FONDAZIONE RODOLFO DEBENEDETTI

Paying for Performance

Incentive Pay Schemes and Employees' Financial Participation

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This draft: May 2010

(*) To be presented at the Annual FRDB conference to be held in Cagliari (Italy) on the 29th May, 2009.
This report has benefited from the comments of Massimo Anelli, Tito Boeri, Lorenzo Cappellari, Piero Casadio, Fathi Fakhfakh, Kevin Lang and Albert Schwenk. Massimo Anelli, Elena Cottini and Federica Origo provided excellent research assistance. The data used in the Report have been made kindly available by the European Science Foundation, the National Opinion Research Center, the OECD, Manageritalia and Federmeccanica. Part of this report was completed when Claudio Lucifora was visiting UNSW, whose hospitality is gratefully acknowledged.

Executive summary

In recent decades, the compensation packages of a growing proportion of firms include pay schemes that are linked to employee or company performance. By motivating individual workers to be more efficient at work and increasing their attachment and identification with the interests of the enterprise, incentive schemes are expected to improve interpersonal relationships, raise job satisfaction, lower absenteeism and waste of intermediate material or capital, and lower turnover rates, all of which should produce lasting effect on company performance.

Most firms that use pay for performance systems do not introduce them by themselves but rather as part of changes in work organisation such as team work, employee involvement committees, or total quality management that offer employees a greater role in decision-making.

While there has been a lot of research done in recent years on the economic effects of incentive schemes, little is known about the patterns of performance related pay both within and across countries. Available studies suggest that when firms have good performance measures, performance related pay is associated with improved employee productivity and better quality of the worker-firm match. Still, we observe significant heterogeneity in the share of firms adopting incentive pay schemes as well as in the type of schemes implemented. In this report we produce, for the first time, a wide array of empirical results to document such heterogeneity, both between and within countries.

In this study, we find that the diffusion of incentive pay schemes ranges from around 10-15 percent in some European countries to over 40 percent in Scandinavian countries and the US. When we investigate the relative importance of the different type of schemes, we find that individual pay and profit/gain sharing schemes are widely diffused, while share ownership schemes are much less common (particularly in Europe). We also document a number of empirical regularities. Incentive pay is found to be less common in countries where there is a large majority of small firms or where the share of family firm is larger. Higher product and labour market regulation is associated to a lower diffusion of incentive pay. Capital market development is a necessary requirement for a wider diffusion of incentive pay (i.e. in particular sharing and ownership schemes). When we control for a large set of individual characteristics and company attributes, we find that the probability that a worker is covered by an incentive scheme is higher in large sized firms and in high-skilled occupations, while it is much lower for females. Incentive schemes are also much less diffused in the public sector.

In order to assess the effects of the introduction of performance related schemes on a number of economic outcomes, we present three ‘case studies’ in personnel economics which use company-specific data. Each study pays particular attention to the internal features that govern the organisation of work, as well as the institutional environment in which firms operate.

In the first case study, we look at the effects of changing the measure of performance from sales to profits in a chain of cafes and restaurants in which the store managers receive incentive pay while regular employees only receive a fixed wage. We find that, by linking the pay of the local manager to store profits forces them to internalise production costs (namely, labour costs) thus

increasing productivity (by about 1-1.5%) and enabling managers to respond more efficiently to changes in the demand by adjusting all production inputs.

The second case study uses data for all firms in the metal engineering industry in Italy to explore the effects of a nation-wide collective agreement that facilitated the introduction of incentive pay. We find that the agreement did increase the rate of adoption of incentive pay schemes and that, in turn, this resulted in an increase in productivity by about 5-6%.

Our last case study looks at the effects of two particular forms of incentive pay, namely profit sharing and employee share ownership, on firm performance and a self-reported measure of work pressure. Results show that profit sharing improves firm's performance while there is no harmful effects of work pressure.

In the final part of the report, we bring together the results of all our analyses and our critical reading of the existing literature, both theoretical and empirical, and we ask whether government should intervene to support the implementation of incentive pay schemes. In particular, in the light of the current economic recession we ask whether the introduction or a wider diffusion of incentive pay may be regarded as a way to consolidate and speed up the recovery.

The case for government intervention in this area is not obvious. While in general companies that use pay for performance do better (or no worse) than others, in terms of productivity and profits; the large heterogeneity observed, across firms and institutional contexts, suggests that not all firms in all circumstances are going to benefit from incentive pay.

To the extent that some firms eschew pay for performance and financial participation through lack of knowledge or adherence to the *status quo*, then moving them in a more productive direction can justify a policy to encourage greater incentive pay or financial participation. Policy intervention may range from training programs (about 'best practices' and how to implement them), to fiscal incentives or subsidies or, even, to mandating programs.

But it may be that governments are the wrong agency for instituting policies. Schemes that give tax breaks to firms with performance for pay schemes will primarily benefit the firms and workers that already have them, or may induce firms to change the form of pay to gain tax advantages without changing how they actually operate. Having seen the effects of the untested *laissez-faire* changes in the rules governing banks on the global economy, it makes little sense to undertake any reforms without detailed simulations of what they may do to the economy under alternative economic scenarios based on sound analysis and extensive discussion with labour, management, and government decision-makers.

Alternatively, trade unions and employers federations may find collective bargaining a more efficacious way to press for changes in compensation and ownership. Unions have agreed to greater decentralised productivity bargaining in Europe, negotiate over the profit sharing schemes in France and Italy, and have a mixed record of supporting and opposing employee ownership and profit-sharing in the US depending on economic conditions.

There are policies that could encourage the spread of group incentive pay and financial participation among firms that deserve consideration. For example, France has a mandatory profit sharing policy for medium sized and large firms. The US allows firms to "deduct compensation expenses" as a cost of business rather than as distributions of profit, only if the plans cover all workers in the firm proportionate to their wages or in some other fair way. Finally, another possible innovative way to encourage firms to experiment with more group pay for performance schemes and financial participation would be to offer prizes for firms that had the most successful

innovations. Each year Fortune Magazine reports on the “best workplaces” in the US and there is a similar report on the best places to work in the UK (www.greatplacetowork.co.uk). In the US the best workplaces have better financial performance and are far more likely to pay workers through incentive pay and with financial participation than other firms. Prizes and contests can be fruitful ways to encourage innovation at low cost.

More generally, given what we know and do not know the best approach would seem to be to design experiments or pilot projects that might try several different ways to encourage the spread of group incentive pay and financial participation schemes that seem to offer productivity advantages over other forms of organising and paying labour.

Can relating workers pay more to the performance of firms help economies adjust in the current crisis? To the extent that part of the crisis was due to the excessive concentration of incentives at the top of firms in finance and elsewhere that generated huge risk-taking that spread toxic assets around the world, increasing normal employees share of performance-related and ownership might help prevent a restoration of the same incentives that contributed to the financial disaster. It is possible that policies that gave advantages to new firms in which workers had group incentives and financial participation might increase the rate of new firms forming, which would help in recovery. But while there is evidence that new firms in high-tech tend to use these modes of compensation, there is no evidence that policies to encourage the practice would in fact have the desired impact in job creation. Experimentation is the necessary path to a better understanding of how policies are likely to work in different institutional context and economic conditions.

1. Introduction

In recent decades, the compensation packages of a growing proportion of firms include incentive pay schemes pay schemes linking pay to employee or company performance. The growth in incentive pay has been fostered by widespread concern over the existence of inefficiencies in the workplace and the belief that incentive pay can raise productivity growth and improve profitability.

Incentive pay has a long standing tradition in economic analysis and policymaking. From the Classical economists (Smith, 1776; Marx, 1867) to analysts and practitioners, compensation systems based on employee performance are seen as a way to correct some of the imperfections in labour, product and capital markets that affect the employment relationship. By motivating individual workers to be more efficient at work and increasing their attachment and identification with the interests of the enterprise, incentive schemes are expected to improve interpersonal relationships, raise job satisfaction, lower absenteeism and waste of intermediate material or capital, and lower turnover rates, all of which should produce lasting effect on company performance. Does extant evidence support these expectations and hopes? What explains the difference in the diffusion of incentive schemes among firms in Europe and the US?

Firms have introduced individual rated schemes, group incentive schemes, profit-sharing bonuses and developed employee stock ownership programs, often through retirement plans that put significant assets in the stock of the firm. Most firms that use pay for performance systems do not introduce them by themselves but rather as part of changes in work organisation such as team work, employee involvement committees, or total quality management that offer employees a greater role in decision-making. Which, if any of these types of incentive schemes improves economic outcomes the most?

Most studies suggest that when firms have good performance measures, performance related pay is associated with improved employee productivity and better quality of the worker-firm match. If this is so, why are these pay systems not more widespread in industrialised economies? Perhaps returns to incentive pay differ across firms and those who are likely to benefit have already adopted them? If all firms that would benefit from performance related pay have introduced it, then subsidising other firms to switch to performance related pay systems through tax breaks and other forms of state assistance will yield lower returns than those estimated for current users. But it is also possible that many firms stick with status quo modes of pay when they could do better with pay for performance systems, which would justify state promotion of some schemes. Making pay dependent on company performance may also be a way for firms to share risk with workers through cost adjustments, which could preserve jobs in difficult times. But there is also evidence that incentive schemes do not necessarily improve performance in all contexts and situations. For example, firms often introduce financial participation schemes for reasons that have little or nothing to do with incentives.

The impetus for this report is twofold. First, while there has been a lot of research done in recent years on the economic effects of incentive schemes, little is known about the patterns of performance related pay both within and across countries. A new wave of studies have used company-specific data to investigate the effects of the introduction of performance related schemes on some measure of employees' or establishments' performance shedding light on the

"causal" effects of incentives on performance. In this study, we focus on a selected number of studies with credible identification strategies that link performance pay to performance. This new literature, known as "insider econometrics", nevertheless rises important issues on the "external validity" of the result, given the substantial heterogeneity in the effects across time, place and environment.

Second, in several countries there has been a renewed *policy interest* in incentive systems that go beyond short-term effort and give employees a stake in the performance and survival of the firms that employ them. In the US, for example, a bill was introduced in the Senate in December 2009 that would provide for state programmes to promote employee ownership.[1] In France, employee financial participation has been the subject of renewed legislative effort in 2006 and 2008, improving provisions for employee access to information under regulated profit-sharing schemes and making the schemes more flexible. In Italy, a new system was introduced for the 2008-2010 period by law 247/2007, by which firms benefit from a tax relief on the collectively negotiated productivity pay premia. In the UK, both of the main political parties have recently put forward policies supporting a measure of employee ownership in public services.

Finally, following economic recessions interest in firm practices that may improve performance and employment grows considerably, and so does interest in possible public policies to promote such practices. For example, following the post oil-shock recession more and more companies looked towards pay for performance to increase bottom-line results and obtain productivity gains. General pay increases slowly gave way to incentive pay and other forms of monetary incentives.

In addition, this particular recession and highly publicised cases, like Enron, have brought out the issue of the employment and pension risks employees bear, and governance systems that might give employees a greater role in overseeing the risks taken by companies — something which may be associated with employee share ownership. As economies from both sides of the Atlantic are now starting to come out of the recession, the introduction or an increase in the diffusion of incentive pay may be regarded as a way to consolidate and speed up the recovery.

We consider evidence pertaining to a range of questions about pay for performance systems. How significant are these forms of compensation and modes of employee involvement? How has their incidence evolved over time? Do incentive schemes and financial participation boost productivity, or do they signal where high productivity is rewarded and thus attract the most productive workers? Which schemes work better, in which situations and to which ends? Should Government subsidise the schemes and, if so, which ones and how? How do incentive schemes interact with country-level institutions, such as centralised wage bargaining systems?

The report is structured as follows. Section 2, illustrates the different forms of incentive schemes and financial participation. Section 3, describes the incidence of performance related pay schemes across and within countries and over time. Section 4 reviews what economic theory suggests may be important in assessing performance pay and financial participation schemes. In section 5, we summarise the empirical literature and highlight difficulties in identifying the causal effect of performance pay on economic outcomes. Section 6, presents evidence on the determinants of performance related pay schemes. It includes case studies with micro-data

[1] Employee Ownership Foundation, "Employee Ownership Blog. Legislative Highlight—S. 2909," April 29, 2010, on http://www.esopassociation.org/blog/template_permalink.asp?id=268 accessed on 1 May 2010.

evidence on the economic effect of incentive schemes. Last, but not least, we review the role of the Government in subsidising performance related pay, and consider possible policy responses toward performance related pay in the current economic crisis and into the foreseeable future.

2. Forms of incentive pay: Performance pay and financial participation

The principle of relating pay to performance is as old as the practice of sharecropping, in which a farmer who works someone else's land is paid with a share of the harvest. Remunerating workers "by the piece" was said by Adam Smith (1776) to be the rule in industry in the 18th century[2] and pay for performance was immediately exported to Australia in the last years of the century (Shields, 2002). Various types of performance bonus schemes, and plans in which firms shared profit with employees or encouraged them to own shares in the company existed at least since the 1840s in France, the UK and the US, as well as in Japan since the end of the first World War (Hatton, 1988; Jones and Kato, 1993). In a separate development, the first trading organisations owned by workers appeared in the UK, France and Italy in the first half of the 19th century (Cole, 1948; Desroche, 1976; Fornasari and Zamagni, 1997). Economists are generally favourable to incentive pay schemes because they are likely to motivate workers to produce more. Belief that incentives work lies at the heart of much economic analysis, but it is not an uncontested belief. Some organisational psychologists argue that extrinsic incentives such as pay for performance displace intrinsic incentives to work and actually reduce output in some settings (Kohn Alfie, 1993)

What differentiates performance pay from financial participation? Essentially, property rights sharing is what distinguishes the two forms of payment systems: in the first case, the schemes do not constitute an entitlement for the workers but are paid on a discretionary basis (tied to individual or group performance), while in the second case employees have a residual right to the firm's surplus (income or wealth).

This section reviews the different types of incentive pay. The incentives may involve relating employees' pay to their individual performance, as with piece rates or most sales commissions; or relating pay to the performance of their working group or team; and/or to the performance of the whole firm (Brown and Heywood, 2002). Schemes that connect remuneration to firm-level performance commonly involve employees participating in property rights, as "residual claimants" to the firm's profits. These forms of incentive schemes, which include profit-sharing and employee share ownership, are often referred to as employees' financial participation. As we will see, not all the schemes that come under financial participation are, strictly speaking, pay systems, but all are thought to have incentive properties and are used as incentive schemes.

2.1 Individual performance pay

Individual performance-related pay schemes can either base the whole of the individual's pay on her performance, or affect only a performance-related bonus in addition to a fixed wage or

[2] P. 185 (1979 edition).

salary. For example, pure piece rates involve payment strictly on the basis of the number of units produced by an employee. Similarly, some employees in services are paid entirely with tips from customers or with a commission on the number of contracts or products they sell. However, it is more common for employees to receive a basic wage, together with a bonus if their individual output exceeds a certain target number of pieces, or with a percentage of the sales they personally attend to in addition to the basic wage.

The examples above link the performance component of pay to an objective measure of output — the number of pieces made, the value of contracts sold, etc. Since most measures often deal with only part of the output, however, pay based on objective measures can be misleading. In addition, it is often difficult to find objective measures of output for some types of work. Accordingly, individual performance pay may also be based on subjective measures of the employee's performance. This form of performance pay, called merit pay, includes pay raises or bonuses that depend in part on managements' subjective assessment of the employee's performance. Performance may be evaluated directly by the line manager or more formally via a performance appraisal scheme that may include not only production or service targets but also colleague and client evaluations. Almost by definition, subjective measures of performance are likely to be affected by biases, whether of a personal nature or due to prejudice against or favouritism for some ethnic, gender, age, sexual preference group. It should thus be less robust to management vagaries than objective measurement. But it is also possible to discriminate indirectly, for example in the definition of the objectives or thresholds that determine performance bonuses. Many firms base pay for performance by a mix of objective and subjective elements.

2.2 Group performance pay

Whether because much modern production is based on workers acting as a group where teamwork is important or because it is sometimes difficult to measure individual performance, performance bonuses are often based on small-group performance. A team's achievement beyond a certain target, or a division's success in completing a project, may be rewarded in this way. Measures of performance may include a number of indicators, from output to rejects to time down for equipment repairs to customer complaints or praises, for example, and can be combined to determine group performance pay.

When the group whose performance is being rewarded is the establishment or the firm, group performance pay becomes financial participation.

2.3 Financial participation

Financial participation gives employees a residual claim over part of the firm's surplus, in the form of profit- and gain-sharing or dividends on employee-owned shares and variation in share value. Generally speaking, employee participation involves sharing property rights with employees (Ben-Ner and Jones 1995). Thus, employees may share in firm surpluses, i.e., profit, as in the case of financial participation, and/or in firm governance (when employees also take part in decisions).

Financial participation includes profit- and gain-sharing schemes -- which we group under the term profit-sharing -- and employee share ownership.

Profit-sharing

Profit- and gain-sharing schemes make employees' pay depend in part on the firm's performance—profit and/or other indicators of performance are used in determining the performance bonuses paid out to employees. The term gain-sharing is sometimes used for schemes that are not strictly based on profit. For example, quality or productivity indicators may enter the computation of firm or establishment performance instead of, or together with, profit.

BOX 2.1 - Forms of Government Support for Incentive Pay

In a number of countries, the state regulates and supports certain types of incentive pay. Profit-sharing and employee share ownership schemes have been the main forms subsidised by governments since the aftermath of the second World War. Until the 1980s, the rationale for support did not explicitly involve improving firm performance. A general desire to increase the involvement of employees in the affairs of the firm seems to have motivated, for example, the US ESOP legislation and the French support for profit sharing under de Gaulle (Uvalić, 2008). Equity considerations, such as the desire to redistribute wealth, seem to have been as important as an overall objective to promote growth in the French case, as well as the perception that savings needed to be encouraged, as in the 1950s and 60s legislations in France and Germany. While performance — in the form of "competitiveness"-- has been more often cited as an objective of state support for financial participation since the 1980s, other goals such as the promotion of a "share-owning democracy" in Britain in the late 1980s or encouraging employee involvement, remain important.

Tax incentives

Several countries promote employee financial participation through a range of fiscal incentives, while other countries offer little or no fiscal support. In this respect, countries vary along a number of important dimensions:

- The tax rate applied (i.e. the tax rate applied to share schemes ranges from 0% in some countries to more than 50% in others)
- The type of tax applied: some countries apply income tax to gains from share schemes, while others apply capital gains tax. Several countries provide payroll tax and/or income tax exemptions on profit-sharing bonuses.
- The types of financial participation scheme eligible for tax relief (i.e. in Ireland and in the UK, for example, tax concessions are available for various share-based schemes but not for cash-based schemes).
- Tax advantages may be offered for companies, employees or both, or even for banks providing the finance to purchase shares to be allocated to employees, as in the US.
- Minimum retention periods – The UK's new Share Incentive Plan (SIP) requires employees to leave their shares in trust for a minimum of five years to avail of tax relief, while the Irish Profit-Sharing Scheme imposes only a three-year block. Deferred profit-sharing bonuses only attract tax concessions if they are not cashed by employees for several years in France.
- Different criteria for tax approval and differences in payroll and corporate tax systems make it extremely difficult to extend financial participation schemes across national boundaries.
- The timing of taxation differs between EU Members. Employees who move across borders may be taxed twice on the same benefits, or may face no tax at all.

Legal frameworks

The legal frameworks for employee financial participation are very different across countries: some have no legal provisions at all, while others have quite elaborate and well-established legislative structures (Poutsma, 2001). For example, in **France** where the legislation is highly supportive (i.e. profit sharing for medium sized and large firms is mandatory) incentive schemes are widespread; conversely in **Greece**, where the legislation is less supportive financial participation schemes are less common.

Profit-sharing bonuses may be paid in cash, or deferred, -- i.e., made available to the employees with a delay of several years after being awarded, with the funds kept in savings accounts, invested outside the firm or kept within the firm. Firms sometimes also pay profit-sharing bonuses in the form of shares of the company (or share options) combining in this way profit sharing and employee share ownership (see below). Although most profit-sharing schemes in some countries (i.e., France) link bonuses to company or establishment-level profit, many combine this with other indicators of collective performance such as sales, absenteeism, quality, etc. These indicators constitute the main basis for profit sharing in many firms and countries (i.e., Germany). Individual employees' bonuses may all be equal in a given firm or may depend on wages, lengths of service with the company and/or on individual records, i.e., of absenteeism. Regulated schemes, such as the French ones or the former British profit-related pay, may specify that all or most employees must be eligible ("broad-based" schemes) on the same terms.

An important issue for the potential economic effects of profit sharing is whether the formula for determining bonuses is known beforehand to employees (as in most regulated European schemes and Japanese ones) or whether the level of bonuses is left to the discretion of management in any given year, as with many US profit-sharing schemes.

Profit-sharing is widespread in Western Europe, the US, Canada (Long, 2002) and Japan, as well as in a number of other countries (see Section 3 below). France and Germany started subsidising profit-sharing (though only modestly in the case of Germany) as part of post-World-War-Two efforts in the 1950s and '60s to increase workers' savings and improve their chances of owning their own houses.[3] France also promoted the schemes as a way of redistributing wealth and encouraging growth. It required all firms with 50 employees or more in France to introduced one profit-sharing plan. Bonuses paid under both this and another, voluntary, regulated French plan are exempt from most payroll taxes (see Box 2.1). A number of other countries offer tax advantages to the firm and/or the employee, in the form of payroll and/or income tax exemptions or reductions, extra tax allowances for investment projects, etc., for schemes meeting certain criteria (typically, schemes that do not exclude certain groups of employees other than those on very temporary contracts and do not offer better conditions to certain groups of employees, and deferred schemes). Mexico, like France, has compulsory profit-sharing.

Employee share ownership

Employees may own shares in the firm in which they work. Firms frequently offer free or discounted shares to employees as part of a profit-sharing scheme or an on-going incentive plan. However, in many cases employees acquire shares in different circumstances, for example as a result of the privatisation of their employing firm or an employee takeover (though employee ownership may still have incentive effects). A key difference is that an employee share ownership scheme will provide for acquisition of shares by new employees on a continuous basis, whereas privatisation, for example, is likely to be a one-off operation introducing future differences between continuing and new employees.

[3] In both countries the legislation was part of the reconstruction effort and in part a response to post-war housing shortages. The idea was that, with sufficient savings, workers might get houses built for themselves and their families. In Germany under the law on the accumulation of capital *Vermögensbildungsgesetz*. See OECD (1995).

Schemes in which employees own shares of the firm in which they work link the employees' wealth to the firm's performance by virtue of their being shareholders as well as employees. If the shares are tradable (the most common case in firms that are not entirely owned by their employees) employees' incomes will be affected by the firm's performance in the form of dividends, and their wealth will depend in part on the share price. In this sense, employee share ownership, unlike profit sharing, may involve losses as well as gains for employees. This risk, added to employment risk, may make employee share ownership a poor vehicle for pension investment, though many employee stock ownership schemes serve as pension plans in the US and an increasing number of European company pension schemes allow investment in company stock.

Tradable shares also mean employees can realise their wealth by selling their shares. This possibility may work to their advantage but can make employee share ownership being unstable, as happened in many transition countries where employees often sold off their shares in the years following privatisation. On way to increase the stability of a scheme is to establish a trust that holds employees' shares for part or all of the duration of the scheme. In such a case, employees often have a say over who manages the trust and may elect trustees or have their trade union manage employee voting rights. However, many employee share ownership schemes do not give employees' shares voting rights, which means that employees participate in surplus but not in the governance of the firm, just as they do with profit-sharing schemes. The US term ESOP refers to a specific type of government-subsidised scheme, the Employee Stock Ownership Plan, under which a firm can take out a subsidised bank loan to buy some of its shares for its employees. As the firm pays back the loan from profits, the shares, which are initially held in trust for the benefit of employees, are gradually released to employees. A similar system (though without the subsidy) has been used in the UK.

While it is clear that many firms adopt employee share ownership as an incentive scheme or a way to reward employee loyalty, share schemes have also been set up by firms as a protection against hostile takeovers, especially in the US. Another reason that is often invoked for adopting financial participation in general has been to keep labour unions out, in particular among US firms. However, both in the US and in several European countries, unions have been frequently involved in negotiating the introduction of financial participation schemes for their members (see box below).

Governments have also supported employee share ownership as a way to promote employee involvement in the affairs of the firm, as in the US with subsidisation of a scheme called ESOP--Employee Stock Ownership Plan. Under the scheme, a firm can take out a government-subsidised bank loan to buy some of its shares for its employees. As the firm pays back the loan from profits, the shares, which are initially held in trust for the benefit of employees, are gradually released to employees. A similar system (though without the subsidy) has been used in the UK for management-employee buyouts (Pendleton et al 1998). UK governments have supported employee share ownership both as a form of employee involvement and a way to promote share ownership generally. Thus, tax incentives were shifted from profit-sharing to employee share schemes in the 1990s. Earlier, employee share ownership had been a feature of a number of UK

privatisations, which were in part aimed at promoting wider share ownership among the population.

Mass privatisation was a feature of the early transition from centrally-planned to market economies in Eastern and Central European countries, several of which have since joined the European Union or are expected to join, and in several countries of the Confederation of Independent States (CIS) formed by former Soviet republics. The process resulted in an unprecedented—and unexpected—level of employee ownership, though this was not as a rule set up to include new employees in the future and has since largely disappeared (see Section 3).

BOX 2.2 Employee-owned firms

In some firms employees share all the available profit among themselves and own all or most of the capital. A series of studies comparing the incentive effects of these two forms of financial participation among employee-owned firms (e.g., Estrin and Jones 1995) found the amounts of both capital ownership and profit-sharing to increase total factor productivity. In his review of early studies of the effects of financial participation on productivity in conventional and employee-owned firms, Doucouliagos (1995) concluded that profit sharing and employee share ownership had stronger positive effects in employee-owned firms.

Famous employee-owned firms include the ***Mondragon*** group of worker cooperatives (Mondragon Corporación Cooperativa, MCC) from the Basque country in Spain, and the ***John Lewis*** Partnership, a chain of department stores and supermarkets in the UK. MCC employs over 100,000 people worldwide. John Lewis has over 60,000 employees in the UK.

In firms owned by their employees, employee-owners usually elect senior management and receive any profits that are not ploughed back into the firm. Cooperative rules sometimes allow limited outside investment and employment of non-member workers, but the bulk of capital is owned by employees and the majority of employees are members.

There are ***two broad types*** of employee-owned firms.

In the US, and in part of the cases in the UK, as well as in many cases of privatisation by employee buy out, the firm is set up like a ***classic company, but owned by its employees***, with shares that are to a certain extent tradable (the firm's rules often require approval by the membership before a share is sold outside the current membership) and appreciate in value with the value of the firm. However, members typically have one vote per person, whether because they are required to hold the same amount of capital or because the firm has a "one member, one vote" rule, as in cooperatives.

The other, more frequent type of employee-owned firm is the ***worker cooperative***, which can be found in Italy, Spain, France and the UK, for example. In this type of employee-owned firm, worker members own some of the capital individually but their membership shares are not tradable. The cooperative rules may allow members to accumulate individually-owned capital over their career with the cooperative, as in Mondragon and in the French case (Arando et al 2010). The remainder of the cooperative's capital is owned collectively by the members and cannot be split. The "one member, one vote" rule applies, as well as other cooperative principles like open and voluntary membership.

There are more than 25,000 worker cooperatives in Italy[4], and as many in Spain, about 2,000 in France, and probably more than 500 employee-owned firms of both types in the UK. Employee-owned firms are larger on average than conventional ones in France and Italy, and can be found in most industries, though they are relatively more present in manufacturing and less in services than conventional firms (Pencavel et al 2006, Fakhfakh et al 2010). Worker cooperatives often survive very long, and the oldest currently trading ones in France and the UK were created in the late 19th century (Pérotin 2006). Studies on the US, Italy and France suggest employee-owned firms are at least as productive as conventional firms (Pencavel and Craig 1994, Estrin 1989, Fakhfakh et al 2010). A growing body of evidence indicates employee-owned firms adjust pay more than employment to changing demand conditions and may thus preserve jobs better in recessions (Craig and Pencavel 1992, Pencavel et al 2006, Burdín and Dean 2009).

[4] We are grateful to Alberto Zevi for supplying the figures.

3. Performance Pay and Financial Participation Today[5]

In recent decades, the incidence and diffusion of incentive pay schemes and financial participation has grown in Europe and the US along most of the dimensions discussed in the previous section.

Individual incentive schemes have a long standing tradition in agriculture and manufacturing industries, where periods of rapid growth alternate with declining phases. For example, the diffusion of piece-rates after increasing significantly during the industrialisation phase (with the growth of the manufacturing industry), have progressively declined together with the shrinking of manufacturing, while they are quite widespread in some service occupations such as sales. More recently, the advances in information and communication technologies (ICT), by reducing the costs of monitoring performance – i.e. collecting and processing information --, have altered the benefits and costs of different incentive pay schemes. On the one hand, ICT has made it easier to appraise output and design optimal incentive schemes (i.e. through quality of line production), thus contributing to a resurgence of individual pay schemes (such as, piece-rates). On the other hand, ICT also contributed to a better monitoring of inputs thus reducing opportunities for shirking and the need to pay incentive premia. At the same time, the rise of team production and the recognition that most jobs – even simple ones — are multi-task has reduced the ambit for individual performance based pay in favour of subjective measurement in individual performance systems (such as, merit pay). In particular, firms make choices regarding the technologies they deploy in the workplace to operate efficiently, these choices have important opportunity costs that depend on the economic environment as well as on country-specific institutional features. When deciding their pay system, firms need to take into account all the relevant features (i.e. at the micro and macro levels), as well as the role of the State, in order to provide in each context the appropriate set of incentives to managers and employees.

In this section, we provide cross-country evidence on the incidence and growth of incentive pay and its relation to country differences in regulations of the labour and product markets.

Studies for the US in the 1980s-1990s reported that 5 to 10% of employees had some form of incentive pay, with wide differences by industry (i.e. ranging from 2% in the chemical industry, to 26% in the service sector) and occupation (i.e. from 2% in low skilled blue-collar occupation up to 21% in sales occupations) (see Carlson, 1982; Brown, 1990; Bonars and Moore, 1995; Barkume and Moehrle, 2001; MacLeod and Parent, 1999). Studies for the US in the late 1990s-2000s, report much higher figures for incentive pay, suggesting significant growth in the percentage of employees covered by incentive pay schemes. Indeed, comparing data from 1994/95 to 2003/04 in a variety of US data sets Dube and Freeman (2010) conclude that indeed there was a huge increase in group incentive pay from the 1970s through the 1990s. Lemieux, McCleod and Parent (2009), using PSID data, estimated that 15% of workers with incentive pay in a given year while 37% held jobs in which a worker 'ever' received incentive pay, and 45% of workers were in one of the two groups. In the PSID the share of employees in jobs with incentive pay ranged from 30% for craftsmen to 78% for sales workers; while share by industries ranged from a low of 33% in mining and durables to a high of 65% in finance, insurance, and real estate. Lazear and Shaw (2008) report that close to 67% of firms used individual incentives for more than 20% of workers while 24% of

[5] This section has benefited from the collaboration of Elena Cottini, see Cottini and Lucifora (2010)

firms had gain-sharing schemes for more than 20% of workers. Evidence from the 2002 and 2006 special modules of the GSS show that financial participation schemes (i.e. profit sharing, gain sharing or employee share ownership) cover up to 47% of employees (Freeman, et al. 2009; Kruse, et al. 2010).

Surveys of company pay practices in Europe show widespread adoption of the schemes in the late 1990s, at least among larger firms (Cranet e-survey and EPOC). Nearly one in two companies (45%) with more than 200 employees reported having some form of sharing schemes, with one-third (31%) having an employee share ownership scheme. However, comparable figures for employee coverage show lower incidences of 10-12% for sharing schemes and 2% for ownership schemes. This reflects the fact that in most firms only a small minority of workers receives incentive pay while few firms with less than 200 employees are likely to have any scheme. Even in industries where a large proportion of companies have schemes, the take-up is limited to a small share of total pay. Evidence from selected studies and EU reports on employees' financial participation[6] shows that the overall incidence of group incentive pay in the private sector has been growing, but at 12% to 15% falls short of the levels in the US. On average less than one-fifth of European employees have ever received some form of incentive pay. In the public sector there is evidence of declines in the use of incentive pay in several countries (see Box 3.4).

Researchers have investigated the patterns of incentive pay among firms, determinants of the type of compensation chosen by firms and the effects of the mode of compensation on performance in some European countries.[7] These studies show that mandatory provisions for incentive schemes (often above a given firm size level), or the introduction of strong fiscal incentives (such as reduced taxation for variable components of pay) are among the main determinants underlying the diffusion of incentive pay in a given country, and account for the significant differences in the incidence in sharing and ownership schemes in European countries.

It is difficult to make strong comparative statements about country differences because data from official sources on the incidence and diffusion of incentive pay is relatively scarce. In the US, until the General Social Survey asked about the structure of incentive pay schemes in special modules on 'quality of work life' (2002 GSS) and 'shared capitalism' (2002, 2006 GSS), there was no single nationally representative source of data available. Similarly, in the EU, with the exception of the *ad hoc* Cranet, EPOC and EWCS surveys there are no official sources of representative data on incentive pay. Most available data on earnings do not provide information on the number of workers covered by incentive schemes, whether a bonus tied to performance has been paid, or on the share of individual or group incentive bonuses on total pay (see Box 3.1 for a discussion of the existing data and measurement problems). Furthermore, there is often confusion on the nature of the incentive schemes as firms may label very different schemes the same way and as the same nominal scheme may be implemented differently by firms. For example there are significant differences in the design and implementation of incentive schemes in public and private sectors because productivity measurement and appraisal in public sectors is difficult. There are also differences between in profit versus non-profit oriented firms, where employees' intrinsic

[6] Brown and Heywood, 2002; IV Pepper report, 2009; Poutsma, 2001; European Foundation for the Improvement of Living and Working Conditions, 2007

[7] Blinder, 1990; Cahuc and Dormont, 1992; Meade, 1986; Estrin et al., 1997; Conyon and Freeman, 2001; Kato and Morishima, 2002; Barth et al., 2006, 2009; Pendleton et al., 2009

motivation may make incentive pay counterproductive. Similarly, incentive schemes for employees with permanent as opposed to fix-term contract can differ substantially, particularly when the incentive schemes take the form of deferred payments.

BOX 3.1 - Data and measurement issues

Information on performance related pay is scarce, not always representative or up-to-date and dispersed in a variety of sources both at the national, as well as the international level. This heterogeneity is also reflected in the differences that exist in the reported figures for the prevalence of incentive pay. Different sources of the data and differences in the measurement of the incentive variable are the main reasons for the heterogeneity in the figures reported in most comparative studies. While a wide set of nationally representative data set also exists with detailed information on incentive pay (for example, Workplace Employment Relations Survey (UK), Enquête Réponse (FR), Integrated Database for Labour Market Research (DK), German Socio-Economic Panel (DE), California Establishment Survey (US), etc.) in this box, we only focus attention on the main international surveys (for the EU or US) which have been used in empirical studies, and discuss some of the measurement issues.

International data

- **EWCS, European Working Conditions Survey (EU)** – It is a random samples of individuals in EU countries, conducted since 1991 at approximately 5-year intervals. All member states of the EU (since 1991) and acceding, candidate and EEA countries (since 2005) are covered. Extended information on incentive pay systems (i.e. piece rate, profit/gain sharing, and share ownership), as well as workers characteristics, job/firm attributes as well as HRM practices. (see http://www.eurofound.europa.eu/ewco/surveys/)

- **EPOC, Employee Direct Participation Organisational Change Survey (EU)** – It is a random sample of establishments with more than 50 employees in the non-agricultural sector. It covers 10 EU member states. The survey was only occasionally conducted in 1996. It provides information on profit/gain sharing schemes and share ownership (broadly defined) in the establishment. (see http://www.eurofound.europa.eu/areas/participationatwork/epocsurvey.htm)

- **CRANET, Cranfield Survey on International HRM (International)** – This is a survey conducted in 30 countries, it has been running since 1990 using standardised questionnaires sent to private and public organisations. It is not a representative survey, and response rates are 15%, on average, of the total number of questionnaires. It covers over 5,500 EU companies (in 2005) with more than 200 employees, and provides information on the presence of collective/group bonuses, profit sharing and share options, as well as a number of HRM practices. (see http://www.cranet.org/data/data.htm)

- **GSS, General Social Survey (US)** - The GSS is a representative samples of US individual and contains a standard 'core' of demographic, behavioural, and attitudinal questions, plus topics of special interest. The first survey dates back to 1972, but special modules with information on incentive pay systems are available in 2002 ("quality of work life" module) and 2006 ("shared capitalism" module). Detailed information on piece-rate, individual and group bonuses, profit/gain sharing and share ownership is available. (see http://www.norc.org/GSS+Website)

- **PSID, Panel Study of Income Dynamics (US)** - The PSID is a longitudinal study of a representative sample of U.S. individuals. The survey provides information on household composition, individual characteristics, health conditions and work status. Data have been collected since 1968 on nearly 70,000 individuals (in 2005) spanning as much as 37 years. Along with employment status, it provides information on the composition of pay and whether the individual has received individual, group or other type of bonuses. (see http://psidonline.isr.umich.edu/)

- **WRPS, Worplace Representation and Participation Survey (US, UK, IR, CAN, AUS, NZ)** – These are national surveys conducted in a number of English-speaking countries. The surveys were conducted in the various countries at different point in time (started in 1994 in the US, by Richard Freeman and Joel Rogers, and continued up to more recent years), and cover several thousands of employees per country in the private sector in medium-large sized firms.

The data provide information on workplace practices and attitudes of workers, on modes of compensation, including individual and group bonuses as well as share ownership schemes.
(see http://www.lse.ac.uk/collections/manpower/datasets/wrps.htm)

- **ECI, Employment Cost Index microdata (US) –** It is a quarterly survey measuring changes over time in the cost of wages and various nonwage compensation costs. The data are derived from employers' administrative records and cover, first establishments (in private, non-agricultural industries) and then jobs (one to eight jobs) within each establishment. The data provide information – for the sampled jobs - on wages, components of pay and fringe benefits. (see http://www.bls.gov/data/#wages)

- **NLSY79& NLSY97 - National Longitudinal Surveys (US) –** It is a nationally representative sample of young men and women born in selected years (1957-64 & 1980-84) and first interviewed in 1979 and 1997, respectively. It provides information on labor market experiences, training investments, schooling, family income, health conditions, geographic residence and components of pay. (see http://www.bls.gov/nls/)

Measurement issues

There are various way to measure the relevance of incentive pay schemes. Depending on the nature of the data, the sampling frame and the questions asked, the indicators can take different forms. Table B3.1 below list some of the indicators more frequently used in the literature.

TABLE B3.1 – Indicators of performance related pay: coverage and type of incentive scheme

Coverage:
- Workplaces or organisations using PRP schemes (as % of those surveyed)
- Workplaces or organisations with at least 20% of employees covered
- Employees in workplaces who are covered by PRP schemes (as % of all employees in the firm)
- Employees who receive incentive pay (self-reported)

Type:
- individual bonus (merit pay or piece-rates)
- group bonus (occupation or team)
- profit sharing (company level: discretional, pre-specified formula, etc.)
- gain sharing (bonus based on other output)
- share ownership (deferred and others)

Composition of pay:
- number of incentive schemes in place
- share of incentive pay over total compensation

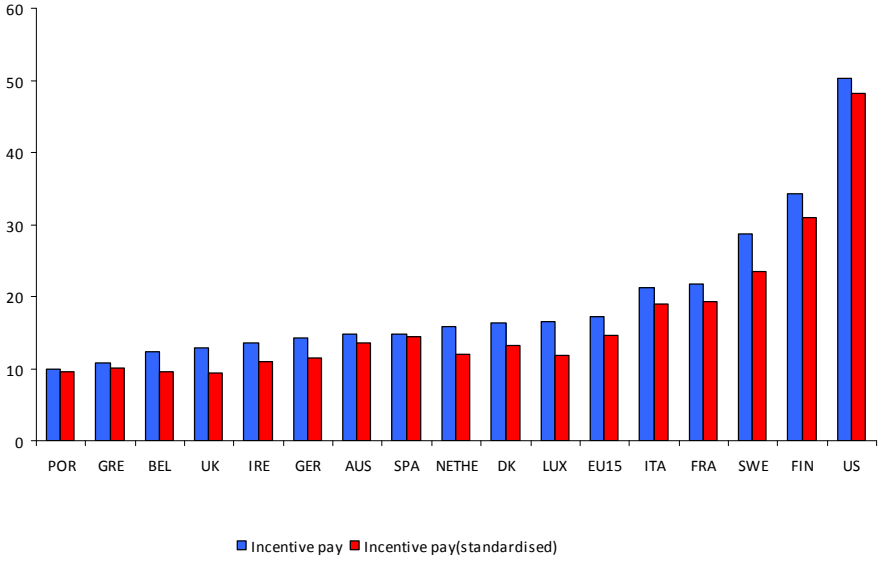
While the above indicators all convey important information on the incidence, coverage and diffusion of incentive pay schemes, information from survey data is rarely available with such detail. In most cases, the incentive pay indicator is based on a dichotomous variable recording whether the firm has any incentive pay schemes in place, or whether individual employees are covered by incentive pay. The information on the share of total pay accounted for by incentive pay is only very seldom available. Hence one lesson that can be drawn from the above discussion of measurement issues indicates that particular care should be used in cross-country comparisons and that harmonised survey data are to be preferred to comparison of country specific survey.

New Comparative Evidence

To help deal with the data problem, we have examined evidence on incentive pay and financial participation in two surveys of individuals in households – the EU's EWCS and the US's GSS, which have a similar multi-stage stratification procedure. While the EWCS only covers employed workers, this creates no problem so it is easy to draw only employed workers from GSS. The surveys provide detailed information on individual bonuses and piece-rates, profit/gain sharing and share ownership schemes, employees' characteristics, firm attributes and additional work organisation practices. One drawback is that EWCS data do not provide separate information on work-group performance pay (while GSS does), thus in the empirical analysis that follows, we include all kind of group-performance bonuses with profit/gain sharing schemes. We use the latest waves available, the 2000 and 2005 surveys for EWCS data, and the 2002 and 2006 surveys for the GSS. Since, data on new member countries of the European Union is available only in 2005, we focus on the EU15, giving attention to new member countries in Box 3.3. Detailed information on sampling procedure and the exact wording of the incentive pay questions are reported in the Data Appendix. Moreover, in order to minimise potentially confounding factors, we restrict attention to employees with a permanent contract, employed in private sector and in profit oriented firms only. We also do not consider managers and CEOs, which are covered by Conyon et al., (2010).

Figure 3.1 reports the ranking of countries by the share of workers who receive any form of incentive pay (i.e. individual, profit/gain sharing and share ownership schemes). It shows striking differences in the diffusion of incentive pay across countries[8].

Figure 3.1: Incidence of incentive pay, by country (pooled years)*



Source: EWCS (pooled 2000-2005) and GSS (pooled 2002-2006) data
Notes: Indices are computed using sampling weights

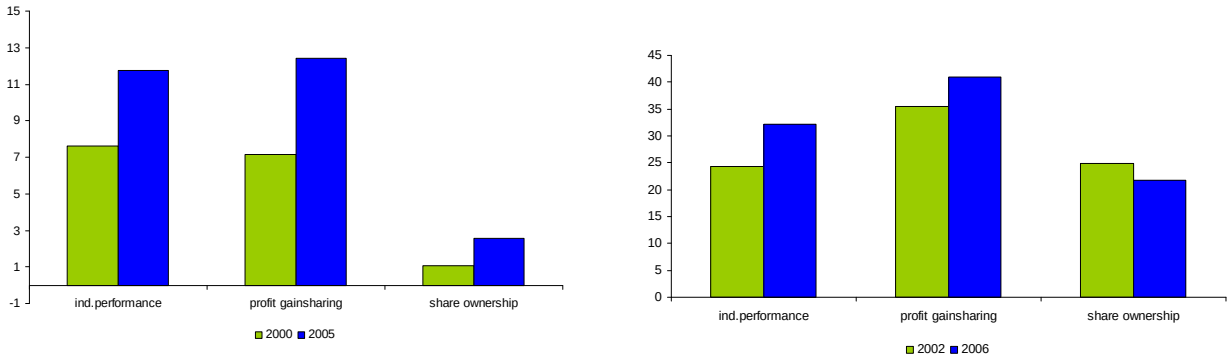
[8] Problems of comparability due to measurement error, cross-country differences in definitions and measurement of incentive pay, differences in institutions, and government policies as well as long-term macroeconomic conditions are not large enough to gainsay the pattern in the figure.

Figures range from around 10-15 percent in some Mediterranean (Portugal and Greece), Continental (Belgium and Germany) and Anglo-Saxon (United Kingdom and Ireland) countries, to 30 and over 40 percent in Scandinavian countries (Sweden and Finland) and the US. Adjusting for some observable industry and firm attributes to create our standardised index)[9], does not change the ranking of countries.

The aggregate figures do not show key differences in the prevalence of the schemes adopted and in the diffusion of incentive pay over time across Europe and the US. To get a finer picture of the cross-country differences, in figure 3.2 (panel a, b) we compare the incidence (for private sector workers) by type of scheme (i.e. individual PRP, profit/gain sharing and share ownership schemes), over the 2000-2006 period[10].

Figure 3.2 : Individual performance related pay and financial participation in Europe and US

a) Europe (2000-2005) b) US (2002-2006)



Source: EWCS (2000-2005) and GSS (2002-2006) data.
Note: figures are computed using sampling weights

This shows that individual pay schemes after declining for some years have now began to increase again. However, individual pay schemes combine merit bonuses and piece-rates, that can be either an innovative individual compensation method -- allowed by the lower monitoring cost of new production technologies --, or traditional piece-rates. Also, the diffusion of profit or gain sharing schemes is likely to depend on whether mandatory provisions or government subsidies through fiscal incentives and other forms of contribution are present (see Box 2.1). This heterogeneity is apparent when combining incidence and trends of incentive pay across countries. In table 3.1, we classify countries according to their (average) diffusion of overall incentive pay (i.e. any of individual/piece-rate, profit/gain sharing and share ownership) at the beginning of the period, and the change occurred over the 2000-2006 period.

[9] The standardised index is the mean incidence of incentive pay, conditional on industry and firm size. Technically, it is derived as the estimated country fixed effects from a cross-country panel regression that includes firm size and a full set of industry dummies as additional controls.

[10] Notice, that this evidence only concerns employees' coverage of incentive schemes and says nothing about the contribution of incentives to total compensation.

Table 3.1: Country patterns in incentive schemes

		Change in incidence (2000-2005)§	
		High	Low
Incidence (2000) §	High	AUS, SPA, ITA	FRA, SWE, FIN, US, GER
	Low	POR, GRE, BEL, IRE, LUX	DK, UK, NETHE

Source: EWCS and GSS data.
Note: § 2000-2005 EWCS; 2002-2006 GSS. Computed using sampling weights

Austria, Italy and Spain exhibit both a high-incidence and a significant (positive) change in the diffusion of incentive schemes over the 2000-2005 period. Most other high-incidence European countries (FIN, FRA, SWE, GER) and the US are characterised by a fairly moderate increase in incentive pay schemes over the same period.

Conversely, countries with initially lower incidence and diffusion of incentive pay (BEL, GRE, IRE, LUX, POR) show a catching-up with respect to high-incidence countries. Finally, there is a group of countries (DK, NETHE, UK), that show a lower than average incidence and moderate (positive) rate of change in incentive pay diffusion.

BOX 3.2 - Factors that explain the rise/fall in incentive pay

Factors that contribute to the rise of incentive pay

- increased competition and openness (due to product market deregulations and globalisation) which drive intensive search for efficiency-enhancing measures at the level of the firm
- skill biased demand for highly productive workers (i.e. technological change and globalisation increase the relative demand for high productivity workers and the need of performance-pay schemes)
- need to increase wage flexibility (i.e. incentive pay can grant greater flexibility of the wage bill over the business cycle)
- falling cost of collecting and processing information with advances in information and communication technologies
- governmental support for financial participation plans (i.e. fiscal incentives or contributions)
- diffusion of decentralised and local bargaining
- decline in union influence and diffusion of participative management
- adoption of 'High Involvement Management' practices (such as, flexible work assignment, cross training, teamwork, etc.)

Factors that constitute an impediment to the diffusion of incentive pay schemes

- High product market regulation
- Small sized firms and family run companies
- High labour turnover (i.e. job churning)
- Less developed financial market (i.e. particularly with respect to share ownership schemes)
- Union opposition and the general industrial-relations climate: (i.e. incentive pay may conflict with traditional union policies of pay compression)
- Intermediate or sectoral wage bargaining (i.e. limits the possibilities of differentiating pay depending on individual company performance)

Determining the relative importance of the different factors is not straightforward, as implied by some of the literature on these issues (for a review see European Commission, 1991, 1997 and 2006), since several variables are hard to measure and a large number of potentially confounding effects are at work. In Box 3.2, we simply review the main factors that have been proposed in the literature as the main determinants (or impediments) to the diffusion of incentive pay schemes, while in the forthcoming sections, we further explore some empirical regularities that characterise the patterns of incentive pay within (section 3.1) and across countries (section 3.2).

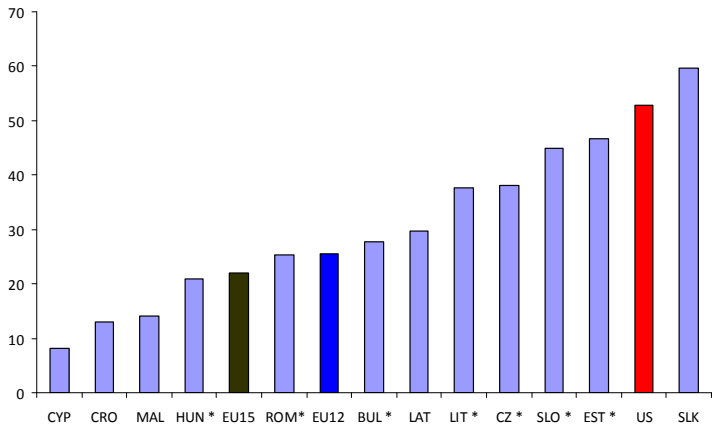
BOX 3.3 : Incentive Pay in New Member Countries of the European Union

The literature looking at incentive pay and financial participation in new member countries of the European Union, particularly for Eastern European countries, has often made reference to the legislative framework developed in the transition phase with respect to the widespread privatisation of previously publicly owned companies, and by the provisions of other laws, most importantly those on cooperatives (Earle and Estrin, 1998). Although the legislative framework was primarily designed to transform ownership of all or parts of companies from state to private, and not directly aiming at the diffusion of incentive schemes, the effects on employees' and financial participation have been substantial (for a detailed review see PEPPER III Report, 2006).

In this box we use the most recent wave of ECWS data (i.e. year 2005) to report on the incidence of incentive schemes and financial participation patterns in new member countries of the European Union.

Figure B.3.1. shows the percentage of employees in new member countries whose pay includes some form of incentive pay and participation in company profits or shares in their companies. For comparison purposes, we also report the EU15 average and the incidence for the US.

Figure B3.3.1. - Incidence of Incentive pay, by country (2005) (*)

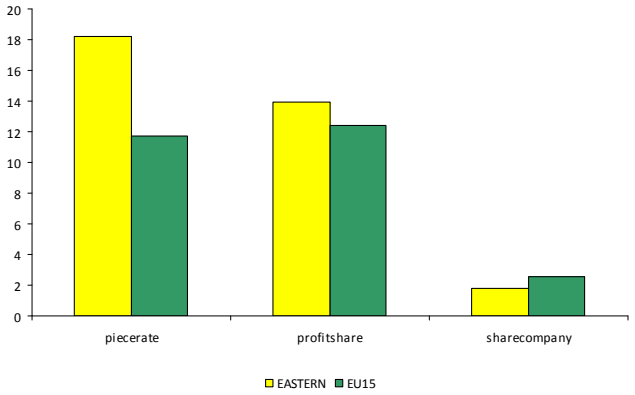


Source: ECWS data

Note: (*) In HUN, ROM, BUL, LIT, CZ, SLO, EST the individual pay component accounts for more than 15% of total pay.

With few exceptions, the incidence of incentive pay schemes is higher in New Member Countries as compared to the members of the EU15. Countries such as Slovenia, Estonia and Slovakia have incidence rates that are comparable to the US. This partly reflects factors such as union weakness in the transition and post-transition phase and the salience of piece rates in some of the new member states. The incidence of financial participation in the new member states (as reported in Figure B.3.2) is close to the EU15 average.

Figure B3.3.2. - Type of Incentive pay



Source: ECWS 2005 data

Employee share ownership declined post-transition in some of the new member countries of the European Union. Employees have not held onto their shares and have progressively sold them, while there were no share ownership provisions for new employees (for recent evidence in transition countries see, Jones, 2004; Estrin et al. 2009).

3.1. Empirical regularities within countries

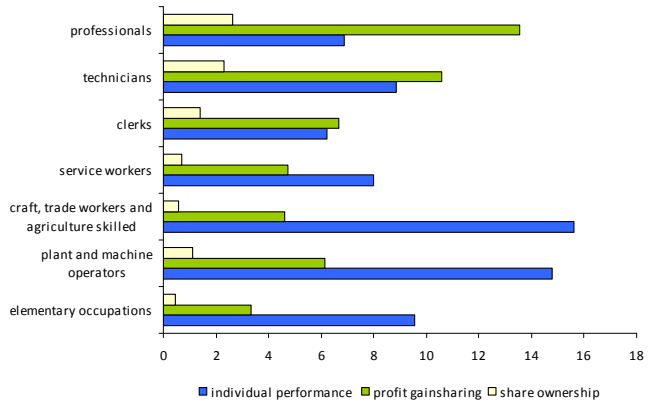
We report some empirical regularities that characterise the diffusion of incentive pay in Europe and in the US by occupation, industry and firm size. In comparing our figures with other studies we note that our sample only includes private sector employees with a permanent contract.[11]

Figure 3.4 reports the distribution of individual pay schemes, profit/gain sharing and share ownership schemes by selected occupations in Europe and the US. In both Europe and US, the diffusion of profit/gain sharing schemes and share ownership is greater in high skilled than low-skilled occupations. In Europe, individual schemes appear widely diffused also in low-skilled occupations while in the US incidence of individual schemes is higher in high-skilled jobs.

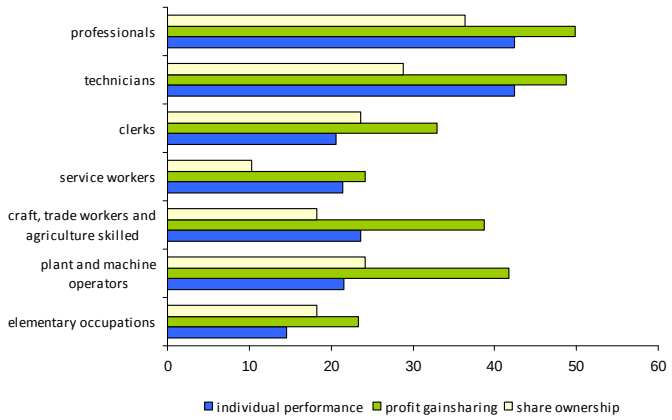
Figure 3.4: Individual PRP, profit sharing and share ownership by occupation, Europe and US

[11] Managers and CEO have been excluded from the present analysis since they are the exclusive focus of another chapter in this report.

a) Europe



b) US

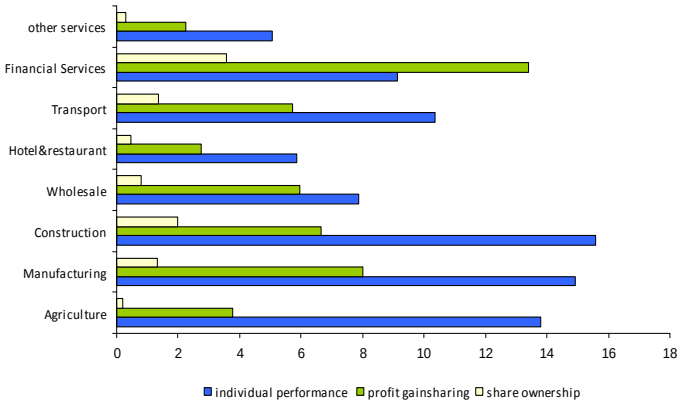


Source: EWCS (pooled 2000-2005) and GSS (pooled 2002-2006) data
Note: CEO and Managers are excluded. Sampling weights are used in the calculations.

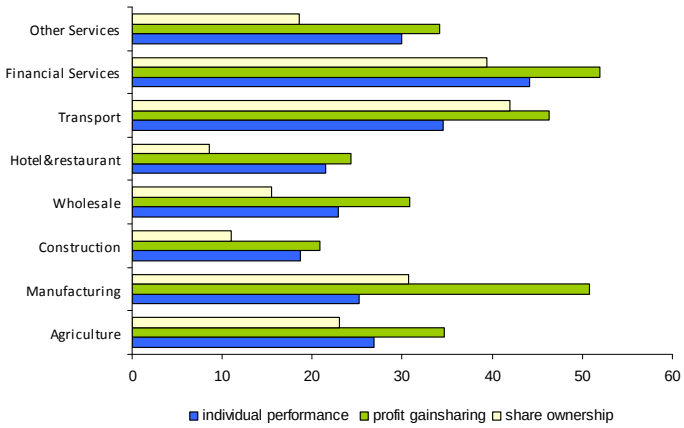
Turning to the distribution of incentive schemes by industry (figure 3.5), our data show that they are more diffused in manufacturing and financial services, and less prevalent in hotel and restaurant and in other services industries. The main difference between Europe and the US lies in the relative importance of individual and piece-rates pay schemes relative to financial participation schemes.

Figure 3.5: Individual PRP, profit sharing and share ownership by industry, Europe and US

a) Europe



b) US



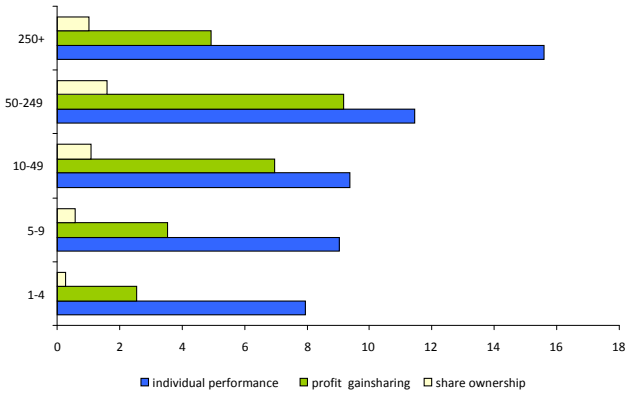
Source: EWCS (pooled 2000-2005) and GSS (pooled 2002-2006) data
Note: Sampling weights are used in the calculations.

Finally, there are significant differences in the distribution of incentive pay schemes by firm size (figure 3.6). While a priori, the relationship between incentive pay and firm size is not obvious since on the one hand, monitoring costs of workers are likely to be higher in large firms, which may make it more profitable to adopt incentive modes of payment but, on the other hand, free

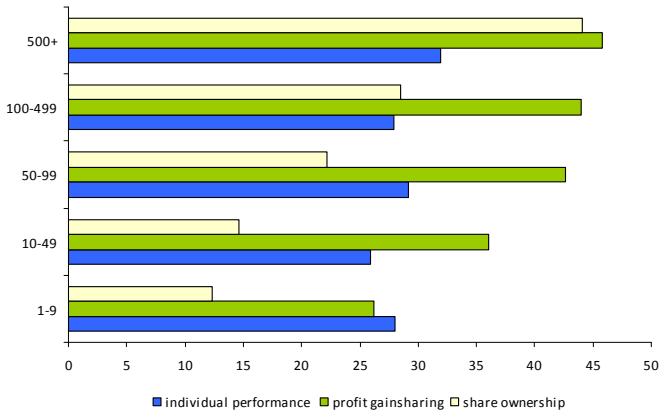
riding behaviour should make the incentive effects weaker. Empirically, the distribution of incentive schemes shows an almost monotonic increase prevalence with size of firm.

Figure 3.6: Individual PRP, profit sharing and share ownership by firm size, Europe and US

a) Europe



b) US



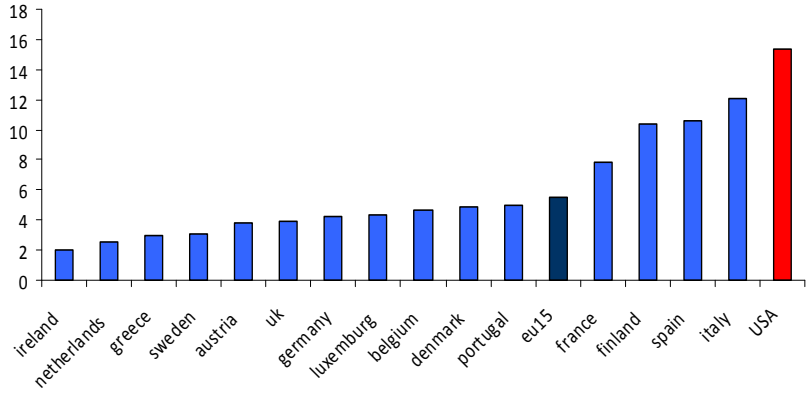
Source: EWCS (pooled 2000-2005) and GSS (pooled 2002-2006) data
Note: firm size bands differ between EWCS and GSS data. Sampling weights are used in the calculations.

The patterns described above suggest different propensities for workers and firms to end up with performance related pay schemes depending on what they do and where they do it. We next seek to drill deeper into the factors that are more frequently associated to incentive pay schemes by looking at the correlates of the probability that the compensation an individual worker receives is linked to performance and the correlates of firms adopting incentive pay and financial participation.

BOX 3.4 : Incentive pay in the public sector

The diffusion of incentive schemes in the public sector of most industrialised countries is reported to be much lower than in the private sector (European Foundation, 2007). In this box, we ask why this is the case and we investigate the patterns of incentive pay in the public sector across countries. A number of explanations have been discussed in the literature. First, incentives in the public sector could simply be 'optimally' low. High-powered incentives (i.e. such as individual PRP) may be disruptive in certain circumstances as they induce excessive competition, whereas public services requires employees cooperation. Second, public sector output is hard to measure: team work, multiple objectives (multi-tasking) or multiple principals are among the main cases discussed in the literature (see Burgess and Ratto, 2003; Burgess et al., 2009, for a review). Third, the contours of public sector can differ substantially across countries, from core public administration, as to include state owned companies. In this respect, the scope of incentive pay schemes may differ substantially. Fourth, public sector employees are generally more unionised, thus there is stronger opposition to pay discretion and wider wage differentials. Fourth, it is generally argued that public sector employees have higher 'intrinsic' motivation and as such do not require to be incentivised to perform well, conversely pecuniary incentive may become counter-productive as they reduce the 'intrinsic motivation' effects (Burgess and Metcalfe, 2000). It has also been argued that, being public sector jobs typically more protected, they tend to attract workers who are relatively more risk averse and, as such, they are also less willing to accept incentive pay schemes (Alesina et al., 2001).
Figure B4.3.1. reports the incidence of incentive pay schemes in the public sector across Europe and the US.

Figure B4.3.1. - Incidence of Incentive pay in the public sector, by country



Source: ECWS data

Incentive pay is less common in the public sector than the private sector in Europe and the US. Across the EU, 5 percent of public sector workers have incentive pay compared with a 15 percent in the private sector. In the US the figures are 15 percent and 48 percent respectively. There is also a significant spread across countries. In particular, France, Finland, Spain, Italy and the US feature above the EU average.

A number of studies have focused on the specificities of incentive pay in the public sector, especially in the area of health and education (Atkinson et al., 2009; Burgess and Ratto, 2003; Dixit, 2002; Eberts et al., 2002; Kahn et al., 2001; Levy, 2002). One of the key issues discussed in these studies is the role of incentive pay as a tool to attract more and better workers (Banjeree et al. 2008).

Table 3.2 reports the sample characteristics of workers in performance related pay jobs and in jobs with fixed pay only, respectively. Employees on incentive pay, as compared to those on fixed pay, are more likely to be males, more highly educated, and to have longer tenure. Incentive pay is more diffused in larger firms, in high-skilled occupations like professional, while it is lower in service jobs. Differences are generally more pronounced in the US, where pay levels are much higher for employees covered by (any) incentive pay scheme than for those who are not so covered.

Table 3.2 : Descriptive statistics: incentive schemes and fixed pay, Europe and US

	Europe		US	
	Incentive pay	*Fixed pay*	*Incentive pay*	*Fixed pay*
	(1)	(2)	(3)	(4)
Personal characteristics				
female	0.310	0.461	0.436	0.542
loweduc*	0.208	0.295	0.067	0.130
mideduc*	0.403	0.395	0.644	0.711
higheduc*	0.389	0.311	0.289	0.158
age <25 years	0.141	0.187	0.134	0.179
age 25-34 years	0.314	0.298	0.296	0.286
age 35-44 years	0.278	0.262	0.253	0.215
age 45+ years	0.267	0.253	0.316	0.321
Industry and occupations				
professionals	0.083	0.068	0.216	0.133
white	0.300	0.316	0.359	0.306
service workers	0.128	0.175	0.105	0.193

blue collars	0.490	0.441	0.320	0.368
agriculture	0.021	0.020	0.015	0.017
industry	0.642	0.548	0.513	0.568
services	0.337	0.432	0.472	0.414
Firm's size				
very small (EU1-4/US1-9)	0.103	0.180	0.159	0.236
small (EU5-9/US10-49)	0.130	0.190	0.229	0.263
medium (EU10-49/US50-99)	0.376	0.361	0.157	0.135
large (EU50-249/US100-499)	0.288	0.211	0.249	0.204
very large (EU250+/US500+)	0.104	0.058	0.207	0.162
Work attributes				
tenure	9.940	8.420	6.030	5.660
hours worked	39.113	36.765	42.966	39.689
Wages (EU-Euros/US-USD)	1,132.926	1,059.843	2,588.470	1,387.270
Nobs	3,814	20,345	668	943

Note: * the variable education for EWCS is only present in 2000.
Sampling weights have been used to compute statistics

In the Appendix table A3.1, we report the marginal effects of the probability that an employee receives some form of incentive pay based on separate probit regressions for Europe and the US. Results portray a similar pattern in the determinants of incentive pay to that shown in Table 3.2, that is lower probability of a PRP schemes for women, young workers and the less educated. The partial effects for firm size are substantial, employees in medium-big firms are characterised by a much higher probability to be in incentive pay jobs, as compared to employees in small firms.

We also investigated the association of incentive pay with various indicators of "high involvement management" practices[12] Using the probit model described in the appendix and different specifications with random and fixed country effects. The results, reported in table 3.3, suggest that high involvement management is, *ceteris paribus*, positively associated with the probability that a worker receives incentive pay. In particular, low job autonomy (-3 percent in EU; -14 percent in US) and performing repetitive tasks (-2 percent in EU; -12 percent in US) are associated with a lower probability that the worker is in a job covered by an incentive pay scheme. This is consistent with the notion that in jobs where the pace of work is dictated by the technology, workers can be more easily monitored and are less likely to receive incentive pay. Conversely, working in shifts and performing complex tasks are positively associated with the probability of a worker receiving incentive pay schemes. Long working hours defined by more than 40 hours per week show opposite effects in Europe and the US: in European countries long hours of work are associated with higher probability of incentive pay (+5 percent), while in the US the probability is lower (-5 percent). One possible explanation for this is the greater hours worked in the US, which would make, the threshold of 40 hours a different meaning than in Europe.

Table 3.3 Incentive pay and work organisation, Europe and US

	Europe		US	
	(1)	(2)	(3)	(4)
Repetitive work (=1)	-0.023***	-0.016**	-0.114***	-0.124***
	(0.007)	(0.006)	(0.022)	(0.021)
Shift (=1)	0.027***	0.016*	0.030	0.028
	(0.012)	(0.008)	(0.040)	(0.040)

[12] See section 2 for a description of HIM practices.

High work intensity (=1)	0.040***	0.036***	-0.011	-0.011
	(0.007)	(0.006)	(0.049)	(0.049)
Low Job autonomy (=1)	-0.034***	-0.029***	-0.151***	-0.138***
	(0.009)	(0.006)	(0.022)	(0.020)
Complex tasks (=1)	0.025**	0.022***	-0.033	-0.027
	(0.012)	(0.006)	(0.039)	(0.041)
Working hours>40	0.037***	0.044***	-0.050**	-0.047***
	(0.010)	(0.009)	(0.020)	(0.024)
Country random effects#	✓		✓	
Country fixed effects#		✓		✓
Rsquared	0.058	0.06	0.101	0.113
Nobs	14,544	14,544	1,530	1,530

Note: All estimates include also employee, firm characteristics and year dummies. Excluded categories are: males, primary education, <25 years, professional, agriculture, firm size <5 EU/<10 US;
For Europe we include country dummies, for US four macro regional dummies. Robust standard errors in parentheses. Significance levels: *** if p<0.01, ** if p<0.05, * if p<0.1 . Probit partial effects reported.

Next, we look at the determinants of different types of incentive schemes. For comparability between EWCS and GSS data (for the reasons discussed above), we restrict attention to individual incentive schemes and financial participation. In table 3.4, we report the estimates of the probability of receiving incentive pay fitting our preferred specification (as in column 4 an 8 in table A3.1 in the appendix). Individual characteristics appear more correlated with financial participation rather than the individual schemes. In Europe, high education is not statistically associated with having an individual incentive , while the blue collar dummy is positive and statistically significant – the opposite for the pattern in the US. The likely reason is that that individual pay schemes for employees in Europe are more often old style piece-rates rather than merit pay based on objective and subjective assessments of performance. In Europe, firm size monotonically increases the probability of incentive pay with similar magnitudes for both individual and financial participation schemes whereas in the US, there is no statistically significant effect of firm size for individual schemes and much larger effects on financial participation than in Europe.

Table 3.4 : Types of incentive schemes, Europe and US

	Europe		US	
	Individual schemes	Financial Participation	Individual schemes	Financial Participation
Employee Characteristics				
Female (=1)	-0.044***	-0.049***	-0.128***	-0.112***
	(0.005)	(0.004)	(0.026)	(0.030)
Mideduc (=1)	0.008	0.022**	0.029	0.119***
	(0.009)	(0.010)	(0.040)	(0.045)
Higheduc (=1)	0.005	0.052***	0.171***	0.257***
	(0.010)	(0.012)	(0.056)	(0.052)
age 25-34 years (=1)	0.008	0.034***	-0.006	0.063
	(0.007)	(0.008)	(0.037)	(0.043)
age 35-44 years (=1)	0.013*	0.034***	0.038	0.143***
	(0.007)	(0.008)	(0.039)	(0.044)
age 45+ years (=1)	0.001	0.024***	-0.031	0.091**

	(0.007)	(0.008)	(0.035)	(0.042)
White collars (=1)	0.006	-0.001	-0.013	-0.026
	(0.010)	(0.007)	(0.037)	(0.045)
Service workers (=1)	0.017	-0.020***	-0.096***	-0.181***
	(0.012)	(0.007)	(0.040)	(0.050)
Blue collars (=1)	0.034***	-0.056***	-0.150***	-0.136**
	(0.011)	(0.008)	(0.038)	(0.049)
Firm Characteristics				
Industry (=1)	0.013	0.012	-0.016	-0.064
	(0.016)	(0.017)	(0.093)	(0.112)
Service (=1)	-0.009	-0.004	0.034	-0.054
	(0.016)	(0.017)	(0.094)	(0.113)
small (EU5-9; US10-49) (=1)	0.014*	0.009	-0.011	0.114***
	(0.009)	(0.008)	(0.035)	(0.040)
medium (EU10-49; US50-99) (=1)	0.027***	0.024***	0.041	0.217***
	(0.008)	(0.007)	(0.042)	(0.044)
large (EU50-249; US100-499) (=1)	0.047***	0.056***	0.015	0.241***
	(0.009)	(0.009)	(0.036)	(0.039)
very large (EU250+; US500+) (=1)	0.074***	0.089***	0.012	0.291***
	(0.015)	(0.016)	(0.038)	(0.039)
Rsquared	0.079	0.104	0.077	0.106
Nobs	14,583	14,583	1,530	1,530

Note: See table 3.3. Probit partial effects reported.

Another way to examine the decision of firms to offer schemes is to ask how many incentive systems they have. Table 3.5 gives the distribution of individuals by number of incentive schemes received: no incentive pay scheme (i.e. only fixed wages), one incentive scheme (either individual or financial participation) or both. There are significant differences between Europe and the US. Only a very small proportion of European workers (1.4 percent) is covered by two schemes, while over one quarter (25.2 percent) of US workers is in a job that combine individual and financial participation schemes. The coefficients in the table are for an ordered probit equation that estimates the partial effect for the probability of receiving at least two incentive schemes. Women, the less educated, young persons and workers in blue collar and service jobs are less likely have more than one incentive scheme than workers with opposite characteristics. Size of firm also increases the chance of having a financial participation and an individual incentive system.

Table 3.5 : Number of incentive schemes: distribution and estimates (ordered probit), Europe and US

		Europe	US
Number of incentive schemes	**0**	*84.21*	*49.72*
	1	*14.38*	*25.08*
	2	*1.41*	*25.2*
Employee Characteristics			
Female (=1)		-0.068***	-0.113***
		(0.004)	(0.025)
Mideduc (=1)		0.019**	0.111***
		(0.008)	(0.038)
Higheduc (=1)		0.040***	0.248***
		(0.010)	(0.043)
Age 25-34 years (=1)		0.028***	0.048

	(0.007)	(0.036)
Age 35-44 years (=1)	0.032***	0.118***
	(0.007)	(0.035)
Age 45+ years (=1)	0.018**	0.083**
	(0.007)	(0.035)
White collars (=1)	-0.001	-0.015
	(0.008)	(0.039)
Service workers (=1)	-0.014	-0.159***
	(0.009)	(0.045)
Blue collars (=1)	-0.023***	-0.124***
	(0.008)	(0.042)
Firm Characteristics		
Industry (=1)	0.020	-0.083
	(0.017)	(0.089)
Service (=1)	-0.009	-0.058
	(0.016)	(0.091)
small (EU5-9; US10-49) (=1)	0.018**	0.067**
	(0.008)	(0.034)
medium (EU10-49; US50-99) (=1)	0.039***	0.172***
	(0.007)	(0.035)
large (EU50-249; US100-499) (=1)	0.075***	0.181***
	(0.008)	(0.030)
very large (EU250+; US500+) (=1)	0.105***	0.216***
	(0.011)	(0.031)
Rsquared	0.0814	0.112
Nobs	14544	1530

Note: The dependent variable indicates the number of incentive pay schemes. It takes value 0 for fixed pay, 1 for individual PRP and 2 for both individual PRP and financial incentives. All regressions include year dummies, and for Europe we include country effects, while for US macro regional dummies. Robust standard errors in parentheses. Ordered probit partial effects reported for top outcome=2. Significance levels: *** if p<0.01, ** if p<0.05, * if p<0.1.

Finally, we decompose the increase in the diffusion of incentive schemes into changes in the characteristics of the workforce (i.e. more skilled workers, less service workers, increase in the proportion of large sized firms, etc.) versus changes in the probability of incentive schemes that are associated with those characteristics[13]; and then do the same exercise for the differences between coverage by incentive systems between Europe and the US.[14]

Table 3.6, reports the results of the decomposition over time. It shows that, in the US 38 percent is due to changes in the characteristics of workers and 62 percent to changes in the associated probabilities; whereas in Europe, trend is entirely attributable to changes in the probabilities.

Table 3.6 : Decomposition of incentive schemes over time (2005 versus 2000§)

	EU		US	
	coef	%	coef	%

[13] We perform a Blinder–Oaxaca type decomposition of the mean outcome differential of our dependent variable (PRP) as developed by Bauer and Sinning (2008). The decomposition in the nonlinear case can be written as: $\Delta^{NL}=\left\{E_{\beta A}(Y_{iA}|X_{iA})-E_{\beta A}(Y_{iB}|X_{iB})\right\}+\left\{E_{\beta A}(Y_{iB}|X_{iB})-E_{\beta A}(Y_{i\beta}|X_{i\beta}\right\}$. We also use Neumark (1988) weighting matrix.

[14] Caveats for this exercise: the time period is not exactly the same in EU and the US; and there remain measurement differences between the EU and US surveys

Characteristics	-0.002	-3.63	0.0177	37.92
Coefficients	0.742	103.62	0.029	62.07
Raw differential	0.0716	100	0.0467	100

Note: Blinder–Oaxaca type decomposition for non linear estimation
§ for the US the time span is 2006 versus 2002

Table 3.7, shows the results of the decomposition between the EU and the US. Eighty five percent of the difference in the incidence of incentive pay between the US and Europe is due to the higher probability of US employees being covered by incentive schemes.

Table 3.7 : Decomposition of incentive schemes, US versus EU

	US vs EU	
	coef	%
Characteristics	0.0513	14.96
Coefficients	0.292	85.04
Raw differential	0.342	100

Note: Blinder–Oaxaca type decomposition for non linear estimation.
Data are pooled over two surveys (2000-2005; 2002-2006)

Even controlling for a relatively large set of individual and firm characteristics, cross country differences in the probability that a worker receives some form of incentive pay remain large. We examine country differences next.

BOX 3.5 - Summary evidence of the main empirical findings: within effects

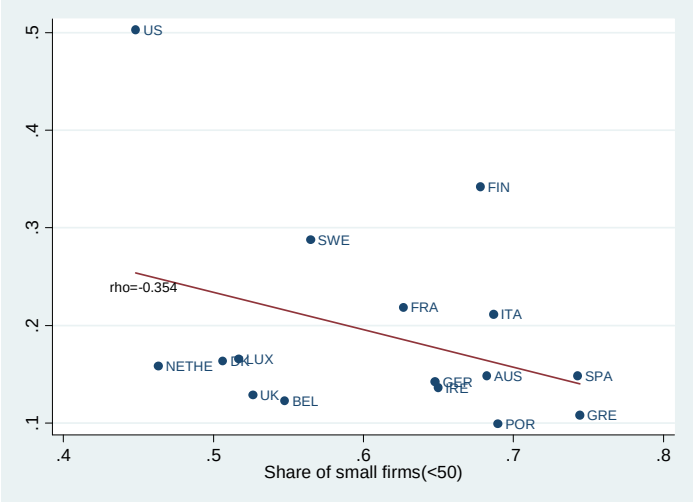
- Only a limited number of studies have investigated the diffusion of incentive schemes across different countries. The evidence presented in this section begins to fill this gap documenting the incidence and growth of incentive schemes in European countries and the US.
- The share of workers who receive any form of incentive pay (i.e. individual, profit/gain sharing and share ownership) is strikingly different between countries, ranging from: 10-15 percent in some European countries to over 40 percent in the US.
- Individual pay schemes and financial participation appear to be on the rise, although still much lower than the US. There is some evidence of a catching-up for those countries with incidence below the median.
- Some empirical regularities, within and between countries, seem to characterise the diffusion of incentive pay and the probability that a worker is covered by an incentive scheme. First, the diffusion of profit/gain sharing is higher in high-skilled occupations. Second, incentive schemes are more prevalent in large sized firms and manufacturing and financial services.
- Incentive schemes are much less diffused in the public sector. Several reasons may explain why: less need of incentives due to (higher) intrinsic motivation, more problems in output appraisal (multi-tasking, team work, etc.), higher workers' risk aversion.
- The probability that a worker is covered by an incentive scheme is, *ceteris paribus*, 9 to 12 percent lower if female, 5 to 14 percent higher at 35-44 years of age, 13 to 24 percent higher in very large sized firms (EU and US respectively), while occupation and industry controls appear to play a minor role. High Involvement Management practices are often associated to incentive pay schemes.
- A decomposition of the differences in incidence between periods and across Europe and the US, shows an important contribution of coefficients (versus characteristics), suggesting a significant change in the mechanisms that determine incentive pay within and across firms.

3.2. Empirical regularities between countries

Because we have relatively few countries in our data set, we examine the links between the diffusion of incentive pay schemes and country variables with simple two variable comparisons of the incidence of performance pay with measures of particular country characteristics. Patterns that replicate those found within countries are more likely to hold up under more detailed investigation.

The first empirical regularity is between incentive pay and the size distribution of firms. Figure 3.7 shows that incentive pay is less common in countries with relatively more workers in of firms with less than 50 employees (rho= - 0.35)[15]. These also tend to be Mediterranean countries where the share of family firm is larger, which is independently likely to limit the introduction and diffusion of employee financial participation schemes (Pendleton et al, 2001).

Figure 3.7 : Incentive pay and share of small firms (<50)



Source: EWCS, GSS and OECD institutional data.
Note: country averages (2000-2005 EWCS; 2002-2006 GSS)

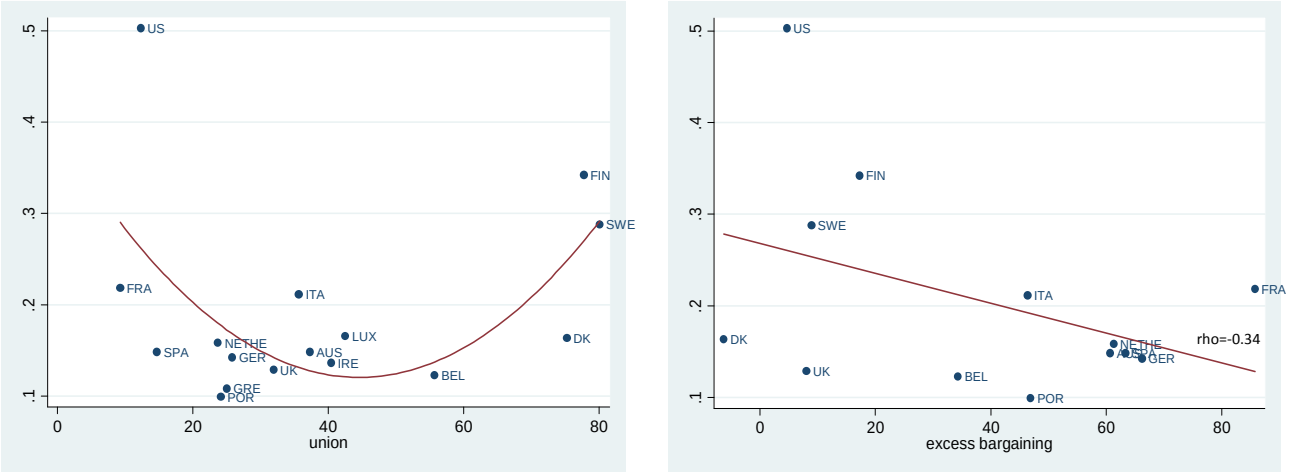
The diffusion of piece-rates or financial participation also depends on the role of collective bargaining in pay setting. Unions generally favour modes of payment that limit managerial discretions and egalitarian pay policies pursued by trade unions contrast with the individualisation of pay or even with strong decentralisation of collective bargaining. Workers paid on piece-rates are, in general, less likely to be union members. Figure 3.8 a) shows, however, that the relation between union density and the extent of incentive pay follows a "U" shape relationship with low incidence of incentive pay at both low and high levels of unionisation. Strong unions may be able to negotiate the introduction of (collective) incentive pay schemes and monitor their application with direct participation in joint management committees. Since union density may not represent the effective union power in bargaining, in Figure 3.8 b) we show the relationship between

[15] The negative correlation is partly driven by the position of the US. If we exclude the US the fitted line flattens.

incentive schemes and excess bargaining power, that is the ability of the union to extend the effects of collective bargaining over and above their membership[16]. The negative correlation shows that incentive pay schemes are more diffused in institutional settings where unions are weak or where they are encompassing; conversely when bargaining power is based on (excess) coverage there is likely to be strong opposition to performance related and discretional pay.

Figure 3.8 : Incentive pay, union density and excess bargaining power

a) Union density b) Excess bargaining power



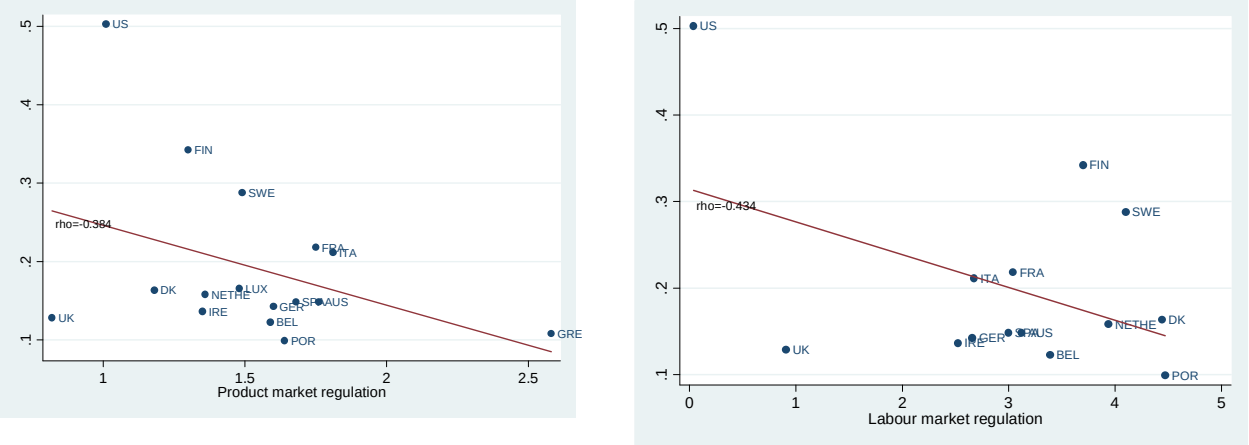
Source: EWCS, GSS and OECD institutional data.
Note: country averages (2000-2005 EWCS; 2002-2006 GSS)

Figure 3.9 a) displays the relationship between a measure of the regulation of product markets and the diffusion of incentive pay. Figure 3.9 b) shows the relation between a measure of the regulation of labour markets and the diffusion of incentive pay. Both measures of regulation are negatively correlated with the diffusion of incentive pay (rho_{PM} = - 0.384; rho_{LM} = - 0.434). Countries with highly regulated product and labour market -- such as Mediterranean and (some) Continental European countries – exhibit a lower diffusion of incentive pay. One possible mechanism at work is that greater regulation reduces competitive pressures to introduce performance related pay to attract, retain and motivate high ability employees.

Figure 3.9 : Incentive pay and market regulation

a) Product market regulation b) Labour market regulation

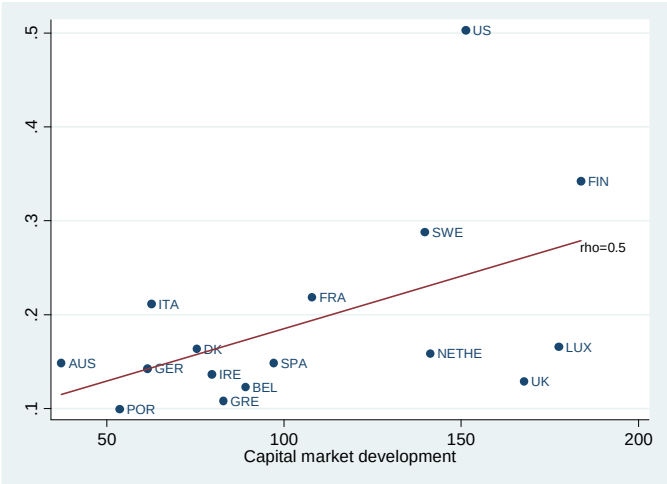
[16] Excess bargaining power is computed as the difference between collective contracts coverage and union membership. In France, for example, union coverage is close to 95% while union membership is less than 10%; conversely in Sweden both coverage and unionisation are very high and excess bargaining power is low. The extent of excess bargaining coverage depends on mandatory (or *de facto*) extensions of union contracts to the relevant occupation/industry.



Source: EWCS, GSS and OECD institutional data.
Note: country averages (2000-2005 EWCS; 2002-2006 GSS)

Capital market development is also associated with the diffusion of incentive pay. Sharing and ownership schemes are more likely when a larger proportion of companies are listed on the stock exchange or capital markets are otherwise more developed. Figure 3.10, shows a strong positive correlation (rho= 0.51) between an index of capital market development[17] and the diffusion of incentive pay. But note that the UK and the US which are in capital market development and should thus experience a higher diffusion of sharing and share ownership schemes (Festing et al 1999, Pendleton et al 2001; Poutsma, 2001) have very different levels of incentive pay, and that the same variation is also found between Finland and Luxembourg and Sweden and the Netherlands.

Figure 3.10 : Incentive pay and capital markets development



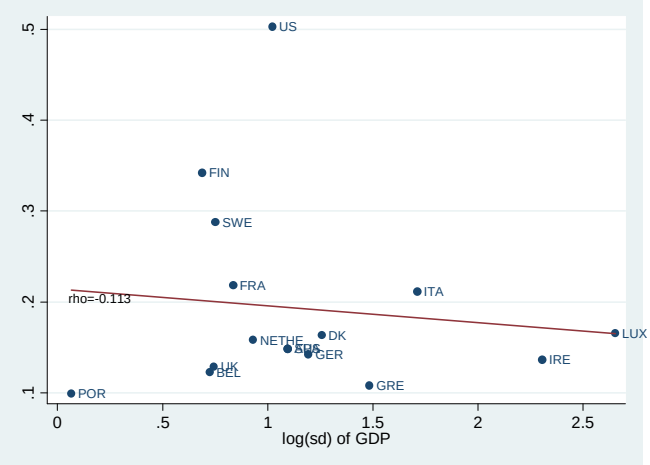
Source: EWCS, GSS and World Bank Capital market index.
Note: country averages (2000-2005 EWCS; 2002-2006 GSS)

Output variability is generally associated with the demand of higher flexibility by firms. In this context, some forms of incentive pay can grant greater flexibility of the wage bill over the

[17] We use the World Bank Capital market index.

business cycle. Figure 3.11 does not support the above hypothesis, as the correlation is weak and bears the opposite sign (rho = - 0.113).

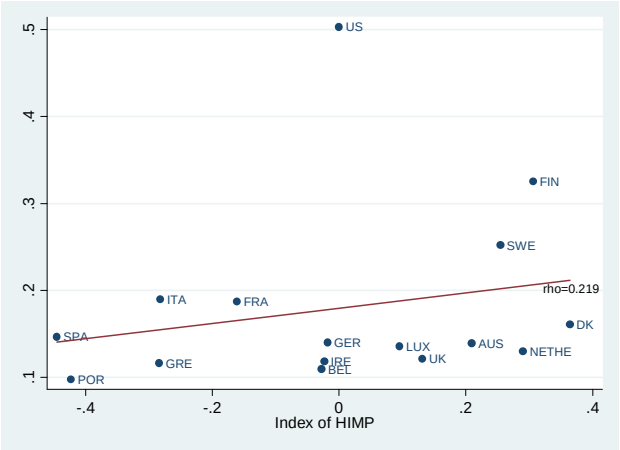
Figure 3.11: Incentive pay and output variability



Source: EWCS, GSS and Eurostat
Note: country averages (2002-2005 EWCS,2002-2006 GSS)

Finally, "high involvement management" practices are likely to be associated with incentive pay. In figure 3.12, we relate an index of several high involvement management practices to the diffusion of incentive pay.[18] The figure documents a large spread in management practices across countries and a positive relationship with the diffusion of incentive pay (rho = 0.219).

Figure 3.12 : Incentive pay and high involvement management practices



Source: EWCS, GSS
Note: country averages (2002-2005 EWCS,2002-2006 GSS)

Overall, the empirical regularities suggest the existence of an association between country attributes and the diffusion of incentive pay schemes.

[18] To construct our indicator of HIMP, we use principal component analysis to extract the first factor out of a large number of management practices drawn from EWCS data.

BOX 3.6 - Summary evidence of the main empirical findings: between evidence

- The diffusion of incentive pay schemes has been shown to be related to several country structural characteristics, such as: the industrial structure, the development of financial markets and the institutional setting.
- There are within-country and cross-country patterns in the diffusion in incentive pay that suggest that economic and institutional factors substantially affect the decision of firms and workers to choose this form of compensation and the type of incentive pay.
- The proportion of workers receiving incentive schemes, in each country, has been found to be associated to:
    - the proportion of small companies,
    - the degree of regulation of product and labour markets,
    - unionisation,
    - capital markets development,
    - diffusion of HIM practices

Appendix to section 3.

Table A 3.1: Estimates of the probability of employees' incentive pay coverage, Europe and US

	Europe				US			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Employee Characteristics								
Female (=1)	-0.095***	-0.093***	-0.080***	-0.081***	-0.100***	-0.097***	-0.121***	-0.125***
	(0.009)	(0.006)	(0.006)	(0.006)	(0.032)	(0.026)	(0.039)	(0.030)
Secondary education (=1)	0.059***	0.033**	0.046***	0.025**	0.169***	0.180***	0.116*	0.127**
	(0.016)	(0.012)	(0.015)	(0.012)	(0.059)	(0.043)	(0.064)	(0.045)
Tertiary education (=1)	0.098***	0.071***	0.072***	0.050***	0.343***	0.359***	0.252***	0.267***
	(0.022)	(0.014)	(0.021)	(0.014)	(0.040)	(0.041)	(0.060)	(0.050)
25 to 34 years old (=1)	0.053***	0.052***	0.032***	0.033***	0.083**	0.094**	0.041	0.054
	(0.010)	(0.010)	(0.008)	(0.010)	(0.041)	(0.040)	(0.054)	(0.043)
35 to 44 years old (=1)	0.051***	0.050***	0.036***	0.036***	0.149***	0.158***	0.121***	0.133**
	(0.012)	(0.010)	(0.009)	(0.010)	(0.042)	(0.041)	(0.044)	(0.043)
45+ years old (=1)	0.046***	0.037***	0.028**	0.021**	0.111***	0.124**	0.079*	0.093**
	(0.012)	(0.010)	(0.009)	(0.010)	(0.033)	(0.039)	(0.042)	(0.042)
White collars (=1)			0.001	0.00005			-0.023	-0.017
			(0.022)	(0.012)			(0.035)	(0.045)
Service workers (=1)			-0.023	-0.018			-0.176***	-0.174***
			(0.022)	(0.013)			(0.040)	(0.052)
Blue collars (=1)			-0.022	-0.026**			-0.130***	-0.138**
			(0.016)	(0.012)			(0.047)	(0.048)
Firm Characteristics								
Industry (=1)			0.020	0.025			-0.082*	-0.093
			(0.027)	(0.023)			(0.048)	(0.106)
Service (=1)			-0.019	-0.011			-0.062	-0.065
			(0.028)	(0.023)			(0.047)	(0.108)
small (EU5-9; US10-49) (=1)			0.021	0.023**			0.075***	0.075*
			(0.016)	(0.012)			(0.020)	(0.040)
medium (EU10-49; US50-99) (=1)			0.046**	0.048***			0.189***	0.193***
			(0.017)	(0.010)			(0.038)	(0.043)
large (EU50-249; US100-499) (=1)			0.091***	0.095***			0.206***	0.205***
			(0.023)	(0.012)			(0.027)	(0.039)
very large (EU250+; US500+) (=1)			0.128***	0.138***			0.248***	0.244***
			(0.036)	(0.019)			(0.043)	(0.039)
Country random effects #	✓		✓		✓		✓	
Country fixed effects #		✓		✓		✓		✓
R squared	0.036	0.0616	0.0467	0.0718	0.045	0.058	0.082	0.096
Number of observations	16,788	16,788	14,583	14,583	1,574	1,574	1,530	1,530

Note: All regressions include year dummies. Excluded categories are: males, primary education, <25 years, professional, agriculture, very small (<5 EU; <10 US); # For Europe we include country dummies, for US four macro regional dummies.
Robust standard errors in parentheses. Significance levels: *** if p<0.01, ** if p<0.05, * if p<0.1. Probit partial effects reported.

Table A3.1 records estimates of a probit model for the relationship between incentive pay and a set of covariates, where PRP_{it} is a dummy variable for whether part of an employee's I compensation includes an incentive pay component (i.e. any of individual/piece-rate, profit/gain sharing or share ownership) in wave *t*, and a vector of individual characteristics, job and firm attributes are controls[19] The covariates are industry, occupation, firm size and organisational practices. We run separate regressions for Europe and the US. Since we pool all individuals across

[19] In practice, we use the following probit specification, $\text{Prob}\{PRP_{it}=1\} = \Phi(\alpha + X_{it}\beta + T_t + C_J)$, where X_{it} refers to the set of covariates, T_t refers to time and C_J to the country/region (when we use random country/region effects the latter terms is omitted).

countries and over time in order to capture country–specific factors that are independent of the included covariates, we specify the error term with a random country-specific effect for Europe and a grouped state geographic vector for the US. Then we relax the assumption of independence with respect to the covariates and include country dummies. Time dummies are always included.

Data Appendix

A) European Working Conditions Survey

Sampling design

The sample of the EWCS is representative of the persons in employment (employees and self-employed, according to the Eurostat definition) during the fieldwork period in each of the countries covered. In each country, the EWCS sample followed a multi-stage, stratified and clustered design with a 'random walk' procedure for the selection of the respondents[20].

The sampling design consists in the following stages:

Stratification of primary sampling units (PSUs) according to region and urbanisation level: as is the usual practice in face-to-face surveys, the interviews to be conducted in each country were clustered in a number of PSUs (each of them corresponding to a 'random walk' starting address) which were allocated to geographic areas stratified by region and urbanisation level. That is to say, in each country a table of population by region and urbanisation level was created, and the PSUs were allocated to the cells according to the proportion of population in each cell.

Random selection of starting addresses within each PSU: within each stratum, each PSU was randomly assigned an address from which the 'random walk' would start.

'Random walk' procedure for the selection of the household: starting from the assigned address, the interviewer followed a strictly pre-defined procedure ('random walk') to select the households to contact for interviewing.4 Once a household was selected, it could not be substituted even if there was nobody at home, until four attempts to contact the interviewer had been unsuccessful (at different times and days). The 'random walks' were scheduled at a time of the day when the employees and self-employed were available (normally, in the evenings and weekends).

Selection of the interviewee within the household: once a successful contact was achieved, the interviewer had precise instructions to: first, identify how many employed persons (according to the Eurostat definition) inhabited the house; and second, whenever more than one person in employment was identified, the person whose birthday was the latest should be selected for the interview.

The target number of interviews was 1,000 in all countries except Cyprus, Estonia, Luxembourg, Malta and Slovenia, in which it was 600.

Question on Incentive pay: [Q. EF.22.]

- What does your remuneration include?

1. Basic fixed salary/wage
2. Piece rate or productivity payments
3. Extra payments for additional hours of work/overtime
4. Extra payments compensating for bad or dangerous working conditions
5. Extra payments compensating for Sunday work
6. Other extra payments
7. Payments based on the overall performance of the company (profit sharing scheme) where you work
8. Payments based on the overall performance of the group
9. Income from shares in the company you work for
10. Advantages of other nature (for instance medical services, access to shops etc.)
11. Other (spontaneous)
12. Don't Know

B) General Social Survey – US [Quality of work life (2002) and Shared capitalism (2006) modules]

[20] Except for Belgium, Netherlands, Sweden and Switzerland, where the selection of the respondents was made using a phone register.

Sampling design

The NORC national probability sample is a stratified, multistage area probability sample of clusters of households in the continental United States. The selection of geographic areas at successive stages is in accordance with the method of probabilities proportional to size (p.p.s.). Furthermore, the clusters of households are divided into replicated subsamples in order to facilitate estimation of the variance of sample estimators of population characteristics.

The sampling design can be described as below:

At the first stage of selection, Standard Metropolitan Statistical Areas (SMSAs) and nonmetropolitan counties covering the total continental United States were grouped according to size strata within the nine Census regions. All population figures and other demographic information were obtained from 1970 Census reports. Within each size stratum grouping based upon geographic location, or racial characteristics (or both), was accomplished before selection. The final frame was further separated into zones or "paper strata" of equal population size in order to facilitate the selection of replicated subsamples of primary sampling units (PSUs). The selection of PSUs was designed to produce four independent subsamples of equal size. The four subsamples were randomly combined to form two larger subsamples of 101 PSUs each. The large subsamples are thus internally separable into two replicated subsamples for variance estimation purposes.

The second-stage procedure involved the direct selection of Census block groups or enumeration districts (E.D.s) within SMSAs or counties, eliminating the traditional intermediate stage of clustering selections within urban places or county division.

From 2004 onwards NORC has introduced an innovative approach to demographic sampling frame construction and sample design for NORC's program of face-to-face surveys. The important changes from previous GSS designs are: (i) the construction of a new list-assisted sampling frame for 72% of the population; (ii) an increase in the size of the certainty stratum (the proportion of the population covered by certainty area selections); (iii) designation of new primary sampling units (PSUs) for the certainty stratum; (iv) designation of new secondary sampling units (SSUs) for the remaining "urban" areas; and (v) designation of larger SSUs for the remaining areas.

Considerations of cost and feasibility have determined that essentially all national sample designs worldwide are multi-stage samples with administrative/political areas as the primary sampling units. The absence of any satisfactory population register in the USA has led to the use of one or more stages of area sampling followed by listing of addresses/housing units in the selected ultimate area units (UAUs). This approach characterizes both the sample designs from the Census Bureau and those from the major social research centers such as the University of Chicago's NORC and the University of Michigan's Institute for Social Research (ISR).

Question on Incentive pay: [Section C – Shared Capitalism – Ballots 1-6]

- In your job are you eligible for any type of performance-based pay, such as individual or group bonuses or any type of profit-sharing?
- Does the size of these performance-based payments depend on?
    - Company profits or performance
    - Workgroup or department performance
    - Individual performance
- What was the approximate total dollar value of these various payments in 2005?
- Do you own any shares of stock in the company where you now work, either directly or through some type of retirement or stock plan?
- Please give a general estimate of how much cash you would get if all this stock were sold today.

4 Theoretical implications

The workhorse model of incentive pay is one in which workers produce in isolation and output depends on costly individual effort. A standard principal-agent problem arises when output is observable by the employer and effort is not. In such a framework, the non-observability of effort is a market imperfection. As Lazear (2000) and Prendergast (1999) show, this justifies the use of a contingent contract that relates pay to output, which can solve (or at least mitigate) the agency problem.

Under a fixed wage scheme, effort is costly to the worker and does not enter directly the determination of pay. Hence, the worker would theoretically exert no effort at all: He or she would essentially be a rentier. To avoid paying workers for doing nothing, firms with a fixed-wage scheme insist upon a minimal output level such that, if the worker produces less than the minimum he/she would be dismissed. In this situation, workers exert the lowest level of effort required to satisfy the minimum requirement.

An alternative to the contract with fixed wages and minimum requirements is individual performance pay in the form of piece-rate, i.e. the worker receives a compensation that is the product of a given price times the output produced, which is itself a positive function of effort. This produces a first order optimum condition as the worker puts in effort up to the point where the marginal cost of effort equals the marginal value of the product produced.

BOX 4.1. The basic workhorse model.

Consider a worker with a utility function that depends positively on pay (w) and negatively on effort (e):

$$U=U(w,e)$$

In a fixed-wage scheme, w is simply set to an exogenous level w_0 whereas under incentive pay it is an increasing function of some measure of output (y):

$$w=w(y(e))$$

The firm does not observe effort but observes y, which is, in turn, positively affected by e.

Hence, in the absence of additional constraints, utility maximisation under a fixed-wage scheme leads to a corner solution with e set at its minimum admissible value (say, zero). A minimum requirement on y may induce higher effort, provided that the threat of job loss in case y falls short of the minimum standard is effective. Labour market imperfections, that generate a positive surplus from the job for the worker, make such a threat credible.

Under incentive pay, the first order condition for utility maximisation is:

$$U_1(w,e)w_1(y)y_1(e)=-U_2(w,e)$$

where subscripts indicate partial derivatives.

Profit maximising firms, may find it optimal to use incentive pay as opposed to fixed-wages, although this is not a general result.

4.1 Heterogeneity and selection

Assume that the market generates both fixed wage contracts and piece-rate type contracts. If workers differ in ability - modelled in the production process (Lazear, 1986; Prendergast, 1999) or in the utility cost of effort (Lazear, 2000) - there will likely be sorting of workers by the type of contract. In the first case, heterogeneity implies that more able workers produce higher output for the same level of effort. In the second case, equally able workers experience lower disutility of effort and produce more. The implications are similar whether workers differ in ability or taste or both, the same employment contract will be more attractive to some than to others, producing a sorting of workers by contract. A piece-rate system will elicit more effort from the worker. If a firm switches from fixed wages to piece rate, it should experience a rise in output both because employed workers are likely to exert more effort and

because it will attract workers who produce more for the same level of effort or exert more effort in any given contract (compared to less able workers). Pay inequality unambiguously increases under the piece-rate contract (Lemieux, 2009).

BOX 4.2 . Heterogeneity and selection

Workers heterogeneity can be introduced either in the utility function or in the performance function. In the utility function, it usually takes the form of lower disutility of effort for "good" workers:

$$U=U(w,c(e,\alpha))$$

where α measures the quality of the worker and it is assumed that $c_2(e,\alpha)>0$.

In the performance function, it generates higher y for "good" workers for any given effort level:

$$y(e, \alpha)$$

also with $y_2(e,\alpha)>0$.

In this setting, high-α workers can achieve higher utility under performance pay while low-α workers select themselves into firms that offer fixed wages.

4.2 Risk aversion and performance measurement

Agency theory provides two additional important insights about incentive pay. The first concerns the role of risk aversion. Assuming that firms are risk neutral while workers are risk averse, the choice of the type of contract involves a trade-off between efficiency and insurance. In a standard fixed-wage contract, the worker is fully insured and exerts minimal effort, thus reducing efficiency. In a piece-rate contract the worker bears all the risk (no insurance), while eliciting higher effort and receiving higher earnings. In a stochastic environment, workers require a compensation for higher risk when moving from a fixed-wage to a piece-rate contract. Such compensation may take any form that guarantees higher mean pay in the face of increased volatility. In practice, most incentive pay schemes involve the combination of a base wage, which is fixed, and a variable component (Prendergast, 2000 and 2002).

The second insight from agency theory relates to the importance of performance measurement (Gibbons, 1987; Baker, 1992 and 2002; Holmström and Milgrom, 1991). The simple workhorse model assumes that output is observable. But the observable measure in a contingent contract is generally only imperfectly related to the objective function of the principal.

One reason for this is that, when output is stochastic, then it is only partially correlated with effort. The output-based contract runs the risk of rewarding luck instead of effort or ability. Relative performance measures, such as one's output compared to the average in the firm or to a previous period, is one response to this problem. Under the assumption that shocks are correlated over time or across workers of the same firm, relative performance measures are more directly affected by individual effort, as the shock averages are controlled for (Baker, 1992).

Another reason for the discrepancy between observable measures of output arises when jobs involve multiple tasks. In such a situation measuring productivity also involves combining multiple indicators (Holmstrom and Milgrom, 1991). Multitasking imposes additional agency problems since the worker might substitute away from tasks with low returns to those that more directly and easily affect pay. Moreover, the firm might not be able to measure the output of all tasks equally well, thus generating potentially unwanted trade-offs across activities.

Subjective evaluations, often in the form of assessments made by one's immediate supervisor in the hierarchy of the organisation provides one way to deal with the multi-tasking problem (Baker et al. 1994), but they have their own problems of favouritism and discretionary behaviour (Prendergast and Topel, 1996).

Another way to deal with the imperfect nature of objective measures of output is to use measures of performance at a sufficiently high level of aggregation to ensure that all tasks are

influential. Profit sharing, as well as other forms financial participation, fall into this category. Obviously, such aggregate measures of performance are influenced not only by multiple tasks performed by the same worker but often times also by the activities of many co-workers. Consequently, a variety of new issues arises, such as the role of teams and the free-riding problem.

BOX 4.3. Stochastic environments, risk aversion and measurement

In a stochastic environment the performance measure y is a function of both effort and a random shock (ε) and the goodness of y as a measure of performance depends on its gradient with respect to effort e, $y_1(e, \varepsilon)$.
Workers' risk aversion is modelled in the form of a concave utility function with respect to w, $U_{11}(w,e)<0$.
Multi-tasking introduces a further complication in the specification of y, which is a function of the many different tasks ($\tau_1, \tau_{2,\ldots,} \tau_T$), each having a different gradient:

$$y(\tau_1, \tau_{2,\ldots,} \tau_T) \text{ with } y_t \neq y_j \text{ for all } t \neq j.$$

Notice additionally that y is a measure of performance, which may not necessarily be the key objective of the profit maximising employer (e.g. sales), so that the gradients of y and the objective of the firm may differ. Under such a system, if the worker is able to allocate effort to different tasks in order to maximise pay and the resulting allocation may not be optimal from the point of view of the principal.

4.3 Group incentives and monitoring

Group-based incentive schemes and financial participation are an alternative or a complement to individual performance pay when it is difficult to measure individual performance. This includes situations when individual output is not observable and only group performance can be used to write a formal contingent contract (FitzRoy and Kraft, 1987; Holmstrom, 1979; Lazear, 1986). As the measure of group performance is taken at a higher and higher level of aggregation, up to overall profits or some other indicator of the firm's financial performance, the employer may have an incentive to play with the accounting rules to under report economic results and, hence, share a smaller fraction of the residual claim with the workers. This is one of the reasons why financial participation is often associated with some kind of workers' involvement in decision making, either by direct participation of workers' representatives in company boards or by ownership schemes (Ben-Ner and Jones, 1995).

Above and beyond measurement issues, the use of aggregate performance measures can reduce monitoring costs (FitzRoy and Kraft, 1986). So far we have maintained the assumption that, while output is observable, although imperfectly, individual effort to the production process is not. Alternatively, at least some part of effort can be observable through the implementation of a monitoring technology, as stressed by Shapiro and Stiglitz (1984) on efficiency wages.

The workhorse model can be augmented to include monitoring by adding a technology that allows the employer to directly observe the effort of the employee at some cost. In this setting, one new type of contract becomes available, namely one with fixed wages and a minimum input or effort requirement. The monitoring technology allows the employer to observe effort and catch shirking, although not perfectly. Hence, the employee knows that with some probability he/she will be caught shirking and loose the job. The choice between an input- or an output-contingent contract obviously depends on whether production inputs or outputs are more easily observed and on the efficiency of the monitoring technology (Lazear, 1986).

The use of group performance and other forms of financial participation can alleviate measurement problems and, in a model with monitoring, they can also lower monitoring costs or improve the efficiency of the monitoring technology (FitzRoy and Kraft, 1995). When individual pay is computed on the basis of the aggregate performance of a group, everyone has an incentive

to monitor co-workers to avoid drops in output which would be reflected in lower pay. Such a mechanism of decentralised monitoring within groups or teams of workers allows the employer to save on monitoring costs. This requires that some aspects of individual effort be observable by co-workers while unobservable to the employer. It also requires that decentralised monitoring by co-workers within a team be associated with credible sanctions. When the employer directly monitors employees via a centralised technology such a sanction is obviously the threat of dismissal. The same threat can be applied to decentralised monitoring within teams if co-workers have the ability to credibly transmit their private knowledge of shirking cases to the employer. Alternatively, the power of horizontal monitoring must derive from some kind of behavioural motivation, such as social approval or social sanctions.

BOX 4.4. Group incentives

The measure of performance is now taken at the group level and it is affected by the effort of all group members:

$$y(e_1, e_{2,\ldots,} e_N)$$

and free-riding arises naturally given that *w* is a function of the same *y* for all members of the group.
Monitoring is usually introduced as the probability of being caught shirking, which is higher the more the employer invests in such activity and the more efficient the technology of monitoring.

4,4 The battle against free riding

If decentralised monitoring is the positive side of group incentives, its negative counterpart is free riding. The available empirical evidence, which we review in section 5, documents that all forms of group incentives are associated with positive effects on performance, which means that firms and workers have developed sufficient mechanisms to reduce free riding to levels that allows group incentive systems to succeed. Among such mechanisms are peer pressure, guilt and shame and norms (Kandel and Lazear, 1992; Mas and Moretti, 2009; Falk and Ichino, 2006). In all cases, the key assumption is that workers care in one way or another about their co-workers or about what their co-workers think of one another.

For example, it has been found that, since workers do not want to damage their peers, the best employees tend to underperform when compensation is based on relative performance as opposed to piece-rate (Bandiera et al., 2005). Similarly, supervisors in teams tend to favour people with whom they are socially connected, although such favouritism can be easily overcome by appropriate economic incentives (Bandiera et. al., 2009).

BOX 4.5. Behavioural effects

Kandel and Lazear (1992) introduce behavioural effects by adding a term $P(\cdot)$ to the utility function, which, for a generic member *i* of the team becomes:

$$U(w,e_i)-P(e_i;e_{-i})$$

where e_{-i} is the vector of efforts of all co-workers.
Peer pressure can be modelled as $P(\cdot)$ being decreasing in one's own effort,

$$P_1(e_i;e_{-i})<0,$$

and norms as deviations from the average effort of peers,

$$P(e-e_i)<0$$

where *e* is the mean of all the effort levels in e_{-i}. All the other behavioural mechanisms can be incorporated in the model similarly.

Economists have also begun to deal with the concepts of extrinsic and intrinsic motivation that have a long history in psychology. Extrinsic motivation refers to motivation to perform certain tasks that comes from standard incentives, either monetary incentives or threat of dismissal or

promotions and demotions. Intrinsic motivation is a personal characteristic embedded in individual preferences as people are assumed to enjoy the carrying out of certain specific activities. Benabou and Tirole (2003) provide a simple framework to think about possible trade-offs between extrinsic and intrinsic motivation. They set up a model in which the agent (the employee) has imperfect information on her own type (ability) and needs to decide whether to undertake a project (the job task) in the interest of the principal (the employer), who also has imperfect information about the type of the agent. The outcome depends both on the type of the agent and on her effort. In such a framework, the agent may interpret the provision of extrinsic incentives as a signal that the principal has a prior about her being a low ability type so that the project can be successful only with significant effort. As a consequence, the agent may update downward the prior about her own type and be discouraged from undertaking the project. In this sense, extrinsic motivation may offset intrinsic motivation.

Within this framework, the principal may improve performance by exploiting the agent's intrinsic motivation rather than by providing direct incentives. For example, in a model in which workers are heterogeneous and have intrinsic preferences over different job tasks, performance can be maximised without the use of direct incentives by efficiently allocating workers to their preferred tasks (Prendergast, 2008). Direct incentives, especially in the form of monitoring or supervision, may actually generate resentment from workers and potentially exacerbate instead of mitigate the agency problem (Akerlof and Kranton, 2008).

Section 3 showed that collective incentive schemes and financial participation schemes are more common in large than in small firms. This is consistent with many of the theories outlined above. For example, it could be related to the existence of economies of scale in monitoring or to the fact that observing effort might be more difficult in large organisations. At the same time, however, it runs counter to the greater tendency to free ride in larger organisations, that should undermine the success of collective incentive schemes. If one works in an organisation with large-N colleagues and everyone gets an equal share of profits, the prospect of earning a small share 1/N is unlikely to induce greater effort. Can there then be some other explanations for the positive correlation between incentive systems and size of firm?

Oyer (2004) assumes that renegotiating contracts is costly and automatic adjustments of wages to the firm's financial performance internalise variation in the workers' outside opportunities, thus reducing the case for explicit renegotiation. The use of stock options and other forms of deferred profit sharing has been justified by the need for start-ups to attract and retain talented and motivated employees when they are liquidity constrained and in the presence of capital market imperfections (Freeman et al. 2009). Along the same line of reasoning, other authors have interpreted the use of deferred profit sharing as a mean to retain workers, whose productivity grows fast at the beginning of their careers and slows down later on (Lazear, 1981; Akerlof and Katz, 1989), although the combined investment of one's labour and savings in the same asset (the employing firm) might lead to sub-optimal levels of risk differentiation (Oyer and Shaefer, 2005). Also, since firms often use a combination of various types of collective incentive schemes and financial participation, a few papers have developed theories that rationalise the parallel adoption of multiple incentives (Holmstrom and Milgrom 1994; Gibbons 1998).

4.5 The macro issues

The macro literature on financial participation has been largely dominated by the early contributions of Weitzman (Weitzman, 1985a and 1985b), who focuses specifically on profit sharing. Weitzman suggests that the adoption of profit sharing would lower the fixed component of wages to accommodate the variable part and would, thus, lead to higher employment. The virtue of profit-related-pay was that it made the cost of labor more flexible and thus smoothed employment until wages fall to the base level while also smoothing profits, which presumably also has macro-economic implications (Nuti, 1987). These models can be compared to the prediction of the classic all-workers-are-owners model of the employee owned firm in which the firm restricts output and employment in a boom so as to increase employees' shares of net profits but increases output and employment in a recession when the prices of output fall so as to spread fixed costs over more workers.[21] Most analysts have viewed this as a perverse supply response since it makes the supply of output negatively related to prices. But it also smoothes employment over the business cycle. The perverse supply/smoothing effect does not apply to employee owned firms that hire "non-owners" to work temporarily or that outsources work to subsidiaries or other firms where workers are paid fixed wages. When employees on the margin are paid fixed wages, the employee owned firm has the same employment responses as a capital-owned firm. Financial participation also allows firms to use risk sharing arrangements to smooth the risk of economic activity and, hence, take more risk on other financial assets with potentially higher returns. (Ichino, 1994).

Conclusion

While analysts have used economic theory to illuminate many important issues pertaining to incentive pay, they have also ignored some issues, such as the role of trade unions, whose policies tend to reduce the adoption of incentive pay systems even though they can serve as monitoring agency when group incentive pay gives all workers a reason for wanting the firm to perform well. Unions are in a privileged position to do this, as one of their core institutional tasks is the aggregation of individual preferences. Unions generally oppose individual performance pay, particularly when it depends on the subjective views of supervisors. But they sometimes support group incentive pay and financial participation which can lead to higher average wages without affecting dispersion (Gregg and Machin, 1989; Pendleton et al., 2009).

Finally, extant theory does not fully deal with the empirical evidence that firms often adopt a mix of various incentive systems and change their system quite often, which turns the theoretical problem from a static one of solving an agency problem to a dynamic one of adjusting to changing economic conditions. A theory of incentive pay adoption that incorporates the need for experimentation by partially informed employers, opens the door to a benefit-cost rationale for government incentives to induce firms to experiment more and to spread best-practice knowledge about the results of the practices of firms widely.

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[21] Let P be the price of output, Q (L) be output, R be the fixed cost of capital, and L be employment. In theory the worker-owned firm maximizes net profits per worker, (PQ-R)/L. The first order condition is PQ' = (PQ-R)/L. Differentiate the first order condition with respect to P as the indicator of cyclic conditions. The result is dL/dP = (Q-Q')/Q'' which is negative by declining marginal productivity.

5. Empirical literature

This section reviews evidence on the effects of incentive pay on productivity and profitability and on the mechanisms by which incentive pay appears to influence worker behaviour. Earlier reviews summarise findings on the association of employee ownership and profit-sharing with productivity across a number of countries: the associations based on production function type analyses yield modest positive relations that may or may not reflect causal patterns (Kruse, 2002; Kruse and Blasi, 1997; Kruse and Weitzman, 1990; Kruse, 1990)[22]. The most convincing studies compare performance for the same firm or workers when they operate under fixed wages and under some pay for performance scheme, either through controlled field experiments or under natural experiments when a firm makes such a change. In both cases there are issues of selectivity: few firms are willing to undergo a field experiment so that the main studies relate to forestry and strawberry-picking while the firms that change policies do so for some reason that may be associated with any change in performance. The most frequent studies compare performance across firms with different compensation systems, much as human capital studies compare earnings among workers with different levels of education. Analysts use diverse econometric tools to try to tease causality out of observational data. (see Box 5.1 for the nature of the identification problem and solutions that have been tried).

It is generally believed that there is an upward bias in estimates of incentive pay effects on performance from cross-sectional comparisons of firms with such systems and those without them. Firms that adopt pay for performance may do so for reasons correlated with their actual performance. They introduce performance pay when they are doing well, or because they have "good management" that might produce good results with any innovation. If firms introduce performance pay when they are doing well or obtain better managers, even fixed effects models will not eliminate the omitted variable bias. But some firms may resort to performance pay when they are doing poorly – a firm on the verge of bankruptcy may sell its assets to workers and become worker-owned – which would induce a negative bias in cross section comparisons. More broadly, the problem in interpreting many existing studies is determining the validity of extrapolating evidence from cross section data or data on changes for the firms that have chosen to change their mode of compensation to firms that have not chosen it. Perhaps the two types of firms are making the best choice given their circumstances, in which case there should be no difference in performance at least on the margin.

BOX 5.1. Methodology

To identify the impact of performance pay on productivity/profits one needs to know the counterfactual outcome, that is, productivity/profits in the absence of performance pay. This is unobserved. Performance pay may not be random across firms. If there are systematic differences in characteristics across firms with and without performance pay that are likely to influence performance, failure to take account of these will bias any estimate of the performance pay effect on productivity. Indicate with D the decision of the company to introduce an incentive pay scheme (the 'treatment') and with Y_1 and Y_0 the outcome (i.e. performance) under treatment and in the absence of treatment (the 'control'), respectively. Thus $E(Y_1 \mid D = 1) - E(Y_0 \mid D = 0)$, where the first term is productivity/profits of those with

[22] See also, Conte and Svejnar (1990); Doucouliagos (1995); Jones, Kato and Pliskin (1997); Perotin and Robinson (2003)

performance pay and the second is productivity/profits of those without performance pay, would in general be biased for the effect of 'treatment on the treated'. An exception is when the counterfactual Y_0 is independent of performance pay. This is credible where performance pay is randomly assigned thus ensuring that potential outcomes are independent of performance pay status. In this situation, $E(Y_0 \mid D = 1) = E(Y_0 \mid D = 0) = E(Y \mid D = 0)$ so that the treatment effect can be consistently estimated by the difference between the observed mean of the outcome variable for the treatment group and the observed mean for the non-treatment group. However, random assignment is rare in this context so analysts have tended to resort to the following for identification of causal impacts:
a) before-after differences: firms switching between pay systems. Valuable when switching occurs for exogenous reasons, eg. natural experiments such as tax inducements.
b) differences-in-differences (DiD): comparison of before-after differences with outcomes for 'controls' that do not experience the switch. Assumes common trends and vulnerable to confounding compositional effects.
c) DiD with fixed effects: allows the analyst to net out fixed differences between treated and control which might confound estimates of performance on productivity.
d) dynamic panel modelling: use of lags to account for endogeneity of pay systems.
e) structural estimation: efforts to simultaneously estimate probability of using a performance pay scheme and productivity. Relies on credibly identifying the participation and outcome equations requiring an exclusion restriction and powerful instruments.

5.1 Individual performance-related pay

The assumption in the standard model is that more able workers seek performance-related contracts since this should give them higher income than a standard contract (Lazear, 1986; Prendergast, 1999: 14-15). For their part, faced with a queue of workers seeking performance-related contracts employers will offer those job slots to the ones that they perceive as being more talented workers. As Prendergast (1999: 14) notes, employers will design contracts "not only to induce effort but also to affect the type of worker they hire". The empirical literature on individual performance-related pay finds substantial productivity gains arising from a switch to piece rates; that these arise from both incentive and sorting effects; but that piece rates can be costly to run, making fixed rate pay more profitable in some instances.

Lazear's (2000) analysis of Safelite, a company that fits auto windshields, examined what happened to productivity when the company replaced fixed hourly rate with a piece rate based on the number of wind shields fitted. Adoption of piece rates led to a large increase in productivity (44%), half of which was attributable to incentives and half to worker sorting, as more able workers stayed with the firm or joined it while the less able left.[23] But despite the improvement in labour productivity, Safelite Glass Corp was unable to make a profit and filed for bankruptcy protection under chapter 11 of title 11 of the United States Code in June 2000. At this writing it has recovered from bankruptcy.

Fernie and Metcalf (1999) studied flat race jockeys, where the agency problem arises from jockeys' ability to blame the horse and conditions for their poor performance. They show that incentive contracts are common because monitoring mechanisms are costly and imperfect. Pay and performance are positively related (with a pay elasticity with respect to performance which is larger than most CEO studies). Jockeys who do well often have the opportunity to move onto a non-contingent retainer fee but then perform more poorly than when they operate under individual incentive contracts.

[23] Lazear notes (2000: 1357): "most of the increase in ability is a result of selection through the hiring process that occurs after piece rates are adopted".

Freeman and Kleiner (2005) investigated a single US firm in the shoe industry that shifted from piece rate pay to time rate pay. They used the time delay in switching pay systems across establishments to help identify the productivity effects of the shift. Productivity measured by monthly average shoes produced per day fell by about 6% with the movement to time rates. But because piece rates required costly monitoring of output quality and led workers to waste leather and take risks with their machines that produced costly injuries the piece rate system cost more per shoe than the time rate system. Profits increased when the firm shifted from piece rates to time rates despite a decline in labour productivity. The time rate was also congruent with a move to continuous flow manufacturing which facilitated more flexible production and allowed for an increase in the number of new shoe styles manufactured. Drawing on evidence from the whole shoe manufacturing sector, the authors argue that the long term trend from piece to time rates shows the disadvantages of piece rates generally outweigh their advantages. The study highlights the problems of 'buying out' workers to move to new piece rates that adequately reflect changes in production. From the workers' perspective, there are declining incentives inherent in "ratchet effects" associated with raising thresholds for piece rate incentives.

All of these studies suffer from the likely endogeneity of firms' choice of pay system. If factors unobservable to the analyst affect both the choice of pay system and productivity this may bias estimated impacts of the pay scheme on productivity. In Lazear's Safelite case, for instance, the shift in pay schedule is related to an improved ability to monitor productivity through new information technology while in Freeman and Kleiner's shoe manufacturing case fixed rates facilitate a move to continuous flow manufacturing. The best way to overcome this problem is through experimental variation in the mode of compensation. Shearer (2004) did this by randomly allocating nine tree-planters in a firm in British Columbia, Canada, to either piece rate or time rate modes of pay. Each worker performed under both systems. Tree-planters were 20 percent more productive under the piece rate regime.[24] They earned more and the firm was more profitable, indicating that in this sector, piece rates dominated time rates.

Bandiera et al. (2005) studied the effects of an exogenous change from pay for relative performance[25] to individual piece rates in a UK fruit picking farm. The average productivity of the fruit pickers increased by 58%. The authors suggest the difference is due to workers partially internalising the negative externality their effort imposes on others under relative incentives. Under piece rates, on the other hand, the relationship among workers does not affect productivity. However, workers only internalise the externality when there is monitoring of effort, thus ruling out pure altruism as the motive for workers' behaviour. The experiment has the virtue, rare in economic field experiments, that the same workers faced an identical work environment throughout (tasks, technology, management, etc.) except for the change in pay system. A follow-up study of the fruit-pickers (Bandiera et al., 2007) explored the productivity implications of

[24] This rose to 22 percent with structural estimation methods used because "Since these statistical estimators compare averages within a given context, they do not generalize to conditions beyond those observed in the experiment unless the incentive effect is independent of conditions. This would happen only if conditions did not vary across plots or worker effort was independent of conditions." (Shearer, p 519). The size of the productivity effect differs across the three geographical areas where the randomisation takes place due to planting conditions. The size of the effects is similar to Paarsch and Shearer's (2000) estimates from firm-level analyses from the same industry which use structural methods to account for the endogenous choice of piece rates and fixed rates.

[25] Fruit-pickers' mean pay was set ex ante for the field but divided up according to relative performance of persons in the crew.

augmenting managers' fixed wages with a performance bonus that is an increasing function of average daily productivity of fruit pickers above an exogenously set threshold. Faced with non-managerial workers of heterogeneous ability undertaking homogeneous tasks, managers selected more able workers (re-employment as a fruit picker occurs on a daily basis) and targeted their supervision at the more able, which raised mean productivity by 21 percent, of which at least half was due to the selection of more able workers. The dispersion of productivity rose because of management's targeting the most able.[26]

Taken together, these studies suggest that piece rates induce greater effort than fixed rates and induce pro-productive worker sorting, some of which is worker-initiated, some of which is due to employer hiring and firing policies. However, the impact on profitability is indeterminate because piece rates entail substantial costs associated with monitoring quality, the maintenance of the piece rate system, and 'buying out' workers' risk aversion. Individual performance-related pay can also be to the detriment of other actions employers may view as desirable such as team-working and knowledge sharing.[27] Studies have also shown that piece rates are subject to 'gaming' such as worker collusion in periods when piece rate thresholds are set.

External validity

A drawback of the existing empirical literature is the uncertainty regarding the generalisability of the results to firms as a whole. As Freeman and Kleiner (2005) note, the movement away from piece rates in shoe manufacturing does suggest that they are not optimal in terms of maximising profits. More broadly, the empirical literature does not tackle the potential incentive effects of salaried contracts which arise through career concerns (Lazear, 1986). As Prendergast notes (1999: 10), where a worker is paid a fixed salary in a given period "despite the fact that there is no immediate relation between pay and performance, he is likely to have incentives to exert effort because good performance will improve future contracts. Such reputational concerns imply that effort exertion can occur without explicit pay-for-performance contracts." Evidence of such effects is only just emerging.[28]

BOX 5.2. Summary evidence on individual performance-related pay

- Studies on individual performance-related pay focus on instances in which outputs are readily observed and inputs (effort) are costly to observe; there are principal-agent problems; and workers have clear opportunities to increase performance via their own efforts (eg. tree planting; jockeys; auto windshield fitters).
- There are substantial productivity gains to switching to piece rate payments. Worker sorting tends to account for roughly half the effect with direct incentive effects accounting for the remainder.
- Schemes are costly to administer/adjust so that profit effects are smaller than productivity effects and are sometimes even negative.

[26] In order to keep the wage bill constant fruit pickers' piece rates fall. All else equal, this implies lower worker effort in the second period which should contribute to lower productivity. The authors rule out possible worker income effects showing productivity rises even in the first 9 days of managerial bonus when piece rates are roughly constant. The final paper in the series uses the same experiment as in Bandiera et al. (2007) to show that managers paid a fixed rate favour workers to whom they are socially connected whereas, when in receipt of a bonus payment, they target their efforts towards high ability workers regardless of social connections (Bandiera et al., 2009).

[27] For a review of this literature see Bloom and Van Reenen (2010).

[28] See, for example, Bryson et al. (2010) who exploit a natural experiment in which some workers in a particular occupation (football referees) switch from pure piece rate to salaried annual contracts. They find worker performance improves among those who move onto salaried contracts relative to those who do not. The finding is robust to the introduction of worker fixed effects indicating that it is not driven by better workers being awarded salary contracts. Nor is it sensitive to workers sorting into or out of the profession.

- Most studies observe a switch from fixed rate to piece-rates. There is little evidence on switches to other forms of individual performance pay such as merit pay. This is unfortunate because individual performance pay remains common.
- Few studies contain information on the proportion of pay linked to performance despite its potential importance for incentives and sorting. And there is little on what happens to the value of fixed pay when performance pay is added.
- The problem of endogenous switching is tackled in a small number of studies.
- Little consideration is given to the potential incentive effects of the 'control' regimes, such as the role of career concerns when on a salary.

5.2 Group incentive pay

Group-based incentive pay systems are increasingly common (Pendleton et al., 2009). Often they are ushered in at the same time as a company makes a switch to team-based production, making it difficult to isolate the incentive effect of group pay. In other instances they are introduced to supplement other incentive pay structures, thus minimising the potential distortions to behaviour which occur when there is over-reliance on a single reward system.[29]

Most of the studies assessing the performance effects of group-based incentive pay rely on the use of personnel data collected from case study firms – often single firms – and use a before-after methodology, sometimes relying on delays in the rollout of a scheme to undertake difference-in-difference estimates.

A good example of this work is the study by Hamilton et al. (2003) which focuses on a garment plant in the USA which shifts from individual piece rate for specific tasks to group incentive pay for each entire garment at the same time as introducing autonomous team working over a three year period. The change is made to accommodate small batch production with quicker turn-around times. The group incentive pay scheme divided teams' net receipts equally among team members. Group production resulted in an 18% increase in productivity. Around one-fifth of the increase was due to high ability workers sorting into team production with the rest of the increase due to greater effort induced by the switch to group-based pay. Holding average ability constant, teams with a wider spread of ability are more productive, suggesting teams benefit from mutual learning and intra-team bargaining. But in this study it is difficult to disentangle the pecuniary incentive effects from team effects. High ability workers choose to switch to team production first despite a loss of earnings, indicating that there are potential substantial non-pecuniary benefits associated with teamwork and it may be these that are driving some of the results.

The single firm case study by Griffith and Neely (2009) evaluates the impact of a change in the targets underpinning a group-based performance pay scheme. The setting is a multinational distributor of heating and plumbing products that introduced a new set of targets for group performance pay in one division prior to rolling it out across the firm. Initially branches operated a bonus based on a percentage of branch-level profits being allocated to staff at the discretion of the branch manager in consultation with the regional manger. The new system was based on multiple targets, was non-discretionary and provided managers with a range of performance indicators. The total pot of money distributed to staff under the new pay regime was similar to the

[29] The public sector has also started to introduce group-based incentive schemes. In the UK, for example, this was one of the chief reforms advocated in the Makinson Report (2000).

previous regime. The new system only succeeded when it was implemented by branch managers with at least ten years' experience. The lesson from this study is that the way in which a pay regime is implemented can be just as important as its design.

Several studies have explored the productivity effects of human resource management practices across multiple firms in a single industry. Restricting analyses to a single industry reduces the extent to which unobservable factors influencing pay practices and productivity can bias causal estimates of pay effects on performance, while the multi-firm setting allows the analyst to extrapolate beyond the case of a single firm. Boning et al. (2007) examine the introduction of group-based incentive pay on productivity in 34 production lines in 19 different companies all making bar products from scrap metal. The authors conceive of complex and simple production processes, with the former benefiting from team production. By the end of the observation period nine-in-ten production lines used group incentive pay[30], but only four-in-ten used teams. Teams were almost never observed without group incentive pay so the study focuses on estimating the effects of group incentives and the interaction of group incentives and team production relative to the absence of group incentives. Production line fixed effects models indicate a positive impact of group incentive pay on productivity (defined as usable product as a percentage of steel loaded onto the line).

The "1/N" problem discussed earlier which induces free-riding is likely to reduce the incentive effects of group performance pay schemes where the group is large. Thus one might expect firm-wide schemes to suffer from a low-powered incentive problem. Knez and Simester (2001) shed light on this issue by examining the productivity effects associated with the introduction of a firm-wide incentive scheme in Continental Airlines. The incentive scheme offered a monthly bonus to all 35,000 staff for hitting firm-wide targets. Their identification strategy entails making within-airport comparisons over time for Continental Airline departures, comparing airports where airplanes were dealt with by Continental employees and those where Continental flight departures were outsourced. Outsourced workers were not covered by the bonus. They find that the bonus scheme did indeed raise performance as measured by improvements in on-time departures. They argue that the operational structure of the airline – in particular its use of autonomous work groups - meant that mutual monitoring within each work group reduced the potential free-riding problem.

The increased use of group incentive payments in the public sector is reflected in studies examining their impact. Burgess et al. (2009) examine the introduction of group incentive pay schemes in the UK tax collection authority. Theirs is a quasi-experimental design with two treated teams facing different incentive structures and a control team. They use data on performance before and after introduction of the incentive scheme. Because only some tasks are incentivised and others are not they estimate triple differences (across time, team and task). The teams are large (roughly 110 workers) so free-rider problems are potentially important, but they include managers so manager effort could be critical. The group incentive scheme elicits increased productivity via a combination of increased individual effort and the reallocation of tasks by supervisors to more productive workers.

[30] The authors argue that since all mills eventually adopt group incentives, this implies that they are productivity enhancing for all and that late adoption is governed by transaction costs rather than differences in performance gains from incentives.

BOX 5.3. Summary evidence on group incentive pay

- Most studies explore switches from piece rates to group incentive pay.
- The switch to group incentives often accompanies other changes such as a switch to team working, making it difficult to disentangle pay effects from other effects.
- Studies tend to find positive productivity effects despite 1/N problems where worker co-monitoring is possible.
- In some cases productivity effects appear consistent with social interactions of the kind predicted by behavioural models (i.e. social connection or social approval/sanctions).

5.3. Financial participation

Financial participation in the company can also act as an incentive to employees although, other things equal, one might expect them to be "low-powered" due to the "1/N" problem. On the other hand, as the Knez and Simester (2001) study above indicates, worker co-monitoring may overcome the potential free-rider problem. Below we discuss two broad sets of financial participation scheme: profit-sharing and share ownership.

Profit-sharing

The effects of profit-sharing schemes on productivity and company performance are heavily contested. This is partly due to difficulties in designing plausible identification strategies. The early literature, reviewed in Bryson and Freeman (2007) for the UK, is dominated by cross-sectional studies which often emphasise interactions of profit-sharing with other practices. No consensus emerges regarding profit-sharing effects. However, evidence for other industrialised countries has been more consistently supportive of the hypothesis that profit sharing has positive effects on productivity. More recent studies, using panel data, provide more robust results. We review some of these studies below.

The difficulties in identifying robust effects of profit-sharing are exemplified by the two studies undertaken by Black and Lynch (2001, 2004) for the United States. Their 2001 study links the 1994 Educational Quality of the Workforce-National Employers Survey (EQW-NES) telephone survey to LRD administrative data for the period 1998-1993 for manufacturing plants in the USA. Weak positive effects of profit-sharing in cross-sectional analyses become statistically non-significant once they adjust for past output, employment and capital investment. However, they find a positive significant interaction between unionisation and profit-sharing among non-managerial employees that remains statistically significant throughout, leading to the conclusion that "more cooperative unionised labour management relations (where employees have a greater role in decision making but also have part of their compensation linked to firm performance) are associated with higher labour productivity" (2001: 441). Recognising that repeated observations on workplace practices would improve the ability to deal with endogeneity and time-varying unobservables, they lamented that "these types of data are unlikely to be produced in the near future" (2001: 444).

A follow-up study (Black and Lynch, 2004) based on the second round of the EQW survey found profit sharing or stock option plans in 42 percent of US manufacturing establishments with 20 or more employees. Using the EQW Round 2, undertaken in 1996, they found substantial

switching among pay systems with a net decline in profit-related pay (26 percent of firms cease using profit-related pay, 4 percent introduce it and 70 percent experience no change). In the 1996 cross-sectional analysis profit-sharing/stock options are positive and statistically significant but, in contrast to 1993 analysis reported above, the interaction between unionisation and profit-sharing is not generally significant and is negatively signed in the one specification where it is significant. Analyses of changes over time found that profit-sharing had no effect.

Share-ownership schemes

Share schemes and employee stock options (ESOP's) are, perhaps, by their very nature rather hard to randomly assign across firms. The best studies rely on firm-level panel data identifying scheme effects as firms switch in and out of the scheme. Jones and Kato's (1995) study uses Japanese firm panel data for 109 large unionised manufacturing firms for the period 1973-1980. They include ESOP's (*mochikabukai)* and bonuses in production function estimates. In another study on Japan, Kato and Morishima (2002), look at the effects of ESOPs and profit-sharing schemes on total factor productivity. Using a 20-year panel of 126 manufacturing firms with various types and combinations of participatory schemes, they estimate production functions with firm-specific fixed effects. The only strong productivity effects are found in firms that have both financial and other forms of participation that cover both management and other staff, while the effect takes several years to appear. Seven years after the schemes are introduced, productivity in the participatory firms is 9% higher than in less participatory firms or firms with no incentive or participation scheme.

ESOP's have grown in use since the early 1970s becoming widespread among listed Japanese companies even though they do not attract tax incentives. Companies try to increase employee participation by matching shares that the employee purchases. Participation rates are in the region of 40-50% where ESOPs are available. They constitute 30% of the value of net assets of the average worker household, and have a higher dollar value than their US equivalents, even though they are largely confined to non-executives. As in US, ESOP's account for only a small percentage of firm market value. In addition, nearly all firms with thirty or more employees pay bonuses to regular employees twice-yearly. These account for over a quarter of total pay. These bonuses depend on individual performance ratings and so they can be labelled individual incentive schemes. The principal finding is that introduction of ESOPs leads to a 4-5% increase in productivity after three to four years while gains from bonuses are smaller: a 10% increase in bonus per employee relative to competitors raises productivity in the following year by 1%.

BOX 5.4. Shared Capitalism in the US

- Firms with share ownership schemes in the USA. No control firms but detail on the operation and structure of share schemes, together with other policies and practices at firm and plant level.
- Shared capitalism is associated with better firm performance, partly because worker co-monitoring limits free-riding behaviour.
- Shared capitalism improves worker well-being partly because share schemes come 'on top' of other compensation and benefits, resulting in reciprocal behaviour akin to gift exchange.
- The risk of investing in one's employer can be managed.
- Share schemes complement other HR policies and practices, resulting in a cooperative corporate culture. It is unlikely that share schemes will elicit positive outcomes without other supportive "bundles" of policies permitting employee involvement in decision-making.

There has been substantial growth in share option plans, including broad based ones, among Finnish quoted companies since mid-1990s. Jones et al (2010) explore their impact on productivity by estimating Cobb Douglas production functions using Finnish panel data on public listed firms for the period 1992-2002. Both broad based share options and more selective option plans are statistically non-significant in fixed effects equations and remain so having accounted for the endogeneity of plans and other production inputs using dynamic panel GMM. Two institutional features of the Finnish system may limit the incentive effects of share schemes. The first is Finnish collective bargaining which means share options cannot substitute for base wages. The second is that Finnish employees with share schemes are exposed to little risk relative to the US options system since options are received at nominal cost to employees and can be traded in secondary markets, thus potentially limiting any incentive effects.

There has been much debate about the impact of share schemes on productivity in the UK occasioned, in part, by the lack of robust evidence on the issue. Progress was finally made in 2007 when Oxera (2007a; 2007b) undertook an analysis of share schemes based on 16,844 UK firms including all those listed on the UK stock exchange plus a number of unlisted companies. The data matched HM Revenue and Customs administrative data on firms with share schemes attracting tax incentives into the Financial Analysis Made Easy (FAME) data set containing sales information and other company accounts information. In addition, they obtained measures of value added per employee for 7,633 companies from the Annual Respondents Database (ARD) provided by the Office of National Statistics. The analysts identify the impact of share schemes using dynamic panel analyses which account for firm fixed effects and incorporate lagged performance and lagged share schemes. Using sales output as the measure of productivity tax-advantaged share schemes are associated with a long-run productivity increase of 2.5 percent. This is considerably lower than the estimates from a static model, suggesting more successful firms tend to adopt share schemes. Gains are confined to firms deploying tax-advantaged and non tax-advantaged schemes together suggesting complementarities.[31] Distinguishing between schemes reveals significant gains are confined to Save-As-You-Earn (SAYE) share ownership schemes which require broad-based eligibility, consistent with literature elsewhere (i.e. Bryson and Freeman, 2010). There are lower estimated productivity gains when output is measured with value added than with sales; different estimated effects across sectors; and different estimates of which schemes matter most when output is measured in value added than when output is measured in sales. Positive productivity effects of tax-advantaged schemes are absent among unlisted companies and smaller companies. The study notes that it lacks information on coverage of schemes or on other business practices of firms that could cast additional light on the impacts of the schemes.[32]

The most recent evidence on the operation of share schemes and their impact on workers and firms comes from a Russell Sage Foundation study undertaken by NBER (Kruse et al., 2010). The study is largely based on firms that run share schemes in the United States. The firms are "shared capitalism" firms. The analysts do not observe switching into or out of share ownership but they are able to make inferences about the operation of schemes and their 'fit' with other

[31] This reflects other recent evidence for Britain which shows positive correlations between share ownership and productivity were confined to workplaces which combined share ownership with other group incentives, namely profit-related pay of group-based performance-related pay (Bryson and Freeman, 2010).

[32] Bryson and Freeman's (2010) analysis shows a number of statistically significant correlations between these factors and productivity in their cross-sectional investigation using workplace-level data.

policies due to the wealth of data they have collected using dedicated firm-level and worker-level surveys. By happenstance one firm introduced a profit-sharing system during the study and agreed to allow the researchers to survey its workers before and after the new plan came in. The results are summarised in Box 5.4.

BOX 5.5. Summary evidence on financial participation

- The standard approach is panel switching models. Dynamic panel models tend to confirm that more successful firms adopt financial participation leading to potential for upwardly biased estimates of impact on performance.
- A range of reasons is given for generally weak incentive effects including the 1/N problem and free-riding; myopia; rent seeking.
- There are hints that combinations of incentive pay schemes can be the key to improved performance.
- Institutional context can play an important role, helping to explain stronger effects in Japan and weak effects in transition economies.
- Share capitalism project indicates that share plans can have strong incentive effects where holdings are sizeable and they interact with complementary firm HR and governance policies.
- The empirical evidence on the effects of financial participation is more controversial than that relating to individual and group incentive pay. There are fewer studies with robust identification strategies which generally find small positive effects.

Finally, mass privatisation programmes in countries undergoing a transition from central planning to market economies multiplied employee share ownership in the 1990s. Estrin et al. (2009) review the effect of privatisation in transition countries putting particular emphasis on findings that are based on a 'credible' identification strategy. They find that employee ownership has a modest (i.e. in Estonia) or non significant effect on productivity (i.e. most other countries in Central and Eastern Europe as well as in countries of the former Soviet Union).

5.5 Summary

There is substantial evidence from a number of studies showing that piece rates increase labour productivity by inducing greater worker effort than fixed rates and induce worker sorting which leads to higher ability workers receiving performance-related pay. But there is also strong evidence that piece rates are relatively costly to maintain and that they may have deleterious effects on some aspects of worker behaviour. Consequently the impact of piece rates on profitability are smaller and can even be negative. This may help explain moves away from piece rate payments in recent years, or at least their use alongside other motivational tools such as group-based incentives. Group-based incentive payments also appear to have positive productivity effects, often overcoming "1/N" problems through worker co-monitoring and moves towards team production more generally.

The most convincing studies on the effects of financial participation tend to find small positive or neutral effects. In addition, many studies emphasise the importance of the conditions under which the schemes are introduced, including in particular other human resource practices. More generally, even when studies identify positive *average* effects of incentive pay in firms where they are deployed, there are many characteristics of workers, jobs and firms which might suggest the effects of particular schemes will be heterogeneous across time and place so that one should be cautious in prescribing the same "treatment" elsewhere. As Prendergast points out (2009: 8): "Such prescriptions will be tempered by the nature of the job carried out by workers, the extent to

which they have discretion in their jobs, and the extent to which the measures used to pay workers truly reflect the inputs of effort". The circumstances surrounding the introduction of schemes, such as the quality of supervision, managerial engagement and links to other human resource practices, can play a crucial role in whether and to what extent greater links between pay and performance will result in improved labour productivity. This is important since the current rash of studies based on "insider econometrics" may suffer from an external validation problem if treatment effects are heterogeneous (Box 5.6).

BOX 5.6. "Insider econometrics": generalisation and external validity

- The methodology adopted in a number of studies reviewed above has been labelled "insider econometrics" (Shaw, 2009; Ichniowski and Shaw, 2009; Bartel at al. 2004). Studies use information "inside" the firm and apply adequate "econometric" techniques to estimate the impact of incentive schemes or HRM practices on performance. Insider econometric studies allow researchers to investigate the effect of the introduction of incentive schemes (the "treatment") in one company or in an industry, on some measure of workers' or establishments' performance.
- Insider studies exploit the quality and richness of the information from the point of view of insiders who adopt the incentive scheme, however reliance on observations within a single firm (or within an industry) rise issues concerning the "external validity" and the possibility to "generalise" the result.
- While results can often shed light on the mechanisms at work when a firm introduces piece rates, or establishments in an industry adopt financial participation schemes, particular care should be used in drawing general conclusions (or prescribing the same "treatment") given the substantial heterogeneity in the effects across time, place and environment.

6. New Evidence on performance related pay

This section presents three cases that provide new evidence on the operation of performance related pay. The first uses changes in incentive pay in a large Italian firm to assess how branch managers respond to a shift in performance related pay when the firm changed the measure of performance from being based on sales of the branch to being based on the profitability of the branch. The second uses exogenous variations in the institutional environment in Italy in the form of the 1993 tripartite agreement on decentralised bargaining and distribution of firm's productivity gain to identify the 'causal' effect of incentive schemes on firms outcomes. The third analyses the effect of pay for performance based on financial performance and on individual and group incentives on work pressure and profitability of the firm. Al three cases find that performance related pay affects performance in ways that are readily interpretable in terms of responsiveness to economic incentives.

6.1 Incentive effects of PRP in a catering services company

Consider the situation in which a firm pays some workers on the basis of the performance of their workplace while paying others fixed wages. Organisational structures of this type are common but have received little attention.[33] For example, most retail banks and fast food chains operate pay systems in which the branch managers are subject to incentive pay, while regular employees are not. [34] More generally, pay schemes of this type are often adopted in firms that are organised in chains (restaurants, hotels, shops, et.) and, also in the public administration for services like hospitals or employment offices. At the limit, one could think of franchising as an extreme application of a performance related pay system in which the franchisee is the residual claimant of the returns from the economic activity and regular employees receive a fixed salary.

This study compares a pay system in which the local manager is compensated according to the level of sales or the level of profits of the local unit that is under his/her control. The choice of the performance measure is not a trivial one. In general, the profits of the business unit that is run, organised and administered directly by the manager would seem to be the best choice. However, very often such local managers are subject to a number of constraints imposed by headquarter - for example on new hirings or purchases – that prevent them from having full control over profits. Moreover, keeping track of profit levels for each local business unit requires accounting systems that are often very costly. Hence, sales are sometimes a more convenient measure that can be recorded more easily. Data from the managers' surveys mentioned above confirm that about half

[33] The literature on performance related pay or profit sharing has been concentrated on the analysis of systems in which all workers are subject to the same schemes (Lazear, 2000; Freeman and Kleiner, 2005 among many others. See section 5.2). The only exceptions are papers that look at the top end of the occupations distributions and explore the agency problems associated with the compensation structure of CEOs (Conyon and Murphy, 2000; Hall and Liebman, 1998; Murphy, 1985). Other than these, the recent paper by Bandiera et al. (2007) discusses some interesting implications of changes in managerial compensation from fixed wage to performance bonus in a fruit picking farm. They find that such a change induces a more efficient allocation of workers to job tasks and it also eliminates some perverse effects of personal favouritism towards workers to whom the manager is socially connected. Similarly to our case study, Bandiera et al. (2007) emphasise the impact of different types of managerial pay on the mangers' behaviour with respect to their employees. Along the same lines are a few papers that look at managerial compensation in the public sector (Atkinson et al., 2009; Burgess and Ratto, 2003; Dixit, 2002; Eberts et al., 2002; Kahn et al., 2001; Levy, 2002).

[34] A recent survey of Italian managers indicates that in firms where managers are subject to incentive pay, only about one third of while collars also receive a variable component of pay (Osservatorio Manageriale, Manageritalia, 2010).

of the times variable pay is based on indicators such as sales, revenues, receipts and half of the times on profits or revenue margins.

The firm is a large Italian company that owns and runs directly a large number of snack bars, fast-foods and self-service restaurants, the majority of which are located along the country's main highways, adjacent to the gas stations. Each store is administered by a local manager, whose pay is a combination of a fixed wage and a variable component. Until the last quarter of 2002 the variable pay was computed mostly but not exclusively on the basis of sales. Then the system was modified so that the local manager's bonus was determined by the profits of the store (although the level of sales still plays a role). Regular employees - i.e. waiters, cooks, et. – are paid a fixed wage. Importantly, the local manager has some decision power over the labour input of regular employees. Although they cannot hire permanent employees, store managers define and allocate workers to work shifts, overtime work, on-the-job training sessions and they can also hire seasonal and temporary workers up to a fixed budget determined by the central firm.

When the manager's bonus is a function of sales, there is an incentive to use excess labour whereas such an incentive disappears when performance is measured with store profits. In addition assuming that a managerial job requires more work effort than a salaried job, the sales-based system attracts managers of lower ability who can use excess labour to boost sales and obtain high bonuses while exerting limited effort. In the profit-based scheme, such a strategy becomes more costly, as the wages of salaried workers enter the determination of one's bonus. Hence, workers with low managerial talent would now prefer to remain salaried employees. The key to our analysis of managers' response to the change in incentives is the complementarity between salaried labour and managerial effort. We expect sales to decrease and labour productivity to rise when profits replace sales as a measure of the manager's performance since the manager will seek to reduce the cost of salaried workers. The effect on profits depends on the degree of complementarity between managerial effort and salaried labour in the production function. When such a complementarity is particularly strong, profits may actually decline. Complementarity also implies that managers will increase their effort to coordinate and organise salaried labour and allocate workers to tasks more efficiently (Bandiera et al. 2007), for example through the setting up of work shifts.

The major empirical problem in identifying the effects of the changing in the pay system is that the firm introduced the system in all stores at the same time, which raises the danger that changes over time may be misread as changes in incentive pay. We address this issue in two ways: by estimating time effects using different functional forms on the assumption that time effects have some continuity, and by examining how local managers react to variation in local traffic flows under the two different pay systems. Incorporating exogenous variation in the traffic flows in our theoretical analysis we show that under a profits-related pay scheme managers react more effectively to such shock, by adjusting the labour input of salaried employees and their own effort whereas under a sales-based system, they can only react by changing their own effort level and thus cannot be as efficient as adjusting all inputs.

Our results show that, the introduction of the new profit-based system leads to fewer hours worked at the restaurant level and lower sales but higher average productivity. The results for profits diverge from the model because the new system did not simply replace sales with profits as a measure of performance, but also became substantially more generous.

The remaining of this section is organised as follows. First we provide a very brief and simple discussion of the theoretical arguments. Next, we present the institutional setting and the data. Finally, we present the empirical results and we conclude with some final remarks.

Theoretical framework

The key theoretical insight to understanding the implications of a change of the pay scheme from sales-based to profits-based is that under the former the local manager has an incentive to use excess labour from salaried employees. We derive such implications using a relatively simple and parsimonious model that we briefly outline here and develop more formally in Box 6.1.1.

Local managers have a utility function that increases with income and decreases with effort. Managers are heterogeneous and more able ones experience a lower cost of effort. The output level of the local restaurant is determined through a production function that requires the labour input of regular employees and managerial effort which are complements. Regular employees are paid a fixed wage while managers' compensation is the sum of the fixed wage and a fraction of either sales or profits of the local restaurant. Additionally, each store has a maximum budget to be spent for the wages of regular employees.

The model is solved in two steps. First, each workers decides whether to apply for a managerial position or remain a regular employee. Managers are appointed at random among those who submit their application. Second, each store is hit by a random productivity shock and the local manager chooses the level of managerial effort and labour input after observing the realisation of the shock. This reflects the nature of the daily if not higher frequency of traffic shocks that we exploit in the empirical analysis.

The model predicts the average quality of managers when incentive pay depends on sales (= the sum of a fixed wage and a fraction of sales) and when it depends on profits (=the sum of a fixed wage and a fraction of profits).[35] With pay depending on sales, there is an incentive to use as much labour as possible up to the limit imposed by the store budget. Given the complementarity of regular labour and managerial effort, in the sales-based case managers also exert higher effort in managing the employees. Moving from a sales-based to a profit-based system raises the average quality of managers and moves both managerial and employee effort to their efficient level. Sales decrease while profits and productivity increase. Moreover, since under the sales-based system managers always use the maximum input of salaried labour allowed by the store budget, they cannot adjust to random changes in productivity. Hence, we expect to see a stronger responsiveness of all inputs (effort and labour) and outcomes (sales, productivity and profits) to variations in traffic flows when managers are paid according to local profits. Consequently, labour productivity and profits should also increase in the new system, as the production inputs are continuously adjusted to their optimal level.

BOX 6.1.1 – A more formal model of local managerial pay.

In this box we provide a brief sketch the formal model that we use to derive the implications discussed in the main text.

Consider a set of heterogenous workers with the following quasi-linear utility function:

$$U = w - \frac{c(e)}{\eta}$$

[35] Formally, what we call *residual profits* is not exactly the usual measure of profits. In fact, actual profits are equal to the value of the output (sales) minus total labour costs, thus including both the salaries of regular employees and the manager's pay.

where *w* is total pay, η is the workers' innate managerial talent (the source of heterogeneity), *e* is the level of managerial effort exerted by the worker and *c(·)* is an increasing and convex function which features increasing returns to scale.

Workers are employed in a set of identical local establishments (restaurants) that produce an output *y* using a combination of both labour input and managerial effort according to the following production function:

$$Y=Af(e,L)$$

where *L* is the total labour input (hours worked), *A* is a random productivity parameter (which captures the traffic shocks in our empirical application) and *f(·)* is a function with positive first partial derivatives and negative second partial derivatives. Moreover, we also assume that cross derivative of *f(·)* is positive (the production inputs are complements). Finally, in order for the equilibrium level of output (sales) to be defined in the model we need *f(·)* to display decreasing returns to scale.[36]

Each local establishment is subject to the same budget limit, which we define as a maximum level of employable labour $\overline{L}$, so that $L \leq \overline{L}$.

Wages are fixed at a level $\overline{w}$ for salaried employees, whereas managers receive $\overline{w}$ plus a variable pay that is defined as a fraction α of either output *y* or residual profits of the establishment π, defined as the value of output minus total fixed labour costs, i.e. $\pi = y - \overline{w}(1+L)$. We define the first pay scheme as sales-based and the latter as profit-based.

The sequence of events in the model is as follows. First, each worker decides whether to submit the application to a managerial position. Then managers are appointed at random among those who submitted an application and both managers and workers are randomly allocated to the various identical establishments. Finally, the productivity shock is realised (*A*), managers choose their level of effort (*e*) and the amount of salaried labour input (*L*) thus defining the equilibrium level of output (*y*) and managerial pay (*w*).

We assume that the economy is populated with identical firms, all organised in a set of local establishments, so that there is no meaningful distinction between the internal and the external market in this model. In this sense, $\overline{w}$ can be interpreted as the prevailing market wage for non-managers.

- Case a: sales-based system. In a sales-based pay system the total wage of the local manager is defined as $w = \overline{w} + \alpha y$. Using this definition, let us solve the model backward and first look at the optimal choice of *e* and *L* of a generic appointed manager with ability η. The fist order conditions for utility maximisation in this specific case take the following form (the subscript *a* indicates equilibrium values):

$$L_a = \overline{L}$$

$$Af_1(e_a, \overline{L}) = \frac{c_1(e_a)}{\alpha\eta}$$

where $f_1(\cdot)$ and $c_1(\cdot)$ are the first derivative with respect to the first argument of each function. The first of these conditions merely indicates that the optimisation procedure obviously leads to a corner solution for *L*: managers do not internalise the cost of excessive labour usage and therefore they will always hit the budget limit. The second first order condition equates the marginal benefits of managerial effort to its marginal disutility.

The decision to apply to a managerial position is taken by comparing the expected utility of working as managers and as a salaried employee. Namely, a generic worker applies to managerial jobs is the following condition is satisfied:

$$E\left[U\left(e_a, L_a\right)\right] > \overline{w}$$

Replacing the first order conditions above into this participation constraint shows that the constraint is always satisfied for any (admissible) value of the parameters and for any level of managerial talent η. The intuition for this result is rather obvious: given the possibility to use excess labour at no cost for the manager, also the less talented workers can obtain higher expected utility as managers by increasing sales (and thus the variable component of pay) with minimal effort.

- Case b: profit-based system. In a profit-based pay system the total wage of the local manager is defined as $w = \overline{w} + \alpha\pi$ and the first order conditions for utility maximisation of a manger change as follows (the subscript *b* indicates equilibrium values under this new scenario):

[36] With the usual assumption of constant returns to scale, only the ratio of the production inputs is defined and the actual scale of production is not determined. This would be problematic in our setting given that the scale of production (sales) is a key variable of the pay system and one of the observable outcomes that we want to analyse.

$$Af_2(e_b, L_b) = \overline{w}$$

$$Af_1(e_b, L_b) = \frac{c_1(e_b)}{\alpha\eta}$$

Now, both the labour input and managerial effort are set at a level that equalises marginal benefits and marginal costs. By definition, $L_b \leq L_a$ and, given production complementarity, this implies that also $e_b \leq e_a$. Trivially, since both production inputs are lower, also the level of output is lower under a profit-based system than under a sales-based system. However, since labour productivity is decreasing and $L_b \leq L_a$, the equilibrium level of labour productivity is higher in case b than in case a. Obviously, the size of all these effects depends on the level of $\overline{L}$. However, since $\overline{L}$ cannot be adjusted contingently on the realisation of the shocks, the overall production efficiency is higher under the profit-based scheme than under the sales-based scheme.

Now, the selection of managerial applicants become more stringent and only workers with a high enough level of managerial talent submit their application. Finally, the effect on profits of a shift from a sales- to a profits-based system depends on the degree of production complementarity between managerial effort and salaried labour. With strong complementarities, the reduction in the input of labour induced by the new system also reduces the returns to managerial effort, thus reducing its equilibrium level and potentially leading to lower profits. When complementarities are weak the effect on managerial effort is lower and profits are more likely to increase.

Institutional setting and data

The company under study is the Italy's largest operator in the food and beverages sector. It was established in the late 1970s when several firms whose activities were concentrated along the country's main highways merged into a single company owned by a government holding. It was common at that time that the State would directly own strategic companies in the country through a financial intermediary of its own. It is only in the mid 1990s that the company was fully privatised. Stores provide services to travellers on major roads. Such stores vary in size and in the types of services they offer. Some are simple bars or cafes while others have self-service restaurants and some others also offer regular restaurants with table service. The largest stores combine restaurants, snack bars and cafes. Most of them also have a mini-market and a newsagent stand. Although the core business remains concentrated to the particular market of travellers by car, the company has extended its activities to other locations like airports, train stations, shopping malls as well as regular city centres. The company is also active in other countries around the worlds (France, Spain, Germany, Belgium, Netherlands, Switzerland, Canada, United States), although typically with different brands.

All local stores have a general manager. The largest stores that offer several different services (bar, self-service, regular restaurant) usually also have workers who act as "head of service" in an intermediate position between the general manager and regular employees. The organisational structure also include area managers, who coordinate and supervise the activity of several stores in a given area. The entire structure is managed and coordinated at the country level by headquarter services. Being by far the larger operator in this sector in Italy, the firm makes extensive use of it internal labour market hiring almost all restaurant managers from current employees. The supply of workers with the required skills and training to manage one of the restaurants of this company is limited in the outside market.

The local manager of the restaurant has considerable autonomy in the management of the store. She/he decides the amount and the composition of the goods purchased withinthe budget allocated to the store, allocates regular employees to tasks, defines works shifts, overtime hours and the schedule of holidays. Local managers can also hire temporary seasonal workers (subject to the approval and the supervision of the HR division) and decides who among the employees of his/her store participates in the training sessions regularly offered by the headquarter HR division. Furthermore, in larger stores with intermediate service managers, some of these functions can be

delegated to them if the general manager of the restaurant decides so. Hence, the local mangers have substantial control over the labour input of their stores, although not fully.

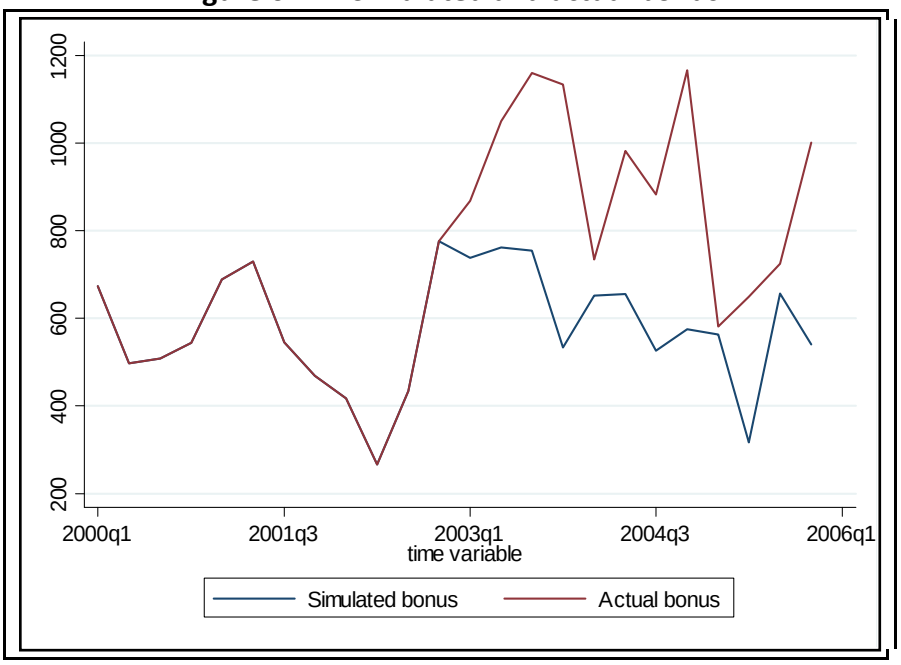
Regular employees (waiters, cooks, etc.) are paid a fixed monthly salary, which is defined both by national bargaining with the unions of the food and beverage sector and by firm level negotiations. Local managers also receive a fixed pay that is defined by the same process of national and local bargaining. On top of such a fixed wage, they also receive a bonus payment that varies with the store's performance. Such a system of incentive pay was originally introduced in 2000 with the bonus paid quarterly and annually computed mostly on the basis of sales, with adjustments for productivity and the quality of services, as measured by a "mystery client".[37] In the years 2001 and 2002 a few (minor) modifications of the system were introduced. In 2003 the company changed the bonus system in a major way. Although sales remain part of the formula that defines the quarterly bonus, the most important element became local profit, i.e. the value of sales minus purchases, labour and administrative costs. The adjustment for the quality of service is still present in the post-2003 system.

Operationally, both before and after 2003, the performance indicators (sales, profits, quality of services) are transformed into "points", better performance is associated to higher points. The bonus payment is, then, computed as the product of the sum of points for each performance indicator and a monetary "point value". Such a "point value" varies by type of store, with the largest and most complex stores being associated with higher values.[38] One other important modification of the post 2003 system is that the point values have been substantially increased, thus making the system more generous. This is indicated by Figure 1, which plots the average actual bonus received by store managers over the entire period 2000-2005 together with the a simulated bonus for the period after 2003 which has been calculated using the actual observed performance but the old pre-2003 rules of the incentive scheme. The figure shows, for given performance, the new system is more generous by over 50%.

[37] The "mystery client" is a system of measurement of the quality of services that is becoming more and more popular in many organisations. It is typically provided by external specialised companies who select a pool of consumers, make sure they have no relation whatsoever with the company under evaluation, send them to the shops with a specified list of goods and services to purchase. These visits take place at random intervals and no information about the timing of the visits nor the characteristics of such "mysterious clients" is disclosed to the personnel of the local shop nor to the general management of the company. The mystery client is given a check-list of quality items to evaluate, such as the kindness of the operators, the cleanliness of the rooms, et.

[38] Stores are classified into 5 different clusters and the point value varies across clusters. For example, the simplest cluster includes store with only a bar or café. The most complex cluster is for stores with multiple bars, restaurants, et.

Figure 6.1.1. Simulated and actual bonus



Our full dataset is an extraction of data on all stores and all store managers over the period 2000 to 2005.[39] The analysis in this section covers the 186 stores that are located on roads and consistently observed from 2001 through to 2005, i.e. two years before the introduction of the new pay system to two years after. The store data include information on employment levels and composition, sales, hours worked and traffic flows in the corresponding motorway tract at the quarterly frequency. Panel A in Table 6.1.1 reports the descriptive statistics for these variables. Local profits are only available from the first quarter of 2002. Since they were not used as a measure of performance in the pre-2003 system, the firm did not collect and maintain this information. The company started collecting it only in 2002 in the run up to the new system.

Table 6.1.1 - Descriptive Statistics

		Incentive Scheme	
	Total	**Old**	**New**
Panel A. Store characteristics: (n = 186)			
Hours worked	11,380	10,993	11,765
	(9,865)	(9,628)	(10,085)
Productivity[1]	69.085	68.175	69.995
	(10.520)	(10.502)	(10.460)
Sales[1]	787,110	751,015	823,189
	(687,546)	(665,316)	(707,381)
Profits[1,2]	619,275	597,824	626,401
	(552,759)	(548,600)	(554,077)
Traffic flows[3]	49,377	47,874	50,880
	(22,986)	(22,606)	(23,270)
Number of workers	36.823	36.392	37.254
	(32.368)	(31.829)	(32.899)
Number of fixed-term workers	9.349	10.533	8.167
	(9.322)	(10.074)	(8.340)

[39] The data have been obtained thanks to an agreement between the Fondazione Rodolfo Debenedetti and the company under investigation.

Number of part-time workers	20.565	20.297	20.832
	(19.591)	(19.293)	(19.884)
Panel B. Manager characteristics: (n=364)			
Age[4]	41.973	41.845	42.101
	(7.976)	(8.053)	(7.898)
Tenure[4]	17.357	17.214	17.499
	(8.391)	(8.429)	(8.352)
1=female	0.099	0.084	0.115
	-	-	-
1= high level of education[5]	0.629	0.620	0.638
	-	-	-
1= manager has kids	0.554	0.514	0.595
	-	-	-
1= born locally[6]	0.252	0.241	0.263
	-	-	-
Total pay	7,123	6,697	7,542
	(1,315)	(1,084)	(1,387)
Base pay	6,387	6,142	6,632
	(918)	(851)	(918)
Bonus	730	545	914
	(789)	(551)	(933)

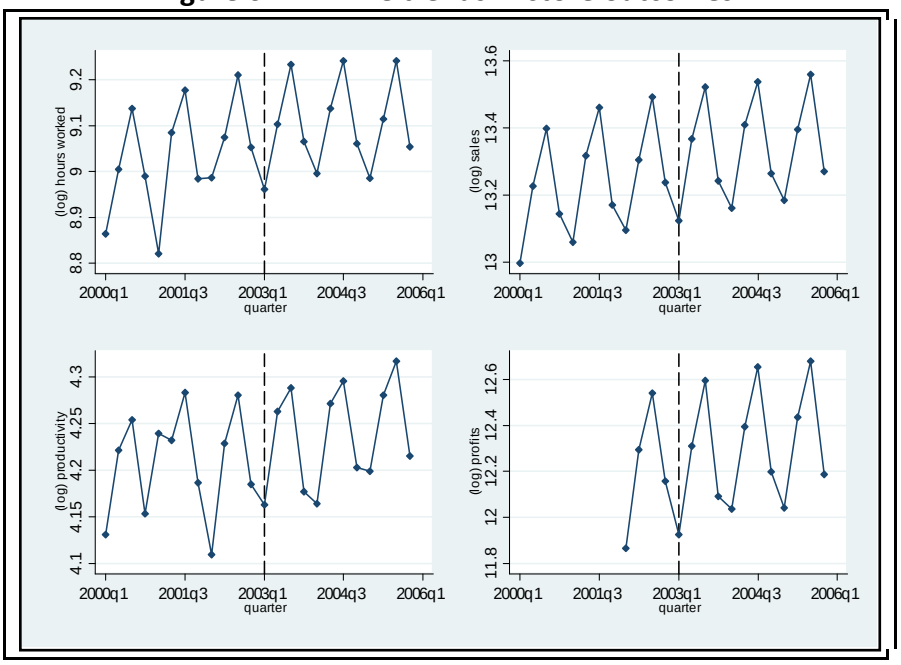
1. Measured at current prices.
2. Available only from the first quarter of 2002.
3. Number of vehicles that have covered the entire motorway tract in the quarter. This number is adjusted by the number of vehicles that covered only a subsection of the entire tract.
4. Age and tenure both vary at the quarterly level.
5. Secondary or higher education.
6. Born in the same province where the store is located.
Standard errors in parenthesis

All variables show a marked time trend that generates higher mean outcomes under the new system, i.e. after 2003, than before; and strong seasonality. This is evident from Figure 2, which plots the evolution over time of (the log of) hours worked, sales, productivity and profits.[40] In fact, traffic flows, which vary seasonally due to holidays are important determinants of the economic activity of these stores.

Company officials report that over the period 2000-2005 they have maintained real prices constant for almost all goods and services and that, if anything, many of their real prices declined slightly. However, since prices are set by the central headquarters they do not influence the type of cross-store comparisons that we carry out. Moreover, all our regressions include time effects, either in the form of quarter dummies or (4^{th} grade) polynomials of quarter, so that we can safely use variation over time in monetary measures of store performance. Nevertheless, differences in local prices may still affect costs and, thus, distort our measure of profits but our regression analysis also includes store fixed-effects which take such differences into account.

[40] All the monetary values are kept at constant prices but the picture looks very similar when deflated for inflation.

Figure 6.1.2. Time trends in store outcomes.

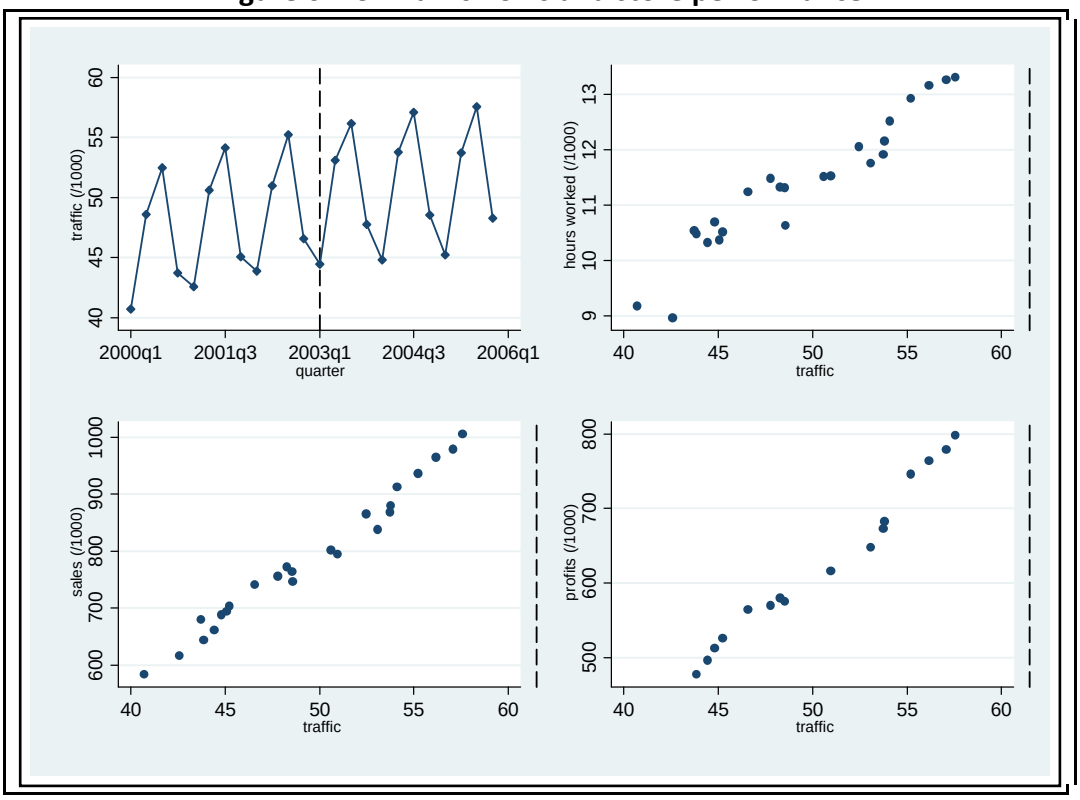


For each store we locate the exact motorway tract where they are located. Motorway tracts are administrative units used to define who is responsible for operating and maintaining the roads. For example, the motorway rings around the largest cities like Rome or Milan are one single tract. The 186 stores in our data are distributed over 36 tracts, whose average length is 112 kilometres with a standard deviation of 55. However, the distribution of tract length is quite skewed to the left. One quarter of all tracts is shorter than 70 kilometres and the median tract is 90 kilometres long. On average, there are 6 stores per motorway tract.

Since (almost) all motorways are subject to the payment of a toll that depends on the length of trip, all vehicles entering and exiting the motorway go through toll stations and are registered. The records of such entries and exits are the basis for the computation of the traffic flows data. Since tracts are normally longer than the motorway section between two adjacent tool stations, the traffic data need to be adjusted to account for vehicles that cover only a subsection of the entire tract. This is done by computing the length in kilometres of each trip that pertains to each tract and divide it by the number of vehicles that ever transited along the tract in a given quarter. Hence, our data should be interpreted as number of theoretical vehicles that cover the entire motorway tract where the store is located.

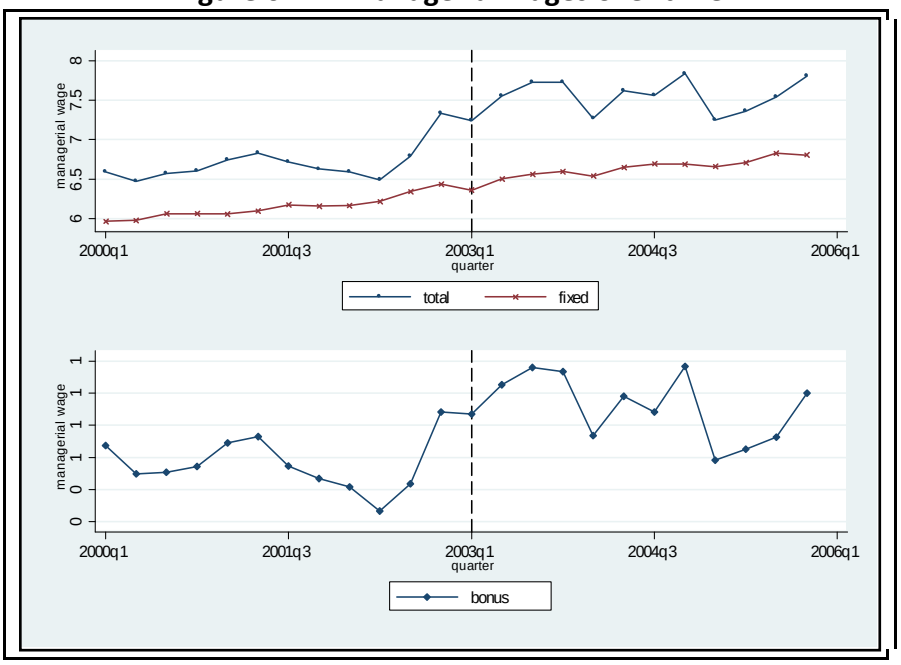
The descriptive statistics in Table 6.1.1 show that the flow of vehicles on the average tract is in the order of almost 50,000 units with a strong increasing trend and also strong seasonality, as is evident from the top-left panel in Figure 6.1.3. The other panels of Figure 6.1.3 show the unconditional correlation between the average flow of traffic in each quarter and the average hours worked, the average sales and the average profits in our stores. Clearly such correlations are very strong, consistently above 0.9.

Figure 6.1.3. Traffic flows and store performance



We also have very detailed information on managers. The personnel archive includes all demographic and contract characteristics. The average age of local managers is around 42, they are predominantly males, although the fraction of women increases significantly over time. Over 60% have a high school degree or higher but only about 4% hold a college degree. Although these numbers are blurred by important time effects, the descriptive statistics show a significant increase in the education level of managers who are appointed after 2003.

Figure 6.1.4. Managerial wages over time



The average total compensation of managers is approximately 7,100 euros per quarter. This is the sum of an average 6,400 euros of fixed wages, which are paid monthly, and 700 euros of bonuses, which are paid quarterly. The time evolution of these variables is reported in Figure 6.1.4, which shows are clear time trend with constant slope for fixed wages and, expectedly, a more variable pattern of bonuses, which start increasing substantially already in 2002 and flatten only at the beginning off 2004.[41]

Empirical analysis

We now turn to a more detailed analysis of the change from the sales- to the profit-based system in the stores from before and after the first quarter of 2003, when the new system was first introduced. As noted, the key identification issue is related to the fact that, since the new system as introduced in all stores at the same time, its impact cannot be separated from a discontinuous time "jump effect" before and after Q1:2003. Our approach to this problem consists of modelling the time effect as a fourth order polynomial. In the appendix we show that our estimates change only marginally when choosing a different functional form. Moreover, being able to observe managers across different stores, we can infer the role of managers' self-selection and pure incentive effects by comparing estimates conditional on either observable managers' characteristics or managers' fixed-effects, or both. This first set of estimates does not contain specific controls for the level of demand, other than the time effects and the store fixed terms. Controlling for heterogeneity in demand levels is important in this setting if one thinks that the effect of the new system differ between stores with high and low demand.

We investigate this later on, when we look at how store performance reacts to variation in traffic flows before and after the introduction of the new pay system by introducing the interaction of such flows and new system in a fully parametric specification of the time effects in levels.

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[41] In 2002, after two quarters of negative results for the company, a special (and temporary) variation in the incentive scheme was introduced for the last two quarters of the year. Such a special scheme may explain part of the sharp increase observed in the data for 2002.

Table 6.1.2 – Store performance in a sales- and a profit-based pay scheme

	Log worked hours (1)	Log sales (2)	Log productivity[1] (3)	Log profits[2] (4)
Panel A				
1=after 2003q1	-0.037***	-0.022**	0.016***	-0.084***
	(0.007)	(0.009)	(0.004)	(0.014)
Manager characteristics	no	no	no	no
Manager fixed effects	no	no	no	no
Observations	4,462	4,463	4,463	2,879
Number of stores	186	186	186	186
Number of managers	364	364	364	297
Panel B				
1=after 2003q1	-0.037***	-0.022**	0.016***	-0.080***
	(0.007)	(0.009)	(0.005)	(0.014)
Manager characteristics	yes	yes	yes	yes
Manager fixed effects	no	no	no	no
Observations	4,261	4,262	4,262	2,833
Number of store	186	186	186	186
Number of managers	348	348	348	296
Panel C				
1=after 2003q1	-0.035***	-0.022**	0.013**	-0.086***
	(0.007)	(0.009)	(0.006)	(0.017)
Manager characteristics	yes	yes	yes	yes
Manager fixed effects	yes	yes	yes	yes
Observations	4,258	4,259	4,259	2,831
Number of stores	186	186	186	186
Number of managers	348	348	348	296

1. Productivity is the ratio between sales and hours worked (average productivity).
2. Our measure of profit is the most consistent with the theoretical model in Box ##, i.e. sales minus total fixed labour costs. Since labour costs are only available since the first quarter of 2002, the number of available observations in column 4 is smaller than in the other columns.
All regressions include store fixed effects, time-varying store characteristics (number of workers, number of fixed-term workers, number of part-time workers), season fixed effects and a 4^{th} order polynomial of time (quarter).
Manager characteristics include age, tenure, gender, a dummy for secondary or higher education, a dummy for parents and a dummy for whether the manager was born in the same province where the store is located.
Robust standard errors in parentheses. Significance: *** if p<0.01, ** if p<0.05, * if p<0.1

Table 6.1.2 gives our first set of results. Each column looks at a different outcome as a dependent variable (in logs). All regressions are estimated with store fixed-effects, a full set of season dummies and time-varying characteristics of the stores (employment size, number of temporary and part-time workers). The standard errors are robust to general heteroskedasticity. Across panels we include additional controls. In Panel B we add a set of observable characteristics of the manager: second order polynomials in age and tenure, a gender dummy, a dummy for secondary or higher education, a dummy for the presence of children in the manager's household and a dummy for whether the manager was born in the same province where the store is located. In Panel C we also add manager fixed-effect and in this case identification is guaranteed only by

managers who change store and stores that change manager over the sample period. This is about half of the total number of observations. Moreover, with manager fixed effects we drop the observable manager characteristics that do not vary over time.
In this setting, one can interpret the estimates produced in Panels B and C and controlling (with different degrees of precision) for managerial ability, hence the comparison of the estimates in Panel A with the others provides an indication of the role of self-selection induced by the introduction of the new pay system.

The results show that, controlling for all fixed and time varying store characteristics, after the introduction of the new system worked hours declined by 3.7%, sales declined by 2.2%, while productivity increased by 1.6%. All these effects are statistically significant at conventional levels and are consistent with the predictions of the model. The model, however, is more ambiguous about the effect on profits and predicts that such an effect should be negative when managerial effort and salaried labour are strong complements. Overall, we find that profits declined by a significant 8.4% after the first quarter of 2003. Notice that the average size of the stores is relatively large, with over 36 full-time equivalent employees, and it is plausible to imagine that restaurants of such size could hardly work well without efficient management.[42]

In Table 6.1.3 we explore the effect on profits further. We introduce two interaction terms in the specification of the regression for profits: we interact the indicator for all quarters in which the new system is implemented (i.e. all quarters after 2002) with the (log) mean traffic flow at the store (over the entire period covered by our data) and with a dummy for highly educated managers (i.e. managers who hold at least a secondary degree). We interpret stores that are located in areas of low traffic as the ones that are easier to manage: they are small in employment size, they are also less differentiated in terms of activities as they typically are either simple bars or restaurants and very rarely they offer more than one type of service. Interactions with all these dimensions (size, type and number of services) lead to qualitatively similar results but we obtain statistical significance only when using mean traffic. Our interpretation is that this measure synthetically captures many of the features of "simple" stores, while at the same time exhibiting more variation across observations.

The three columns in Table 6.1.3 replicate the three specifications reported in Panels A to C in Table 6.1.2. Consistent with the above interpretation, we find that in store located in areas with very low traffic levels, the introduction of the new pay system is associated with higher profits. This effects decreases rapidly towards zero and becomes significantly negative already around the 10th percentile of the mean traffic distribution. Our model suggests that the correct interpretation of this result is that complementarities between managerial effort and regular employees are strong and significantly affect the impact on profits of the new pay system. We find that managers who hold at least a secondary degree are able to limit the negative impact of the new system on profits by a sizeable 77%. In fact, in stores where the manager is consistently highly educated both before and after the introduction of the new system the effect is indistinguishable from zero. However, this effect is statistically significant at conventional levels only in column 3, where we add manager fixed-effects. In general, however, augmenting the set of controls with managerial characteristics or fixed-effects does not change the picture significantly.

Table 6.1.3 – Heterogeneous effects on store profits.

	Log profits[1]	Log profits[1]	Log profits[1]

[42] All these effect are barely affected by the introduction of observable managers' characteristics (Panel B) and manager fixed-effects (Panel C), suggesting that selection plays only a minor role in the current context.

	(1)	(2)	(3)
1=after 2003q1	0.457**	0.457**	0.452***
	(0.219)	(0.219)	(0.173)
[1=after 2003q1]x[1=(log) mean traffic]	-0.039*	-0.039*	-0.042***
	(0.021)	(0.021)	(0.016)
[1=after 2003q1]x[1=highly educated manager[2]]	0.023	0.023	0.067**
	(0.017)	(0.017)	(0.028)
Manager characteristics	no	Yes	yes
Manager fixed effects	no	No	yes
Observations	2,352	2,352	2,352
Number of stores	151	151	151
Number of managers	257	257	257

1. Our measure of profit is the most consistent with the theoretical model in Box ##, i.e. sales minus total fixed labour costs.
2. Secondary education or higher.
All regressions include store fixed effects, time-varying store characteristics (number of workers, number of fixed-term workers, number of part-time workers), season fixed effects and a 4th order polynomial of time (quarter).
Manager characteristics include age, tenure, gender, a dummy for secondary or higher education, a dummy for parents and a dummy for whether the manager was born in the same province where the store is located.
Robust standard errors in parentheses. Significance: *** if p<0.01, ** if p<0.05, * if p<0.1

Finally, in Table 6.1.4 we look more specifically at the role of traffic flows. We replicate the estimates of Table 6.1.3 replacing the time effects with a full set of quarter dummies, so that the coefficient on the dummy for post-2003 cannot be identified. Additionally, we include the log of the flow of traffic in the store tract in each quarter and its interaction with the post-2003 dummy. As already suggested by Figure 6.1.3, traffic flows strongly influence all outcome variables with a positive sign. Consistent with the predictions of the model, we find that under the new pay system, hours worked are more responsive to exogenous traffic shocks and so are sales. Productivity and profits also show the same pattern but the effects are not significant at conventional statistical levels. Under the pre-2003 pay system, the elasticity of hours worked and sales to the flow of traffic was 0.026 and 0. 046, respectively. Such elasticises increase by 40% to 50% after the introduction of the new system. As with previous estimates, selection of managers does not seem to play a crucial role as the estimates in Panels A, B and C are very similar. In Panel C, when we add manager fixed-effects, although the point estimates do not change substantially, we lose statistical significance at conventional levels.

Table 6.1.4 – Reaction to traffic shocks in a sales- and a profit-based pay scheme

	Log worked hours	Log sales	Log productivity[1]	Log profits[2]
	(1)	(2)	(3)	(4)
Panel A				
Log of Traffic	0.026***	0.045***	0.019***	0.069***
	(0.007)	(0.010)	(0.005)	(0.016)
[1=after 2003q1] x log Traffic	0.011*	0.019**	0.008	0.009
	(0.006)	(0.009)	(0.005)	(0.013)
Manager characteristics	no	no	no	no
Manager fixed effects	no	no	no	no
Observations	3,623	3,624	3,624	2,352
Number of stores	151	151	151	151

Number of managers	314	314	314	257
Panel B				
Log of Traffic	0.024***	0.042***	0.018***	0.071***
	(0.008)	(0.010)	(0.005)	(0.016)
[1=after 2003q1] x log Traffic	0.012**	0.020**	0.008	0.006
	(0.006)	(0.009)	(0.005)	(0.013)
Manager characteristics	yes	yes	yes	yes
Manager fixed effects	no	no	no	no
Observations	3,483	3,484	3,484	2,318
Number of stores	151	151	151	151
Number of managers	300	300	300	256
Panel C				
Log of Traffic	0.029***	0.048***	0.019***	0.063***
	(0.008)	(0.011)	(0.005)	(0.017)
[1=after 2003q1] x log Traffic	0.009	0.014	0.005	0.015
	(0.007)	(0.011)	(0.006)	(0.015)
Manager characteristics	yes	yes	yes	yes
Manager fixed effects	yes	yes	yes	yes
Observations	3,480	3,481	3,481	2,316
Number of stores	151	151	151	151
Number of managers	300	300	300	256

1. Productivity is the ratio between sales and hours worked (average productivity).
2. Our measure of profit is the most consistent with the theoretical model in Box ##, i.e. sales minus total fixed labour costs. Since labour costs are only available since the first quarter of 2002, the number of available observations in column 4 is smaller than in the other columns.
All regressions include store fixed effects, time-varying store characteristics (number of workers, number of fixed-term workers, number of part-time workers), season fixed effects and a 4^{th} order polynomial of time (quarter).
Manager characteristics include age, tenure, gender, a dummy for secondary or higher education, a dummy for parents and a dummy for whether the manager was born in the same province where the store is located.
Robust standard errors in parentheses. Significance: *** if p<0.01, ** if p<0.05, * if p<0.1

Final remarks

In this case study we have analysed the effects of a change in the variable compensation of local managers at a large chain of restaurants and cafes in Italy. Each store of the chain is under the direct responsibility of a local manager whose compensation includes a variable component which was originally computed (mostly) on the basis of sales and subsequently modified to profits. We find that this change leads to a more efficient use of salaried labour and lower sales but to an increase in productivity. Importantly, we also find that under the new system local mangers are able to adjust more efficiently to demand shocks, measured by variation in traffic flows for those stores located along the main toll-based roads in the country.

Appendix of section 6.1.

TABLE A6.1.1 - Treatment effects under different specifications of the time-effects

	Log worked hours	Log sales	Log productivity[1]	Log profits[2]
	(1)	(2)	(3)	(4)
Benchmark (4th gade)	-0.037***	-0.022**	0.016***	-0.080***
	(0.007)	(0.009)	(0.005)	(0.014)
Cubic	-0.037***	-0.021**	0.017***	-0.080***
	(0.007)	(0.009)	(0.005)	(0.014)
Quadratic	-0.014**	-0.016*	-0.001	-0.078***
	(0.006)	(0.008)	(0.006)	(0.016)
Linear	-0.014**	-0.016*	-0.001	-0.027**
	(0.006)	(0.008)	(0.007)	(0.012)
Manager characteristics	yes	yes	yes	yes
Manager fixed effects	no	no	no	no
Observations	4,261	4,262	4,262	2,833
Number of store	186	186	186	186
Number of managers	348	348	348	296

6.2 Decentralised bargaining and firm performance: Evidence from the metal engineering industry[43]

Performance related pay became more important in Italy after the 1990s institutional changes, which introduced collective performance pay schemes to enable more competitive/profitable firms to share productivity gains with their workers. From the firm perspective, the wage flexibility allowed by adoption of collective performance pay schemes was a strategic tool to face changing business conditions when it is difficult to adjust employment levels (at least in large and unionized firms). Evidences discussed in section 5 supports this strategic role for performance related pay in terms of increases in firm productivity, lower turnover, higher employees satisfaction and other positive outcomes. Productivity gains are also usually associated with wage increases, especially where productivity gains are high[44]. A recent study based on a shorter version of the panel data set used in this study (Origo, 2009), points out that the adoption of collective performance-related pay schemes increased labour productivity (around 7-11%) and wages (around 2-3%). Besides increasing productivity and wages of (incumbent) employees, performance related pay should also affect other measures of firm performance, such as workers turnover (i.e. through significant sorting effects for the most productive workers) and within firm wage differentials (due to both incentive and sorting effects in firms with such pay schemes). Despite appealing testable predictions, as discussed in the review of the empirical literature in section 4, the lack of suitable data has so far prevented extensive and sound empirical evidence on the effects of incentive schemes on worker sorting and within firm wage (or ability) inequality. Some of the existing studies implicitly assume that management can freely choose how and when to change the compensation schemes. However, in contexts where unions are more powerful (as in some EU Countries, including Italy; see Corneo and Lucifora, 1997; Checchi and Lucifora, 2002), it is more realistic to assume that any substantial change in employment or wage conditions is bargained between the firm and local union representatives. When the role of unions is taken into account, the theoretical and empirical evidence show that incentive and sorting effects are less marked: unionised workplaces usually offer higher wages under any form of pay compensation (including fixed wages), attracting high ability workers even in the absence of incentive schemes (Booth and Frank, 1999). Indeed, in the presence of low power incentives, the firm may consider the union as an alternative monitoring device, since a good performance and the existence of profits to be shared is also in the interest of the workers. Similar evidence for the US shows that the return to wages of flexible pay systems is roughly the same in unionised and non-unionised firms (Brown, 1992; Black and Lynch, 2001). Origo (2009) suggests that the positive effects of collective performance related pay on productivity are higher in low unionised firms, while wage effects are more significant in highly unionised ones. The structure of collective bargaining – at industry-wide national level, in Italy, and decentralised at the firm level, in the US – and other institutional differences in the way unions behave can explain some of the above differences.

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[43] This section has benefited from the collaboration of Federica Origo, see Lucifora and Origo (2010)

[44] In the case of Italy, empirical evidence for the 1980s shows that productivity gains were on average around 10% (Biagioli and Curatolo, 1999). More recent studies based on firm-level panel data report that PRP schemes are used as an incentive to boost an initial relatively low level of productivity (Amisano and Del Boca, 2004) and that productivity gains are partly distributed to the workers through higher wages, even if the elasticity of the latter to profits per employee remains quite low, at around 2% (Cristini and Leoni, 2007).

The institutional context

In 1993, the Italian government, national trade unions and employers' associations signed an income policy agreement aimed at curbing the inflation rate in light of the EU Maastricht targets, introducing a two-stage bargaining system consisting of national-level bargaining by industry and local-level agreements. The national level was meant to maintain wages purchasing power, while firm or regional level bargaining was meant to promote sharing through performance related pay schemes. The 1993 Agreement stressed the need to make wages more flexible in order to avoid the wages-prices spiral that characterised the Italian economy in the 1980s and to prevent further unemployment increases by enabling negative macroeconomic shocks to be partially absorbed through wages adjustments. In light of these objectives, in 1992 the automatic indexation system (*Scala Mobile*) was abolished, which increased wage inequality (Manacorda, 2004)[45]. The Italian metal engineering industry – which is the leading industry in national-level bargaining – further emphasised the role of flexible pay schemes with the 1994 industry-wide agreement, which explicitly referred to the 1993 Agreement recommendations in terms of flexible wage increases at the local level[46]. It recommended that collective performance related pay schemes that linked wage increases to specific indicators of productivity, profitability or other measures of firm performance be determined by the employers and local unions through firm or regional level bargaining.

These recommendations changed firms' attitude towards local wage bargaining. Before 1993 there was no official institutional support for performance pay, wage increases at the firm level usually took the form of fixed premiums and relatively few large firms introduced collective PRP, probably after considering their internal potential net benefits. The institutional reform discussed above, meant that the introduction of such schemes was to be considered the "norm" instead of fixed wage increases[47]. This reduced the downside risk of introducing collective PRP because switching firms were unlikely to lose out more than other firms from unforeseen consequences of the switch[48].

According to the results of an ad-hoc survey carried out by the national statistics office (Istat, 1999) on a representative sample of around 8,000 firms with at least 10 employees in both the manufacturing and service sectors, in 1995-96 firm-level bargaining involved around 10% of the firms surveyed and 40% of total workers. The majority of the workers covered by company-level collective bargaining was employed in manufacturing firms (73.4%), rather than in services (26.6%). Wage issues occupied the first place among bargaining topics in most of the agreements signed. Incentive pay schemes were bargained in 40% of total bargaining firms, with almost 60% of the total workforce involved. As regards the metal engineering industry, local-level bargaining took place in one out of five metal engineering firms and covered around 55% of total workers in that industry. Almost all of these firms bargained over wages and almost two out of three introduced some form of performance-related pay scheme.

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[45] The Scala Mobile granted the same absolute wage increase to all employees in response to prices increase. Since its abolition involved all the workers and it happened before the actual implementation of the 1993 Agreement in terms of collective PRP, this should not represent a main confounding factor in our estimates.

[46] Metal engineering firms started introducing collective PRP on the basis of the directions of both the 1993 Agreement and the 1995 industry contract since 1995.

[47] Notice that this happened also without the introduction of formal sanctions for firms deviating from these recommendations and without strong fiscal incentives (see box 6.2.1).

[48] Alternatively, if we consider performance pay as a "network good", the reform may have increased the benefits of switching to performance pay. Furthermore, these benefits should increase with the number of adopters.

The variable pay scheme usually replaces traditional fixed wage premiums, as an addition to minimum wage levels set by collective agreements. In this sense, wage flexibility is only upward, but the wage premium may be zero if performance targets are not met or if payment is conditional on profitability.[49] The amount of the premium is usually the same for all the workers involved. When it differs, the amount paid is proportional to either the wage associated with each occupational level[50] or to an indicator of individual absenteeism.

Evidence shows that the actual share of incentive pay in total wage has averaged 5-6% of the total gross wage (Casadio, 2003; 2009; Brandolini et al., 2007).

The peculiarities of the taxation system applied to collective PRP may also explain why these schemes are widely diffused but their actual amount still represents a low share of total wage (see Box 6.2.1).

Box 6.2.1 : Collective PRP and fiscal incentives

Since the mid Nineties collective PRP have been partly subject to some tax exemption. The latter was first introduced in 1997 and then reformed in 2008. According to law 135/1997 (and subsequent decrees) from 1997 to 2007 firms were exempted from paying social security contributions on part of the actual amount of the collective PRP (up to 3% of total annual individual wage), except of a sort of "solidarity contribution" (*contributo di solidarietà*) equal to 10% of the exempted premium. Such tax exemption was automatically applied to all firms which formally sent their firm-level contract to the Ministry of labour (*direzione provinciale del lavoro*). This procedure was reformed in 2007, when a new system was introduced for the 2008-2010 period, by law 247/2007 (and subsequent decrees). According to the new procedure, firms could enjoy a tax relief equal to 25 percentage points of the total social security contribution rate due on the actual amount of the collective PRP (initially up to 5% of total annual individual wage, but actually reduced to 3% in 2008)[51]. Financial resources allocated to this intervention determine the actual number of eligible firms, which in 2008 could apply by sending electronically their request by a certain date (the so called "click day" was on the 15 September 2008). Eligible firms were then chosen according to the date of arrival of their request. In order to allow all firms to enjoy such tax relief, in 2009 the maximum amount of the collective PRP subject to tax exemption was reduced to 2.25% of total annual individual wage.

Table B6.2.1 simulates the effects of these reforms in the case of a blue collar worker earning 26,000 Euros a year (including 1,000 Euros of collective PRP) in a manufacturing firm with more than 50 employees.

Table B6.2.1 Effects of the reform

	Benchmark	1997	2008	2009
Basic annual wage	25,000	25,000	25,000	25,000
Collective PRP	1,000	1,000	1,000	1,000
Maximum share of total wage subject to lower taxation	-	3%	3%	2.25%
Collective PRP actually subject to lower taxation	0	780	780	585

[49] The Istat survey shows that failure to fulfil the performance targets usually implies a proportional reduction of total payment (44.6% of total workers). The premium can actually be zero for 42.6% of the workers involved. A minimum fixed payment is anyway guaranteed for the remaining 12.8%.

[50] Metal engineering workers are classified into two categories (blue and white collars) and eight occupational levels (the so called "*livelli di inquadramento*") broadly defined in the national agreement for the metal engineering industry. The basic pay ("*minimo tabellare*") is parameterized on these levels. The same kind of normalization is sometimes used to determine the actual amount of the PRP.

[51] Both in 1997 and in 2008 workers could also enjoy a tax relief equal to 100% of their social security contribution.

Social security contributions paid by the employer on collective PRP	320.8	148.6	125.8	174.6
Saving w.r.t. benchmark	-	172.2	195	146.3

Note: full social contribution rate paid by the employer is equal to 32.08%
If not differently specified, monetary values are in Euros.

According to the figures in Table B6.2.1, firms can save up to 60% of total social security contributions due on collective PRP, but actual tax savings depend on the (maximum) share of collective PRP subject to lower taxation. Given the same maximum share, the 2008 reform increased tax savings with respect to the 1997 regime, but once the maximum share has been reduced (from 3% in 2008 to 2.25% in 2009), tax savings under the new regime were lower than under the 1997 one. Furthermore, these savings represent a small part (lower than 2%) of total social security contributions paid by the employer.
Finally, it should be also noticed that the implementation of these laws has been usually characterised by some delay and great uncertainty about the actual amount of resources available (and hence the actual share of PRP that could benefit from tax exemption). Hence, it is very unlikely that firms changed dramatically their behavior in terms of adoption of collective PRP due to these reforms.

The data

The empirical analysis uses a representative sample of Italian metal engineering firms derived from the annual survey carried out by the national employers' association of the metal engineering industry (Federmeccanica), mainly for wage bargaining purposes. For this research, waves from 1989 to 2007 are available. On average around 2,800 establishments employing 425,000 employees are surveyed each year, covering, respectively, around 10% of the firms and 25% of the workers in this industry. Although the survey was not initially created with a longitudinal design,[52] over the period almost two thirds of the establishments are surveyed at least twice, and around 10% are present for at least ten years (1% are present throughout the whole period).
The sample is representative of the composition of the metal engineering industry in Italy, with the partial exception of small and Southern firms.

The questionnaire consists of two main sections: one relating to the whole firm, the other to each single establishment within the firm. The first section asks questions about the firm's main features (industry, employment level, sales, outsourcing and exports), union activity (union density, union organisations and strikes), firm-level bargaining (actors and contents)[53], wage levels and composition, immigrant workers. The second part of the questionnaire asks each establishment questions concerning employment composition (by sex, type of contract and qualification), employment flows (hires by type of contract and separations by reason), shifts, working time (including overtime hours, temporary lay-offs and absenteeism), workplace injuries and investments. The questionnaire was substantially changed/simplified in 1999, when most of the questions on issues that are not directly related to the bargaining activity of the employer association (such as sales, outsourcing, exports and investments) have been dropped. These changes do not allow to compute any measure of labour productivity since 2001[54]. Owing to the

[52] A sort of panel was introduced in the 1980s (the survey started in 1976), mainly to keep the quality and variability of wage time series under control. However, only one establishment out of four belonged to the "official" panel, while many more were observed more than once in the time span considered.
[53] This information is available only for firms signing a new contract in the year of the survey-
[54] Some minor changes in the questionnaire were introduced also in 2005.

institutional changes of the first half of the 1990s, the definition of wage flexibility and the corresponding questions were changed in the surveys conducted after 1995. Before that year there were neither incentives nor clear public policy guidelines regarding the introduction of PRP schemes, which was essentially an individual choice probably based on profit maximisation considerations or the results of some costs-benefits analysis. In the surveys from 1989 to 1994, the bargaining firms were asked whether wages were among the issues bargained, and whether they had introduced variable premiums, either individual or collective (such as productivity-related or profit-sharing schemes). We count firms as adopting PRP if they answered in the affirmative to at least one of the questions relating to the introduction of flexible wage schemes.

Since 1995, in accordance with the principles of the 1993 Agreement and the guidelines for the new national metalworkers' agreement signed in July 1994, the questions relative to flexible pay schemes were re-formulated using the same terminology as proposed by the national-level agreement (which introduced the definition of collective PRP, "*premio di risultato*") and no longer differentiate between individual and collective premiums. Firms introducing PRP are then all the bargaining firms that declared that they had followed the national agreement by introducing some type of (collective) PRP scheme.

The empirical strategy

The empirical analysis seeks to estimate the impact of the introduction of collective PRP on a set of indicators of firm performance in a manner similar to a treatment evaluation problem, where the "treatment" is the introduction of collective PRP. Given the availability of firm-level panel data, this can be written as follows:

$$Y_{it} = \alpha T_{it} + \beta x_{it} + \theta_i + \tau_t + \varepsilon_{it} \qquad [1]$$

where Y_{it} is a measure of performance of the establishment i at time t, T is a dummy equal to 1 when collective PRP is in place, x_{it} is a vector of time-variant control variables, θ_i is the firm specific fixed effect, τ_t the common time fixed effects and ε_{it} the usual error term. α is the "treatment" effect to be estimated.

Estimation of equation [1] by Fixed Effects (FE) or First Differencing (FD) provides consistent estimates of the causal treatment effect as long as the treatment T is strictly exogenous or under the assumption that the only difference between the treated and the control group are captured by the individual fixed effects θ_i (Ichniowski and Shaw, 2009). Correlation between T_{it} and ε_{ir} for any t and r cause inconsistency in both estimators, but the FE one has smaller bias when we can assume contemporaneous exogeneity (implying that $Cov(T_{it}, \varepsilon_{ir})=0$; Imbens and Wooldridge, 2009).

It is reasonable to expect that the introduction of collective PRP is highly correlated with the firm specific fixed effect (which may also proxy, for example, management quality, firm culture or climate); if this is the main factor influencing the introduction of collective PRP, FE estimates should be consistent. However, since firms can choose when and how to introduce collective PRP, they may also choose to do so on the basis of past outcomes of Y_{it}, thus violating the strict exogeneity assumption (while the contemporaneous exogeneity assumption should hold). In order to take into account potential endogeneity of the treatment, in the following empirical analysis we shall also exploit the institutional reform discussed above in order to identify the causal effect of the introduction of collective PRP on firm performance. Specifically, we shall assume that such reform can be considered as an exogenous shock to the probability of adoption of collective PRP

ad we shall considered as "treated" those firms which introduced such type of variable pay after the reform. As mentioned above, after the 1993 Agreement the metal engineering industry has further emphasised the importance of bargaining collective PRP at the firm level in the 1994 industry agreement. Since firms were waiting for directions from national (industry) bargaining, very few firms signed a new firm-level contract between 1993 and 1994. Firms subject to this reform are then those which bargained such premiums since 1995. Hence, we identified the causal effect of collective PRP by considering as "treated" only firms introducing collective PRP since 1995, while the control group includes all firms which never adopted such pay schemes over the period considered. In what follows, we shall provide more evidence on how this reform changed wage bargaining at the firm level.

Furthermore, it should be noticed that in Italy, and mainly in the metal engineering industry, collective PRP schemes are usually introduced through local (firm-level) bargaining. Non-bargaining firms are on average small and characterised by low unionisation rates. They usually adhere to the national agreement for the metal engineering industry, paying the wage levels that the national metal engineering unions and employers' associations have agreed upon. The probability of introducing wage flexibility is then highly correlated with the probability of adopting a firm-level contract, which in turn depends closely on firm size and union presence[55]. We take into account this feature by also using as control group only firms with a firm-level contract but without collective PRP.

Descriptive empirical evidence

Figure 6.2.1 depicts the evolution of firm-level bargaining and the adoption of collective PRP. The first panel of the figure highlights that, while the number of firms with a firm-level contract has been roughly stable over time at around 50%, the share of firms with collective PRP has been growing from roughly 10% in 1989 to more than 40% in 2007. This overall change was due to two main changes in the rate of increase of collective PRP: in 1995-1996 and in 2005. The first one is associated with institutional changes discussed above. This is shown more strongly when we consider only firms signing a new contract each year: the share of bargaining firms adopting some collective PRP goes from around 35% in 1989-1994 to almost 80% in 1995, reaching 90% in 1996 and moving around this level in all the subsequent years (see bottom panel of Fig. 6.2.1). Moving in the opposite direction, the share of bargaining firms introducing other types of (presumably fixed) wage premiums fell from around 60% in 1989-94 to 20% in 1995 and decreased slightly thereafter.

Figure 6.2.1

[55] For further details on this aspect and more in general on the so called "eligibility issue" see Origo (2009)

Incidence of firm-level contract and collective PRP, 1989-2007

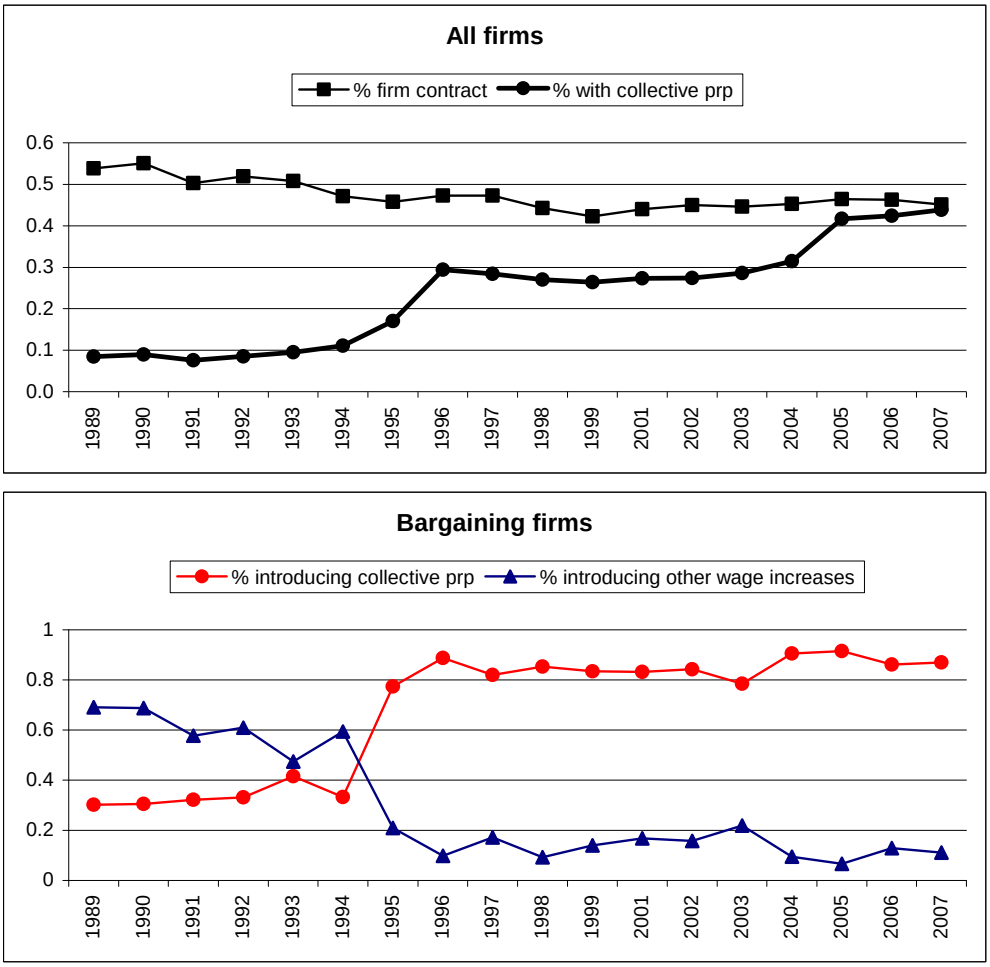


Table 6.2.1 shows that the firms introducing collective PRP schemes are quite different from the other firms along many dimensions, such as size, workforce composition, working time schedules, industrial relations. In terms of performance, they are more productive and pay higher wages; furthermore, they display lower turnover rates, less absenteeism and more within wage inequality. These differences are statistically significant also when we restrict the control group to firms with a firm-level contract but without collective PRP.

Focusing on labour productivity, Figure 6.2.2 highlights the existence of significant differences within sectors (using a three digits NACE/ATECO classification). However, from a descriptive point of view such differences are not clearly correlated with the incidence of collective PRP. An Oaxaca decomposition applied to pooled data shows that around 88% of the observed productivity differential between firms with and without collective PRP is determined by a different endowment of observable characteristics, particularly firm size, outsourcing and propensity to export. Among observables, around 60% of the explained differential is due to time fixed effects, meaning that firms introducing collective PRP are relatively more concentrated in years characterised by higher productivity growth[56].

Table 6.2.1 - Differences by establishment type

[56] Detailed results of the Oaxaca decomposition are available upon request.

Pooled data, 1989-2007

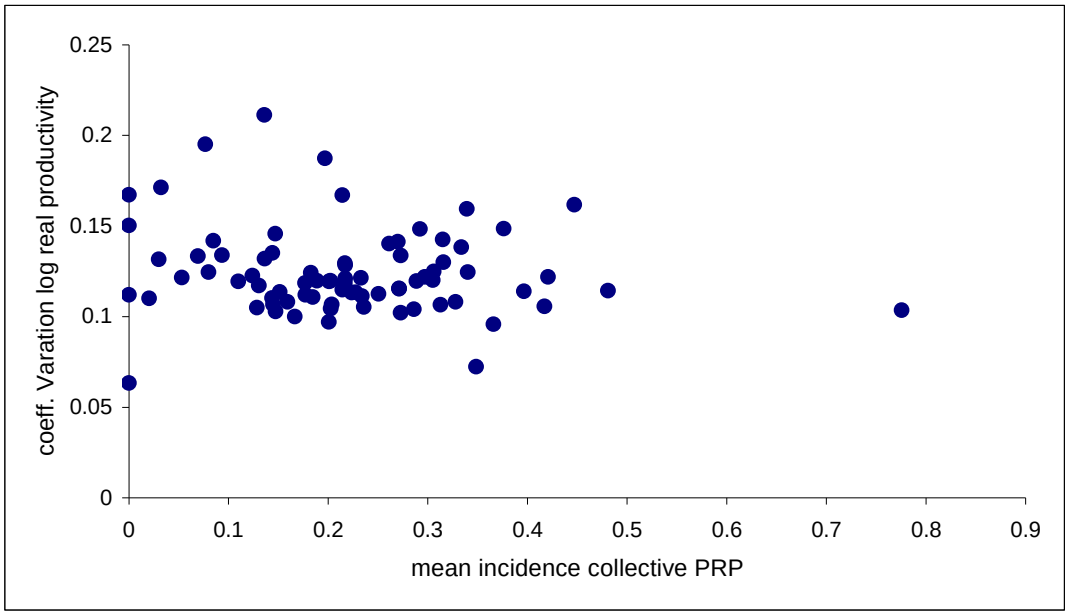
	no prp and no contract a	no prp and contract b	prp (and contract) c	Differences c-a	c-b
Labour productivity					
(log of real sales per worker)*	5.125	5.086	5.394	0.269***	0.308***
turnover_rate	0.398	0.283	0.238	-0.160***	-0.045***
hire_rate					
total	0.179	0.122	0.112	-0.067***	-0.010***
manual workers	0.128	0.087	0.081	-0.047***	-0.006***
non manual workers	0.051	0.034	0.031	-0.020***	-0.004***
fire_rate					
total	0.219	0.162	0.126	-0.093***	-0.035***
manual workers	0.158	0.114	0.091	-0.068***	-0.024***
non manual workers	0.061	0.047	0.036	-0.025***	-0.011**
log(real wage)	9.752	9.791	9.830	0.078***	0.039***
wage diff by skill	0.250	0.257	0.290	0.040***	0.033***
coeff of variation of wages^	0.355	0.373	0.392	0.038***	0.019***
Hours of absenteeism per employee	254.9	205.2	131.9	-122.9***	-73.3***
Other characterstics					
Firm size (n. employees):					
1-19	0.470	0.119	0.035	-0.435***	-0.084***
20-49	0.344	0.254	0.161	-0.183***	-0.093***
50-99	0.118	0.204	0.178	0.060***	-0.026***
100 and over	0.068	0.423	0.626	0.558***	0.202***
multiplant (1=yes)	0.179	0.273	0.413	0.235***	0.141***
Workforce composition					
% women	0.221	0.199	0.197	-0.024***	-0.002
% non manual workers	0.348	0.346	0.360	0.012***	0.014***
immigrants (1=yes)	0.806	0.528	0.946	0.140***	0.417***
% workers on CFL	0.044	0.037	0.025	-0.019***	-0.012***
% temporary workers	0.045	0.027	0.058	0.012***	0.030***
% part timers	0.034	0.021	0.023	-0.011***	0.002**
Working time schedules					
flex time (1=yes)	0.012	0.033	0.035	0.023***	0.002
shifts (1=yes)	0.139	0.386	0.581	0.442***	0.195***
overtime hours per worker	47.61	62.976	40.932	-6.67***	-22.04***
temporary lay offs (CIG, 1=yes)	0.103	0.225	0.210	0.107***	-0.015***
Industrial relations					
union (1=yes)	0.473	0.914	0.967	0.494***	0.053***
% unionised workers	0.137	0.398	0.387	0.250***	-0.011***
strike (1=yes)	0.170	0.643	0.760	0.590***	0.117***
Other firm characteristics					
outsourcing (1=yes)*	0.345	0.521	0.372	0.027***	-0.149***
export (1=yes)*	0.338	0.599	0.427	0.089***	-0.172***
investment (1=yes)*	0.193	0.402	0.339	0.146***	-0.063***

* until 1999

^ based on 16 occupations (livelli di inquadramento)

Figure 6.2.2

Incidence of collective PRP and dispersion of labour productivity by economic sector



Looking at the main features of schemes shows considerable heterogeneity in the nature of the PRP schemes[57]. Figure 6.2.3 shows the share of firms with collective PRP by number of parameters (top panel) and by type of parameters (bottom panel) used to compute the amount of the variable wage premium. According to the Figure, most firms use no more than three parameters, particularly related to productivity and profitability (the mean number of parameters is 2.43). Almost 40% of firms whose PRP scheme depends only on one indicator adopts "pure" productivity premiums (i.e., depending only on one indicator of productivity), while "pure" profit sharing schemes (i.e., depending only on one indicator of profitability) are used by 28% of these firms. The role of profits may be actually more crucial, since in more than 40% of the firms adopting collective PRP schemes actual payment is conditional upon the existence of (positive) profits[58]. Quality indicators are seldom used by themselves, but they are often combined with other parameters, particularly with productivity ones, with the aim to avoid that higher productivity is obtained at the expense of product quality[59]. This evidence suggests that firms adopt quite different collective variable pay schemes with the actual design probably driven by firms-specific elements (such as availability of data to measure the relevant parameters, management quality, industrial relations climate, firm culture, degree of information transparency) and by

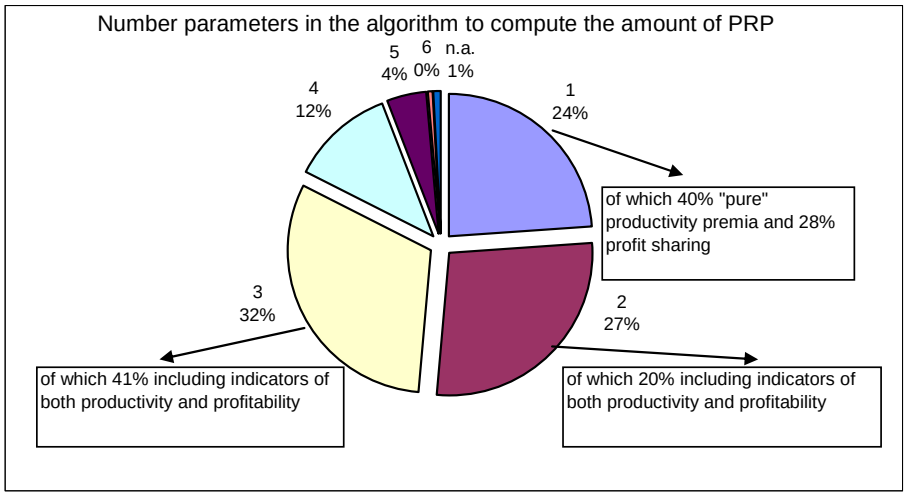
[57] Detailed information on structure and payment of collective PRP is available from 1995 to 2004.

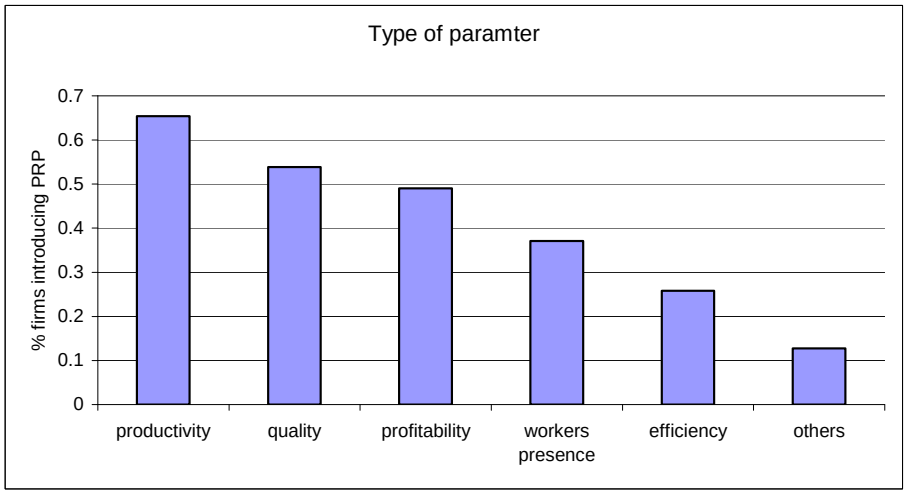
[58] The "non negative profits" condition applies to the entire premium for half of these firms, while it conditions part of the total payment for the other half.

[59] A quality indicator is used by less than 5% of firms using only one indicator, more than 40% of those using two indicators (and half of them combines quality and productivity).

considerations on workers' perception (and possible reaction)[60]. Workers should be more prone to accept a collective variable pay scheme when its structure is relatively simple (i.e., based on few parameters) or when it depends on parameters that are closely linked to workers' productivity. Furthermore, since the structure and design of collective variable pay schemes is formally spelt out in the firm-level contract and hence easily accessible), firms introducing collective PRP for the first time may also look at the experience of other firms already adopting such premiums in the same area/sector. Given these considerations, we will examine whether the actual design of collective PRP influences firm performance.

Figure 6.2.3 Share of firms with collective PRP by number/type of parameters





60 Even if employers should take into account also incentive effects, some studies conclude that they rarely evaluate productivity gains of schemes to involve employees (Loveridge, 1980; Kessler and Purcell, 1992).

Main econometric results

Table 6.2.2 presents the main estimates of the effect of collective PRP on labour productivity **(**proxied by the natural logarithm of real sales per worker)[61]. Columns differ for either the model specification or the identification strategy adopted. Using the whole sample and considering as "treated" all firms which introduced collective PRP schemes over the period considered, in column 1 we control for time and firm fixed effects; we then progressively add controls also for firm size (column 2), workforce characteristics (column 3), working time schedules (column 4) other firm characteristics (column 5) and industrial relations (including also a dummy for the presence of a firm-level contract; column 6)[62]. Using the latter specification and in light of how collective PRP is usually adopted/bargained in Italy, in column 7 we restrict our sample to firms with a firm-level contract. Finally, given the potential bias of estimated treatment effects with FE models, in column 8 we exploit the exogenous reform discussed above and we consider as "treated" only firms introducing collective PRP since 1995 (see the *Empirical Strategy* Section).

Our estimates suggest that collective PRP significantly increases productivity by 5-6%. The estimated effect is quite robust to both model specification and the identification strategy. This is on the upper end of estimates in earlier studies for different countries reviewed in section 5.

Table 6.2.2 Effect of PRP on labour productivity, 1989-99
Linear FE estimates; dep var: log of real sales per worker

	All						Only firms with contract	Treated firms introducing prp since 1995
	1	2	3	4	5	6	7	8
PRP	0.064***	0.065***	0.066***	0.059***	0.059***	0.052***	0.046***	0.050***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
firm size	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
workforce characteristics	No	No	Yes	Yes	Yes	Yes	Yes	Yes
working time schedules	No	No	No	Yes	Yes	Yes	Yes	Yes
other firm characteristics	No	No	No	No	Yes	Yes	Yes	Yes
industrial relations	No	No	No	No	No	Yes	Yes	Yes
R2 (overall)	0.234	0.226	0.266	0.284	0.296	0.297	0.325	0,303
N obs	29,153	29,153	27,618	27,618	27,618	27,618	14,128	26,206
N firms	8,604	8,604	8,212	8,212	8,212	8,212	4,326	8,066

Note: Robust standard errors in brackets. *** Statistically significant at 1%

Table 6.2.3 reveals the existence of some heterogeneity by group of firms. Productivity gains following the introduction of collective PRP schemes are statistically significant in firms with more than 20 employees and located in the North of Italy. Furthermore, productivity effects are larger

[61] As mentioned in the Data Section, a measure of labour productivity is available only until 1999. Furthermore, since productivity is measured only at the firm level, firms are the basic units for these estimates. Complete estimates are reported in Appendix I.

[62] See Table 1 for details on the variables used.

in firms in high tech sectors (compared to firms in low tech ones) and in firms with a relatively low share of unionised workers (albeit a statistically significant positive effect is found also in firms with a high unionisation rate).

Table 6.2.3 : The effect of collective PRP on labour productivity by firms group, 1989-1999

	by firm size (n. employees)		by industry°			by region			by union presence^	
	<20	>=20	low tech	high tech	services	North	Centre	South	weak	strong
PRP	-0.052	0.048***	0.047***	0.069**	0.006	0.042***	0.110	0.158	0.061**	0.032**
	(0.06)	(0.01)	(0.01)	(0.03)	(0.04)	(0.01)	(0.08)	(0.32)	(0.02)	(0.01)
R2 (overall)	0.260	0.328	0.351	0.246	0.240	0.305	0.173	0.256	0.256	0.352
N obs	7,262	18,903	14,781	6,181	5,203	23,528	1,890	747	12,666	13,540
N firms	2,864	5,822	4,682	2,206	2,187	6,943	783	336	4,807	4,405

Note: Model specification as in column 8 of Table 6.2.2. Standard errors in brackets. *= statistically significant at 10% **= statistically signficant at 5% ***= statistically significant at 1%.
° Low tech sectors: foundries, metals, metallic tools and metal micro-parts; High tech sectors: precision tools, electronic equipment and transportation; Services: technical assistance and tehnical offices.

^ Based on the median unionisation rate (22%).

Table 6.2.4 reports estimates of the effect of collective PRP by number of parameters used in the algorithm of the premium (column 2), by type of parameters (column 3) and by type of payment (i.e., conditional or not on the existence of positive profits, column 4). Overall, these figures suggest that productivity effects are smaller in firms whose collective PRP scheme is relatively complex or linked to profitability indicators. The negative effect of profits is particularly clear when they influence whether the premium is actually paid or not. However, only the latter effect is (weakly) statistically significant[63].

Table 6.2.4 : Effect of PRP on labour productivity by type of premium, 1995-1999
Linear FE estimates; dep var: log of real sales per worker

	1	2	3	4
PRP	0.027*	0.041**	0.029*	0.041**
	(0.02)	(0.02)	(0.02)	(0.02)
complex prp (3 or more parameters)		-0.028		
		(0.02)		
pure productivity premium			0.006	
			(0.04)	
pure profit sharing			-0.018	
			(0.04)	
prp payment conditional on positive profits				-0.051*
				(0.03)
R2 (overall)	0.058	0.058	0.058	0.058
N obs	11,913	11,913	11,913	11,913

[63] Notice that information on the structure of the premium is available from 1995 to 2004 and our measure of labour productivity is available until 1999. Hence, these estimates refer to 1995-1999. Statistical significance of FE estimates may be influenced by the relatively short time period considered.

N firms	5,037	5,037	5,037	5,037

See Note at Table 6.2.3

Estimates for each type of scheme should be interpreted as the differential effect with respect to the general category PRP

Turning to workers turnover, Table 6.2.5 presents the estimated effect of PRP on hire and separation rates, also distinguishing between blue and white collars[64]. Following the same research strategy as we did for productivity, we also use the institutional reform as an exogenous shock to identify the causal effect of PRP on workers flows. According to our estimates, collective PRP schemes significantly increase hire rates, while their effect on separation rates is negligible.

Table 6.2.5 : Effect of PRP on hire and separation rates, 1989-2007
Linear FE estimates.

A) TOTAL

	All		**Firms introducing PRP since 1995**	
	hire rate	*separation rate*	*hire rate*	*separation rate*
PRP	0.006**	0.000	0.008***	0.003
	(0.00)	(0.00)	(0.00)	(0.00)
R2 (overall)	0.091	0.059	0,089	0.058
N obs	48,606	48,579	46,386	46,360
N establishments	12,507	12,505	12,254	12,252
Δemployment due to PRP	0.006		0.005	
(hire-separation rate)	(0.004)		(0.004)	

B) BY SKILL

	Blue collars				**White collars**			
	All		**Firms introducing PRP since 1995**		**All**		**Firms introducing PRP since 1995**	
	hire rate	*separation rate*	*hire rate*	*separation rate*	*hire rate*	*separation rate*	*hire rate*	*separation rate*
PRP	0.007***	0.005	0.007***	0.007*	-0.000	-0.004**	0,001	-0.004*
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
R2 (overall)	0.097	0.040	0.096	0.040	0.063	0.041	0.064	0.040
N obs	48,606	48,579	46,386	46,360	48,606	48,579	46,386	46,360
N establishments	12,507	12,505	12,254	12,252	12,507	12,505	12,254	12,252
Δemployment due to PRP	0.002		0.0001		0.005**		0.005**	
(hire-separation rate)	(0.003)		(0.004)		(0.002)		(0.002)	

See Note at Table 6.2.3

However, estimates by skill reveal that the estimated effect on hires is statistically significant only for blue collar workers. Furthermore, in the case of white collar workers PRP seems to significantly reduce separations. From these figures we can conclude that the overall effect of collective PRP on employment is usually positive but small (less than 1%) and mainly for white collar workers. Where employment increases due to the introduction of collective PRP,

[64] Since workers flows are measured at the establishment level in the survey, establishments are the basic units of these estimates. Complete estimates are reported in Appendix II.

there is a reduction in workers outflows (white collars) and a slight increase in workers inflows (blue collars).

Since the introduction of more wage flexibility should allow firms to react to negative shocks by adjusting wages rather than employment, it is also interesting to look at the effect on workers flows over the business cycle. This is particularly important given that the algorithm of the PRP scheme is locally defined by the bargaining parties and it may be re-defined at any bargaining round (usually every four years since 1993), thus allowing the introduction of parameters/criteria that could produce some effects in terms of employment smoothing over the business cycle. In light of these considerations, Table 6.2.6 shows the effect of collective PRP on hire and separation rates over the business cycle. More specifically, looking at the value added of the metal engineering industry, we could distinguish four main phases over the period considered: a severe recession from 1989 to 1993 (in which value added declined in this industry by 3 per cent on average each year, while it increased by 1 per cent for the whole economy), a long recovery from 1994 to 2000, a brief and mild recession from 2001 to 2003 and another recovery from 2004 to 2007 (before the 2008-2009 crisis, which is not observable in our data-set). Estimates in the table show that the introduction of collective PRP reduced white collar workers outflows (and inflows) particularly during the 1989-1993 recession[65]. On the contrary, the positive effect on blue collar workers hire rates was larger (and statistically significant) in the last decade. In the most recent recovery (2004-2007) collective PRP seems to significantly increase also the hire rate of white collar workers. Overall, these results confirm that firms introducing (more) wage flexibility can enjoy more employment stability (at least in the case of white collar workers) particularly during severe business conditions.

Table 6.2.6 : Effect of PRP on hire and separation rates over the business cycle, 1989-2007
Linear FE estimates.

	Total		Blue collars		White collars	
	hire rate	*separation rate*	*hire rate*	*separation rate*	*hire rate*	*separation rate*
prp 1989-93	-0.004	-0.015*	0.002	-0.003	-0.005***	-0.012**
	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.00)
prp 1994-2000	-0.000	0.002	0.002	0.007*	-0.002	-0.005*
	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
prp 2001-2003	0.012***	0.005	0.011***	0.005	0.001	-0.001
	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.00)
prp 2004-2007	0.017***	0.002	0.014***	0.004	0.004*	-0.002
	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.00)
R2 (overall)	0.109	0.062	0.146	0.038	0.179	0.081
N obs	48,606	48,579	48,606	48,579	48,606	48,579
N establishments	12,507	12,505	12,507	12,505	12,507	12,505

See Note at Table 6.2.3

[65] This also explain why in Table 5 the estimated effect of collective PRP on white collars separation rate is smaller when we consider as "treated" only firms introducing such premiums since 1995.

If the introduction of collective PRP influences both productivity and workers sorting, this should produce some changes also on within wage inequality. Table 6.2.7 reports the main FE estimates of the effect of collective PRP on two alternative measures of wage inequality: the (log) wage differential between blue and white collars (columns 1-3) and the coefficient of variation computed on the basis of mean wages for sixteen occupational levels[66] (columns 4-6). Columns 1 and 4 include only time fixed effects, while the full specification is used in the remaining columns. In Columns 3 and 6 identification is again based on the 1993-94 institutional reform. Estimates in the table point out that the introduction of PRP significantly increases wage inequality (by around 3%), regardless of the inequality measure used, the model specification or the identification strategy adopted[67].

Table 6.2.7 : Effect of PRP on within wage inequality, 1989-2007
Linear FE estimates.

	a) Diff wage			*b) CV wage*		
	All		Firms introducing PRP since 1995	All		Firms introducing PRP since 1995
	1	2	3	4	5	6
PRP	0.031***	0.029***	0.036***	0.029***	0.024***	0.032***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
R2 (overall)	0.015	0.020	0.023	0.004	0.010	0.010
N obs	43,053	41,367	39,885	43,053	41,367	39,885
N firms	10,871	10,458	10,324	10,871	10,458	10,324

Note: Diff wage is the wage differential between blue and white collars; CV wage is the coefficient of variation computed on the basis of mean wages for 16 occuapations ("livelli di inquadramento"). Models 1 and 4 include only time fixed effects, while the remaining models include controls for time fixed effects, firm size, workforce composition, working time schedules, industrial relations and other firm characteristics. Standard eorrs in brackets. ***= statistically significant at 1%.

Final remarks

Using a unique and rich panel data-set for a representative sample of establishments for the 1989-2007 period, we have found that the introduction of collective PRP significantly increases productivity and to some extent employment by increasing the hire rates of the blue collar workers and reducing the separation rate of the white collar workers. The overall effect of collective PRP on employment is usually positive but small and it is statistically significant only for the white collar workers. These incentive and sorting effects change also internal wage inequality, which is significantly higher after the introduction of collective PRP.

[66] For more details on the occupational ladder see footnote 4. Since wages, as productivity, are measured at the firm level. firms are the basic observations for these estimates. Complete estimates are reported in Appendix III.

[67] We also found that the introduction of collective PRP significantly increases wage levels by around 3%. Estimates are available upon request.

Appendix I
Effects of wage flexibility on labour productivity, 1989-1999
FE estimates

	1	2	3	4	5	6	7	8
prp	0.064***	0.065***	0.066***	0.059***	0.059***	0.052***	0.045***	0.050***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
y1990	0.132***	0.132***	0.130***	0.125***	0.122***	0.122***	0.133***	0.120***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
y1991	0.225***	0.226***	0.225***	0.243***	0.240***	0.241***	0.253***	0.238***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
y1992	0.292***	0.292***	0.284***	0.307***	0.306***	0.306***	0.333***	0.300***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
y1993	0.364***	0.364***	0.352***	0.386***	0.386***	0.386***	0.422***	0.376***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
y1994	0.499***	0.498***	0.491***	0.504***	0.504***	0.506***	0.535***	0.494***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
y1995	0.718***	0.717***	0.708***	0.705***	0.702***	0.703***	0.739***	0.697***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
y1996	0.760***	0.774***	0.775***	0.778***	0.776***	0.779***	0.810***	0.766***
	(0.01)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
y1997	0.780***	0.793***	0.793***	0.794***	0.792***	0.794***	0.822***	0.781***
	(0.01)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.02)
y1998	0.831***	0.831***	0.813***	0.841***	0.839***	0.840***	0.908***	0.832***
	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)	(0.02)	(0.02)
y1999	0.836***	0.836***	0.815***	0.844***	0.841***	0.843***	0.912***	0.833***
	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)	(0.01)	(0.03)	(0.02)
size_2049		-0.026*	-0.011	-0.013	-0.018	-0.018	0.049	-0.014
		(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.03)	(0.02)
size_5099		-0.039*	-0.028	-0.033	-0.041*	-0.042***	0.041	-0.035
		(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.04)	(0.02)
size_100		-0.053*	-0.032	-0.038	-0.051*	-0.053***	0.014	-0.047
		(0.03)	(0.03)	(0.03)	(0.03)	(0.02)	(0.05)	(0.03)
multiplant (d)		-0.014	-0.027	-0.026	-0.027	-0.027**	-0.024	-0.022
		(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.02)	(0.02)
% women			0.248***	0.266***	0.262***	0.263***	0.160	0.275***
			(0.06)	(0.06)	(0.06)	(0.04)	(0.11)	(0.06)
% white collars			0.355***	0.359***	0.364***	0.364***	0.372***	0.382***
			(0.06)	(0.06)	(0.06)	(0.03)	(0.14)	(0.07)
immigrants (d)			0.005	0.002	0.001	0.001	0.006	0.001
			(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
% CFL			0.087***	0.039	0.036	0.036	0.182***	0.024
			(0.03)	(0.03)	(0.03)	(0.03)	(0.06)	(0.03)
% fixed term contracts			0.007	-0.034	-0.034	-0.033	0.021	-0.033
			(0.04)	(0.04)	(0.04)	(0.03)	(0.07)	(0.04)
% part timers			-0.112*	-0.112*	-0.111*	-0.109**	-0.102	-0.117*
			(0.06)	(0.06)	(0.06)	(0.05)	(0.12)	(0.06)
flex weekly hours (d)				-0.014	-0.013	-0.014	-0.007	-0.021
				(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
flex daily hours (d)				-0.026	-0.027*	-0.027*	-0.012	-0.025
				(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
shifts (d)				0.028**	0.025**	0.025**	0.024*	0.022*
				(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
overtime per worker				0.000**	0.000**	0.000***	0.001***	0.000**
				(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
temp lay offs (d)				-0.118***	-0.116***	-0.116***	-0.092***	-0.116***
				(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
outsourcing (d)					0.022***	0.022***	0.018	0.021**
					(0.01)	(0.01)	(0.01)	(0.01)
export (d)					0.040***	0.040***	0.019	0.041***
					(0.01)	(0.01)	(0.01)	(0.01)
investments (d)					0.029***	0.029***	0.029***	0.029***
					(0.01)	(0.01)	(0.01)	(0.01)
contract (d)						0.021**		0.019*
						(0.01)		(0.01)
union (d)						-0.006	0.018	-0.002
						(0.01)	(0.04)	(0.01)
strike (d)						-0.004	0.008	-0.003
						(0.01)	(0.01)	(0.01)
const.	4.659***	4.687***	4.522***	4.508***	4.465***	4.461***	4.388***	4.452***
	(0.01)	(0.02)	(0.03)	(0.03)	(0.03)	(0.02)	(0.07)	(0.03)
R2 (overall)	0.234	0.226	0.266	0.284	0.296	0.297	0.326	0.303
N obs	29153	29153	27618	27618	27618	27618	14150	26206
N firms	8604	8604	8212	8212	8212	8212	4327	8066

Appendix II
Effects of wage flexibility on hire and separation rates by skill, 1989-2007
FE estimates

	Total				Blue collars				White collars			
			Firms introducing PRP since 1995				Firms introducing PRP since 1995				Firms introducing PRP since 1995	
	hire rate	separation rate	hire rate	separation rate	hire rate	separation rate	hire rate	separation rate	hire rate	separation rate	hire rate	separation rate
prp	0.006**	0.000	0.008***	0.003	0.007***	0.005	0.007***	0.007*	-0.000	-0.004**	0.001	-0.004*
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
size_2049	0.011**	-0.079***	0.011**	-0.077***	0.009**	-0.043***	0.009**	-0.041***	0.002	-0.037***	0.002	-0.036***
	(0.00)	(0.01)	(0.01)	(0.01)	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.01)
size_5099	0.004	-0.128***	0.003	-0.121***	0.006	-0.065***	0.007	-0.062***	-0.002	-0.063***	-0.003	-0.059***
	(0.01)	(0.02)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.01)	(0.00)	(0.01)
size_100	-0.005	-0.177***	-0.005	-0.163***	-0.000	-0.094***	0.001	-0.086***	-0.005	-0.083***	-0.006	-0.078***
	(0.01)	(0.02)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.01)	(0.00)	(0.01)
multiplant (d)	-0.003	0.008	-0.001	0.011*	-0.002	0.004	-0.001	0.005	-0.001	0.005	-0.000	0.006*
	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
% women	-0.023	0.090	-0.029	0.075	-0.024*	0.053	-0.029**	0.035	0.001	0.037	0.000	0.040
	(0.02)	(0.06)	(0.02)	(0.06)	(0.01)	(0.04)	(0.01)	(0.04)	(0.01)	(0.03)	(0.01)	(0.03)
% white collars	-0.018	0.139***	-0.016	0.149***	-0.169***	0.042	-0.174***	0.050	0.151***	0.097***	0.158***	0.099***
	(0.01)	(0.04)	(0.02)	(0.04)	(0.01)	(0.03)	(0.01)	(0.04)	(0.01)	(0.02)	(0.01)	(0.02)
immigrants (d)	0.004*	0.001	0.004*	0.002	0.006***	0.002	0.007***	0.003	-0.003**	-0.001	-0.003**	-0.001
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
% CFL	0.203***	0.423***	0.194***	0.411***	0.135***	0.271***	0.126***	0.259***	0.068***	0.151***	0.067***	0.152***
	(0.02)	(0.06)	(0.02)	(0.06)	(0.01)	(0.04)	(0.01)	(0.04)	(0.01)	(0.03)	(0.01)	(0.03)
% fixed term contracts	0.205***	0.175***	0.203***	0.175***	0.154***	0.138***	0.151***	0.138***	0.051***	0.037**	0.052***	0.038**
	(0.02)	(0.03)	(0.02)	(0.03)	(0.01)	(0.02)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.02)
% part timers	-0.051**	0.558***	-0.048*	0.576***	-0.040*	0.324***	-0.036	0.337***	-0.011	0.234***	-0.012	0.238***
	(0.03)	(0.12)	(0.03)	(0.13)	(0.02)	(0.09)	(0.02)	(0.09)	(0.01)	(0.07)	(0.01)	(0.07)
flex weekly hours (d)	0.003	0.005	0.001	0.005	0.003	0.006	0.002	0.006	-0.001	-0.001	-0.000	-0.001
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
shifts (d)	0.006	-0.003	0.006	-0.001	0.003	-0.000	0.003	0.001	0.003	-0.003	0.003	-0.002
	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
overtime per worker	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
temp lay offs (d)	-0.046***	0.049***	-0.048***	0.049***	-0.039***	0.034***	-0.041***	0.033***	-0.007***	0.016***	-0.007***	0.015***
	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
contract (d)	-0.014***	-0.000	-0.013***	-0.001	-0.012***	-0.005	-0.011***	-0.006	-0.002	0.005*	-0.002	0.005*
	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
union (d)	-0.028***	-0.008	-0.027***	-0.010	-0.022***	-0.015**	-0.022***	-0.016**	-0.006***	0.007*	-0.005**	0.007*
	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
strike (d)	-0.007***	-0.001	-0.007***	-0.002	-0.006***	0.001	-0.006***	0.001	-0.002*	-0.003	-0.001	-0.003
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
y1990	-0.000	0.012*	0.001	0.014*	0.001	0.006	0.002	0.007	-0.002	0.006**	-0.002	0.007**
	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
y1991	-0.031***	0.012	-0.031***	0.011	-0.024***	0.006	-0.023***	0.005	-0.007***	0.006*	-0.007***	0.006*
	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
y1992	-0.038***	0.026***	-0.038***	0.025**	-0.027***	0.014*	-0.026***	0.013	-0.012***	0.013***	-0.012***	0.011**
	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
y1993	-0.058***	-0.022***	-0.061***	-0.028***	-0.039***	-0.020***	-0.041***	-0.025***	-0.019***	-0.002	-0.020***	-0.003
	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
y1994	-0.020***	0.031***	-0.022***	0.028***	-0.007*	0.014**	-0.008**	0.012	-0.013***	0.018***	-0.014***	0.016***
	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.01)
y1995	0.017***	0.004	0.015***	-0.001	0.022***	0.001	0.021***	-0.002	-0.005**	0.003	-0.006**	0.001
	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
y1996	-0.007	0.002	-0.010	-0.005	0.001	0.003	-0.001	-0.002	-0.007**	-0.001	-0.009***	-0.003
	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.01)
y1997	-0.018***	-0.011	-0.021***	-0.018*	-0.006	-0.010	-0.007	-0.014*	-0.012***	-0.002	-0.014***	-0.004
	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
y1998	-0.010	0.039**	-0.012*	0.032*	-0.007	0.027*	-0.008	0.023	-0.003	0.012**	-0.004	0.009*
	(0.01)	(0.02)	(0.01)	(0.02)	(0.01)	(0.02)	(0.01)	(0.02)	(0.00)	(0.01)	(0.00)	(0.01)
y1999	-0.018**	0.039**	-0.021***	0.032*	-0.013**	0.025	-0.014**	0.020	-0.005*	0.014***	-0.007**	0.012**
	(0.01)	(0.02)	(0.01)	(0.02)	(0.01)	(0.02)	(0.01)	(0.02)	(0.00)	(0.01)	(0.00)	(0.01)
y2001	-0.032***	0.040**	-0.035***	0.033*	-0.025***	0.025	-0.026***	0.021	-0.007***	0.014***	-0.009***	0.012**
	(0.01)	(0.02)	(0.01)	(0.02)	(0.01)	(0.02)	(0.01)	(0.02)	(0.00)	(0.01)	(0.00)	(0.01)
y2002	-0.050***	0.026	-0.054***	0.019	-0.037***	0.008	-0.039***	0.003	-0.013***	0.018***	-0.015***	0.016**
	(0.01)	(0.02)	(0.01)	(0.02)	(0.01)	(0.02)	(0.01)	(0.02)	(0.00)	(0.01)	(0.00)	(0.01)
y2003	-0.061***	0.010	-0.064***	0.002	-0.045***	0.000	-0.046***	-0.005	-0.016***	0.010*	-0.018***	0.007
	(0.01)	(0.02)	(0.01)	(0.02)	(0.01)	(0.02)	(0.01)	(0.02)	(0.00)	(0.01)	(0.00)	(0.01)
y2004	-0.076***	-0.018*	-0.079***	-0.025**	-0.056***	-0.025***	-0.057***	-0.030***	-0.020***	0.007	-0.022***	0.005
	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
y2005	-0.080***	0.003	-0.083***	-0.004	-0.056***	-0.007	-0.058***	-0.012	-0.023***	0.010*	-0.025***	0.008
	(0.01)	(0.02)	(0.01)	(0.02)	(0.01)	(0.02)	(0.01)	(0.02)	(0.00)	(0.01)	(0.00)	(0.01)
y2006	-0.067***	0.010	-0.071***	0.003	-0.045***	-0.005	-0.047***	-0.010	-0.022***	0.015**	-0.024***	0.013**
	(0.01)	(0.02)	(0.01)	(0.02)	(0.01)	(0.02)	(0.01)	(0.02)	(0.00)	(0.01)	(0.00)	(0.01)
y2007	-0.064***	-0.003	-0.068***	-0.009	-0.047***	-0.015	-0.048***	-0.019	-0.017***	0.012*	-0.019***	0.010
	(0.01)	(0.02)	(0.01)	(0.02)	(0.01)	(0.02)	(0.01)	(0.02)	(0.00)	(0.01)	(0.00)	(0.01)
const.	0.200***	0.116***	0.204***	0.113***	0.196***	0.101***	0.201***	0.102***	0.004	0.014	0.003	0.011
	(0.01)	(0.02)	(0.01)	(0.03)	(0.01)	(0.02)	(0.01)	(0.02)	(0.00)	(0.01)	(0.01)	(0.01)
R2 (overall)	0.091	0.059	0.089	0.058	0.097	0.040	0.096	0.040	0.063	0.041	0.064	0.040
N obs	48606	48579	46386	46360	48606	48579	46386	46360	48606	48579	46386	46360
N establishments	12507	12505	12254	12252	12507	12505	12254	12252	12507	12505	12254	12252

Appendix III
Effects of wage flexibility on within wage inequality, 1989-2007
FE estimates

	Diff wage			CV wage		
	1	2	3	4	5	6
prp	0.031***	0.029***	0.036***	0.029***	0.024***	0.032***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
y1990	0.010***	0.011***	0.012***	0.006*	0.005	0.007**
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
y1991	0.004	0.010***	0.011***	0.010***	0.014***	0.018***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
y1992	0.002	0.009***	0.010***	0.011***	0.017***	0.020***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
y1993	0.008**	0.016***	0.016***	0.009**	0.016***	0.020***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
y1994	0.034***	0.040***	0.042***	0.018***	0.025***	0.029***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
y1995	-0.006	0.001	-0.003	-0.056***	-0.048***	-0.050***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
y1996	-0.006	0.001	-0.006	-0.049***	-0.036***	-0.039***
	(0.00)	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)
y1997	-0.010**	-0.002	-0.008	-0.041***	-0.028***	-0.030***
	(0.00)	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)
y1998	-0.009**	0.009*	0.003	-0.035***	-0.017***	-0.020***
	(0.00)	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)
y1999	-0.001	0.016***	0.010*	-0.030***	-0.013**	-0.017***
	(0.00)	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)
y2001	0.019***	0.035***	0.029***	-0.023***	-0.008	-0.011**
	(0.00)	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)
y2002	0.016***	0.032***	0.025***	-0.012***	0.003	-0.002
	(0.00)	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)
y2003	0.004	0.020***	0.013**	-0.018***	-0.003	-0.008
	(0.00)	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)
y2004	0.009**	0.025***	0.018***	-0.021***	-0.007	-0.011**
	(0.00)	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)
y2005	0.014***	0.032***	0.023***	-0.020***	-0.005	-0.011*
	(0.01)	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)
y2006	0.025***	0.041***	0.033***	-0.026***	-0.011*	-0.016***
	(0.00)	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)
y2007	0.022***	0.038***	0.029***	-0.020***	-0.005	-0.011*
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
size_2049		0.022***	0.022***		0.036***	0.036***
		(0.00)	(0.00)		(0.00)	(0.00)
size_5099		0.035***	0.036***		0.071***	0.072***
		(0.01)	(0.01)		(0.01)	(0.01)
size_100		0.043***	0.043***		0.090***	0.092***
		(0.01)	(0.01)		(0.01)	(0.01)
multiplant (d)		0.000	0.001		-0.006	-0.007*
		(0.00)	(0.00)		(0.00)	(0.00)
% women		-0.072***	-0.075***		-0.004	-0.004
		(0.02)	(0.02)		(0.01)	(0.01)
% white collars		-0.005	-0.002		0.006	0.007
		(0.01)	(0.01)		(0.01)	(0.01)
immigrants (d)		-0.008***	-0.007***		-0.008***	-0.007***
		(0.00)	(0.00)		(0.00)	(0.00)
% CFL		0.050***	0.047***		0.054***	0.054***
		(0.01)	(0.01)		(0.01)	(0.01)
% fixed term contracts		0.028***	0.027***		0.023***	0.021***
		(0.01)	(0.01)		(0.01)	(0.01)
% part timers		0.079***	0.081***		0.003	0.004
		(0.02)	(0.02)		(0.01)	(0.01)
flex weekly hours (d)		0.001	-0.000		-0.007	-0.008
		(0.01)	(0.01)		(0.01)	(0.01)
shifts (d)		0.011***	0.012***		0.010***	0.010***
		(0.00)	(0.00)		(0.00)	(0.00)
overtime per worker		-0.000	-0.000		0.000	0.000
		(0.00)	(0.00)		(0.00)	(0.00)
temp lay offs (d)		-0.002	-0.002		-0.003	-0.002
		(0.00)	(0.00)		(0.00)	(0.00)
contract (d)		-0.006**	-0.008**		0.000	-0.001
		(0.00)	(0.00)		(0.00)	(0.00)
union (d)		-0.002	-0.002		0.000	0.000
		(0.00)	(0.00)		(0.00)	(0.00)
strike (d)		0.000	0.000		0.001	0.003
		(0.00)	(0.00)		(0.00)	(0.00)
const.	0.245***	0.230***	0.233***	0.374***	0.318***	0.318***
	(0.00)	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)
R2 (overall)	0.015	0.020	0.023	0.004	0.010	0.010
N obs	43053	41367	39885	43053	41367	39885
N firms	10871	10458	10324	10871	10458	10324

6.3 Incentive pay and financial participation in France

In this section, we present new evidence on the effect of incentive pay on performance in a representative sample of French firms. The study looks at the relationships between incentive schemes, work pressure and firm performance[68].

Context and issues

Since the late 1950s France has had regulated profit-sharing schemes as well as individual-and group-performance pay. It now has a high incidence of profit sharing, and in the last two decades many large French firms have also been adopting employee share ownership. Several studies have examined the effects of profit sharing and employee share ownership on performance of French firms, including productivity, absenteeism and quits[69]. The findings of these studies support the hypothesis that both profit sharing and employee share ownership have positive effects on total factor productivity and reduce absenteeism, though only the more long-term oriented deferred profit-sharing and employee share ownership schemes have beneficial effects on quits. However, until now little consideration has been given in this literature, whether in studies concerning France or elsewhere, to the possibility that incentive pay may be associated with increased work pressure. Besides the positive effects on motivation leading employees to work more and better—or "smarter"—and to improvements in organizational effectiveness, incentive schemes may create excessive work pressure or stress and may induce employees to over-exert themselves. Increased work pressure may or may not improve performance in the short run and may be detrimental to long-run performance as it affects health. It may also have ambiguous welfare implications. If health and safety is a merit good, individual employees may accept more pressure at a given pay level than would be optimal for themselves. Thus productivity gains associated with incentive schemes might not be unambiguously welfare improving if they were associated with increased work pressure and stress. The present study examines the relationship between profit sharing and work pressure, and the effect of both work pressure and profit sharing on firm performance.

The study uses data from the last two rounds of the French REPONSE survey which provides detailed information on incentive schemes in the firm, as well as on industrial relations and other aspects of human resource management practices and employee participation. Unlike existing studies on incentive pay in France, which only had information on financial participation schemes, we are able to control extensively for individual and small group performance-pay schemes in the firms concerned. In addition, the information collected by REPONSE from a sample of employees in each firm surveyed makes it possible to look at employees' reported work pressure and to take into account their reported motivation, their characteristics and those of their jobs while investigating the performance effects of incentive schemes.

Data and Empirical Strategy

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[68] This section has benefited from the collaboration of Fathi Fakhfakh, see Fakhfakh and Pérotin (2010)

[69] See Estrin et al (1987) Estrin and Jones (1995) Cahuc and Dormont (1997) Brown et al (1999) Fakhfakh and Pérotin (2000) Fakhfakh (2004) and Fakhfakh, Pérotin and Gago (2010). The early studies are reviewed in Fakhfakh and Pérotin (2002).

We use a representative panel sample of a little over 900 private-sector establishments in industry and services that are present in both the 1998 and 2004 rounds of the REPONSE survey[70]. All establishments have 20 employees or more. The REPONSE survey collects information from managers, employee representatives and a sample of employees in each firm surveyed. The information we use comes from the management survey and the employee samples[71]. For some of the estimations, we have merged this data set with economic information from the annual enterprise survey Enquête annuelle d'entreprise (EAE) 2004.

We focus on two main questions: the extent to which an incentive scheme is associated with work pressure, and the effects of work pressure and incentive pay on performance. We therefore estimate two main equations. One equation investigates work pressure (equation [2]), and the other one firm's performance (equation [3]). The central hypotheses we explore are that profit sharing increases work pressure, which may in turn affect performance, and that profit sharing itself also affects performance directly. We therefore include profit sharing and other forms of incentive pay among the variables explaining work pressure, and include both profit sharing and work pressure in the performance equation.

The overall structure of the model is the following.

$PS_j = \phi(X1_j)$ $\quad j = 1,\ldots, n$ [1]

$WP_{ij} = \gamma(X2_{ij}, X3_j, PS_j)$ $\quad i = 1,\ldots, m$ [2]

$Perf_j = \eta(X4_j, PS_j, \overline{WP_j})$ [3]

i.e., the existence of a profit-sharing scheme in firm *j* (PS_j) is a function of firm-level factors $X1_j$; the work pressure experienced by employee *i* in firm *j* (WP_{ij}) depends on employee-level factors $X2_{ij}$, firm-level factors $X3_j$, and the existence of a profit-sharing scheme in firm *j*. The performance of firm *j* ($Perf_j$) depends on firm-level factors $X4_j$, the existence of profit sharing in firm *j* (PS_j) and the mean work pressure (or its expected value) experienced by employees in firm *j* ($\overline{WP_j}$).

In REPONSE, both the work pressure and performance variables are qualitative, and have been transformed into dummy variables taking the values 0 and 1. The work pressure variable corresponds to a question asking employees if they feel they have to rush in their work. In order to proxy for real pressure, i.e., pressure of the type that is likely to create stress, our variable takes the value 1 only if the employee answered "yes, always" (as opposed to "never", "occasionally" or "often"). The performance variable comes from a question regarding the establishment's profitability compared to its main competitors, and takes the value 1 if the manager answers the establishment's performance is better ("rather better" or "much better") and 0 otherwise. Productivity would be more appropriate to the hypotheses linking incentive pay and performance (see Section 4 above). The qualitative measure of profitability in REPONSE is correlated with firm-level productivity and has produced results that are reasonably consistent with those of

[70] We will be using the terms "firm" and establishment" interchangeably in the text (but not in the variable definitions in the Appendix) from here on. The survey sample is stratified, and representativeness is achieved with a set of weights available with the survey data. Survey questionnaires and other information on REPONSE are available on http://www.travail-solidarite.gouv.fr/etudes-recherche-statistiques-de,76/statistiques,78/relations-professionnelles,85/enquete-reponse-2004-2005-premiers,280/presentation-de-l-enquete,4188.html.

[71] The sizes of the employee samples are reported in the appendix (Table A6.3.1).

production function estimations in the past (see Fakhfakh, Pérotin and Robinson 2010). However, the categorical nature of the variable poses some estimation problems (see below). In order to confirm our findings, we also test our hypotheses regarding performance by estimating a production function on 338 manufacturing firms in our sample that also appear in the EAE in 2004.

As our measure of work pressure (*WP)* is a binary variable, we initially estimate a probit model that explains the probability of *WP* taking the value 1. However, incentive pay is not present randomly in firms. In particular, it is likely that the same factors that explain the existence of a particular incentive scheme are also correlated with work pressure. Incentive pay may appear to have an effect on work pressure that is really caused by other factors that explain both the presence of incentive schemes and work pressure. In order to correct for this in the work pressure equation, we take into account factors observed in 1998 that explain the existence of profit sharing in the firm in 2004 but not work pressure observed in 2004. More precisely, we estimate the work pressure equation by a Full Information Maximum Likelihood (FIML) procedure—IV probit--in which profit sharing is instrumented by lagged factors (observed in 1998).

When we estimate the effects of work pressure and profit sharing on performance, we also need to take into account the fact that, while work pressure may affect performance, factors associated with performance may have affected work pressure in the first place. We may observe apparent effects of work pressure on performance that really are due to reverse causality. Similarly, if more (or less) productive firms tend to adopt profit sharing, a positive (negative) association between profit sharing and productivity could be due to reverse causality. If we use our qualitative measure of performance, we again have to estimate the equation non-linearly. However, we cannot use IV probit estimation to correct for reverse causality this time. In our model, profit sharing determines work pressure but is itself explained by predetermined factors observed in 1998, i.e., the model is recursive. Using the IV probit procedure would imply using one set of instruments for both work pressure and profit sharing and thus effectively destroying the recursive nature of the model[72].

In order to get around this problem, we have estimated two types of performance equations (both using 2004 levels of all the variables). First, we estimate a probit model with the qualitative performance measure as a dependent variable. In this estimation, we endogenise work pressure simply by replacing the corresponding dummy variables with the predicted values from the work pressure equation estimated by IV probit, as one would in a linear model[73]. We endogenise profit sharing with the predicted values from a probit estimation in which profit sharing is explained by the 1998 values of the variables we used as instruments for profit sharing in the work pressure equation. In other words, we now estimate the profit sharing equation separately, and use it to correct the performance estimation. This approach would provide consistent estimates if the estimation of the performance equation were linear, but may provide less accurate (inconsistent) estimates in this case. We explore the extent of the differences between the two types of estimates by comparing results obtained with the IV probit procedure and with this two-step probit estimation for the work pressure equation and discuss this and other variants below .

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[72] See Wooldridge (2002) p 237. In addition, the estimation does not converge with our data when we try to endogenise work pressure as well as profit sharing in the performance equation.

[73] More precisely, we insert in the performance equation, which is at the firm level, the firm-level average of the predicted values for work pressure (since the work pressure equation is estimated at the employee level).

The second type of performance equation we estimate is a production function. For a subsample of 338 manufacturing firms in our data set, we are able to merge the data from REPONSE 1998 and 2004 with economic information from the 2004 round of the annual French enterprise survey, EAE. Here the dependent variable is the logarithm of value added, which is a continuous variable, so we are able to use linear estimation. Work pressure and profit sharing are endogenised again by inserting the predicted values from IV probit and probit estimations respectively into the performance equation, here the production function[74]. This approach yields consistent estimates. However, in all the estimations in which we endogenise either profit sharing or both profit sharing and work pressure (including the work pressure equation, the equation explaining a qualitative measure of performance and the production function) we use bootstrap estimates of the standard errors.

The data we have potentially allow doing this for profit sharing, employee ownership and two types of individual incentive pay schemes for non-managerial employees, as well as a group-performance pay scheme. The endogenising equation predicting the existence of profit sharing in a firm performs well. However, endogenising the other incentive schemes at the same time, together with work pressure, runs into difficulties—in particular, the other endogenising equations have poor fit and give very low predicted values. As a result, we obtain quite unreliable estimates even in the production function equation. We therefore focus on cash profit sharing[75], for which our findings can be compared with a number of existing studies for France.

However, the implication of our approach is that the effects estimated for other forms of incentive pay and for other factors that are likely to be endogenous, such as the presence of union representatives in the firm, may be biased (though this may not be as serious a problem with employee share ownership[76]). These variables remain important as controls in the estimation, in order to isolate as much as possible the effects of the factors we are focusing on from the possibly confounding effects of other factors. In our discussion of the findings, we will therefore keep in mind the possible endogeneity bias when we discuss the effects estimated for other forms of incentive pay and control factors.

We will present the equation that determines profit sharing first, followed by the work pressure equation (in which profit sharing is instrumented with the same variables that explain its existence in the profit-sharing equation) and the two types of performance equations.

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[74] We actually insert the logs of the predicted values for both *PS* and the mean *WP* into the production function. When we use a production function approach, the coefficients associated with dummy variables are elasticities (differences between logs). But once we use the instrumented values for the dummies, the interpretation of their coefficients is altered since the predicted values are continuous. To get back to the elasticity interpretation, we simply take the logs of the relevant predicted values (another way of dealing with this is to use the predicted values without taking logs but then multiply each coefficient by the mean of the relevant predicted values).

[75] We use voluntary profit sharing schemes (*intéressement*) about which there were no regulatory changes in the period intervening between the two rounds of the survey.

[76] Employee share ownership is found primarily in the largest companies listed on the Paris stock exchange (and we control for firm size) and is often set up in such a way that it is financed by a profit-sharing scheme, the existence of which we endogenise.

Specification

The equation explaining the existence of profit sharing in 2004 includes explanatory variables observed in 1998 at the firm level. We include employment in the equation to reflect the hypothesis that collective incentive pay may be introduced in larger or in smaller firms, as argued earlier in this report. Profit sharing may also be adopted to share risk with employees (Estrin and Wilson 1986) and/or as a way to provide employees with higher pay in situations of uncertainty, where permanent pay raises might be regarded by the firm as too risky. Uncertainty is proxied for with replies to a question asking managers whether forecasting future sales is easy in their industry. As this type of uncertain situation may occur when the firm's prospects are poor, or when they are improving or good but unsettled, we include qualitative variables indicating whether sales and employment have been increasing in the previous three years. Firms that inform their workforce regularly about the affairs of the firm may be more likely to introduce a scheme that will require keeping employees informed of performance, so the equation includes a variable giving the number of ways in which the firm informs its workforce ("information flows"). Finally, depending on the level of pay associated with the scheme, firms may look towards the flexibility of profit sharing in order to cut costs, or use it as a way to offer higher pay as a form of "efficiency wage". We therefore include two additional variables, one of which concerns whether the firm competes with low prices ("price competition") and the other with high quality ("quality competition")[77].

Work pressure may increase with job insecurity, longer working hours, a greater control over one's job and higher skills, but may be reduced with union strength (Gallie 2007)[78]. The equation explaining work pressure in 2004 includes contemporary levels of variables proxying for these aspects, as well as variables indicating whether the firm has different types of individual and collective incentive schemes (individual pay raises, individual bonuses and collective bonuses for non-managerial and managerial and professional employees, as well as stock options for managers and professionals). Other explanatory variables include the employee's educational levels and occupational categories; proxies for the organization of work and technology (team work, flexible posting); and variables indicating the extent of information received by employees about the firm's affairs and the firm's communication efforts, which may decrease or increase pressure. We also control for the types of motivating factors reported by employees to matter to them (financial or not, fear of redundancy, and promotion) and employees' sense of recognition, which may affect their sense of pressure in a given work situation. We include employees' assessment of industrial relations, which may cause more pressure if they are tense (whether the employee has recently

[77] The explanatory variables are predetermined in relation to having a profit-sharing scheme in 2004. At least one of these variables—easy forecasting—is likely to capture a structural characteristic of the firm's business (the question does not concern any particular year) and the questions on the evolution of sales and employment concern the previous three years. In addition, a substantial number of firms abandon and/or adopt profit sharing between the two rounds of the survey: 18.5% of the sample firms that had a profit-sharing scheme in 1998 (87 out of 470) no longer have one in 2004, and 25.8% of the firms that have a scheme in 2004 (134 out of 519) didn't have one in 1998. Firms that have profit sharing in 2004 therefore decided to adopt it or to continue their existing scheme in the meantime, and their characteristics observed in 1998 are unlikely to be endogenous to having profit sharing in the first place.

[78] Unions are more likely to be aware of health and safety risks than individuals (Fakhfakh, Pérotin and Robinson 2010) and strong unions may mitigate employers' market power over individual employees (Manning 2006).

taken part in industrial conflict is also included) and of management's attitude to conflict. Finally, in order to account for overall pressure in the workplace we include other firm-level factors, such as whether the firm competes on a global market and the way it competes, as well as firm and employee characteristics proxying for unobserved factors (the firm's size, whether it has only one establishment and whether it belongs to a group, and the employee's age and length of service in the firm).

The qualitative measure of performance is determined by the characteristics of the firm and its market (firm size and structure, whether it sells on a global market and competes with low prices) employee information and governance participation including representative employee voice (whether the firm has a works council and union representatives) and incentive schemes and work pressure. In the production function version of the performance equation, the log of value added is explained by the logs of the employment level of the firm and that of its fixed assets, and the same vector of control variables.

Descriptive Statistics

Table 6.3.1 presents the incidence of incentive pay (highlighted) and other firm characteristics including the extent of employee information, as well as performance and average work pressure reported by the firm's sample of employees in 2004 (variable definitions are presented in the appendix, Tables A6.3.2 and A6.3.3). Some of the firm-level variables observed in 1998, which are used in the profit sharing equation, are also included. Starting with incentive schemes, 43% of the firms in the sample had profit-sharing and 8% had employee share ownership schemes in 2004, which is consistent with national statistics, given that the sample firms all have 20 employees or more (Cellier and Chaput 2008[79]). Between half and two-thirds practiced individual raises or individual or collective bonuses for managers and professionals, but less than 3% had stock options for that category of staff. Nearly three-quarters of establishments had individual pay raises for non-managers and a little under half had individual or collective bonuses for those staff groups.

Almost half of the establishments had union representatives, and about 40% a works council. The seemingly high incidence of the two types of representative voice institutions is normal for France, where all firms with 50 employees or more have statutory works councils, and both works councils and labour unions have comparatively extensive information and consultation rights, even where union membership is low (Gumbrell-McCormick and Hyman 2006). More than half of the establishments surveyed had quality circles, and 80% held shopfloor meetings. Nearly half practiced flexible posting. An average of almost 30 % of employees in each establishment reports excessive work pressure, and 21% of firms report a performance that is better than that of their competitors, but a greater proportion compete with low prices in 2004 (29%) than in 1998 (22%) Up to about half of the sample firms reported growing operations in 1998, but only less than a third of establishments found it easy to forecast future sales.

[79] Some 55% of the sample employees work in establishments with profit sharing and 15% in establishments with employee share ownership (see appendix, Table A4) which is also consistent with national figures from the comprehensive Pipa survey of financial participation conducted annually by the French Ministry of Labour.

Table 6.3.1. Variable Means. Firms

Variable	Mean
REPONSE 1998	
Forecasting is easy	0.325
Employment is growing	0.415
Sales are growing	0.530
Intensity of information flows	3.136
Price competition	0.222
Quality competition	0.630
REPONSE 2004	
Employment	115.11
Performance better than competitors'	0.208
Firm's market is global	0.252
Quality circles	0.536
Shopfloor meetings	0.266
Intensity of information on the firm's affairs	1.508
Intensity of communication	2.190
Firm has only one establishment	0.461
Firm is part of a group	0.436
Works Council	0.398
Union Representative(s)	0.487
Mean of Work Pressure	0.286
Profit sharing plan	0.433
Employee share ownership plan	0.080
Individual raises for managers and professionals	0.672
Individual bonuses for managers + professionals	0.591
Collective bonuses for managers + professionals	0.489
Stock options for managers + professionals	0.026
Individual raises for non-managerial employees	0.715
Collective bonuses for non-managerial employees	0.474
Individual bonuses for non-managerial employees	0.498
Company savings plan	0.380
Price competition	0.292
Flexible posting	0.497
Enquête annuelle d'entreprise (EAE) 2004	
K	169,012.80
VA	1,110,842.00
L	1,220

Table 6.3.2 reports the variable means for the data collected from employees in 2004. More than a quarter (26.5%) of the employees surveyed report excessive work pressure, though only 14% fear for their job (and 12% instead hope to receive a promotion or a pay increase) and 42% or so feel the value of their work is recognised by management. Nearly half (48.7%) assess the industrial relations climate as tense in their establishment, and some 46% feel it has deteriorated in recent years, even though 45% find management has a constructive attitude to problems in the workplace. Although 45% of employees are in workplaces where there was no industrial action in

the previous three years, 30% have taken part in industrial action or some other form of collective action (but this could be outside their workplace—the survey question is ambiguous). The average employee normally works 36.5 hours a week, and a considerable proportion (70%) work in teams at least part of the time.

Table 6.3.2. Variable Means. Employees

Variable		Mean
Work pressure		0.265
Education Default: no qualification	Pre-high school qualifications	0.258
	High school Diploma	0.123
	2 years higher education	0.141
	3-4 years higher education	0.072
	5 years higher education or more	0.071
Occupational group (default: blue collar)	Clerical	0.165
	Technicians/Associate professionals	0.209
	Managers/professionals	0.170
	Other categories	0.071
Does some manual work		0.522
Part time		0.109
Autonomy at work		0.539
No. Types of Financial motivation		1.015
No. Other types of motivation		2.075
Feel their work is recognised		0.415
No industrial action in last three years		0.453
Took part in industrial action in last three years		0.300
Fears being made redundant		0.139
Hope of promotion		0.120
Feels management consults to resolve conflicts		0.448
Assessment of IR climate as tense		0.487
IR climate worse than three years ago		0.459
Log age of employee		3.693
Log length of service		2.318
No. of weekly hours worked		36.527
Team work		0.709
No. of factors limiting dedication		1.441

Estimations

The results of the probit estimation explaining the presence of profit sharing in 2004 are presented in Table 6.3.3. As expected, uncertainty increases the probability of having profit sharing (easy forecasting has a positive effect). The scheme may thus be adopted or continued in order to share risk, but also when business is growing. Although firms that inform their employees more are more likely to have profit sharing, this form of incentive pay will be more present in firms that compete primarily on costs (low prices) but not in those that compete on quality.

Table 6.3.3. Profit Sharing Equation – Probit estimation[80]

N = 910	Coefficient	z
Variable (1998 values)		
Forecasting easy	- 0.073***	-5.30
Employment is growing	0.071***	5.07
Sales are growing	0.030**	2.19
Intensity of information flows	0.068***	19.61
Price competition	0.060***	3.87
Quality competition	0.016	1.17

***, **, * denote significant at the 1%, 5% and 10% levels respectively.

Table 6.3.4 presents the estimates of the work pressure equation, both when the existence of a profit sharing scheme is not endogenised and when it is. Having a profit-sharing plan seems to increase work pressure when the endogeneity of the plan is not taken into account but has a substantial negative effect on work pressure when the endogeneity of profit sharing is appropriately handled. This suggests that the apparent increase in work pressure associated with profit sharing is due to the situations in which firms implement profit sharing rather than to the scheme itself. Employee share ownership schemes are associated with less work pressure, with a stable coefficient across estimation methods. However, the coefficients estimated for several incentive schemes are affected by the instrumentation. All forms of incentive pay for managers and professionals are associated with an increase in the pressure perceived by employees in the firms concerned, except for stock options. In contrast, individual forms of incentive pay for non-managerial staff (individual raises and bonuses) are associated with decreased pressure. Among non-managerial schemes, only collective bonuses correlate with increased pressure. This complex pattern could be related to the fact that people in different occupational groups have control over different aspects of their measured performance, and suggests that managerial incentives may result in pressure being put on other employees (but the estimates may also be affected by endogeneity). Interestingly, the intermediate occupational and qualification groups (clerical workers, technicians and associate professionals, as well as employees with 3-4 years of higher education) are the only ones that correlate with less pressure than the reference group (blue collar workers, no qualification). It could be that both responsibilities and subordinate positions increase work pressure.

Long working hours are associated with more pressure as expected. The presence of labour union representatives also seems to have a positive effect, but this may be due to reverse causality—unions may be more active in establishments where there is a lot of pressure. Both an industrial relations climate perceived as tense and a deteriorating one are associated with increased pressure, whereas a constructive management attitude correlates with less pressure. Both those employees that work in establishments where there hasn't been any industrial action in the last three years and the ones that actually took part in a conflict in the same period report less pressure. Governance participation has the expected ambiguous effects, with shopfloor meetings associated with less pressure but quality circles, works councils and other forms of information

[80] All equations are estimated with a constant term, the coefficient of which is not reported in the tables presenting results of nonlinear estimations.

and communication with more, as is autonomy at work. Fearing for one's job increases pressure as expected, but so also does hoping for a promotion. Otherwise, pressure is greater in smaller firms and firms that compete with low prices and operate on global markets, as could be expected.

Table 6.3.4. Work Pressure Equation – Probit and IV Probit estimations (bootstrapped s.errors)

N= 2,589 Variable		PS not instrumented Coefficient	z	PS instrumented[a] Coefficient	z
Logsize		-0.034***	-51.53	-0.042***	-65.50
Global market		0.036***	29.36	0.009***	7.05
Quality circles		0.058***	47.41	0.055***	46.26
Shopfloor meetings		-0.076***	-44.46	-0.073***	-43.54
No. of factors limiting dedication		0.158***	460.35	0.161***	455.09
Intensity of communication		0.030***	54.50	0.022***	38.03
Intensity of information on the firm's affairs		0.002***	3.63	0.020***	33.99
Mono-establishment		-0.066***	-59.65	-0.081***	-74.42
Group		0.116***	95.63	0.133***	111.76
Works council		-0.063***	-45.04	0.043***	17.99
Union representative(s)		0.020***	13.82	0.073***	44.02
Profit sharing		0.035***	25.64	-0.864***	-54.17
Employee share ownership		-0.108***	-67.84	-0.108***	-69.64
Company savings plan		-0.028***	-20.78	0.225***	48.28
Flexible posting		-0.066***	-57.77	-0.040***	-32.97
Individual raises for managers and professionals		-0.077***	-48.91	0.051***	18.35
Individual bonuses for managers and professionals		0.077***	57.18	0.041***	27.55
Collective bonuses for managers and professionals		-0.085***	-40.45	0.174***	34.28
Stock options for managers and professionals		-0.020***	-8.84	-0.022***	-10.15
Individual raises for non-managerial employees		0.008***	5.26	-0.005***	-3.50
Collective bonuses for non-managerial employees		0.064***	31.96	0.146***	61.20
Individual bonuses for non-managerial employees		-0.002	-1.56	-0.002**	-2.15
Price competition		0.079***	69.00	0.089***	79.61
Education	Pre-high school qualifications	0.255***	188.76	0.204***	115.71
	High school Diploma	0.175***	97.10	0.140***	72.07
	2 years higher education	0.173***	95.50	0.126***	62.00
	3-4 years higher education	-0.093***	-36.63	-0.121***	-48.47
	5 years higher education or more	0.147***	56.26	0.127***	49.01
Occupational group	Clerical	-0.119***	-63.52	-0.150***	-80.35
	Technicians/Associate professionals	-0.040***	-23.74	-0.022***	-12.98
	Managers/professionals	0.087***	39.77	0.021***	8.69
	Other categories	0.067***	27.09	0.008***	3.22
Does some manual work		0.140***	107.30	0.132***	101.73
Part time		0.236***	117.29	0.220***	108.45
Autonomy at work		0.033***	29.60	0.025***	23.42
No. Types of Financial motivation		0.049***	46.24	0.060***	58.21
No. Other types of motivation		0.065***	163.56	0.065***	168.95
Feel their work is recognised		-0.190***	-150.79	-0.169***	-124.62
No industrial action		-0.007***	-5.15	-0.055***	-34.46
Took part in industrial action		-0.161***	-111.57	-0.189***	-131.36

Fears being made redundant	0.093***	61.57	0.137***	84.61
Hope of promotion	0.024***	14.16	-0.006***	-3.50
Feels management consults to resolve conflicts	-0.231***	-202.82	-0.235***	-209.02
Tense IR climate	0.149***	118.54	0.148***	120.02
IR climate worse than three years ago	0.037***	32.02	0.017***	14.32
Log age of employee	0.487***	170.41	0.500***	179.02
Log length of service	-0.086***	-120.09	-0.094***	-134.45
No. of weekly hours worked	0.009***	109.83	0.010***	128.19
Team work	0.146***	122.15	0.134***	109.76

***, **, *: significant at the 1%, 5% and 10% levels respectively.
[a] PS instrumented with 1998 values of vars. in Table 6.3.3

We now turn to the performance equations (Tables 6.3.5 and 6.3.6). In order to explore the extent to which our two-step probit estimates might be biased, we have compared the IV probit results that we just discussed for the performance equation with two-step probit estimates (see appendix, Table A6.3.5). The direction of the effect estimated for profit sharing is the same, as is that of employee share ownership. However, the coefficients estimated for most other forms of incentive pay are substantially affected by the instrumentation. The exceptions are stock options for managers and professionals, and individual bonuses for non-managers. The coefficients of most of the other variables are quite stable.

Table 6.3.5. Performance equation – Probit and Two-step probit estimations (bootstrapped standard errors)

N = 910	Neither Profit Sharing nor Work Pressure endogenised		Both Profit Sharing and Work Pressure endogenised[a]	
Variable	**Coefficient**	**Z**	**Coefficient**	**z**
Logsize	0.172***	13.93	0.192***	15.22
Global market	0.180***	9.01	0.137***	6.71
Intensity of communication	-0.031***	-3.66	-0.038***	-4.33
Intensity of information on the firm's affairs	-0.060***	-7.78	-0.058***	-7.39
Mono-establishment	-0.138***	-7.68	-0.130***	-7.08
Group	-0.088***	-4.73	-0.045**	-2.32
Works council	-0.444***	-20.28	-0.486***	-21.60
Union representative	-0.417***	-20.86	-0.439***	-21.33
Work pressure	0.136***	5.29	0.241***	3.82
Profit sharing	-0.141***	-6.49	1.245***	7.81
Employee share ownership	0.304***	10.44	0.319***	10.98
Company saving plan	0.037*	1.85	-0.026	1.32
Individual raises for managers and professionals	0.517***	22.55	0.414***	17.86
Individual bonuses for managers and professionals	-0.210***	-10.17	-0.182***	-8.55
Collective bonuses for managers and professionals	0.472***	16.82	0.477***	17.01
Stock options for managers and professionals	-0.176***	-3.55	-0.123**	-2.44

Individual raises for non-managerial employees	0.132***	5.70	0.167***	6.99
Collective bonuses for non-managerial employees	0.155***	5.59	0.089***	3.20
Individual bonuses for non-managerial employees	0.103***	5.50	0.152***	8.02
Price competition	-0.368***	-18.89	-0.397***	-19.83

***, **, * denote significant at the 1%, 5% and 10% levels respectively.

[a] Work pressure endogenised with predicted values from IVprobit estimation of the work pressure equation (see Table 6.3.4 above). Profit sharing endogenised with predicted values from probit estimation of the profit sharing equation (see Table 6.3.3).

Table 6.3.5 presents the estimates for the equation in which performance is measured with a binary variable. As with the work pressure equation, the estimates on the left are those obtained without endogenising any explanatory variable. Both work pressure and profit sharing have been endogenised for the estimates on the right-hand side of the table, though in a way that may yield inaccurate estimates. Work pressure has a positive effect on performance in both estimations**.** In contrast, having a profit-sharing scheme, which appeared to have a negative association with performance in the model without endogenisation, is found to have a positive effect on performance once it is properly endogenised. Just like its apparent positive association with work pressure, the apparently negative association of profit sharing with performance is due to the conditions in which it is adopted or continued and is reversed when those conditions are taken into account.

Employee share ownership, which like profit sharing was negatively associated with work pressure, is positively associated with performance. This may of course be due to the fact that firms that do well also tend to have employee share ownership. Even as we keep this in mind, it is interesting to notice that, among incentive pay schemes for managers and professionals, one (individual raises) has the same pattern of estimated effects—a negative association with pressure and a positive one with performance—while individual bonuses seem to increase pressure but to cut performance. This might suggest that schemes that increase pressure are bad for performance and those that cut pressure increase performance, were it not for the fact that stock options are negatively associated with both pressure and performance in our estimates. Individual raises and bonuses for non-managerial employees, which were associated with lower work pressure (contrary to what happened with managerial staff) also seem to improve performance. But then so do collective bonuses for non-managerial staff, despite having a positive effect on work pressure.

The production function results, presented in Table 6.3.6, are more reliable, though they only concern a subsample of manufacturing firms. These estimates confirm the central result from the probit performance equation about profit sharing: the positive effect of profit sharing on performance is not due to reverse causality[81]. Indeed, endogenising the existence of the scheme increases the estimated positive effect. However, employee share ownership is found to have no significant effect. Generally, the production function estimates suggest that most forms of

[81] This result is robust to changes in the specifications of the profit-sharing and work pressure equations (using linear probability models and un-instrumented probit) as is the finding concerning work pressure in the production function.

incentive pay are positively associated with productivity, as are the presence of a works council and that of union representatives. These estimates differ in two interesting ways from the two-step probit ones. The first is that work pressure is found to have a negative effect on performance here. This could be due to the more accurate estimation method or to the subsample, since this subsample does not cover services. The other difference is that incentive pay is generally found to have more uniformly positive effects with the production function.

Generally, the performance equations suggest that both financial participation and most forms of incentive pay improve performance, though outside the results for profit sharing our findings could be affected by reverse causality. Interestingly, these findings also imply that the positive effect of profit sharing on performance is not obtained through excessive work pressure on employees but rather in spite of the negative effect of having a profit-sharing scheme on work pressure. We have conflicting findings on the relationship between work pressure and performance, but our consistent estimates (from the production function) suggest that work pressure has a negative effect on performance. However, our current findings also suggest many incentive schemes—primarily those directed at managerial and professional staff, could both create work pressure and improve performance. These results may be affected by endogeneity if better performing firms tend to put in place incentives for managerial staff—though the fact that 59 to 76% of the employees in our sample are in establishments that have the schemes concerned suggests that the practices are hardly the privilege of a few business champions.

Table 6.3.6. Production function (dependent variable: Ln VA – weighted least squares, bootstrapped standard errors)

N = 338	Neither Profit Sharing nor Work Pressure endogenised		Both Profit Sharing and Work Pressure endogenised[a]	
Variable	**Coefficient**	**Z**	**Coefficient**	**z**
Ln K	0.144***	29.30	0.131***	19.92
Ln L	0.864***	145.97	0.877***	122.88
Global market	-0.043***	-6.47	-0.051***	-6.32
Intensity of communication	0.036***	8.66	0.054***	15.49
Intensity of information on the firm's affairs	-0.008***	-2.62	-0.016***	-4.61
Mono-establishment	-0.187***	-21.55	-0.228***	-19.03
Group	-0.045***	-5.01	-0.031***	-4.33
Works council	0.023**	2.34	0.020**	2.10
Union representative	0.026***	3.82	0.026***	3.31
Work pressure	-0.096***	-10.01	-0.111***	-12.68
Profit sharing	0.059***	6.74	0.419***	12.42
Employee share ownership	0.042***	2.47	0.003	0.18
Company saving plan	0.071***	6.14	0.057***	5.86
Individual raises for managers and professionals	0.082***	6.79	0.090***	6.94
Individual bonuses for managers and professionals	0.058***	6.13	0.051***	4.76
Collective bonuses for managers and professionals	0.021**	1.97	0.039***	3.68

Stock options for managers and professionals	0.293***	13.01	0.247***	10.85
Individual raises for non-managerial employees	0.015	1.57	0.030***	2.71
Collective bonuses for non-managerial employees	0.150***	15.65	0.134***	14.68
Individual bonuses for non-managerial employees	0.115***	12.83	0.110***	11.82
Price competition	-0.101***	-10.90	-0.102***	-11.58
Constant	3.106***	108.63	3.377***	60.72
Adjusted R^2	0.960		0.961	

***, **, * denote significant at the 1%, 5% and 10% levels respectively.

[a] Profit sharing replaced by log of predicted value from probit estimation of profit-sharing equation (see Table 6.3.3); work pressure replaced by log of predicted value from IV probit estimation of work pressure equation (see Table 6.3.4).

Conclusions

This first exploration into the relationships between incentive pay, work pressure and firm performance suggests that profit sharing has positive effects on performance and is not a factor of excessive work pressure. Profit sharing improves performance not because it imposes undue pressure on employees, but rather despite the pressure that is found where profit-sharing schemes are implemented, and if anything the schemes ease the pressure. In addition, our findings confirm that the positive effects that profit-sharing schemes have repeatedly been found to have on firm performance in France are not attributable to reverse causality. Taking into account the factors that explain the existence of profit-sharing schemes in certain firms but not in others actually increases the estimated effect of the schemes on firm performance. Since the effect on performance is substantial, the free-riding tendencies that are feared to affect collective incentive schemes is presumably not severe, though whether a measure of (beneficial?) free-riding or other favourable conditions in the workplace explain the lower pressure associated with profit sharing is an intriguing question.

In this study, we were able to control for a rich set of firm- and employee characteristics and for the presence of other incentive schemes, but could not examine the effects of these other forms of incentive pay on work pressure and performance with the same attention to endogeneity issues as with profit sharing. The apparent effects of these other schemes are complex, and hint at interesting differences between incentives aimed at management and professionals and those aimed at non-managerial staff. Further investigation into these issues may also shed new light on the way management-initiated employee involvement and incentive pay schemes, industrial relations and negotiated schemes affect employee motivation, welfare and performance.

APPENDIX A6.3

Table A6.3.1. Size of employee samples

Employees per establishment	No. of establishments in the complete Reponse 2004 sample	No. of establishments in the private-sector panel sample used in the study
1	481	148
2	681	225
3	619	196
4	469	160
5	274	112
6	102	32
7	40	11
8	9	5
9	1	
10	1	
11	1	
Total	2678	889

Table A6.3.2. Variable Definitions: Firms *(continuing on next page)*

Variable	No. of obs.	Min.	Max.
REPONSE 1998			
Forecasting future sales is easy yes (1) /no (0)	962	0	1
Employment has been growing in the last three years (1) / stable or decreasing (0) in establishment	962	0	1
Sales have been growing in the last three years (1) / stable or decreasing (0)	962	0	1
Intensity of information flows: No. of practices from list including: regularly informing all employees about firm's economic situation; likely evolution of employment in estab.; evolution of pay in estab.; training opportunities; likely future technological or organizational changes; and firm strategy; company newsletter.	962	0	7
Price competition: strategy is primarily based on prices (1) / [other options] (0)	962	0	1
Quality competition: strategy is based primarily on quality (1) / [other options] (0)	962	0	1
REPONSE 2004			
Employment: annual average No. of employees in establishment	962	20	10441
Performance: profitability is much better or rather better than main competitors' (1) / about the same, rather worse or much worse (0)	962	0	1
Firm's market for main product is global (1) /local, regional, national, European (0)	962	0	1
Intensity of information on firm's affairs: No. of topics all employees are regularly informed about, from list including firm's strategy; firm's economic situation; social and environmental impact of operations; likely evolution of employment in establishment and firm; evolution of pay in establishment; and likely future technological or organizational changes--none (0) / 1 (1) / 2 (2) / 3 or more (3).	962	0	3
Intensity of communication: No. of means to stimulate employees' involvement in 2004 from list including suggestion box; company newsletter; open day; quality drive; company charter; employee survey--none (0) / 1 (1) / 2 (2) / 3 or more (3).	962	0	3
Firm has only one establishment yes(1) / no (0)	962	0	1
Firm is part of a group yes (1) / no (0)	962	0	1
Quality circles: establishment has quality circles yes(1) / no (0)	962	0	1
Shopfloor meetings: there are regular shopfloor, office or department meetings in the establishment yes (1) / n(0)	962	0	1
Works Council: there is a works council in the estab. yes(1) / no (0)	962	0	1
Union Representative(s) in the establishment yes (1) / no (0)	962	0	1
Flexible posting: employees normally move among different posts yes (1) / no (0)	962	0	1
Mean of Work Pressure: mean of work pressure variable over employee sample	889	0	1
Profit sharing plan: establishment has a regulated voluntary profit-sharing scheme in 2004 (*intéressement)* yes (1) / no (0)	962	0	1
Employee share ownership plan: Employees hold some of the firm's capital yes (1) / no (0)	962	0	1
Company savings plan yes(1) / no (0)	962	0	1
Individual raises for managers and professionals: in 2004 managers and professionals had individual raises in the estab. yes (1) / no (0)	910	0	1
Individual bonuses for managers and professionals: in 2004 managers and professionals had individual bonuses yes (1) / no (0)	910	0	1
Collective bonuses for managers and professionals: in 2004 managers and professionals had group-performance bonuses yes (1) / no (0)	910	0	1
Stock options for managers and professionals: in 2004 managers and professionals received stock options yes (1) / no (0)	910	0	1
Individual raises for non-managerial employees: in 2004 non-managerial staff had individual raises yes (1) / no (0)	956	0	1

Collective bonuses for non-managerial employees: in 2004 non-managerial staff had group-performance bonuses yes (1) / no (0)	956	0	1
Individual bonuses for non-managerial employees: in 2004 non-managerial staff had individual bonuses yes (1) / no (0)	956	0	1
Price competition: one of the top three elements of firm's strategy is to compete with low prices (1) [other options] (0)	962	0	1

Table A6.3.2 *continued*. Variable Definitions: Firms

Variable	No. of obs.	Min.	Max.
Enquête annuelle d'entreprise (EAE) 2004			
K: fixed assets in € 1000s	338	52	150 million
VA: value added (standard accounting definition) in €1000s	338	715	17.1 million
L: annual average of monthly employment level	338	20	107,725

Table A6.3.3. Variable Definitions: Employees

Variable		No. of obs.	Min.	Max.
Work pressure: employee feels they have to rush in their work - yes, always (1) / never, occasionally, or often (0)		2695	0	1
Education Default: no qualification	Pre-high school qualifications	2695	0	1
	High school Diploma	2695	0	1
	2 years higher education	2695	0	1
	3-4 years higher education	2695	0	1
	5 years higher education or more	2695	0	1
Occupational group Default: blue collar workers	Clerical	2604	0	1
	Technicians/Associate professionals	2604	0	1
	Managers/professionals	2604	0	1
	Other categories	2695	0	1
Does some manual work: yes (1) / no (0)		2695	0	1
Part time: yes (1) / no (0)		2695	0	1
Autonomy at work : employee usually deals with incidents without help (1) / without help only in certain well-defined cases that are known in advance, or usually with help (0)		2621	0	1
No. Types of Financial motivation: No. of factors that motivate employee from list including (factors in next variable and) pay and promotion prospects – neither (0) / one (1) / two (2)		2695	0	2
No. Other types of motivation: No. of factors that motivate employee from list including (factors in previous variable and) fear of losing job; satisfaction from a job well done; loyalty to company goals; hope to gain or keep boss's respect; hope to gain or keep colleagues' respect; overcoming challenges; and wish to make customers happy – none (0) / 1(1) / 2 (2) / 3 (3) / 4 (4) / 5 or more (5).		2695	0	5
Feel the value of their work is recognised yes (1) / no (0)		2695	0	1
No industrial action in last three years in the estab. (1) / some (0)		2695	0	1
Took part in industrial action or other form of collective action (eg, petition, rallye) in last three years yes (1) / no (0)		2695	0	1
Fears being made redundant within the next 12 months yes (1)/ no(0)		2695	0	1
Hopes for raise or promotion in the next 12 months yes (1) / no (0)		2695	0	1
Feels management consults to resolve conflicts: when there are difficulties or tensions in the company, management consults employees or their representatives to find common solutions (1) / decide what they think is best, or don't act (0)		2595	0	1
Assessment of IR climate: tense or rather tense (1) / calm or rather calm (0)		2695	0	1

IR climate deteriorating compared with three years ago (1) / (0)	2695	0	1
Log age of employee	2685	2.890	4.158
Log length of service	2676	0	3.738
No. of weekly hours worked: normal No. of hours worked weekly	2616	1	99
Team work employee does part of their work in a team yes (1) / no (0)	2589	0	1
No. of factors limiting dedication: No. of positive answers ("yes, definitely" as opposed to "yes, somewhat; not really; or not at all") to question asking whether a list of factors make it harder for the employee to be dedicated to their work. List includes: job insecurity; low pay; lack of autonomy; working conditions; lack of recognition; deadlines are too tight; lack of training; workplace atmosphere; and no allowances made for personal or family constraints.	2695	0	8

Table A6.3.4 Means of Firm Variables over Employee Sample (2004)

Logsize of firm	5.106
Firm has global market	0.404
Quality circles	0.634
Shopfloor meetings	0.880
Intensity of communication	1.815
Intensity of information flows	2.333
Firm has only one establishment	0.417
Firm is member of a group	0.551
Works council	0.652
Union representative(s)	0.734
Profit-sharing	0.555
Employee share ownership	0.148
Individual raises for managers and professionals	0.761
Individual bonuses for managers + professionals	0.642
Collective bonuses for managers + professionals	0.592
Stock options for managers + professionals	0.064
Individual raises for non-managerial employees	0.788
Collective bonuses for non-managerial employees	0.589
Individual bonuses for non-managerial employees	0.449
Price competition	0.299

Table A6.3.5. Work Pressure Equation – Two-step probit and IV probit compared

Variable	**Two-step probit**		**IV probit**	
	Coefficient	**z**	**Coefficient**	**z**
Logsize	-0.031***	-45.79	-0.042***	-65.50
Global market	0.038***	30.61	0.009***	7.05
Quality circles	0.057***	46.47	0.055***	46.26
Shopfloor meetings	-0.075***	-43.76	-0.073***	-43.54
No. factors limiting dedication	0.159***	462.38	0.161***	455.09
Intensity of communication	0.031***	56.65	0.022***	38.03
Intensity of information on the firm's affairs	0.004***	8.15	0.020***	33.99
Mono-establishment	-0.067***	-60.81	-0.081***	-74.42
Group	0.116***	96.37	0.133***	111.76

Works council		-0.059***	-42.35	0.043***	17.99
Union representative(s)		0.019***	13.47	0.073***	44.02
Profit sharing		**-0.353*** **	**-34.60**	**-0.864*** **	**-54.17**
Employee share ownership		-0.110***	-69.01	-0.108***	-69.64
Company savings plan		-0.015***	-11.82	0.225***	48.28
Flexible posting		-0.066***	-58.09	-0.040***	-32.97
Individual raises for managers and professionals		-0.070***	-45.24	0.051***	18.35
Individual bonuses for managers and professionals		0.075***	56.34	0.041***	27.55
Collective bonuses for managers and professionals		-0.077***	-37.35	0.174***	34.28
Stock options for managers and professionals		-0.021***	-9.52	-0.022***	-10.15
Individual raises for non-managerial employees		0.008***	5.00	-0.005***	-3.50
Collective bonuses for non-managerial employees		0.071***	35.25	0.146***	61.20
Individual bonuses for non-managerial employees		-0.002**	-2.18	-0.002**	-2.15
Price competition		0.079***	69.33	0.089***	79.61
Education	Pre-high school qualifications	0.253***	187.37	0.204***	115.71
	High school Diploma	0.177***	97.87	0.140***	72.07
	2 years higher education	0.173***	95.63	0.126***	62.00
	3-4 years higher education	-0.095***	-37.36	-0.121***	-48.47
	5 years higher education or more	0.148***	56.76	0.127***	49.01
Occupational group	Clerical	-0.119***	-63.42	-0.150***	-80.35
	Technicians /Associate professionals	-0.037***	-22.01	-0.022***	-12.98
	Managers/professionals	0.085***	39.09	0.021***	8.69
	Other categories	0.066***	26.68	0.008***	3.22
Does some manual work		0.140***	107.45	0.132***	101.73
Part time		0.233***	115.55	0.220***	108.45
Autonomy at work		0.032***	28.74	0.025***	23.42
No. Types of Financial motivation		0.049***	46.74	0.060***	58.21
No. Other types of motivation		0.065***	164.13	0.065***	168.95
Feel their work is recognised		-0.190***	-150.24	-0.169***	-124.62
No industrial action		-0.011***	-7.62	-0.055***	-34.46
Took part in industrial action		-0.162***	-111.75	-0.189***	-131.36
Fears being made redundant		0.092***	61.04	0.137***	84.61
Hope of promotion		0.024***	13.98	-0.006***	-3.50
Feels management consults to resolve conflicts		-0.231***	-202.72	-0.235***	-209.02
Tense IR climate		0.148***	117.94	0.148***	120.02
IR climate worse than three years ago		0.038***	32.85	0.017***	14.32
Log age of employee		0.490***	171.39	0.500***	179.02
Log length of service		-0.088***	-122.34	-0.094***	-134.45
No. of weekly hours worked		0.009***	109.41	0.010***	128.19
Team work		0.145***	121.35	0.134***	109.76

***, **, * denote significant at the 1%, 5% and 10% levels respectively

7. Should governments encourage group incentive pay and financial participation?

Market capitalism is facing its greatest economic challenge since the 1930s Great Depression. The collapse of the vaunted system of modern finance has brought advanced economies to a precipice which seems to require major reforms in economic institutions to restore economic stability and prosperity. While it would be foolhardy to rule out the possibility that huge banks and financial institutions will regain control of global capitalism, the door is more open than in decades for reforms that can change the relation between finance and the real economy and between workers and their firms.

To what extent does the system of pay for performance and financial participation examined in this volume offer possible paths to reform? Should governments seek to encourage further development of pay for performance and employee financial participation in their firms? If so, what policies might they choose?

These are hard questions. Going from research findings, based largely on observational studies in which firms and workers choose the mode of compensation and financial participation rather than from controlled experiments, to recommendations for changes to encourage additional pay for performance is a giant step. Modern economic methodologies – identifying natural experiments from which to make inferences, finding instrumental variables to isolate exogenous variation in pay for performance and financial participation, and diverse econometric wizardry – can carry us just so far in reaching scientifically valid conclusions about how the economy works, much less in assessing how policy changes might affect future outcomes. It takes considerable chutzpah for researchers without line responsibility for enacting and implementing policies to make policy recommendations. At the same time, to research important economic issues and eschew drawing implications for policy is irresponsible and negligent. Research is supposed to help us not only understand how the economy works but how to make it work better for normal citizens.

There are two ways to make the jump from research to policy. The first is to assume that relevant decisions have to made "today" and to offer suggestions about what currently looks most promising, albeit with a wide band of confidence. The second is to assay existing knowledge and ask what further information would be needed to make a recommendation with great confidence and to gather that information. In what follows we try to balance the two by contrasting the case for policies to encourage greater adoption of pay for performance and the case for doing nothing. We then examine four potentially attractive policies and the assumptions about the world or new information that would make them worth trying.

Are policy interventions justifiable?

Economists often argue that justification for policy interventions should rest on evidence of imperfections in markets. But that criterion provides only rough guide to decisions in the real world. No markets operate with the simplicity and perfection of the textbooks. And no governments implements policies in the deal way that cures market imperfections as drawn up in the textbook. Almost every market has some imperfections. Until the crash of Wall Street many believed that the financial market was as perfect a market as could be found in modern capitalism: "Rational decision-making, transparency in transactions, a single goal of maximisation …", this belief motivated the deregulation of finance. On the other side, even if there is uniform agreement that a particular market is not working well, policy intervention may not improve matters because policies may work as or more imperfectly than the market. Putting aside what we

call market imperfections, the case for any policy is that it makes things work better along the dimensions that the society wants.[82]

The case for new policies to encourage group incentive pay and financial participation begins with the research finding that this type of schemes is often associated with better outcomes for firms and workers and almost never with worse outcomes. Studies using different methodologies, across different countries, some with better designs for isolating causal impacts from simple correlations, some with representative data sets, and so on, show that companies that use pay for performance do better (or no worse) than others, in terms of productivity and profits, and may also improve workers well being.[83] However, the estimated benefits vary. Many production function studies find 2-3% higher productivity in firms with group incentive pay or financial participation[84]. The new studies in this report found positive effects in France, and a 5-6% gain in Italian metal engineering. In nearly all cases, moreover, the effects seem to operate through positive channels lower turnover, greater commitment to the firm as opposed to speed-ups, and tend to raise job satisfaction. While the choice of the level and mode of performance-related pay presumably creates a selectivity problem that can exaggerate the effects of the policies on outcomes, there is no evidence that the problem is sufficiently large as to overturn the positive results found in study after study. There is, however, a wide dispersion of estimated effects among companies and in confidence bands around estimated coefficients, which suggests that what works in one setting will not work or not work as well in another. Consistent with the evidence the returns to these compensation systems are positive is the fact that an increasing proportion of firms adopt performance pay in recent decades. That they do this without government financial support indicates that this incentive schemes pass that usual "market test".

Just to be sure, the fact that an organisational form or mode of pay has positive effects in statistical studies and is growing in the economy does not itself justify policy interventions. Perhaps firms where the incentive scheme pays off most adopt it quickly, and the rate of adoption of other firms is ideal. Given the heterogeneity in firms and workers, we would expect that while pay for performance and financial participation is right for some firms and workers, it may be the wrong strategy for others. Finding that pay for performance or financial participation have positive outcomes on productivity and various measures of worker well-being may be necessary for considering any policy intervention, but it is hardly sufficient. A sufficient argument requires two additional points. The first is usually phrased in terms of market imperfections. For some reason, the public goods nature of compensation systems allows management to weigh pay at the top more highly in decision-making or to take excessive risks, than it should be for the long-run well being of shareholders, workers or consumers.

To the extent that some firms eschew pay for performance and financial participation through lack of knowledge or adherence to the *status quo* -- as behavioural economics studies find occurs throughout economic life, or for any other non-productivity related reason --, then moving them in a more productive direction can justify a policy to encourage greater incentive pay or financial participation, ranging from programs to educate firms about best practice techniques and how to implement them, to using tax breaks or subsidies to induce firms to undertake these initiatives or, even, to mandating programs.

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82 If society wants to encourage workers' cohesion, management-labour cooperation, employees say at their workplace, involvement in decisions, flexible labour costs, and improve job satisfaction, those goals would enter any policy evaluation of financial participation and group incentives.

83 Perotin's 2003 review showed positive or non-negative effects in studies covering 20 countries .

84 In France some of the findings vary between 6 and 9%.

But it may be that governments are the wrong agency for instituting policies. Business groups such as the US's "Employee Ownership Association" or the EU's European Federation of "Employee Share Ownership" may make better cases for spreading financial participation. Trade unions and employers federations may find collective bargaining a more efficacious way to press for changes in compensation and ownership. Unions have agreed to greater decentralised productivity bargaining in Europe, negotiate over the profit sharing schemes in France and Italy, and have a mixed record of supporting and opposing employee ownership and profit-sharing in the US depending on economic conditions.

Perhaps neither governments nor private groups can find a policy that in fact works. The penultimate criterion for policy intervention is that the intervention improves outcomes in the desired way. As the deregulation of finance in the US and elsewhere has shown with a vengeance, economists and policy-makers committed to standard models and theories can be utterly wrong in their assessments of what will improve outcomes. One needs "experimentation" in policy to find out what works and what doesn't work --- experimentation and more experimentation and …

The case against policy interventions rests on the wide variation among companies in the estimated impacts of pay for performance that suggests that some will lose from choosing those policies while others will gain. Moderate positive gains on average are not enough to justify the expense of implementing the changes and government subsidies. Schemes that give tax breaks to firms with performance for pay schemes will primarily benefit the firms and workers that already have them, or may induce firms to change the form of pay to gain tax advantages without changing how they actually operate, which would drain funds from the Treasury with no productivity gains. This is what allegedly happened in the UK from 1987 through 2000 when it gave tax breaks for profit related pay systems. Similarly, some analysts argue that US Employee Stock Ownership Plans have smaller impacts on productivity than many hoped they would because some firms adopt ESOPs solely for the tax breaks. There is an additional problem with these schemes. Almost all research on the distributional effects of performance pay, including the analysis of France in this volume, show that the beneficiaries tend to be the relatively well-off, which makes subsidies regressive. Having seen the effects of the untested *laissez-faire* changes in the rules governing banks on the global economy, it makes little sense to undertake any reforms without detailed simulations of what they may do to the economy under alternative economic scenarios based on econometric estimates of the magnitude of key parameters and extensive discussion with labour, management, and government decision-makers. The devil in policy innovations is always in the details, so even if some ideal policy intervention might work, actual interventions fail because actual policies are far from ideal.

Without going into the details, here are four possible policy interventions that might help economies increase the adoption of group incentive systems and worker financial participation in firms: (i) mandating such schemes for firms, (ii) removing the deduction of compensation expenses for firms that limit schemes to a small number of workers, (iii) tax breaks for firms that introduce schemes, (iv) best practice awards and prizes. Since the same nominal policies can work differently in different institutional settings, they often have to be tweaked or adjusted for local conditions.

Possible Policies to encourage group incentives and financial participation

As noted earlier in this volume, France has substantially raised the proportion of firms that share profits with workers by making profit sharing "mandatory" for medium sized and large firms.

Forcing firms to a profit-sharing scheme may seem overly draconian – a one size shoe to fit all firms – but in fact management and unions negotiate the specifics at the firm, and the state steps in only if the negotiations don't take place or don't reach a settlement. The states' stepping in with a regulated scheme has the advantage of providing explicit formula to compute workers' share of profits, which makes it easier for smaller firms to implement without having to work it out themselves but the cost of imposing the same formula on firms that may face different economic conditions. A large portion of large firms also adopt "voluntary" regulated profit-sharing schemes -- presumably because they offer a way of raising pay without having to pay payroll taxes. What works in France, however, may not work in countries with more decentralised decision-making. But there are other ways to spread profit sharing and ownership among firms.

One mechanism that the US has used to encourage firms to introduce socially desired modes of compensation is to allow the firm to "deduct compensation expenses" as a cost of business rather than as distributions of profit, only if the plans cover all workers in the firm proportionate to their wages or in some other fair way. By applying this rule to health insurance and pensions, the US has induced firms that might have given those benefits solely to management to offer them to all workers. But the US does not apply such a policy to firms granting stock options or other forms of ownership or bonuses beyond wages. Those forms of pay are deductible as a cost of business even when they are given solely to executives. A natural extension of policy would be to extend the rule that allows for deduction of expenses to those forms of compensation only if the benefit is available to all workers proportionate to their incomes. In fact, both the UK and France require subsidised schemes to be available to all employees on the same terms.

Studies that differentiate all employee stock programs from those limited to executives find that the former have greater benefits, as one would expect since they should motivate a larger number of persons.[85] This form of regulation would increase workers' stakes in their firm and limit executive abuse of options, bonuses, and ownership schemes, thus reducing inequality within firms as well as having productivity benefits. If shareholders chose to make the benefits less generous, as is likely given the large increase in expense, the likely decline in tax receipts might be modest.

The policy that has received most attention in seeking to spread financial participation and profit-sharing are special "tax breaks" for firms that introduce such benefits. As noted in the case against policy intervention, giving tax breaks to firms for undertaking this policy has potential drawbacks. Whether tax breaks are desirable or not depends critically on whether the tax breaks are given to all firms with the benefit, including those who adopted it before the program, on the elasticity of response of firms who have not introduced the desired programs to introduce them, as well as on the productivity gains from the programs. The numbers matter critically in any assessment of state assistance geared to financial participation.

If many firms already have profit-sharing or financial participation schemes, "bribing" them with tax breaks will simply enrich them without any economic benefits and makes the policy more costly than if few firms have the program or if the tax break goes solely to those that do not have the program. Giving tax breaks only to "marginal firms" that change policy penalises early adopters and creates the potential for firms to alter their ownership structure to gain the tax benefit. The extent to which authorities can limit such undesirable side effects will go a long way

[85] See Conyon and Freeman (2003), and Bryson and Freeman (2010).

in determining the cost effectiveness of a program. One possible solution is to make the tax breaks time sensitive: firms that change in a given time window get the advantages but others do not. Another is to require firms that take the tax break undergo some form of possibly subsidised training in ways to make the new compensation systems work.

It is better if the supply response of firms in shifting to financial participation or group incentive systems to tax breaks is large than if the supply responses were low. We do not know much about the elasticity of changing systems in response to tax breaks though governments have tried enough schemes to give some estimate of that parameter.

Estimates of productivity gains are generally moderate and, as noted, possibly biased upward, so that the gains in national productivity are more likely in the 1-2% range than in the 5-6% range. But it is possible that social gains are higher. Workers report greater job satisfaction from being paid with incentive pay and working with some financial participation in the firm. For lack of data over long periods of time, existing studies rarely examine long-term effects of programs on anything other than profitability or productivity or firm survival. There are no estimates of the possible monetary value of this sort of social gain.

Because firms, particularly small firms, often do not have much information about how to manage workers under group incentives or financial participation schemes, as larger firms do, a fruitful policy may be to give the government agency responsible for small and medium sized enterprises the responsibility of gathering information about what works and what does not, publicising best practices, and otherwise seeking ways to aid firms that choose to pay workers in these ways. Such a program could possibly use retired managers from firms that have succeeded with pay for performance systems as mentors to potential new adaptors. Indeed one possibility would be to combine tax breaks for a limited period with such information/training activities. Since we know little about the possible success of such efforts, the safest way to proceed would be with some experimental program.

Finally, another possible innovative way to encourage firms to experiment with more group pay for performance schemes and financial participation would be to offer prizes for firms that had the most successful innovations. Each year *Fortune Magazine* reports on the "best workplaces" in the US and there is a similar initiative on the "best places to work" around the world (www.greatplacetowork.com). These awards gain considerable attention. In the US the best workplaces have better financial performance and are far more likely to pay workers through incentive pay and with financial participation than other firms. Prizes and contests can be fruitful ways to encourage innovation at low cost.

On the operational side, trade unions may play an important role in accompanying some of these policies. While in some cases, particularly in the US, unions have been opposing employee ownership and profit-sharing, there is evidence that a wider participation of workers in the firm's decisional process as well as broad band plans where all workers are covered provide a more favourable environment for these policies to deploy their effects.

In sum, there are policies that could encourage the spread of group incentive pay and financial participation among firms that deserve consideration. Given what we know and do not know the best approach would seem to be to design experiments or pilot projects that might try several different ways to encourage the spread of group incentive pay and financial participation

schemes that seem to offer productivity advantages over other forms of organising and paying labour.

Can relating workers pay more to the performance of firms help economies adjust in the current crisis? In the Weitzman shared economy model, the reduction in fixed earnings associated with profit sharing pay would help preserve employment. To the extent that part of the crisis was due to the excessive concentration of incentives at the top of firms in finance and elsewhere that generated huge risk-taking and illegal and amoral decisions that spread toxic assets around the world, increasing normal employees share of performance-related and ownership might help prevent a restoration of the same incentives that contributed to the financial disaster. It is possible that policies that gave advantages to new firms in which workers had group incentives and financial participation might increase the rate of new firms forming, which would help in recovery. But while there is evidence that new firms in high-tech tend to use these modes of compensation, there is no evidence that policies to encourage the practice would in fact have the desired impact in job creation. Experimentation is the necessary path to a better understanding of how policies are likely to work in different institutional context and economic conditions.

Should governments encourage group incentive pay and financial participation? Going back to the two ways in which researchers can respond as researchers to such a question, our answer would be, a mild “yes” but by experimenting with some pilot schemes rather than spending large sums on untested policies.

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