP system is the ability to observe whatever output is being incentivized through the PRP scheme, although Williams et al. (2021) suggest that PRP can be helpful in motivating workers where it is difficult to directly measure output (as, for example, with managerial and professional occupations). Recently, there do not seem to be any wide ranging and comprehensive analyses of the determinants of PRP. Rather, recent research has focused on differences across particular characteristics.

One area that has received a good deal of research is gender differences in PRP. On the one hand, research has shown that women are less likely to prefer competitive situations like those found in PRP (see reviews in Croson and Gneezy 2009 and Niederle and Vesterlund 2011). On the other hand, an objective PRP system where output is visible has less chance of discrimination on the basis of gender. Recent research has continued to investigate these differences, though the research seems to indicate that

the preferences effect outweighs the discrimination effect. For example, de la Rica et al. (2015) find little evidence of discrimination avoidance in a sample of Spanish workers where the rate of PRP is very high among men. Higher female risk aversion plays a role here too as Klinowski (2019) finds in experiments that women are less likely to take an increased piece rate contract as a 'self-improvement' mechanism, potentially leading to larger gender wage differentials. Finally, Saccardo et al. (2018) devise a more continuous measure of PRP to examine the gender difference in PRP at the intensive margin, and they report that the gender difference is even more striking using this broader measure.

Another area that has been the focus of research is the sorting that PRP can induce. While this point is returned to several times below, papers such as Jirjahn and Mohrenweiser (2019) show that PRP attracts high productivity workers, but particularly when job tasks are multidimensional, though this is only true for individual PRP and not group PRP schemes. Risk preferences are also important for selection into PRP or non-PRP jobs. Shen et al. (2014) use experiments to show that the less risk averse workers will be drawn to PRP jobs.

Are PRP workers more productive and do they earn more? Recent Evidence

One of the early key papers to examine the effects of PRP on worker outcomes is Booth and Frank (1999). Using data from the British Household Panel Survey, they show that PRP increases wages by nine percent for men and six percent for women, theorizing that this represented the difference between productivity and monitoring costs by the firm. McNabb and Whitefield (2007) further suggest these wage gains are higher when PRP is combined with employee participation in the workplace as this can enhance the productivity gains.

A large subsequent research has examined the magnitude of this wage premium with variations over time, place and socio-demographic characteristics. For example, gender differences in rates of PRP also lead to gender differences in pay. McGee et al. (2015) analyze US National Longitudinal Survey of Youth data to show that the gender pay difference is influenced slightly by the difference in PRP rates. Likewise, Heinz et al. (2016) use experimental data to show that gender differences in competitiveness with women being less competitive than men can lead to an increase in the gender pay gap. Heywood and Parent (2017) suggest that the effect of PRP on gender earnings differentials is largest at the top end of the earnings distribution, particularly among married women.

Other research examines the pattern of PRP wages over the business cycle. Stokes et al. (2017) chart the pattern of relative wages between PRP and fixed wage workers at different quantiles during the Great Recession of 2008 and its aftermath. They find that the largest relative fall for PRP worker pay happened at the bottom of the earnings distribution, even after controlling for unobserved heterogeneity. For those at the upper end of the earnings distribution, there was little change in the relative pay between the two groups, though the data suggest that those in PRP jobs had longer job tenure.

A key challenge in estimating the premium to performance pay comes from the ability to disentangle the productivity enhancement caused by the incentivization of performance and the selection of already productive workers who get a bigger return for effort in PRP schemes. Galindo da Fonseca et al. (2020) emphasize the selection effect and use US survey data to show PRP schemes do a good job in matching highly productive workers to PRP jobs. On the other hand, Damiani et al. (2016) use instrumental variable quantile regression to show the main effect to increase wages

was due to the increase in productivity of workers, thus emphasizing the importance of incentive effects of PRP. Furthermore, Bayo-Moriones et al. (2017) suggest PRP is more effective in generating productivity than high performance human resource management schemes. Kang (2021) further shows that the increase in productivity caused by PRP can help newly exporting firms be more competitive as PRP helps these firms generate absorptive capacity to meet the increased demand for labor quantity and quality. Finally, Kato and Kauhanen (2018) use employer-employee matched data from Finland to show that group productivity compensation schemes were particularly good at increasing productivity of the firm.

Other factors can actually undermine the productivity incentives of PRP systems. Enforcement of the contract is important as PRP can reduce effort if the scheme is not enforced strongly (Kvaløy and Olsen 2015). Although intrinsic motivation is discussed below, it is relevant to mention here that Huffman and Bognanno (2017) use experimental data that suggest that PRP can crowd out nonmonetary motives lowering the expected productivity gain of PRP.

Do workers 'like' PRP? Subjective well-being and PRP

Since most studies show that workers on PRP contracts have higher earnings, *ceteris paribus*, one would expect that they would be happier in these jobs. However, as discussed above, only certain kinds of workers are attracted to these types of jobs and so the implementation of PRP schemes may not be universally appreciated by all workers. In addition, as detailed below, there are a number of unintended consequences from PRP that may impact the overall subjective evaluation of PRP jobs. Thus, there have been a number of papers that have looked at the relative job

satisfaction of PRP and non-PRP jobs generating significant disagreement in the literature.

The early literature on PRP and job satisfaction suggested a complex relationship. McCausland et al. (2005) use the British Household Panel Survey (BHPS) dataset and find that PRP is associated with lower job satisfaction for the low paid, while it is associated with higher job satisfaction for the very highly paid. The authors suggest that this split is due to the use of PRP as a controlling mechanism for the low paid while for the very highly paid it is seen as a reward mechanism. On the other hand, Heywood and Wei (2006) and Green and Heywood (2008) show a generally positive relationship between PRP and job satisfaction for the US and UK, respectively. In a more detailed analysis of more waves of the BHPS as well as a bespoke dataset, Pouliakas and Theodossiou (2009) generally find no effect on job satisfaction by individual PRP, though they do find that group productivity pay (such as bonuses) generate higher satisfaction.

In the intervening time, there have been numerous papers investigating the link between PRP and job satisfaction with seemingly little agreement as to whether the link is positive (e.g. Campbell and Im 2019, Cornellissen et al. 2011, Kampkötter 2017, Ledic 2018), whether the link is positive only for group performance pay (e.g. Bryson et al. 2016) or whether the link holds only for individual pay (e.g. Cloutier et al. 2013), and the role of gender and disability in the link between PRP and job satisfaction (e.g. Pagan and Malo 2021, Shantz et al. 2018), as well as a number of country-specific studies on PRP and job satisfaction.

Section 3. Unexpected Distortions and Remedial Actions

While much of the basic theory on PRP is well established, the discussion above has hinted that even in this theory, the linkage between PRP, productivity and pay is not as straightforward as the theory might predict. Some types of unintended consequences are well researched while others are emerging. This section will first review the challenges facing firms when designing payment schemes in such a way to elicit desired behaviors while avoiding unwanted worker reactions – that is, it will discuss how firms seek to get the contract 'right' from a design viewpoint. The section goes on to investigating a newer strand of the literature – namely, how PRP and health might be related. Although such a link was observed by Adam Smith, this linkage has been the focus of an expanding body of research that had implications for workers, firms and public health.

3.1 Worker distortions

***Getting the contract 'right'*.** While much of the theory of PRP is straightforward and intuitive, firms have found it hard to create incentive remuneration schemes that 1) are ideally suited for attracting and selecting the correct type of productive workers to the firm and 2) have the correct incentives for increasing productivity of the existing workforce of the firm. There are, as such, two familiar problems of offering variable pay for performance contracts, firms may want to consider - broadly falling into the two categories of 1) selection or adverse selection effects and 2) moral hazard effects where workers either avoid or evade the intended incentives mechanisms of PRP.

Adverse selection relates to issues where performance inducing contracts may attract a certain type of worker. Whilst selection issues can be problematic, it is a double-bladed sword that can cut both ways. Indeed it is possible it can be exploited to

the advantage of the firm. For instance, it is possible that workers who are attracted to performance-related work have desirable qualities. Azmat and Möller (2018) study the conditions for when large prizes in contracts attract the most able talent to the firm. Not only is the size of reward important, the type of performing-enhancing pay may matter too. Bartling et al. (2009) study experimental data where participants are given a choice between piece rates and tournaments and find more egalitarian participants shun competition. Of concern to firms that offer tournaments is Bartling et al.'s finding that overconfident workers tend to self-select into competition, though this effect is at least partially offset by individuals with more task specific talents, who seem to prefer competition. Gender issues are also of importance when it comes to self-selection. Niederlie and Westerlund (2007) argue and demonstrate that females are more likely than males to shun competition. Klinowski (2019) uses experimental methods to show females do not self-select into self-improvement pay to the same degree as males, where the gender gap is largely explained by higher risk aversion and lower self-confidence. Eber et al. (2021), however, show that female's aversion towards competition declines with age. Furthermore, the type of competition matters for females, as discussed by Sheremeta (2016), who show women behave more competitively than their male counterparts in certain tournament settings, such as all-pay auctions and lottery contests.

Whilst self-selection is of obvious importance, the discussion will now turn to issues more closely aligned to the moral hazard problems that firms find when trying to assign the optimal performance-related contracts. The hidden actions of workers fall into two main subgroups: avoidance and evasion, two terms that are borrowed from the taxation literature. The avoidance behavior of workers is simply about the workers' privately optimal reductions of effort in response to (sometimes poorly) designed

incentive contracts, whereas evasion relates to hidden action that may even be punishable with getting the sack and includes illicit behavior such as manipulating the payment scheme through gaming, for instance false accounting or sabotage of co-competitors in a tournament type contest.

The most common example of such moral hazard problems is the well-known quantity vs quality trade-off which is discussed below. Then, the discussion turns to several other contractual moral hazard aspects that have been realized as important in the PRP literature. Some further discussion highlights some of these findings in the discussion below.

Quantity vs quality: It is well known that quantity performance-related pay may lead to a substitution away from quality towards quantity, a problem particularly pertinent for a piece rate system (Lazear 2000). Related to this is multitasking where the workers value to the firm relies on a multiple of tasks. Holmstrom and Milgrom (1991) sets out a principal-agent model to try to deal with multidimensional tasks by workers highlighting the difficulty in specifying a contract over differing tasks since workers will respond to the particular dimensions that are rewarded and may ignore other dimensions that are not rewarded.

***Intrinsic motivation*:** Extrinsic incentive gains from PRP can in some instances be crowded out by intrinsic motivation losses, see e.g. Gneezy et al. (2011). The loss of intrinsic motivation under PRP is, therefore, an issue that can cause concerns to firms. Such concerns can lead the firm to move away from high powered incentives to a situation where less PRP is utilized and the wage does not vary greatly with performance. On the other hand, a survey of 184 professionals by Cabanas et al. (2020) suggests that individual PRP can have both direct and indirect positive effects on intrinsic motivation as it generates a valuable feedback on performance.

Linked to intrinsic motivation are prosocial incentives. The importance of prosocial incentives in the public sector may lead policy makers to adapt their rewards systems (Besley and Ghatak 2018). Finan et al. (2017) provide a review of field experiments and household surveys studies on the prosocial provision of public services in developing countries. Recently, Dur et al. (2021) investigates theoretically how labor market conditions can explain why some leaders use praise to motivate workers, while other leaders use social punishment. They argue a binding wage floor for workers, through institutions such as trade unions, minimum wages or limited liability, can lead firms to hire a leader who make use of (inefficient) social punishments. The social punishments allow the firm to extract rents from the worker and lessens the need for high bonus pay. In a one period setting, only moderately altruistic leaders use praise as a motivation tool, whereas only moderately spiteful leaders use social punishments.

Gaming. A substantial problem for firms is any form of gaming that effects the measure of performance but not the desired outcome. Workers may game the system to gain payment without such gaming resulting in better production outcomes and to the detriment of the employer. The two main problems with gaming are that gaming causes a wasteful use of resources and a weakening of incentives. There are many examples of such gaming processes spanning different types of industries, organizations and firms, and too many to provide a full overview. Instead, three examples follow. The first example relates to CEOs and CFOs manipulating accounting and reporting processes of a firm's performance in order to benefit from incentives mechanisms such as share options and bonus schemes. Crocker and Slemrod (2007) demonstrate PRP contracts for CEOs based on reported earnings cannot simultaneously provide the correct incentives to exert effort and the correct incentives to report profits truthfully. The second example relates to workers in teams devoting resources to enhance own

performance measures to the detriment of both the worker's co-workers and firm. Corgnet et al. (2019) use experimental methods to investigate the manipulation and gaming that occurs in the presence of PRP. They look at what they term "window dressing" where participants can spend resources in performance manipulation and found such activities substantially higher under individual PRP than when the participants shared equally in production from team performance. The final example relates to the now extensive literature of gaming in public provided health provision (for a survey, see Chalkley 2018). An example of gaming in the NHS in England is found in Propper et al. (2010) who look at a government policy intervention of penalties and rewards to reduce patient waiting times and find evidence for manipulation of the data to artificially move patients off the waiting lists. A study looking at gaming by doctors in the US health service was given by Alexander (2020) who investigates a program designed to provide incentive pay to doctors in order to lower the cost of the health care provision of Medicare patients. The program was found to be ineffective as doctors were able to sort and select high and low-cost patients to their own advantage.

3.2 Health consequences of PRP – The Adam Smith observation

One potential unintended consequence that has received a good deal of recent attention examines the relationship between PRP and health. Interestingly, the link was identified at least as early as Adam Smith who remarked in the *Wealth of Nations*, "Workmen… when they are liberally paid by the piece, are very apt to overwork themselves and to ruin their health and constitution in a few years." (Smith, 1776, p. 83) Although remarking specifically about piece rates, the tendency to damage their own health through overwork can happen with any PRP system, so that PRP have health effects are likely to extend to all types of PRP.

While Smith did not detail the mechanisms by which PRP might impact the health of workers, there are at least three potential ways the link could manifest. First, the pressure to produce output inherent in PRP could lead to an increase in accidents and injuries at work either by cutting corners in terms of health and safety or just increasing the speed of work. Thus, this linkage would predict increases in injuries for those paid by PRP, *ceteris paribus*.

A second potential pathway focuses on the effect of PRP on work time. Any form of PRP, but especially piece rates, make explicit the opportunity cost of leisure. Thus, PRP workers know that when they are not producing output, they are not getting paid. Therefore, there will be a substitution from leisure time to work time to give an increased opportunity to work. PRP workers, therefore, may substitute away from healthy activities such as exercise or cooking a healthy meal, for work and take away eaten at their desk. Unlike injuries where the impact is immediate, for this mechanism it is the potentially long-time exposure to PRP and the increased work hours associated with it that crowd out healthy behaviors to generate ill health.

A final potential pathway has to do with how workers internalize the extra effort and uncertainty and variability in income that many PRP jobs generate. It is possible then that PRP jobs are associated with higher levels of persistent low-grade stress, *ceteris paribus*, which medical science is increasingly recognizing as a significant predictor of ill health (McEwen 1998 and Rohleder 2014).[2]

Much of the early empirical literature on this PRP-health link examined particularly industries and occupations (e.g. Monaco and Williams 2000, Rodriquez et al

[2] There is only one paper that suggests that PRP may be beneficial to health. Pan et al. (2021) suggest that PRP allows workers to vary their effort in ways that hourly-paid workers will not do. Using an observational study design, they show for a group of farm workers, those paid by performance were more likely to adjust their effort levels – reducing it compared to hourly workers during very hot times and increasing it during cooler times.

2006, and Williamson et al. 2009 in trucking; Freeman and Medoff 2005 and Saha et al. 2004 in manufacturing; Toupin et al. 2007 in agriculture). In a wide-ranging summary of the health literature, Johansson et al. (2010) reviews more than 30 articles, finding that nearly all show at least a correlation between piece rates and various injuries at work, although again, these tend to be done at an occupational level.

Since then, there have been several papers that have examined the PRP-injury link using broader samples. Using a cross section of individual-level data from the European Working Conditions Survey, Bender et al. (2012) find that the probability of a work-related injury is higher for those paid at least partially by piece rates and is particularly prevalent among manual workers. This higher injury probability remains even after controlling for the possibility of sample selection. Artz and Heywood (2015) analyze US panel data and confirm this finding, despite being able to control for individual heterogeneity through worker and worker-firm fixed effects and measures for risk preferences. These linkages also exist when examining firm-level data as DeVaro and Heywood (2017) show significantly higher health-related absences in UK firms employing PRP.

In addition to examining the link between PRP and injuries, recent research has also looked at correlations between PRP and other forms of health measures. Davis and Hoyt (2020) focus on a longitudinal dataset of 'gig' workers in the US and find that those paid by piece rates experience higher odds of reporting health limitations, particularly among the low-paid, women and non-white workers. Using longitudinal data from the UK, Bender and Theodossiou (2014) by employing duration analysis show initially healthy workers are more likely to develop general, heart, stomach or mental health problems the longer the exposure to PRP, an effect that is particularly strong for nonmanual workers. Davis (2016) indicates that this link is not just an issue in

developed economies, showing that Vietnamese manufacturing workers paid by PRP have worse physical and mental health even after controlling for a number of employer specific variables. Most recently using the UK Household Longitudinal Survey dataset, Andelic et al. (2022) examine subjective health measures as well as objective health measures from the Nurse Assessment supplement to show that PRP is related to higher systolic blood pressure and fibrinogen, a blood marker for inflammation that is caused by exposure to stress even after correcting for endogenous PRP treatment.

The final area of empirical research has focused on the link between PRP and mental health and stress. While touched on in Bender and Theodossiou (2014) and Davis (2016) where they examine specific questions on mental health and PRP, Baktash et al. (2022) use German data to show PRP increases subjective evaluations of stress, even after controlling for endogeneity. Interestingly, though, they find risk tolerance moderates the subjective evaluation of stress effect. Dahl and Pierce (2020) use a unique Danish dataset on drug prescriptions for mental health problems such as anti-depressants and find that when firms adopted PRP, there was an increase in such prescriptions.

A key problem, though, in many of these studies on stress is the subjectivity of the stress measure and the endogeneity of PRP (though this latter point is potentially problematic in all of this empirical research). This has led researchers to examine PRP in experimental settings since at least the problems with endogeneity can be dealt with directly in an experimental design. A number of experimental papers show that in studies of the effects of PRP, self-reported stress is higher among PRP recipients (e.g. Cadsby et al. 2016 and Dohmen and Falk 2011). However a recent series of studies (Allan et al. 2020 and Allan et al. 2021) have included the measurement of salivary cortisol, the so-called 'stress hormone', in experiments that randomize PRP allocation.

Both studies find higher levels of cortisol among those in the PRP group, with the latter paper having further controls for individual heterogeneity through a crossover design.

As a final point to this sub-section, there are a couple recent papers that are examining how PRP workers may try to mitigate the effects of the increased stress of PRP beyond seeking medical interventions as Dahl and Pierce (2020) document as discussed above. Though not central to their paper, Bender and Theodossiou (2014) note that there was a cross sectional association between PRP and frequent drinking of alcohol. This suggestion has been shown to be robust in two subsequent papers. Artz et al. (2021) use US longitudinal survey data and corrections for endogeneity in a panel context to show that PRP workers are more likely to use alcohol and illegal drugs, presumably to handle the stress caused by PRP. Using German data, Mehrzad et al. (forthcoming) find that alcohol use is higher for PRP workers, even after controlling for endogeneity.

3.3 The unintended consequences of Tournament theory

The seminal work of Lazear and Rosen (1981) led to a large literature that either investigated tournament theory empirically or investigated theoretical extensions of their initial set up of the model. A key strength but also a weakness in tournaments as a payment for performance mechanism, is the competitive environment it creates. On the one hand competition provides the workers with the incentives to exert the required effort. On the other hand competition may decrease cooperation in the workforce, becoming a particular problem if the exertions of workers transgress into sabotage (Lazear 1989) with females less likely to partake in sabotage (Dato and Nieken 2014). The illicit sabotage behavior used by competitors to simultaneously increase their probability of winning and illicitly evade effort is often referred to as industrial

politicking. One way firms can combat politicking, this unwanted consequence of competition, is to soften the incentives, by reducing the wage spread in the tournament $W_2 - W_1$.

A further reason to suppress the incentives of large wage spread is that tournaments may lead to excessive risk taking (Hvide 2002; Jaggia and Thosar 2017; Adams and Waddell 2018). When workers can choose their own risk, they may substitute away from effort towards risky projects in order to win promotion. Under such circumstances, firms should dampen the incentives by compressing the wage between winners and losers.

Whilst discrimination is not necessarily a direct outcome of performance-related pay, discrimination can vary across different types of employers and incentive schemes. DeVaro et al. (2018) use a tournament model to investigate how the level of discrimination vary across different hierarchies, depending on how tasks vary through the hierarchy. They found discrimination is more prevalent where tasks do not vary much with promotions. Simply put, the opportunity cost of not promoting a person from a disadvantaged group increases if there are substantial changes in tasks to perform with a promotion.

There is a very limited literature on tournaments and health. Presumably the underlying mechanisms that were discussed linking PRP and health would apply here as the tournament system also elicits similar behavioral responses. Perhaps the biggest difference is that there is a 'winner' of the tournament so the reward to the incentivized behavior is limited, even if the effort is across a number of people. Thus, this reward may mitigate the negative health consequences from the performance element of the contract. This could be a reason for the findings of the lower mortality of Academy

Award winners (Redelmeier and Singh 2001) of about four years[3] and Nobel prize winners (Rablen and Oswald 2008) of between one and two years. More specific literature on health and tournaments by Buckert et al. (2017) further suggests that in an experimental setting, tournaments do increase stress as measured by salivary cortisol, blood pressure and heart rate as well as subjective evaluations of stress. There is even evidence by Boyce and Oswald (2012) that shows using survey data that winning the tournament and being promoted does not increase health, but rather increases the likelihood of mental health problems.

3.4 The firms' remedial measures to distortions

Whilst some of the firm responses have at their disposal to combat adverse worker effects to PRP have been discussed above, the following discussion details this issue further. There are several interventions available to the firm, of which six are worth considering in more detail, 1) weakening extrinsic incentives, 2) strengthening intrinsic incentives and corporate culture, 3) increasing monitoring, 4) changing organizational structures, and 5) cost of effort reducing measures. In addition are 6) the malignant designs the firm may have by coercing its workforce to exert higher levels of effort.

***Extrinsic Incentives*.** If incentives are causing distortions, then one way of reducing distortions can be found by simply weakening the incentives given. For instance if strong extrinsic incentives are causing the loss of intrinsic motivation or, excessive competition leading to more sabotage or excessive risk-taking, the firms can counteract the distortions by reducing the incentives of its PRP scheme.

[3] Since this article, there has been considerable debate over the accuracy and robustness of this result. See for example, Sylvestre et al. (2006).

Strengthening intrinsic incentives and corporate culture. Cassar and Meier (2018) argue that the meaning of work should enter the workers objective function so that nonpecuniary benefits play a role in exerting effort levels. They argue work is much more than simply a source of income and that workers care about other nonpecuniary but meaningful aspects of their occupation. In this sense corporations may even have incentives to create social meaning where there erstwhile was none. An early work by Ichniowski et al. (1997) demonstrates the importance of non-monetary pay for motivation and how such mechanisms might benefit the firms through higher worker productivity.

***Monitoring*.** When PRP results because of asymmetric information, the firm may weaken the negative effect of the payment scheme by lessening its reliance on PRP. Alternatively, less reliance on PRP can be achieved by increasing the amount of monitoring reducing the extent of the asymmetric information problem. A recent paper that examines this is Jensen et al. (2020). Using a field experiment in Kenya, they document the positive effect of conspicuous monitoring of remote work on performance for not only the incentivized tasks, but also for related tasks that were not incentivized in the contract.

Organizational Structure, Job design and Outsourcing. Work arrangements can depend on type of organizational structure in the firm as well as the particular job designs of work. Such work arrangements may also be influenced by the levels of distortions PRP elicits. The level of outsourcing and use of temporary work may be one way of reducing the problem of internal contracting. The gig economy, where workers are engaged in flexible work arrangements through temporary manpower agencies or by being independent contractors and independent free lancers, has been rising in recent years. Katz and Krueger (2019) estimate such alternative work arrangements

rose from 10.7% to 15.8% from 2005 to 2015. The choice of organizational structure within a firm is an area that has received a lot of attention in the Management literature emphasizing the different levels of worker autonomy in different architectural organizational structures (see Koster 2021 for a discussion) where less worker autonomy is associated with a more hierarchical firm structure. Autonomy is lower, for instance, in firms organized in a functional style with many levels of hierarchy, than flatter organizations with low levels of hierarchy such as occurs in matrix style organizations. From an economic point of view countervailing effects arise when moving towards structures that allow more autonomy. More autonomy creates a higher degree of agency problems when there is asymmetric information - necessitating more PRP. More autonomy will, in all likelihood, also increase the intrinsic value of the job abd, thus, decrease the necessity of high-powered incentive schemes. The overall effect on PRP of these countervailing effects of different organizational styles is, therefore, a matter to be determined by empirical research. Bloom et al. (2012) find that organizational structure mattered when it came to trust and that more decentralized structures within firms led to more trust. This may in itself have motivational effects with positive productivity outcomes (Meier et al. 2019).

Cost of effort. As is apparent from Figure 1 Panel C and Figure 2 Panel D, the effort of workers will increase with effort level. One strategy firms can implement in order to alleviate any distortions of PRP reducing the effective effort the workers exert is to implement policies reducing the cost of effort. Whilst there are several ways cost of effort reducing measures could be implemented, most of the methods use and relate to non-pecuniary aspects of jobs. Aspects of the work environment in general such as comfortable office furniture, areas of relaxation, water coolers, subsidized work

canteens are all examples of aspects that may affect the cost of staying at work and have positive effects on worker's exertions.

Not all benefits given by firms are, however, necessarily positive. Perks or fringe benefits have for instance been argued to be a form of rent extraction by top managers. Evidence of such rent extraction is nevertheless mixed. Rajan and Wulf (2006), for instance, find little evidence of rent extraction by looking at perks such as company jets. They argue there are benefits to the firm of offering travel were executives arriving refreshed are more able to negotiate good deals. In terms of the discussion here, it is possible that being physically refreshed reduces the cost of effort required in a negotiation and that such perks have an effort inducing effect.

***Malignant design*.** Whilst firms may genuinely struggle with the design of their performance-related pay to avoid the unintended consequences of high-powered incentives, they may also act in more malevolent ways and try to subjugate their workforce. The seminal work on labor coercion (Acemoglu and Wolitsky 2011) show coercion is productive in the sense it increases output through the complementarities of effort and coercion - where coercion increases the effort of the worker. Coercion, however, is also shown to yield a lower social welfare as it involves a costly transfer of resources from the workers to the employer. Coercion in their model affects the outside option of the workers, through which the employer could at a cost subjugate the worker.

Whilst studying the coercion a state exercises against its subjects, Aldashev and Zanarone (2017) argue the state faces a trade-off between the positive effects of enforcement and the effects of expropriation. They conclude with the following promising avenue of future research relating specifically to performance-related pay: '*Given its ownership of assets and its power to terminate employment relationships and to*

allocate tasks and rewards (Holmstrom and Milgrom 1994), the firm may be seen as a powerful "ruler". The firm's CEO may use his power to expropriate managers and employees (for instance, by changing piece rates or withdrawing discretionary bonuses and promotions), but also to enforce internal contracts between divisional managers and their subordinates (for instance, by immediately firing a manager who fails to promote or pay the subordinate as promised, even when a replacement for the manager cannot be readily found, so that termination is costly for the firm).' (Aldashev and Zanarone 2017, p. 58)

While there is limited research on this in the empirical literature on PRP, a related paper by Heinz et al. (2016) uses experiments to suggest that the choice of PRP structure can influence the gender pay gap. In an experiment where subjects can choose a competitive (i.e. tournament) and non-competitive performance-based scheme (i.e. piece rates) and a dictator game by participants playing as employers to decide the amount of money shared between the employees and employers. The results show that while there were no gender differences by employers in the income from the tournaments, employers were much more likely to reduce the payments to women when piece rates were chosen.

3.5 Government interventions

Whilst government policies such as taxation policies have an impact on performance-related pay, increases in taxes do not necessarily have the expected *a priori* effects. Skåtun (2017) demonstrates that taxes in a tournament setting may increase, rather than decrease, effort. While the wage spread decreases, with a proportional tax increase, the spread in utility between winning and losing may fall depending on the risk aversion of workers.

There are also other government interventions with effects on PRP. While it is beyond the scope of this chapter to go into such government interventions in any great detail, it is helpful to give a few brief comments. Most countries have stringent Health and Safety legislation in relation to workplaces. For a survey of how Health and Safety practices affect workplaces see Salguero-Caparrós et al. (2020). From an economic point of view such interventions only need to apply if there is some (market or information) failure within the firm-worker relationship to provide such provisions. In as much as regulation is a binding constraint, it will have an effect on workplace practices and the cost of effort. Such effects will, in turn, affect the intrinsic value to the worker. DeVaro and Heywood (2016) argue the PRP premium may be a function of the adverse health consequences and argue public enforcement of health and safety regulations, could be concentrated at firms using individual performance pay. As a corollary of that it is possible that firms face a choice between several options 1) do nothing and risk the fines of breaking legislation, 2) reduce PRP in order to fall within current legislation or 3) enact remediating health and safety measures whilst maintaining the incentives of PRP.

Section 4. Summary

This chapter has sought to give background to and a discussion on the long standing but still rapidly developing literature on the unintended consequences of PRP. Some of the distortions and remedies are well known, while others are less explored. Of the less explored, there are three that deserve further, if brief, attention. First, disaggregating employer distortive behavior into avoidance and evasion and how legal requirements and workplace practices interact with PRP design is a useful avenue of research that

may bear fruit. Second, there is now a growing literature on the effect of PRP on health outcomes and the many supply side worker self-harming responses to high powered incentives in the workplace. What is significantly lacking in this literature is a demand side as well as a normative understanding on how workplace practices within firms but also how health and safety legislation evolve in order to make work less onerous, stressful and hazardous and how this in turn affects the extent and type of PRP. Finally, thirdly, and perhaps more speculatively, is linking PRP to the relatively new literature on labor coercion.

Acknowledgement

Responsible Section Editor: Klaus F. Zimmermann

The article has benefitted from valuable comments of the editors and anonymous referees. Financial support by the UK ESRC (Grant ES/R01163X/1) for related research for Professor Bender is gratefully noted. There is no conflict of interest.

Cross-References

Bonus Plans, Subjective Performance Evaluations, and Career Concerns

Gender, Gender Self-perceptions and Workplace Leadership

Performance Feedback and Peer Effects

Tournaments and Competition

Wage Policies, Incentive Schemes and Motivation

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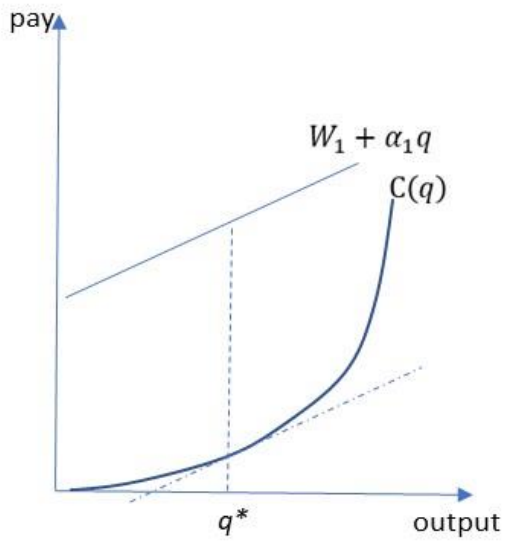
Figure 1:Diagrammatical presentation of Piece Rates

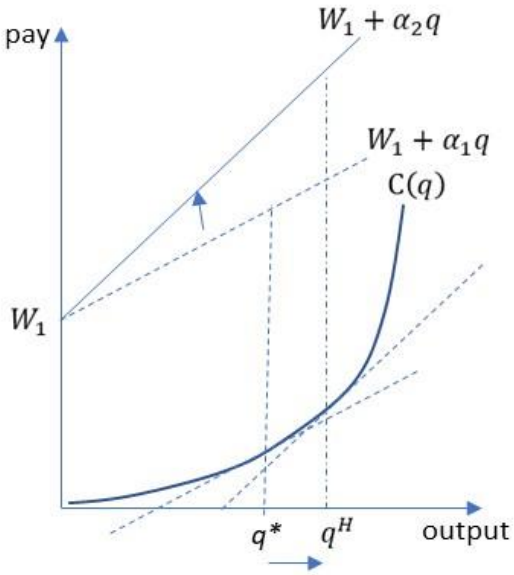
Panel A

The Optimal Effort



Panel B

An increase in the piece rate



Panel C

A reduction in the cost of effort

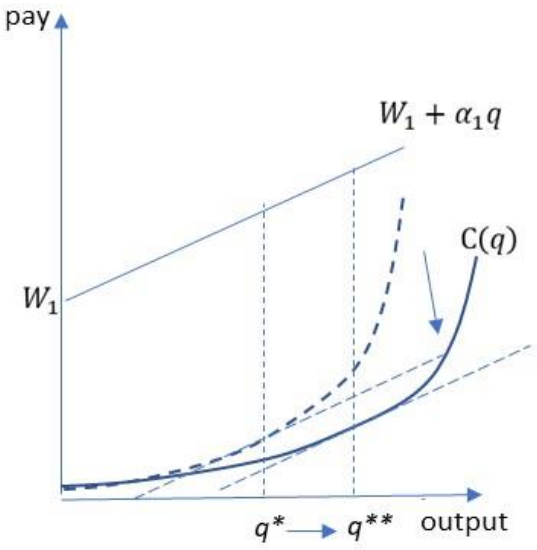


Figure 2:Diagrammatical presentation of Tournament effort