

Zwysen, Wouter

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Performance pay across Europe: Drivers of the increase and the link with wage inequality

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European Trade Union Institute

Wouter Zwysen is a senior researcher at the European Trade Union Institute (ETUI) in Brussels, Belgium. Contact: wzwysen@etui.org

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Abstract

This paper shows that the use of performance pay schemes has risen substantially across Europe from fewer than one-fifth in 2000 up to one-third in 2015, using data from the European Working Conditions Survey and the Structure of Earnings Survey enriched with external contextual data. This increase has been partly driven by technological change and increased openness to trade, particularly through a rising use of bonuses or shares linked directly to firm performance. Institutional factors such as employment protection legislation and collective pay agreement coverage also play an important role. Performance pay may contribute to wage inequality through two channels: (a) workers receiving it generally already have higher earnings and work in high-skilled jobs; and (b) compared to other similar workers in similar positions, those receiving performance pay earn 7 to 9 per cent more. The increase in inequality is not a given, however, as the presence of strong employee representation is associated with a more equal distribution of these wage gains.

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Introduction

Wages increasingly contain variable components and performance pay is an important aspect of this. Linking wages to an indicator of performance can lead to an increase in wage inequality, with differences between otherwise similar workers depending on how their wages are set. Performance pay is distributed less equally than basic salaries, is generally less scrutinised and especially boosts wages at the top of the distribution – thereby potentially increasing inequality (Lemieux *et al.* 2009, Bryson *et al.* 2013b, Bryan and Bryson 2016, Kristal *et al.* 2020). These types of variable pay also tend to exacerbate existing inequalities such as gender pay gaps or migrant gaps.

It is important to look at this aspect of wages as rising wage inequality in high-income countries primarily reflects differences in pay setting between firms. These between-firm differences partly reflect productivity differences and the extent to which employers share rents (Crisuolo *et al.* 2020, Tomaskovic-Devey *et al.* 2020). Macro-economic and institutional factors lead to larger productivity differences between firms (Berlingieri *et al.* 2017). The use of variable pay components linking wages to some indication of performance, thereby linking wages more directly to the firm's performance, is an understudied factor in comprehending this trend. Of course, while performance pay can increase differences between employers it also serves to differentiate workers within the same firm and can thereby increase within-firm wage inequality.

In this paper, I use cross-national data to analyse performance pay across the European Union from the early 2000s and answer three main questions: (1) To what extent is variable pay used across Europe? (2) What macro-economic and institutional factors explain the differences between countries, industries and over time? And (3) do these payment types contribute to wage inequality? The literature on this in Europe is sparse and, to the best of my knowledge, this is the first paper directly linking macro-economic and institutional factors to this aspect of pay setting and then connecting this to the wider issue of wage inequality.

I highlight three main findings here. First, the share of workers receiving performance pay increased substantially between 2000 and 2015, by between 9 and 15 percentage points. This increase can be linked to large economic and institutional trends: performance pay was increasingly used in sectors and by workers more affected by technological change and international trade, as well as in countries with more regulated labour markets. These drivers

increase the benefits of tying workers to the firm using performance pay and incentivising them to increase productivity. Institutional factors, particularly a decline in the coverage of collective pay agreements, also contribute to the increasing use of performance pay.

Second, performance pay contributes to wage inequality in three ways. First, better-paid workers are more likely to receive performance pay. Second, there is a premium to performance pay of 7-9 per cent compared to similar workers who receive a fixed salary. Third, this premium is larger higher up the earnings distribution. In 2015 I estimate that the total wage inequality would have been 6 per cent smaller without the use of performance pay. Bonus payments in general – including but not restricted to performance pay – also made up a substantial part of the increase in earnings inequality from 2006 to 2014.

Third, employee representation and coverage by collective pay agreements temper the contribution of performance pay to earnings inequality. In firms where employee representation is present, performance pay is more equally divided and benefits all workers more equally. In these cases, performance pay is not as limited to higher earners and neither does the premium vary so much over the earnings distribution. The contribution to earnings inequality is substantially lower or even absent where worker representation is stronger.

1. Background and conceptual framework

1.1 What is performance pay

This paper focuses on variable components of pay that wholly or partially relate to some indicator of performance.¹ This can be related to individual performance by easily quantifiable measures such as piece-rates or commission or through performance reviews; to team-based performance; or directly to the performance of the firm through shares or bonuses. Variation between employers in the use of performance pay – due to their individual costs and benefits and the employers' ability to set up these systems – can be one way in which pay for otherwise similar workers increasingly differs between them. This is especially the case for types of performance pay that directly link wages to firm performance in the form of bonuses or through employees receiving some part of their pay in the form of shares (Crisuolo *et al.* 2020, Tomaskovic-Devey *et al.* 2020). These types of performance pay – particularly the more individual ones – also play a role in widening wage inequality within firms.

Employers will offer variable pay schemes where wages depend on performance if the expected efficiency benefits of this system outweigh the costs (Lemieux *et al.* 2009). Understanding how the use of performance pay changes over time and its role in wage inequality then depends on the way in which this cost-benefit analysis changes. They can also often serve to tie workers more closely to the firm (Bryson *et al.* 2013a, Eurofound 2016). This follows a gift-exchange logic in which workers feel a sense of ownership and loyalty (Bryson and Freeman 2019).

Performance pay can have two main benefits. First, it is assumed to incentivise worker effort and ensure they act in line with the employer's goals, and thereby increase productivity (Lazear 2000, Bradler *et al.* 2019). This is especially important where it is difficult to measure effort such as when tasks are complex or when more discretion on the part of the worker is required (Bryson *et al.* 2014, Prendergast 2015). In that case, performance pay is used as a way to align the worker's goals with those of the firm and reduce shirking. It is also more important if the return on extra effort is higher, for instance

1. There are other aspects of pay beyond base pay which are of interest such as deferred pay (e.g. pension savings), healthcare or in-kind benefits (Kristal 2017). These are outside the scope of this paper, however.

because of complementarities or with very able workers (Lemieux *et al.* 2009, Bryan and Bryson 2016).

Performance pay can also increase the flexibility in pay within a firm (Stokes *et al.* 2017). It can be a way for firms to differentiate more and reward certain workers (Eurofound 2016, Kristal 2017, Kristal *et al.* 2020). This added flexibility will be more important where wages and employment are otherwise rather rigidly set.

However, monitoring performance and paying these bonuses is costly – more so if jobs are more complex and difficult to monitor. Importantly, where jobs consist of different tasks and these are not all as easy to monitor, incentive pay may lead to some tasks being neglected at the cost of others (Holmstrom and Milgrom 1991). In general, more productive firms would be more able to pay some of these costly bonuses and thereby further increase their productivity, resulting in larger differences in earnings between firms (Card *et al.* 2013). Relatedly, these schemes can increase wage disparity within the firm which can lead to resentment and reduce social cohesion within the team. This is one of the reasons why trade unions may warn against possible arbitrary decisions on performance and the potential for growing wage inequality (Eurofound 2016).

Finally, even when firms offer performance pay schemes, there are differences between workers in whether they accept these (Lazear 2000, Lemieux *et al.* 2009, Bryson *et al.* 2013c). More risk averse workers are less likely to rely on this type of payment and would prefer fixed pay (Cornelissen *et al.* 2011). Usually the employer also needs to offer higher base pay in compensation for this risk.

The prevalence of performance pay varies strongly between countries and over time, with estimates ranging from 10 to 15 per cent of workers in southern Europe and the UK to around 30 per cent in Germany and 40 per cent or more in the US and the Nordic countries (see e.g. Manning and Saidi 2010; Bryson *et al.* 2013b; Sommerfeld 2013; Bryan and Bryson 2015; Gittleman and Pierce 2015).

In line with the framework above, performance pay is more likely for more productive and skilled workers – those with higher-skilled occupations, the more highly educated and those doing complex and less routine tasks (Lemieux *et al.* 2009, Barth *et al.* 2012, Bryson *et al.* 2013b, Gittleman and Pierce 2015). It is also more likely in larger firms and those with higher pay where monitoring can more easily be covered through existing and dedicated HR systems (Bryson *et al.* 2013b, Bryan and Bryson 2016, Bryson *et al.* 2018). There is further variation by work arrangement, with those on non-standard contracts and with lower tenure less likely to receive performance pay (Bryson *et al.* 2013b) indicating that performance pay is used as a reward and to tie workers to a firm.

1.2 Performance pay and wage inequality

Performance pay is likely to contribute to wage inequality. The seminal work by Lemieux *et al.* (2009) links increasing wage inequality directly to the increased use of performance pay. They show that 21 per cent of the rise in male income inequality was due to the increasing use of performance pay, although later estimates put this at around 9 per cent (Gittleman and Pierce 2013). In their UK study, Bryson *et al.* (2018) estimate that around one-third of the variance in wages can be attributed to performance pay; while Bryan and Bryson (2016) find that it contributes mainly to wage inequality at the top of the distribution. Barth *et al.* (2012) estimate a more modest effect in Norway – where wage inequality within firms would be 4 per cent higher in the absence of performance pay and even 10 per cent where the effects of performance pay are not tempered by trade unions. A German study shows that wage inequality has increased in Germany, as has performance pay, but the rise is actually mainly in non-performance pay jobs (Sommerfeld 2013).

Performance pay leads to an increase in wage inequality through the following main mechanisms. First, the more productive and better performing workers will be more likely to choose to be on performance pay as they will then earn more – the presence of a sorting effect. Second, the wages of workers on performance pay are generally higher than those of otherwise similar workers – indicating a performance pay premium. Besides the sorting effect, this premium reflects a closer link between workers' productivity and their wages as well as financial compensation for the uncertainty of this form of pay (Lazear 2000, Lemieux *et al.* 2009, Cornelissen *et al.* 2011). The size of the premium differs between studies and countries, ranging between 9 per cent and 17 per cent on average when accounting for observed characteristics and at between 2 and 5 per cent when accounting for the sorting effect (Lemieux *et al.* 2009, Manning and Saidi 2010, Barth *et al.* 2012, Gittleman and Pierce 2013, Bryan and Bryson 2016). The premium is higher at the top of the wage distribution – meaning that those workers who are already on higher earnings benefit the most from these extra bonuses and payments (Hanley 2011).

Rising wage inequality is not a necessary price to pay for higher productivity as shown by findings that the benefits are shared more equally in firms with stronger worker representation (Barth *et al.* 2012). While several studies have documented a link between firm productivity and the introduction of performance pay as well as an increase in firm profitability (Lazear 2000, Gielen *et al.* 2010), this higher productivity seems to be present both for workers on performance pay schemes and those who are not, even though the wage increase benefits only those on performance pay (Franceschelli *et al.* 2010). The productivity boosting effect would mainly hold for individual performance pay, however, rather than the more collective measures.

1.3 Has performance pay increased over time?

Over time, workers' pay may have become increasingly linked to their own performance and/or firm performance. Previous studies have found an important increase in prevalence in the US from the 70s to the 90s (Lemieux *et al.* 2009). This was later contested as the use of performance pay may thereafter have stabilised and even decreased (Gittleman and Pierce 2015). Performance pay was increasingly used at the end of the 90s and early 2000s in the UK (Manning and Saidi 2010) and from the 80s up to 2009 in Germany (Sommerfeld 2013). Importantly, there has also been a shift in the recipients of performance pay. Where it was initially widespread among lower-paid workers, for instance in retail, it has become increasingly accorded to higher earners (Gittleman and Pierce 2013).

This paper links this increase to the large macro-economic and institutional factors affecting wage inequality overall.

Technological change can make performance pay more attractive by simultaneously increasing the benefits of incentivising effort and reducing monitoring costs. Digitalisation increases the relative demand for high-skilled workers, outstripping supply and – through complementarities – the productivity of these workers (Autor *et al.* 2003, Michaels *et al.* 2013). Firms would then not only be more eager to attract high-skilled workers through attractive packages – including different variable pay components – but also benefit more from incentivising their workers (Lemieux *et al.* 2009). On the cost side, new technologies ease the effort of monitoring workers' outputs,² making incentive pay more viable (Lemieux *et al.* 2009).

The opening up of trade similarly increases the benefits of paying for performance through increasing the stakes for firms and through increased need for delegation in the face of uncertainty (Barth *et al.* 2008). If lower-skilled workers are increasingly outsourced, the relative demand for higher-skilled workers increases, making it more important for firms to attract and retain those workers whose productivity is complemented by cheaper imports. They can do this by providing them with performance pay or by sharing the larger rents with those workers (Bryan and Bryson 2016). Higher openness to trade indeed strengthens the link between firm productivity and worker pay (Davidson *et al.* 2014, Helpman *et al.* 2017).

Trade unions and worker representation could affect performance pay in two counteracting ways. On the one hand, worker representation at firm level can reduce the costs of monitoring performance – since the union has a better view on each worker's efforts – and it can push for profit-sharing by the firm, thereby increasing performance pay (Barth *et al.* 2012). On the other hand, where unions are able to bargain on wages they tend to compress

2. However, technological change may also make it easier to monitor work inputs, for instance by logging actions at work throughout the day, which would make shirking more difficult – thereby removing the need for performance pay.

wage variability and oppose individual premiums that increase overall wage inequality, especially if they are based on potentially subjective measures (Eurofound 2019). While it is thus not completely clear whether performance pay itself is more likely with a strong union, they are likely to change the type of performance pay, reducing the role of individual performance pay in favour of team or firm-wide incentives (Barth *et al.* 2012). There is also likely to be a difference between union strength at sectoral and national level which could, depending on the level at which bargaining occurs, be more averse to performance pay; while local worker representation may also push for rent sharing in the firm. The literature generally finds performance pay to be less likely for unionised workers and in establishments with central rather than individual wage bargaining (Barth *et al.* 2008, Gittleman and Pierce 2015).

Finally, the regulation of employment and wages can affect performance pay. If firms have more autonomy in how they set wages – meaning collective agreements are less centralised – there will be greater variation in the use of performance pay. Second, the extent to which it is easier or harder to fire workers (employment protection legislation) affects employers' needs for flexibility. Variable pay will be more in use where it is more difficult to hire and fire workers as it can then provide wage cost flexibility in terms of adapting to the business cycle (Bryson *et al.* 2014). There is also variation between countries in legal requirements; in France, for instance, large firms are required to relate pay to firm performance.

2. Data and methods

This paper mainly uses the European Working Conditions Survey (EWCS) from 2000 to 2015. This is a repeated cross-national survey of the workforce carried out every five years. The sample is restricted to employees aged 18-64 with no missing values on important variables.

Table 1 Different salary components and performance pay over time

Earnings from main job include:	2000/2001	2005	2010	2015
Basic fixed salary/wage	93.0%	96.2%	96.5%	96.3%
Piece-rate or productivity payments (1)	10.6%	11.7%	11.6%	10.0%
Payments based on individual performance				16.6%
Payments based on performance of team/ working group/department	2.5%	4.7%		9.9%
Payments based on overall performance of company where you work	6.4%	8.8%	12.8%	14.1%
Income from shares in the company you work for	1.1%	2.0%	2.9%	4.1%
Aggregated to performance pay				
Individual performance pay (2)	10.6%	11.7%	11.6%	22.9%
Only piece-rate pay	2.7%	1.9%	1.5%	1.6%
Individual performance bonus	7.9%	9.8%	10.1%	21.3%
Financial participation	7.0%	9.7%	13.6%	15.3%
Any performance pay (1)	17.4%	20.5%	22.3%	26.2%
Any performance pay (2)	17.4%	20.5%	22.3%	32.6%

Note: weighted average (cross-national weights) from EU-28 countries excepting Croatia. (1) individual performance pay is only based on piece-rate or productivity payments; (2) in 2015 individual performance pay includes either piece-rate or productivity payments or payments based on individual performance. Financial participation combines receiving payments based on the overall performance of the company or receiving income from shares.

Source: EWCS 2000-2015

The main variable of interest is whether a worker receives variable pay linked to performance. By combining questions on whether earnings include certain types of payments,³ five dummy variables are created:

3. One limitation of this data is that workers are asked whether their earnings include any of these types. This means that people who could receive variable pay but who did not in the period of the survey – for instance because their performance was not good enough – are

- piece-rate pay for workers who do not receive a fixed salary but receive all pay based on their own performance;
- individual performance pay⁴ for workers who receive a bonus linked to their own performance;
- team performance pay⁵ if pay partly depends on team performance;
- financial participation schemes⁶ for workers whose bonuses depend on firm performance or who receive part of their salary as shares; and
- any performance pay for receiving at least one type.

Table 1 shows the individual questions used and the shares of workers covered by them in the EU-28 over time, as well as the aggregate indices. For individual performance pay I combine two questions: the variable on whether earnings contain some variable element linked to productivity such as piece-rates; and whether the worker receives pay dependent on individual performance. As the latter was only asked in 2015, its inclusion may exaggerate the increase somewhat but, even when omitting this variable, there is a clear change from around 17 per cent of workers receiving any type of performance pay in 2000/2001 to 26 per cent receiving it in 2015. Throughout the analyses I use the second version of any performance pay and individual performance pay – thus encompassing the 2015 question.

2.1 Analysing who receives performance pay

The first question in the analysis deals with the probability of receiving these types of performance pay. Which workers receive performance pay? How does this probability vary over time? Is it affected by macro-economic and institutional changes? This is done through multilevel models where observations are nested in country-industry-time groups, as shown in equations 1a and 1b. The outcome is the receipt of performance pay for worker

excluded. This could mean that an association of performance pay with earnings is over-estimated, since only those cases where performance met certain standards were included. On the other hand, the use of performance pay is then likely an under-estimation.

4. Piece-rate pay and individual performance pay are defined based on three questions in the EWCS. First: ‘do the earnings in your main job include a basic fixed salary or wage?’ – asked in all waves. Second, ‘do the earnings from your main job include: piece-rate or productivity payments’ – asked in all waves; and third: ‘do the earnings from your main job include payments based on individual performance’ – asked only in 2015. Workers who responded yes to either of the last two questions were classified as receiving individual performance pay; and then classified as either piece-rate or individual performance pay workers depending on their receipt of a fixed salary. This means that the definition in 2015 was wider than in the other years. In 2015 the correlation between the two questions was 0.2.
5. Respondents are asked if their earnings from their main job include payments based on the performance of their team/working group/department. This question was not asked in 2010 and so I multiply impute it using chained imputation with five imputations based on education, country, wave, sector, gender, age, migrant status, family situation, occupational level, job quality, tasks carried out at work, hours of work, type of contract, use of PCs or machines, earnings quartile and the receipt of other types of payment.
6. This is based on two questions asked in all four waves: do the earnings from your main job include: payments based on the overall performance of the company where you work?; and do the earnings from your main job include income from shares in the company you work for?

‘i’ in industry ‘j’, country ‘c’ and year ‘t’, regressed on individual (x) and work-related (O) characteristics; a year trend to capture changes over time that affect all countries and industries; a random normally distributed error term (ζ_{cjt}) which varies by country-year-industry groups; and a ‘white noise’ error term. The next model (equation 1b) then separately adds contextual factors for technological change (Techn); trade openness (Trade); worker representation (Represent); collective pay agreements (CPA); and employment protection legislation (EPL).

All analyses are weighted using a combination of design weights and post-stratification weights and account for population differences between countries so that they are cross-nationally comparable. As a robustness test, this analysis is repeated using fixed effects to control for industry, country and year trends.

$$\text{Eq1a: } PP_{i,cjt} = \alpha + \beta * X_{i,cjt} + \gamma * O_{i,cjt} + \text{Wave}_t + \zeta_{cjt} + \varepsilon_{i,cjt}$$

$$\text{Eq1b: } PP_{i,cjt} = \alpha + \beta * X_{i,cjt} + \gamma * O_{i,cjt} + \text{Wave}_t + \theta_1 * \text{Techn}_{icjt} + \theta_2 * \text{Trade}_{cjt} + \theta_3 * \text{Represent}_{icjt} + \theta_4 * \text{CPA}_{cjt} + \theta_5 * \text{EPL}_{ct} + \zeta_{cjt} + \varepsilon_{i,cjt}$$

2.1.1 Variables in the EWCS and external data

The demographic and work-related controls are taken from the EWCS. I include demographic controls for gender, age, migrant status,⁷ whether the worker has any dependent children in the household and whether they are cohabiting, as these can all influence labour market position. I further include the highest obtained qualification as an indicator for the worker’s level of skill: lower secondary or less; upper secondary or post-secondary non-tertiary; or tertiary.⁸ As the receipt of performance pay should vary by the work carried out, I include occupational skill level in three categories,⁹ as well as information on the tasks. Routineness is measured by doing short repetitive tasks, monotonous tasks and whether and how often work has to be interrupted for an unforeseen problem. Abstraction is measured by whether the job includes complex tasks, learning new things and assessing the quality of your own work. Finally the extent to which work is manual: carrying/moving heavy loads; tiring or painful positions; and repetitive hand or arm

-
7. This question varies over the waves. In 2000/2001 it was defined as having a different nationality; in 2005 and 2015 it was defined as a different country of birth; and in 2010 it was defined as both you and your parents being born elsewhere.
 8. Information on the highest level of qualification was missing in 2000. I therefore impute it using chained imputation with five imputations based on country, wave, sector, gender, age, migrant status, family situation, occupational level, job quality, tasks carried out at work, hours of work, type of contract, use of PCs or machines, earnings quartile and receipt of other types of payment.
 9. Following the ILO classification, managerial, professional, technicians and associate professionals are classified as high-skilled; clerical support workers, service and sales workers, skilled agricultural, forestry and fishery workers, craft and related trades workers, plant and machine operators and assemblers are classified as middle-skilled; and elementary occupations as low-skilled.

movements (Autor *et al.* 2003). I further include firm size;¹⁰ the hours usually worked recoded into 32 hours or fewer, 33 to 47 hours or 48 hours or more; and whether they work on a temporary contract.

These variables account for important aspects of the worker's earning potential and the type of job they carry out. I expect performance pay to be received more by workers on more standard contracts as a way of binding them to the firm. As this is cross-sectional data I cannot include person-specific characteristics that are not observed but that have been shown to play an important role in earnings and in receiving performance pay, such as individual motivation and effort (e.g. Lemieux *et al.* 2009). Ideally firm differences in pay would be accounted for, as performance pay is generally used more in higher-paying firms, but this is not available in this dataset (Bryson *et al.* 2018).

The drivers are measured by a combination of survey questions from the EWCS and external data matched at sector,¹¹ country and year level.

The EWCS includes three questions that can capture the use of technology, recoded to two variables ranging from 0 'never' to 1 'all the time': whether the main paid job involves working with computers (7 categories);¹² and whether workers are exposed to machines either because they are exposed to vibrations from tools (7 categories) or because the pace of work depends on machines (yes or no) (Menon *et al.* 2019). Besides using individual scores, I also calculate the average among other workers in similar jobs – the same industry, to 1 digit occupational level, country and year. I further include three indicators to capture digitalisation based on an OECD taxonomy paper (Calvino *et al.* 2018). First, a measure of investment in ICT equipment (computer hardware and telecommunications equipment) and in software and databases, both as a share of non-residential gross fixed capital formation.¹³ Second, the purchase of ICT intermediates as a share of total sectoral output – the share of computer services (the services offered by the sector 'computer and related activities') and the share of intermediate computer goods (produced by the 'computer and electronics' sector).¹⁴ Finally I include an indicator of the digital-related

10. Single person firms; micro-firms (2-9 employees); small firms (10-49 employees); medium-sized firms (50-249 employees); and large firms (250+ employees).

11. Agriculture, hunting, forestry and fisheries; mining and quarrying; manufacturing; electricity, gas and water supply; construction; wholesale and retail trade and repairs; hotels and restaurants; transportation and communications; financial intermediation; real estate and business activities; public administration; other services.

12. From 2000 to 2010 they asked whether the main paid job involves working with computers (PCs, network, mainframes). In 2015, this was revised to: 'does the main paid job involve working with computers, laptops, smartphones,?'. The correlation between receiving any type of performance pay (strictly defined) and PC use was comparable in 2010 (0.12) and 2015 (0.10). The incidence of the variable grows from 37.6 per cent in 2005 to 41.3 per cent in 2010 and 46.1 per cent in 2015.

13. The data is taken from national accounts on oecd.stat, by sector (ISIC4); and augmented with data from euklems where missing. It is available at the country-industry-year level.

14. This data is taken from the OECD inter-country input-output database and national input-output tables.

human capital in a sector, measured by its proportion of IT workers,¹⁵ taken from the Labour Force Survey. Each indicator is the average of its components and is standardised and then combined into one score.

Trade is measured through trade openness – imports plus exports over value added in a country-industry – as well as by the direction of trade, including the share of imports in total trade (imports plus exports). Trade data is taken from the OECD Trade in Value Added datasets.¹⁶

The EWCS includes a question on worker representation in the workplace which varies over time. In 2000/2001 and 2005, workers were asked if they discussed their work organisations or work-related issues with a worker representative; in 2010 they were also asked whether there was a worker representative in the company; and in 2015 they were asked whether a trade union, works council or similar organisation was present at work.¹⁷ I redo the analyses for 2010 and 2015 to check robustness – showing similar results as in the pooled analysis. As with digitalisation, I also calculate the average among other workers in similar jobs – the same industry, to one digit occupational level, country and year. I capture union density rates by country, sector and year from the database on Institutional Characteristics of Trade Unions, Wage Setting, State Intervention and Social Pacts (ICTWSS version 6.1).

I use the Structure of Earnings Survey in 2002, 2006, 2010 and 2014 to calculate the share of workers who are covered by a national collective pay agreement, a sectoral agreement, a firm-level agreement, another type of collective pay agreement or are not covered by any agreement (see e.g. OECD 2018).¹⁸

Finally I include data on the employment protection legislation index for workers on regular contracts which captures regulations on dismissals of workers (OECD 2020). The index is based on statutory laws, collective bargaining agreements, case law and expert opinions. The higher the index,

15. IT specialists are in four occupational codes: managers in IT; software developers and analysts; database and network specialists; technicians in ICT and user support (ISCO-08 133, 251, 252, 351; and ISCO-88 213 and 312).

16. TiVa at ISIC3 from December 2016; and Trade in Value Added Principal indicators (December 2018) at ISIC4. Imports, exports and value added per industry-country-year were linked to EWCS at industry level (12 categories).

17. The question based on whether any issues were discussed with worker representatives under-estimates the presence of representation as it only includes those who had an issue. In 2010, that question correlates at 0.25 with the question on the presence of a worker representative. The questions in 2010 and 2015 are very similar. As a test I regressed worker representation in 2010 on individual and work-related characteristics; and then used those coefficients to predict the values in 2015. The correlation between the predicted scores and actual representation was around 0.5 in 2010 and in 2015.

18. I restrict the SES sample to full-time workers aged 20-59 with non-missing information on occupation, firm, collective pay agreement and sector. The sample is weighted and representative of all workers in firms with 10 or more employees. These weighted shares are matched to the EWCS: SES 2002 to EWCS 2000; SES wave 2006 to EWCS 2005; SES 2010 to EWCS 2010; and SES 2014 to EWCS 2015.

the more regulated and difficult it is to fire workers which introduces more rigidity in the labour market. These indices vary only at country-year level.

These drivers do not all change in line with each other over time. Table A1 in the Appendix¹⁹ shows the unweighted average and standard deviation of the different drivers at country-sector-year level as well as the change from 2000/2001 to 2015 and how the size of that change relates to the overall variation in the variable. From this it becomes clear that average machine exposure and trade intensity do not vary much over time and neither do the collective pay agreement coverage rates. PC use increased the most over time, followed by union density and representation and then digitalisation.

2.1.2 Structure of Earnings Survey

Besides the EWCS I also use the Structure of Earnings Survey – a large cross-national European survey carried out every four years from 2002. This surveys enterprises with at least 10 employees, excluding agriculture and the public sector, who provide information on a sample of workers within the enterprise. The SES contains detailed data on earnings as well as a variable on all periodic, irregular, ad hoc and exceptional bonuses and other payments that do not feature in every period and also has more detailed sectoral information than the EWCS. The bonus data includes productivity bonuses and profit-sharing premiums but is much broader as it also includes Christmas bonuses, allowances for leave, 13th or 14th month payments, etc.²⁰ The SES includes fewer individual variables: highest qualification; age [in categories]; gender; as well as three skill groups based on occupation, full-time work and hours worked per week as well as weeks worked per year. Industry is aggregated to 19 groups based on the ISIC3 and ISIC4 2-digit categorisations.²¹ I use the SES as a robustness test to analyse the determinants of receiving any bonus, using a similar model as in equations 1a and 1b.

19. Appendix documents are available on www.etui.org/publications

20. In 2002 eight countries (ESP, FIN, FRA, ITA, LUX, PRT, ROU, SVK) included questions on the type of bonuses received with three types: regular or recurring bonuses; bonuses related to productivity; or bonuses related to profit. The largest part of the bonuses, by far, was made up of regular bonuses. This was more than 85 per cent in Spain, Portugal, Romania and Slovakia; 60-70 per cent in Luxembourg and Finland; and one-third in France. The share of productivity bonuses ranged from 12 per cent to 35 per cent while profit bonuses were lower, between 2 per cent and 24 per cent. Bonuses in the SES are much wider than performance pay as defined using the EWCS.

21. Food products, beverages and tobacco; textiles, textile products, leather; wood, paper, pulp, printing; chemical, rubber, plastics, fuel, other; basic metals and fabricated metal products; machinery and equipment; transport equipment; manufacture n.e.c; electricity, gas, water supply; construction; wholesale and retail trade and repairs; hotels and restaurants; transportation, storage and communications; financial intermediation; real estate, renting and business activities; education; health and social work; other community, social and personal services; public administration and defence, and mandatory social security.

2.2 Analysing the contribution to wage inequality

The second question is how performance pay contributes to wage inequality. First, I analyse whether performance pay differs over the earnings distribution as shown in equation 2. I include the same demographic and work-related control variables as well as fixed effects for country, sector and wave, adding a variable on country-specific quartiles of earnings (Earn_group). The EWCS includes categorical questions on net monthly earnings in 2000/2001 and 2005, and more detailed amounts in 2010 and 2015.

$$\text{Eq2: } PP_{i,cjt} = \alpha + \delta * \text{Earn_group}_{i,cjt} + \beta * X_{i,cjt} + \gamma * O_{i,cjt} + \text{Country}_c + \text{Industry}_j + \text{Wave}_t + \varepsilon_{i,cjt}$$

In the 2015 wave of the EWCS, net monthly earnings are available, allowing for an analysis of the performance pay premium – the extent to which receiving a type of performance pay results in higher earnings. As shown in equation 3, the log of monthly earnings is regressed on performance pay indicators, including the same controls as in equation 1. Each performance pay indicator is introduced separately. I then use quantile regression to model the 10th and 90th percentiles of earnings conditional on all controls of equation 3 and compute the difference between the two conditional percentiles to estimate whether performance pay widens inequality, measured as the interdecile ratio in pay.

$$\text{Eq3: } \text{Ln(earnings)}_{i,cj} = \alpha + \delta * PP_{i,cj} + \beta * X_{i,cj} + \gamma * O_{i,cj} + \text{Country}_c + \text{Industry}_j + \varepsilon_{i,cj}$$

Finally I connect the information on whether performance pay is more prevalent higher up the wage distribution and whether there is a premium to receiving this type of pay to calculate the contribution to wage inequality. I do this for the last wave of the EWCS (2015) and the SES (2014) following work by Lemieux *et al.* (2009). This method consists of comparing actual wage inequality with a counterfactual wage distribution in which there is no performance pay. This counterfactual distribution is estimated by taking the wage distribution for all workers who do not receive performance pay and weighting this by a function of the probability of receiving performance pay. Following Lemieux *et al.* (2009) the weighting factor is $\text{Pr}(PP=0) / \text{Pr}(PP=0 | X)$, with $\text{pr}(PP=0)$ being the probability of not receiving performance pay. The conditional probability is obtained by running a logit regression of not receiving performance pay on all predictors, including industry fixed effects. The impact of performance pay is then the difference in inequality (measured through percentile ratios and the variance) in the population as a whole, with the counterfactual one consisting only of people who do not receive performance pay, weighted to account for their selection. This is done separately per wave and country. The intuition is that a worker who, given their characteristics, would be likely to receive performance pay is given a higher weight so that the distribution of workers without performance pay is made to be similar to the whole population.

3. Results

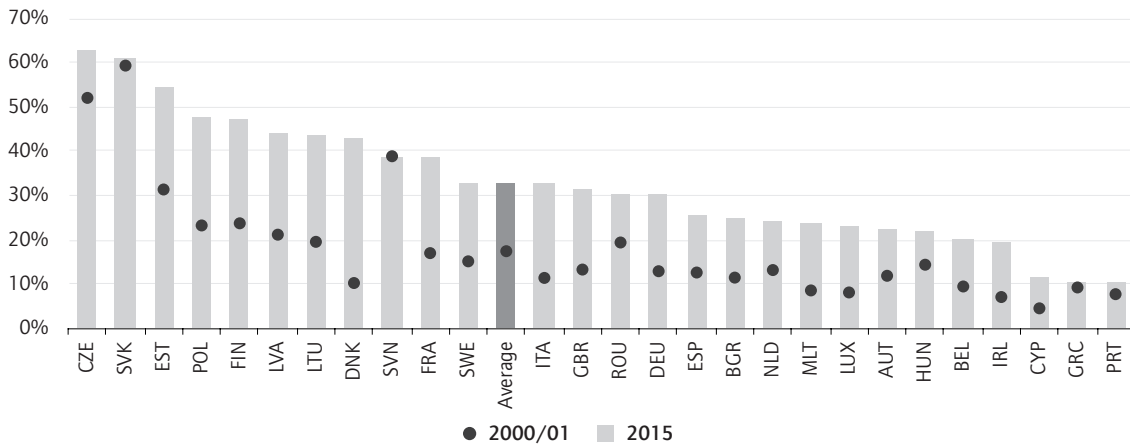
3.1 Prevalence of performance pay

Descriptive statistics of the main variables are shown in Table A2 in the Appendix, cross-tabulations of performance pay over different categories in Table A3 and the correlation of performance pay with continuous variables in Table A4. The share of performance pay increases substantially over time. On average, over all workers from 2000 to 2015, 28 per cent of men and 19 per cent of women receive performance pay. It is less likely for workers on temporary contracts, those working short hours and having low qualifications or working in low-skill occupations. The probability of receiving performance pay increases with firm size. There are also substantial differences between sectors: performance pay is lowest in public administration, other services, and hotels and restaurants; and highest in financial services, mining and quarrying, and utilities. The probability of receiving performance pay is highest for those with representation at work, those more intensively using PCs and machines, and higher earners. This is in line with previous findings and theoretical expectations that performance pay is more likely for higher-skilled workers and those on standard contracts. These workers are, as a result, tied more to the firm, possibly exacerbating differences with non-standard workers.

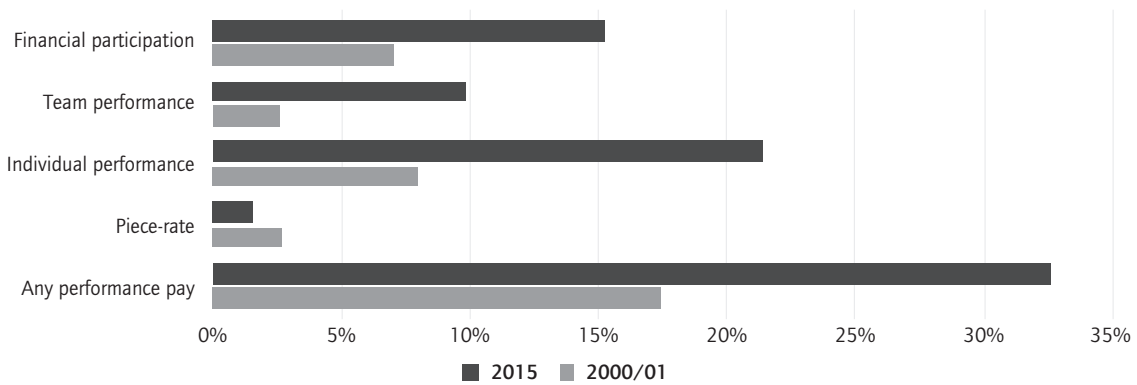
The share of workers receiving performance pay almost doubled from 2000 to 2015, as shown in Figure 1. While 18 per cent of European workers received some form of performance pay in 2000, this was the case for one-third of workers in 2015. Despite substantial variation between countries, pay is increasingly linked to performance in all countries except for Slovenia and Greece where it remained constant, as shown in panel 1 of Figure 1. It is highest in central and northern Europe (e.g. Czechia, Slovakia, Estonia, Poland, Finland, Denmark) and somewhat lower in southern countries (Cyprus, Portugal, Greece). This pattern of variation between countries, as well as the large increase over time, is in line with most of the literature (Lemieux *et al.* 2009, Manning and Saidi 2010, Bryson *et al.* 2013b, Sommerfeld 2013, Bryson *et al.* 2018).

Figure 1 Performance pay becomes increasingly prevalent over time

Panel 1: Prevalence of performance pay across countries



Panel 2: Prevalence by type



Note: Figure 1 (above) shows the share of any type of performance pay over time by country; and (below) the weighted average across all countries over time.
Source: EWCS

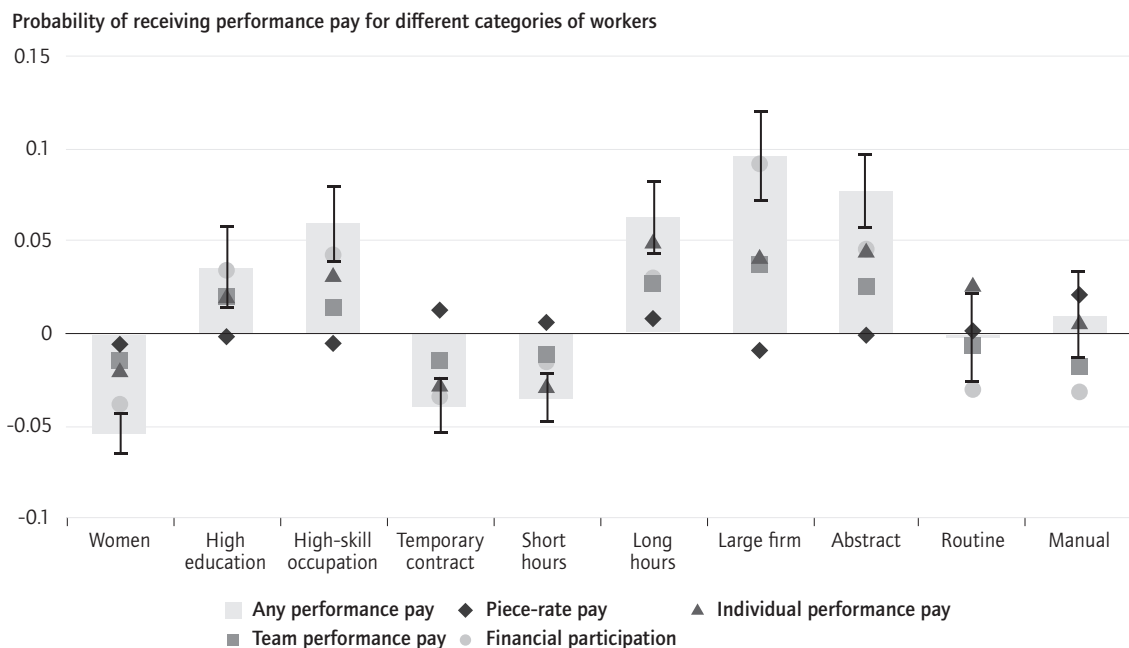
Almost all types of performance pay have increased substantially over time with the exception of pay being dependent only on performance or commission, which declined to only 1.6 per cent in 2015. The incidence of financial participation doubled from 2000/2001 to 2015 while the incidence of team-based performance pay increased from 2.5 per cent to 10 per cent. Receiving individual performance pay was much higher in 2015 than 2000/01 although it has to be borne in mind that it was asked through two questions in 2015 which biases this increase upwards. Most employees receive only one type of performance pay but the amount of workers who receive different types of bonus increases: 7 per cent of workers received bonuses based on their individual performance and team-based performance in 2015, as did 8 per cent based on their individual performance as well as some form of financial participation scheme in 2015. This is up from 1 per cent and 2 per cent, respectively.

3.2 Who receives performance pay?

The use of performance pay varies strongly between workers and tasks. This variation is generally in line with theoretical expectations, namely that performance pay is more likely where incentivising effort can be more effective, where jobs are more complex and difficult to monitor and for workers who are on standard contracts and more tied to their firms. Figure 2 shows the estimated probability of receiving any performance pay as well as the different types. Full regression results are shown in Table A5 in the Appendix.

First, performance pay is more likely for high-skilled workers and where tasks are more abstract. This is in line with expectations of performance pay being used where it is more difficult to control effort and where increased effort can have larger productivity effects. These workers can be more productive while these tasks are generally more difficult to monitor, making the use of performance pay to incentivise effort and ensure productivity more likely. The association of these characteristics is strongest in the case of financial participation schemes. In the case of high-skilled occupations and abstract tasks, employers are more likely to link pay to the performance of the firm or a team rather than individual performance – which would be more difficult to monitor. In routine tasks – generally easier to monitor – workers are more likely to receive individual performance pay.

Figure 2 Higher performance pay for more skilled workers in stable employment relations



Note: Coefficients and 95 per cent confidence interval from multilevel linear probability model with random coefficient at country-sector-year level, weighted and controlling for age, gender, gender by age, family situation, occupation, education, type of work and year fixed effects. The coefficient for women is given at age 35.
 Source: EWCS 2000-2015

Second, performance pay is less likely for workers that are on non-standard work arrangements. Workers on temporary contracts and those working shorter weeks (32 hours or less) are less likely to receive most types of performance pay – although there is a slightly higher probability of being paid on a piece-rate contract. These workers tend to be more precarious though. This finding is in line with firms using performance pay as a reward and a means to tie workers to them. Women are also less likely to receive performance pay, especially financial participation. Performance pay can thus increase the difference between workers on good standard contracts and labour market ‘outsiders’.

Third, large firms are more likely to offer performance pay – particularly in the form of financial participation. Large firms are more likely to be able easily to bear the costs of monitoring and of providing these bonuses through dedicated HR departments.

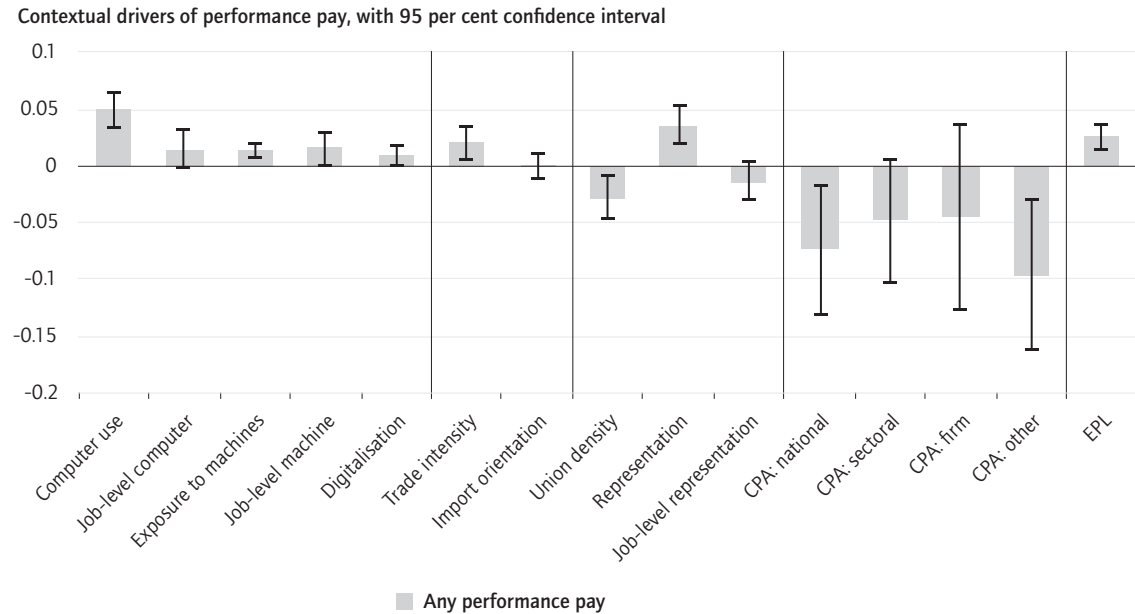
These findings are generally in line with earlier reported findings from the literature – more performance pay for individuals with higher earning potential, on more complex tasks, in larger firms and for those on standard contracts (Lemieux *et al.* 2009, Manning and Saidi 2010, Barth *et al.* 2012, Bryson *et al.* 2013b, Gittleman and Pierce 2015, Bryson *et al.* 2018). Performance pay may, worryingly, increase the risk between ‘insiders’ and ‘outsiders’ on the labour market.

Table A6 in the Appendix shows that these patterns are also present when using a model with common industry and country trends, indicating these findings are not driven by specific country or industry trends.

3.3 What role for macro-economic and institutional factors?

Macro-economic and institutional changes are key to understand how performance pay has become so much more present. Figure 3 and Table 2 show the relation between the use of any sort of performance pay and the comparably large changes (from the 75th to the 25th percentile for each variable) in the use of technology, openness to trade, worker representation, collective pay agreements and employment protection legislation. Full coefficients for these multilevel models on the probability of receiving any performance pay are shown in Table A7 and a summary of the coefficients for all types of performance pay is shown in Table A8 in the Appendix.

Figure 3 Large economic trends and institutional changes associated with increase in performance pay



Note: Estimated from multilevel model with clusters at country-industry-year, weighted to be cross-nationally representative and controlling for socio-demographic and work characteristics and year fixed effects. It shows the effects of a large change (75th to 25th percentile) in a driver on the probability of receiving any type of performance pay (with 95 per cent confidence interval); each block of variables is added separately. N=61,392 with 900 clusters.
Source: EWCS 2000-2015

Table 2 Estimated effect of contextual factors on performance pay

	Any performance pay	Piece-rate pay	Individual performance pay	Team performance pay	Financial participation
Computer use	0.051*** (0.008)	-0.003 (0.002)	0.014** (0.007)	0.017*** (0.006)	0.051*** (0.006)
Job-level computer	0.015* (0.009)	-0.001 (0.002)	0.001 (0.007)	0.001 (0.006)	0.02*** (0.006)
Exposure to machines	0.015*** (0.004)	0.001 (0.001)	0.018*** (0.003)	0.005** (0.002)	0.001 (0.003)
Job-level machine	0.017** (0.008)	0.006*** (0.002)	0.014** (0.006)	0.002 (0.004)	-0.001 (0.005)
Digitalisation	0.009* (0.005)	-0.002 (0.001)	-0.002 (0.004)	0.003 (0.002)	0.012*** (0.004)
Trade intensity	0.021*** (0.007)	0.004** (0.002)	0.008 (0.005)	0.008*** (0.003)	0.016*** (0.006)
Import orientation	0.001 (0.006)	0.001 (0.001)	0.001 (0.004)	0.002 (0.002)	-0.002 (0.004)
Union density	-0.027** (0.011)	-0.001 (0.003)	-0.011* (0.007)	-0.014*** (0.004)	-0.016* (0.009)
Representation	0.037*** (0.009)	-0.004*** (0.001)	0.026*** (0.006)	0.016*** (0.004)	0.028*** (0.007)
Job-level representation	-0.013 (0.009)	-0.002 (0.002)	0 (0.006)	-0.011** (0.005)	-0.003 (0.007)
Collective pay agreement: national	-0.073** (0.029)	-0.011** (0.004)	0.005 (0.018)	-0.045*** (0.01)	-0.06*** (0.022)
Collective pay agreement: sectoral	-0.047* (0.028)	-0.019*** (0.004)	-0.007 (0.016)	-0.036*** (0.009)	-0.01 (0.026)
Collective pay agreement: firm	-0.044 (0.043)	-0.008 (0.005)	0.026 (0.028)	-0.053*** (0.018)	-0.032 (0.037)
Collective pay agreement: other	-0.095*** (0.034)	-0.018*** (0.005)	-0.058*** (0.017)	-0.039*** (0.012)	-0.008 (0.028)
Employment protection legislation	0.027*** (0.006)	0 (0.001)	0.026*** (0.004)	0.003 (0.002)	0.009** (0.004)

Note: Estimated from multilevel model with clusters at country-industry-year, weighted to be cross-nationally representative and controlling for socio-demographic and work characteristics and year fixed effects. It shows the effects of a large change (75th to 25th percentile) in a driver on the probability of receiving any type of performance pay (with standard errors in parentheses); each block of variables is added separately. N=61,392 with 900 clusters.

* p<0.05, ** p<0.01, *** p<0.1

Source: EWCS 2000-2015

In line with expectation, performance pay is more likely for workers who are more exposed to technology in the sense of working with PCs or machines or who are in jobs or sectors with a higher intensity of digital technologies. This supports the hypothesis that technological change may increase the benefits of performance pay – through the higher benefits of incentivising effort or a greater need to attract the best workers as well as through a possible reduction in monitoring costs. Importantly, digitalisation is associated with a greater use of financial participation schemes, which drives the overall association. Such schemes could reflect such firms' engagement with a form of the sharing of the higher rents, as noted by higher firm differences in pay. Technological investment increases the productivity of workers and increases the stakes for firms in hiring the most skilled workers – leading to increased use of performance pay to tie workers to the firm and to incentivise effort. This mechanism can be one of the reasons for the increasing differences between firms (Criscuolo *et al.* 2020, Håkanson *et al.* 2020). Workers who use computers at work are 5 percentage points more likely to receive performance pay – mainly through financial participation – while those who are more exposed to different machines are 1 percentage point more likely to receive performance pay – driven by individual performance pay. On top of this individual effect, workers who are in jobs (occupations within industries) where more computers are used, as well as greater exposure to machines, are a further 1.5 percentage points more likely to receive performance pay. Finally workers in sectors that invest more in ICT capital, import more ICT goods and ICT services as intermediates and employ more ICT professionals are around 1 percentage point more likely to benefit from financial participation. This supports the idea that firm differences in performance payments are more important in sectors with higher digitalisation – where productivity differences may be larger and the demand for high-skilled workers greater.

Performance pay is also used more in sectors which are more open to trade, with a large difference in trade intensity being associated with a 2 percentage points higher probability of receiving performance pay. The effect is largest for financial participation schemes which again could support the idea that this is a form through which firm rents are shared with workers. This finding is in line with greater connection to global trade markets increasing the need for incentivising workers through performance pay and for the selection of the best employees (Davidson *et al.* 2014).

Worker representation also clearly matters, although the effect seems to differ depending on the level of representation. Employees who report that there is indirect employee representation in the company²² are 3.5 percentage points more likely to receive performance pay than those who do not have such access.

22. The variable on employee representation varies over time. Prior to 2010, it only captured employee representation for those workers who discussed some work-related issues. I therefore carry out the analyses using only the 2010 and 2015 waves. There is no real change for union density or average representation at job level but access to employee representation has a stronger effect (an increase of 4.6 percentage points instead of 3.6 percentage points).

In line with the work by Barth *et al.* (2008), workplace representation mainly increases the probability of performance pay linked to team performance or financial participation and has a less positive effect on individual bonuses while having a negative effect on the use of piece-rate systems. On average, I mainly find support for the idea that workplace representation is associated with more performance pay although mainly at group level. This is in line with the findings of Barth *et al.* (2008) and Bryson *et al.* (2014) that workplace representation can increase the use of performance pay as it reduces monitoring costs and through rent extraction.

On the other hand, the use of performance pay is higher in sectors where fewer workers are covered by collective pay agreements. Collective pay agreements at national, sectoral and, to a lesser extent, firm level are associated with a lower use of bonuses and performance pay. Where a high percentage of workers is covered by national collective pay agreements, the prevalence of performance pay is, on average, up to 7 percentage points lower. It then seems the case that collective pay agreements, especially those at levels above the firm, discourage different types of performance pay which would be in line with a desire to reduce arbitrariness in pay (Eurofound 2016).

Finally, as expected, stricter employment protection legislation is positively associated with the use of performance pay – particularly the use of individual bonuses. This can be one way for employers to build some flexibility into their pay structure (Stokes *et al.* 2017). Employment protection legislation mainly affects the probability of making individual bonus payments followed at a distance by financial participation schemes.

Table A9 in the Appendix shows the results of a sensitivity test where common year, country and industry trends are included. The results are similar to those reported above. The association between digitalisation and performance pay is stronger and statistically significant overall, while results for trade are similar, but the association between trade openness and receiving any type of performance pay is no longer statistically significant – although the association with financial participation and piece-rate pay is. The main difference is that union density is slightly positively related with performance pay in this specification,²³ driven by financial participation. As in the main results, there is a positive association between workplace employee representation and performance pay; and a strongly negative relation between all types of collective pay agreement and performance pay.

How much of the increasing use of performance pay can be attributed to macro-economic and institutional factors? Table A10 in the Appendix

23. This means that, for instance within the same country, performance pay tends to be higher in those sectors and in those years in which union density is higher – although this is not a strong association. This is likely because union density does not vary so much between sectors within countries and accounting for country fixed effects captures much of this variation.

shows the part of the total variation in performance pay over time that can be attributed to digitalisation, globalisation and institutional factors. This is estimated by comparing the additional variance (adjusted R squared) explained by regression models including those drivers of total variance that can be explained by including flexible dummies for time, allowing for different trends by country-sector. This shows that digitalisation is the most important concept, explaining around 22 per cent of the total variation in the receipt of performance pay over time within a country-sector, followed by 15 per cent for trade union representation. Digitalisation is particularly important when it comes to financial participation where it explains 44 per cent of the variation over time. Trade explains only 9 per cent overall. Digitalisation, globalisation and workplace representation jointly explain 40 per cent of the time variance for receiving any performance pay and 60 per cent for financial participation. In a more restrictive sample, also including employment protection legislation and collective pay agreements, all drivers jointly explain 58 per cent of the variation over time and even 73 per cent of the variation in financial participation. While these factors do not explain all the variation over time in a country-sector, they do explain a substantial part of it – up to half or even more.

I also use the Structure of Earnings Survey to study the receipt of any kind of bonus – this includes performance-related bonuses but also other regular payments such as holiday or Christmas bonuses. As in the previous analysis, bonuses are more likely for the higher qualified and those in high-skill occupations and at large firms, while they are less likely for workers on temporary contracts. As with performance pay in the EWCS, there is a positive relation between digitalisation and receiving bonuses; and between trade openness and receiving bonuses. As above, bonuses are more likely where employment protection legislation is stricter. Bonuses are, in general, more likely where union density is higher and in the presence of collective pay agreements, particularly at firm-level or ‘other’ category (i.e. than national or sectoral agreements). Strong unions and coverage by collective pay agreements are likely to institutionalise bonuses such as holiday pay or allowances, thereby establishing a difference from the analysis of pure performance pay as above. The full results are shown in Table A11.

In summary, performance pay is mainly received by more high-skilled workers or those doing more abstract tasks, on stable employment contracts and in large firms. The use of performance pay has increased substantially over time. These large increases are in line with the positive association of the use of technology and openness to trade with the probability of receiving performance pay. While centralised collective pay agreements are associated with a lower incidence of performance pay, workers whose interests are protected in the workplace are more likely to receive such bonuses – especially linked to team or firm-level performance rather than to that of the individual. The trends towards digitalisation and globalisation, as well as the declining coverage of collective pay agreements, can contribute to the rise in performance pay.

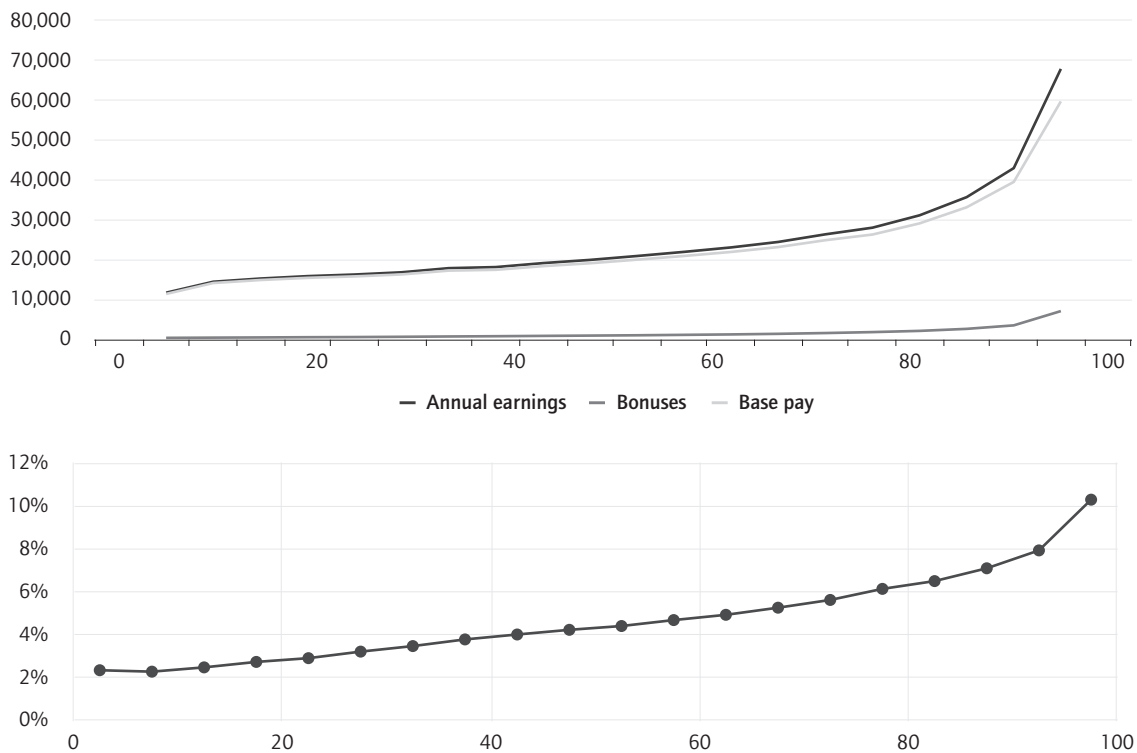
The use of financial participation – which has also risen rapidly over time and is most affected by contextual and institutional factors – can be a possible explanation for how wages increasingly differ between firms. This closer link between wages and firm performance can be one way in which a widening gap between firms in their productivity directly affects wage inequality (Berlingieri *et al.* 2017).

3.4 Performance pay over the wage distribution

To what extent does performance pay lead to rising wage inequality? The response depends on who receives performance pay and the effects of performance pay on wages.

First, bonuses and extra payments are more important to overall earnings the higher up the earnings distribution you go. Figure 4 shows that bonuses make up around 10 per cent of earnings at the top of the wage distribution compared to only 2 per cent at the bottom. These bonuses consist of all types of payments on top of salary, including compensation for overtime and regular bonuses such as Christmas bonuses.

Figure 4 Bonuses contribute more to earnings at the top of the earnings distribution

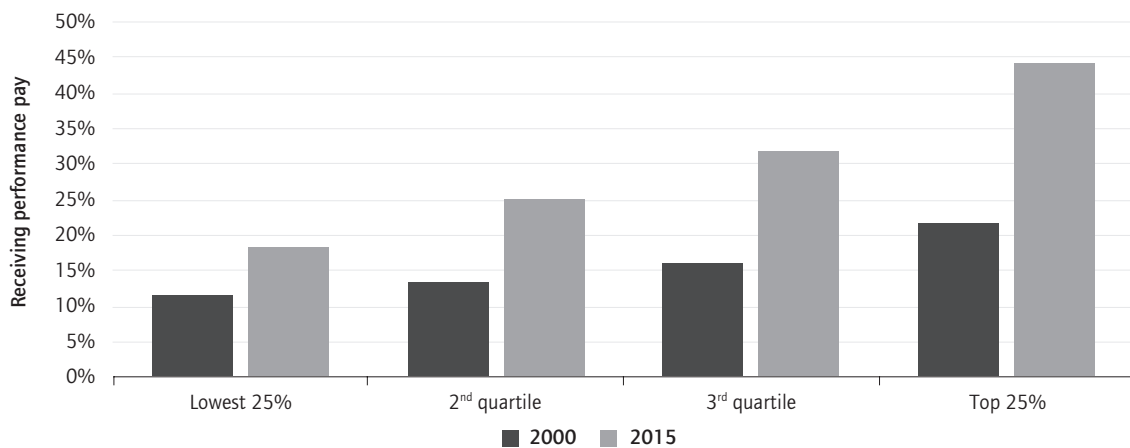


Note: Figure 4 (above) shows weighted average annual earnings over countries, decomposed into annual base pay and annual bonuses, in euros in real terms; and (below) the share of total annual income made up by bonuses over the wage distribution (quintiles of annual earnings).

Source: SES 2014

When looking specifically at performance pay (Figure 5), the probability of receiving performance pay clearly increases with earnings – more so over time. Workers in the top quartile of earnings were almost twice as likely to receive performance pay as workers in the lowest quartile in 2000. By 2015 they were 2.8 times as likely. Piece-rate pay is more likely for lower earners; but all other types are three to four times as likely for the top quartile than the bottom one. These gaps have all increased. As shown in Figure 6, the type of performance pay received also differs strongly over the earnings distribution in 2015. Piece-rate pay is only really present (14%) among the lowest earners. The probability of receiving multiple types of performance pay increases with earnings: while less than a quarter of the lowest earners receive at least two types of performance pay, this is the case for almost half of the highest earners.

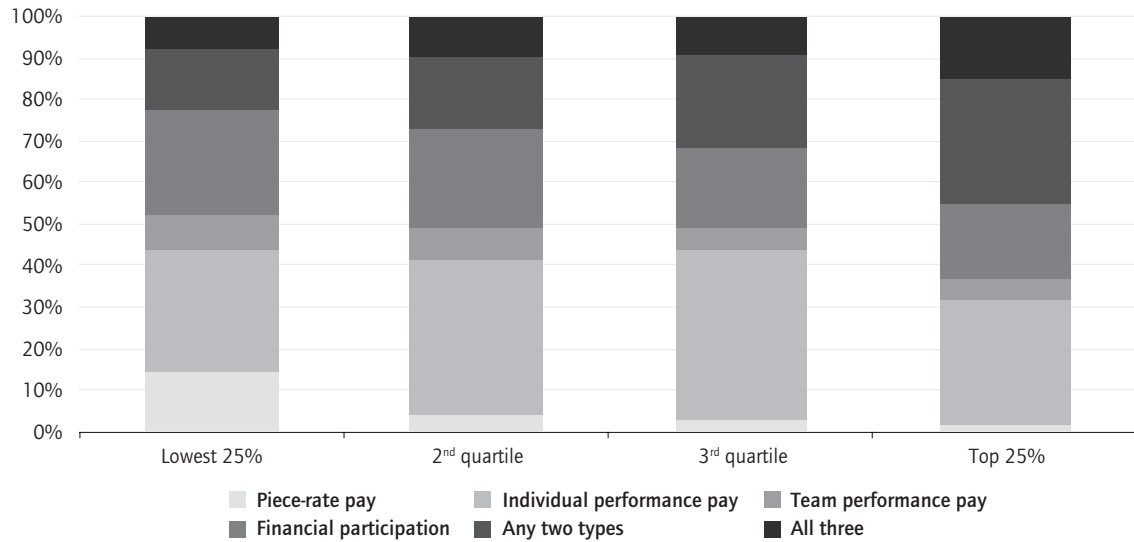
Figure 5 Performance pay is more likely for higher earners – and the gap is increasing with time



Note: The probability of receiving performance pay over the earnings distribution, averaged over countries in 2000 and 2015.
Source: EWCS 2000/2001 and 2015

Even accounting for type of work, performance pay is more likely for higher earning workers. Figure 7 shows the difference in the probability of receiving performance pay separately by earnings quartile, controlling for other individual and work-related characteristics as well as country, year and industry effects. The highest earning workers are 12 percentage points more likely to receive performance pay than the lowest-earning workers, while the 3rd quartile has a higher probability of only 4 percentage points. Individual performance pay has the strongest gradient by earnings while financial participation is most common among the highest earners compared to all others. There is no real gradient for team performance bonuses – in line with Barth *et al.* (2012) who claim team bonuses contribute less to inequality. Table A12 in the Appendix shows the difference in the receipt of performance pay between the top and bottom quartile of earnings by country.

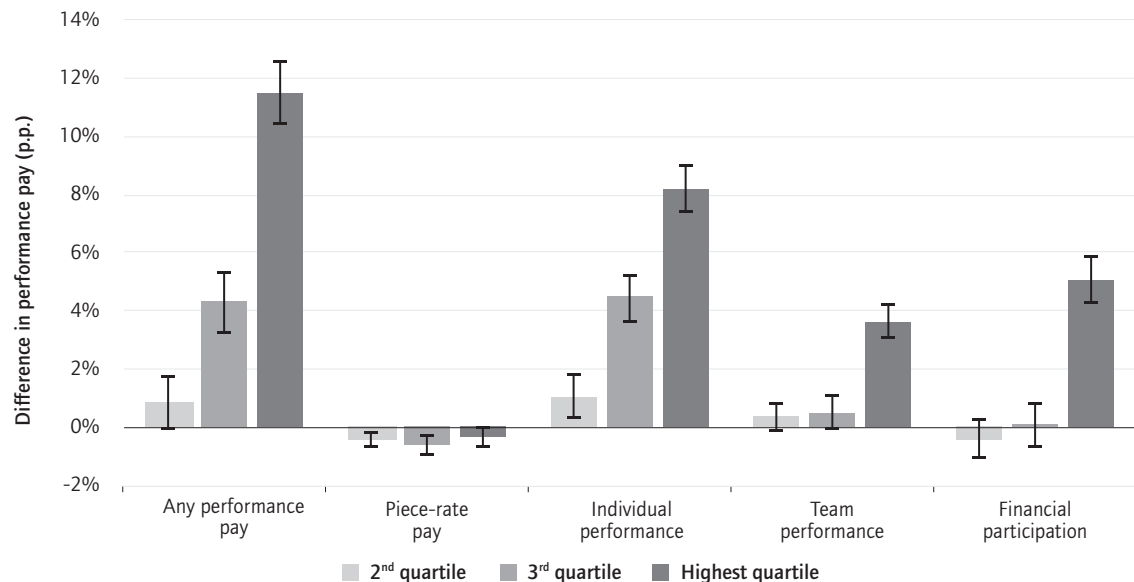
Figure 6 The mixture of performance pay types was relatively stable over the earnings distribution in 2015



Note: The distribution of the types of performance pay received among those receiving it by earnings quartile in 2015, weighted to be representative.

Source: EWCS 2000/2001 and 2015

Figure 7 Performance pay increases more at the top than the bottom of the earnings distribution



Note: Estimated difference in prevalence between different quartiles of wage distribution compared to the lowest 25 per cent of earners, with 95 per cent confidence interval. Estimated from model with socio-demographic and work-specific controls as well as industry, country and year fixed effects.

Source: EWCS 2000/2001 and 2015

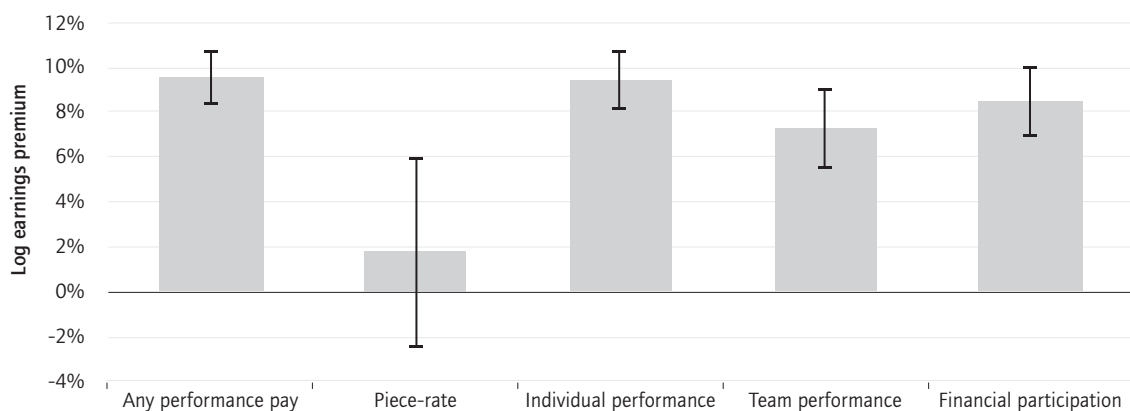
3.5 Is there a performance pay premium?

This leaves us with the question whether workers receiving performance-based pay also earn more than similar workers who receive a fixed salary – the so-called performance pay premium. This premium is estimated from the EWCS by regressing log monthly earnings in 2015 on whether workers receive performance pay, accounting for socio-demographic differences and type of work as well as for country and industry fixed effects. Figure 8 shows the estimated performance pay premium for the different types of scheme.

Workers who receive any type of performance pay earn 7 to 9 per cent more than similar workers in the same country and industry that do not. The exception is piece-rate pay, where there is no statistically significant premium – indicating that this type of payment simply replaces base salary. Table A13 in the Appendix shows the full results from the model estimating the performance pay premium.

This estimate corresponds closely to previous findings. Several studies from the US estimate the performance pay premium at between 9 and 15 per cent when accounting for observed and workplace characteristics (Lemieux *et al.* 2009, Heywood and Parent 2012, Gittleman and Pierce 2015); in the UK it is placed between 5 and 14 per cent (Manning and Saidi 2010, Bryan and Bryson 2016, Bryson *et al.* 2018); and a Norwegian study puts it at between 2 and 9 per cent (Barth *et al.* 2012). This premium drops when accounting for heterogeneity across firms (Bryson *et al.* 2018) and especially for personal selection, for instance by studying workers over time as they move between pay systems. In the latter case, the premium generally drops to between 2 and 5 per cent (Lemieux *et al.* 2009, Manning and Saidi 2010, Barth *et al.* 2012, Gittleman and Pierce 2013, Bryan and Bryson 2016).

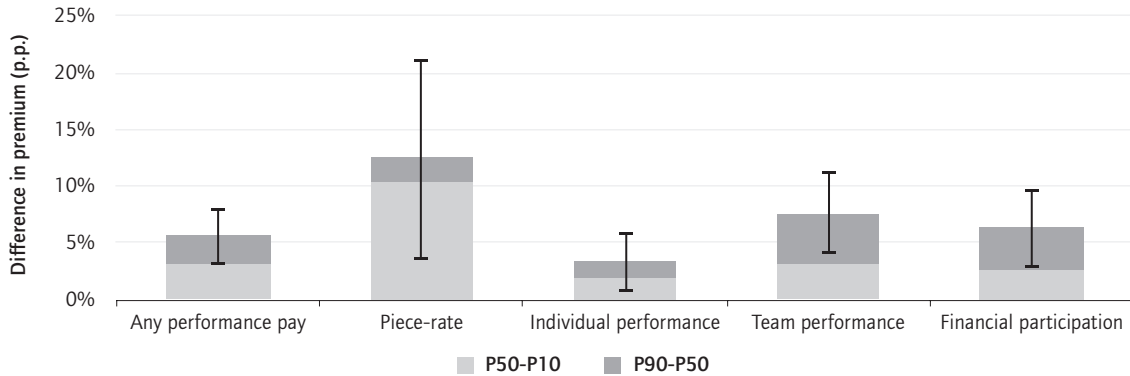
Figure 8 Monthly earnings are higher on average for workers receiving performance pay



Note: Premiums from receiving different types of performance pay, estimated in separate models controlling for socio-demographics, work characteristics, country and industry fixed effects, weighted, in 2015.

Source: EWCS 2015

Figure 9 The performance pay premium is higher at the top than at the bottom of the wage distribution



Note: Estimated difference in performance pay premium at 90th, 50th and 10th percentiles of monthly wage distribution with 95 per cent confidence interval. Estimated from quantile regression on log monthly earnings, controlling for socio-demographic and work characteristics, including country and industry fixed effects, in 2015.

Source: EWCS 2015

The pay premium itself also differs over the wage distribution, meaning that higher-earning workers receive a bigger bonus from performance pay than lower-earning workers, keeping all else constant. I estimate the premium for the 10th, 50th and 90th percentiles of the wage distribution in 2015. Figure 9 shows these estimated differences from the 90th to the 10th percentile (and the 95 per cent confidence interval) decomposed into inequality at the top (90th to 50th) and bottom (50th to 10th).

All types of performance pay have higher returns at the top than at the bottom, ranging from being 3 percentage points higher for individual performance pay to 11 percentage points for piece-rate pay – driven by the very low, and even negative, premiums at the bottom. Performance bonuses for team or firm-wide performance are 7-8 percentage points higher at the top than at the bottom and this is driven slightly more by inequality at the top than the bottom. This increasing pay premium is in line with earlier findings (Bryson *et al.* 2018). Full results for the premium by pay quantile are shown in Table A14 in the Appendix.

In summary, performance pay is associated with wage inequality. Higher earners are much more likely to receive such variable pay and this inequality in receipt has increased over time. Performance pay itself is also associated with higher earnings and again more so for workers towards the top of the wage distribution.

3.6 How much does performance pay contribute to wage inequality?

Finally I quantify how much performance pay contributes to overall wage inequality. Following Lemieux *et al.* (2009), I compare the actual wage distribution with a counterfactual one in which no-one received performance pay. This counterfactual distribution is obtained by weighting all workers who do not receive performance pay by a function of their probability of receiving performance pay based on their characteristics. The intuition is that those workers who do not receive performance pay, but who have similar profiles to those that do, get a higher weight when estimating the counterfactual distribution than people who are less similar. Table A15 in the Appendix compares the bias in socio-demographic and work characteristics between workers who are on fixed rather than performance pay before and after reweighting, showing that the two groups are more comparable after the reweighting.

Table 3 Share of inequality in log earnings attributable to performance pay or bonuses, estimated through counterfactual method

	Any performance pay	Piece-rate pay	Individual performance pay	Team performance pay	Financial participation	SES: bonuses
Variance	5.6%	-0.8%	2.1%	2.1%	3.0%	0.2%
p99-p90	0.4%	-5.0%	-3.6%	-4.9%	6.6%	-9.9%
p90-p50	3.9%	3.6%	0.0%	3.6%	3.2%	0.4%
p50-p10	2.0%	-7.1%	0.6%	-1.0%	-0.3%	7.0%
p90-p10	2.9%	-2.3%	0.3%	1.1%	1.3%	3.2%

Note: The estimated contribution to overall inequality (in different measures) made by receipt of performance pay, EU*+, comparing the actual log monthly earnings distribution to the counterfactual, weighted to account for selection into performance pay.

*SES: BGR, CYP, CZE, DEU, ESP, EST, FRA, GBR, GRC, HUN, ITA, LTU, LUX, LVA, NLD, NOR, POL, ROU, SVK in 2014

+EWCS: AUT, BEL, BGR, CYP, CZE, DEU, DNK, ESP, EST, FIN, FRA, GBR, GRC, HUN, ITA, LTU, LUX, LVA, MLT, NLD, POL, PRT, ROU, SVK, SVN, SWE in 2015

Source: EWCS 2015 and SES 2014

Wage inequality in Europe in 2015 was up to 6 per cent higher due to the use of performance pay than it would otherwise be – depending on what measure of inequality is used. Table 3 shows the summary of the difference between the actual and the counterfactual distribution as the percentage of different inequality measures that can be attributed to performance pay (in the EWCS) or to bonuses (SES). Previous studies estimated the contribution of performance pay to the variance in earnings at between 5% in the United States in 2010 (Gittleman and Pierce 2015) up 27% in 2011 in the UK (Bryson *et al.* 2018), with substantial variation. Figure A1 in the Appendix shows the contribution of performance pay to the variance in earnings across countries. This ranges from a modest decrease in inequality in Denmark, Cyprus, Poland and Spain, to an increase of more than 10% in Finland, Latvia, Slovenia and Malta.

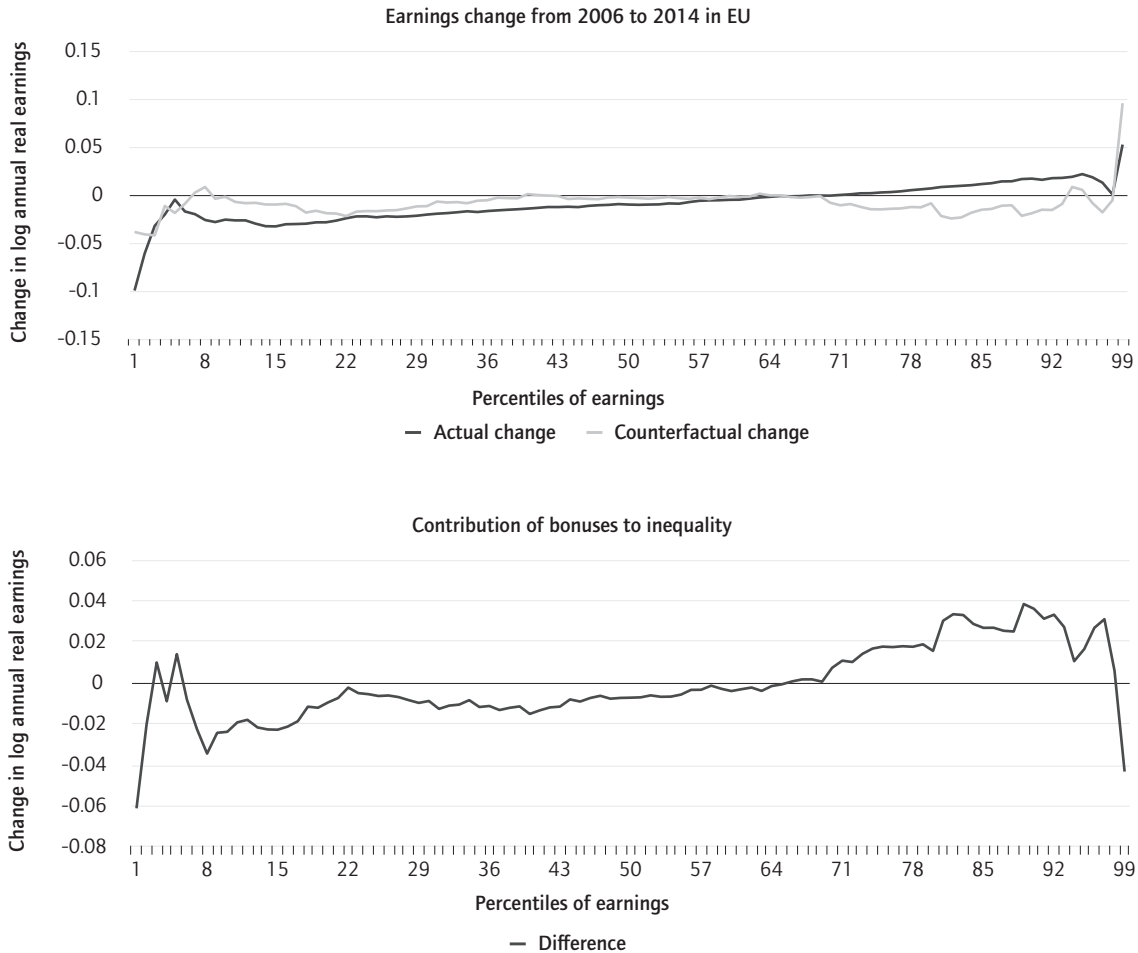
Comparing percentile ratios shows the effect on the wage distribution. This shows that financial participation schemes mainly contribute to earnings inequality at the top of the earnings distribution (6.6 per cent). Piece-rate pay contributes the least to earnings inequality as it mainly seems to replace wages. Performance pay contributing more to inequality at the top than the bottom of the earnings distribution is also generally consistent with previous studies (Lemieux *et al.* 2009, Gittleman and Pierce 2015, Bryan and Bryson 2016, Bryson *et al.* 2018, Sommerfeld 2013).

This analysis is repeated using the SES including all bonuses, so not only performance pay. Jointly, all bonuses do not seem to contribute to wage inequality as much as performance pay and do not play as much of a role in the top half of the earnings distribution.

While it is not possible with the EWCS to study changes in inequality over time, previous studies tend to find that that performance pay has contributed to increasing inequality but estimates vary in the importance of this effect: no real effect in Germany (Sommerfeld 2013), a modest contribution in the UK (Bryan and Bryson 2016), and a large increase in the United States in the '80s and early '90s (Lemieux *et al.* 2009), but more modest afterwards (Gittleman and Pierce 2015).

Figure 10 uses the SES to show how the distribution of annual earnings has changed over time and to what extent bonuses of all types have contributed to this. It demonstrates that, while bonuses do not have a large effect on overall inequality in 2014, they have contributed to making the earnings distribution less equal by positively contributing to earnings at the higher end of the distribution and reducing earnings at the lower end. Performance pay seems to increase earnings growth from the 70th percentile upwards. The lower panel shows that this contribution increases at successively higher levels in the earnings distribution. This analysis shows that performance pay contributes more to earnings inequality than bonuses overall, so it is likely that performance pay itself has played the larger role in changes in inequality within Europe.

Figure 10 Bonuses mainly affect earnings increases at the top of the earnings distribution



Note: Figure 10 shows the changes in annual earnings over the distribution in 16 EU countries from 2006 to 2014. It contrasts this with the counterfactual distribution, obtained by reweighting workers who did not receive any bonus in 2006 and 2014 and estimating the change between the two. This represents a weighted average over 16 countries: BGR, CYP, CZE, DEU, ESP, EST, FRA, GBR, HUN, ITA, LTU, LUX, LVA, NOR, ROU, SVK.
Source: SES 2006-2014

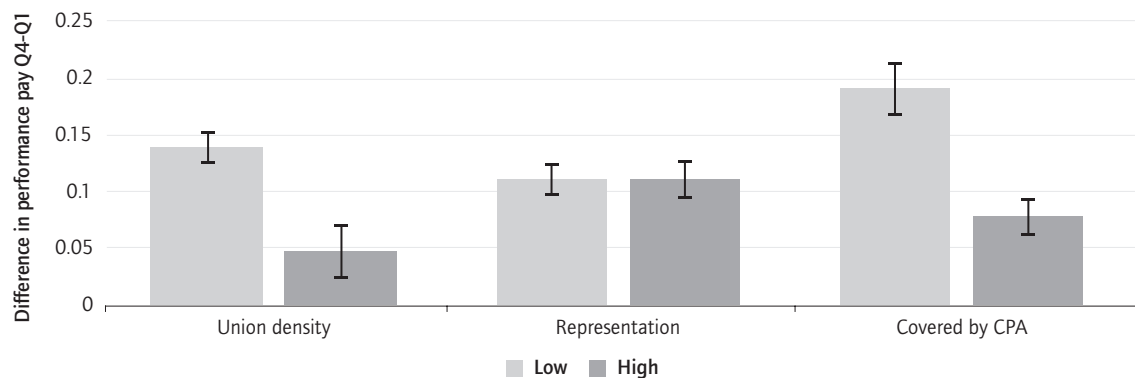
3.6.1 Employee representation reduces the inequalities of performance pay

Inequality does not necessarily follow from higher productivity being induced by performance pay. First, research shows that productivity also grows among workers who do not receive performance pay in those same firms; and second, the rewards can also be more equally divided (Franceschelli *et al.* 2010, Barth *et al.* 2012). Previous research from Norway (Barth *et al.* 2012) has indicated that trade unions and worker representation breaks, or at least reduces, this relationship between performance pay and wage inequality. This is because unions can provide a clear benefit to employers – they can be better placed to monitor workers’ performance – and, in return, pay is distributed more

equally. This is in line with firm-level collective agreements having both an effect on wage growth for everyone and productivity growth, as shown in a recent Belgian study (Garnero *et al.* 2020).

First, Figure 11 shows that sectors where trade unions are stronger or where more workers are covered by a collective pay agreement have a more equal distribution of performance pay than those with weaker union densities or lower coverage rates. Figure 11 shows the difference in probabilities (in percentage points) of receiving performance pay in the highest earnings quartile compared with the lowest one. This more equal distribution in the presence of worker representation means performance pay does not only accrue to already better-off workers.

Figure 11 Inequality in who receives performance pay differs by bargaining institutions

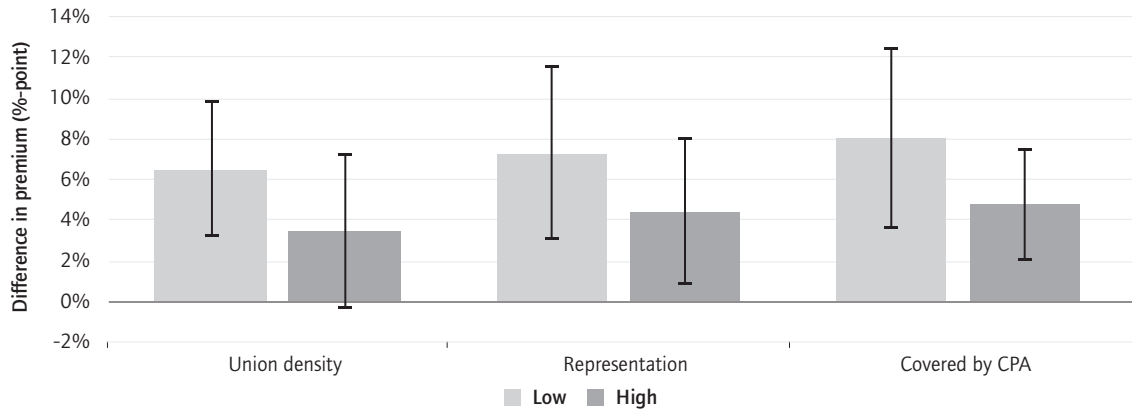


Note: The difference in performance pay at the top versus the bottom quartile, with 95 per cent confidence intervals, at low (10th percentile) and high (90th percentile) values of worker representation. Estimated from regressing the probability of receiving performance pay on earnings group interacted with worker representation indicators, in separate models. Regressions are weighted and controlled for demographic and work characteristics as well as country, industry and wave fixed effects.
Source: EWCS 2015

Second, Figure 12 shows that the performance pay premium itself is also more equally distributed where there is a stronger union, in workplaces that have employee representation and where more workers are covered by collective pay agreements. This shows the performance pay premium in 2015 at the 90th and the 10th earnings percentiles, interacting performance pay and three indicators of collective coverage in separate quintile regressions: sectoral union density, workplace representation and the share of workers not covered by collective pay agreements.

These figures indicate less inequality in who receives performance pay and less inequality in the effect on wages of performance pay in the presence of stronger worker representation and voice. If collective representation is lower – because of lower union density, the lack of a collective pay agreement or for individuals who have no access to a representative – the difference in the performance pay premium over the wage distribution is substantially higher than where there is more worker representation.

Figure 12 The performance pay premium is less unequally distributed where worker representation is stronger



Note: Difference between the effects at the 90th and 10th percentiles on log earnings, estimated from quantile regression interacting whether workers receive any type of performance pay with one collective representation indicator, controlling for demographics, work characteristics, sector and country fixed effects in separate models. Shows the coefficients and standard error performance pay at a high (90th percentile) level of the collective representation indicator as well as at a low level (10th percentile).
Source: EWCS 2015

Table 4 Contribution of performance pay to earnings inequality differs by worker representation

		Variance		P90-P50		P50-P10	
		Actual	Difference	Actual	Difference	Actual	Difference
Workplace representation	No	0.32	10%	0.61	10%	0.78	4%
	Yes	0.23	1%	0.57	5%	0.55	-5%
Union density	Lower	0.31	6%	0.61	4%	0.71	1%
	Higher	0.26	4%	0.51	7%	0.68	1%
Collective pay agreement coverage	Lower	0.35	6%	0.62	6%	0.82	2%
	Higher	0.24	3%	0.56	5%	0.60	3%

Note: Showing the influence of performance pay over the earnings distribution by comparing the actual distribution of log monthly earnings in 2015 (demeaned by country) and weighted cross-nationally with the counterfactual distribution obtained by weighting workers not receiving performance pay by propensity. Figures are separated by groups of worker representation: the presence of representation in the workplace; the lowest versus the highest quartile of union density; and the lowest versus the highest quartile of a collective pay agreement.
Source: EWCS 2015

Table 4 repeats the counterfactual analysis on the role of performance pay in earnings inequality, but separately for the population covered by stronger representation and those where it is weakest. It shows the actual value of the variance and the interdecile ratios, as well as the difference of that actual value with the counterfactual one – the part that can be attributed to performance pay. There is a clear effect: performance pay contributes hardly at all to earnings inequality among workers who have access to workplace representation, while 10 per cent of the overall variance for the non-covered can be attributed to performance pay. The difference is largest at the top of the earnings distribution. Union density has a similar pattern but the difference

is less strong. There is, however, less difference for collective pay agreements. This finding is in line with previous work from Norway (2012), which found that performance pay increased wage dispersion within firms by 10% in the absence of a union, but hardly had an effect if more than half of the workers were members of a workplace union.

Conclusion

This working paper set out to study the use of performance pay across Europe, what drives changes in its use and whether it contributes to earnings inequality.

First, performance pay is being used much more over time, especially individual bonuses and schemes of financial participation. These types of payments are mainly given to more high-skilled workers and those doing more complex tasks where it is more difficult to control worker effort. They are also given to workers on standard employment contracts rather than those working fewer hours or on temporary contracts. Importantly, women are also less likely to receive performance pay. In this way, the use of performance pay further exacerbates existing inequalities. It is important to understand these inequalities in variable pay which tend to be larger than gaps in the base wage but which receive less scrutiny.

Macro-economic and institutional factors play an important role in the decision to offer and take up performance pay: it is more likely in more technologically intensive sectors and in those more affected by trade, as well as in countries with stricter employment protection legislation. The role of worker representation is somewhat double: at workplace level there is a positive association with receiving performance pay, particularly linked to team or firm performance; but collective pay agreement coverage and stronger union density are associated with a reduction in the use of performance pay. This shows the importance of institutional factors as well as major economic changes in shaping the pay structure.

Second, I show a link between performance pay and earnings inequality in Europe. First, there is a compositional effect where workers with higher earnings potential are more likely to receive performance pay. Second, even among otherwise similar workers, those whose pay is linked to performance earn 7 to 9 per cent more than those receiving a fixed salary. Third, on top of higher earners being more likely to receive this performance pay premium, it tends to be relatively higher at the top than at the bottom. Around 6 per cent of the variance in earnings in European countries can be attributed to performance pay. Financial participation schemes, through shares or bonuses, are particularly important at the very top.

Stronger worker representation diminishes this inequality in performance pay, however. While there seems to be a positive association between workplace

representation and the receipt of performance pay, performance pay is subsequently more equally distributed among workers. The premium is also more equally distributed in the presence of stronger worker representation. As a result, the contribution to earnings inequality is smaller where workers are better represented. This means it is possible to set earnings in a way that rewards effort or shares rents at firm level without increasing inequality. While some of the rising inequality may reflect a higher propensity to make a link between wages and productivity, this is less likely the case for the more collective types of bonus and it also seems the case that these same benefits could be combined with a more equal distribution.

This paper points to the importance of considering different types of wages and their contribution to wage inequality. Wage inequality – without taking variable components into account – may then increasingly be an underestimate of earnings inequality. Changes in the economy lead to an increase in variable pay which, in turn, increases wage inequality. However, institutional factors can limit the amount of inequality associated with it. This points to the need for regulation and collective bargaining such that rising productivity benefit everyone.

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**European
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Bd du Roi Albert II, 5
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Belgium
+32 (0)2 224 04 70
etui@etui.org
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