VARIABLE PAY SYSTEMS AND/OR COLLECTIVE BARGAINING? COMPLEMENTS OR SUBSTITUTES?

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Abstract: There is uncertainty as to whether collective wage bargaining impedes the implementation of variable pay systems or not. We argue that much of this uncertainty is due to neglect of differences in the institutional structure of bargaining. Using representative company level data for all member states of the European Union, we investigate the incidence of variable pay systems in general as well as different types including payment-by-results, performance-related pay, and team-related pay under different bargaining arrangements. We find that the institutional structure of collective bargaining matters: variable pay systems thrive under company and multi-level collective bargaining, while their implementation is hindered under national-level collective wage bargaining.

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In recent decades *labor market institutions* have come under increasing pressure to meet demands for company wage flexibility, often leading to institutional reforms in many industrialized countries with the aim of helping companies to react rapidly and flexibly to changing market conditions and shocks. In particular, *pay flexibility* has become an increasingly important topic both in academia and for policy makers. In this context reforms have focused on both *collective wage bargaining* (CWB) institutions and procedures as well as on various measures which allow companies to tie wage payments more closely to performance criteria, in particular the implementation of *variable pay systems* (VPS) (e.g. Marginson 2015).

The intention of policy makers who initiated these reforms is to limit pay determination via CWB and to foster it via VPS in order to increase labor market flexibility and facilitate higher productivity and employment growth. While pay determination via CWB tends to focus on the regulation of base or core pay, that via VPS refers to payment schemes that link an employees' wage to her individual, her team/group or the establishment's or company's performance. Thus, the implementation of VPS is expected to enhance flexibility as pay determination is more closely tied to companies' or establishments' success. However, as the amount of disposable pay is limited, pay determination via CWB which focuses on base pay, reduces the leeway for any variable pay component and vice versa.

Therefore, at first glance, it appears that CWB and VPS are two opposite poles which might even 'threaten' each other (Arrowsmith and Marginson 2011) as they represent two different forms for the determination of pay. Consequently the answer to the question of whether CWB and VPS are complements or substitutes initially appears to suggest the latter. At second glance however there is research (e.g. Nergaard *et al.* 2009) which suggests that by

examining different contextual factors such as, for example, the wider industrial relations systems in which companies are embedded, the relationship between CWB and VPS is more varied and complex than appears at first sight.

In particular, as argued by Kalmi *et al*. (2012), the relationship depends on two main factors. First, upon the role of the predominant national CWB system and the norms and options for companies to deviate from the norm. Second, on the need for companies to compensate for any potential flexibility constraints which emanate from CWB systems. Against the background that the role of the predominant national CWB system and its norms have become weaker in recent decades, we develop our analysis on the incidence of VPS further by arguing that different CWB systems place different degrees of constraint on companies, and hence on their need to compensate for the effects. Specifically, we derive a granular categorization of different CWB systems and investigate if differences in CWB arrangements produce an effect which encourages companies to implement VPS *per se* as well as distinct types of VPS, because it allows them to compensate for any flexibility constraints. Thus we investigate if VPS can be considered to be a complement to CWB rather than a substitute.

The classification of different systems of CWB which will be investigated in our analysis not only captures differences in the level at which CWB takes place, but also – where relevant - considers the integrative interaction between actors at different levels. Thus, we will formulate hypotheses on the relationship between CWB and VPS and base our analysis on a fine-grained categorization of different CWB arrangements, which we test using comprehensive and representative establishment level data for all European Union (EU) member states.

Different Structures and Forms of Collective Bargaining and Variable Pay

It is well documented in the literature that the role, institutional structure and procedures of CWB differ significantly between different countries (e.g. European Commission 2014) but also increasingly across different sectors of the economy (e.g. Bechter *et al.* 2012). While some studies (e.g. Kalmi *et al*. 2012) differentiate CWB systems into three categories, i.e. centralized, decentralized and multi-level systems, we differentiate further, not only with respect to the level, but also taking into account the integrative interaction between bargaining units at different levels. Specifically, we will differentiate CWB at *company*, *sector*, and *national level*, which could be either exclusive (i.e. *single-level bargaining*) or not (*multi-level bargaining*). We also differentiate between forms of integrative interaction or coordination (i.e. *governed* or *ungoverned*) between actors on different levels. We will argue in the following that these differences matter with respect to the incidence of VPS for companies.

The level of CWB is the 'classical' dimension of differentiation considered in the literature and is essential for investigations of any form of company flexibility (e.g. Armstrong *et al.* 1998; Del Boca *et al.* 1999). The literature usually distinguishes between collective agreements struck on a company or establishment (decentral), sector (intermediate) or national (central) level. The latter two levels are often subsumed as higher level CWB systems. In addition, the literature also differentiates multi-level CWB systems, in case collective agreements are struck on multiple levels simultaneously. Due to recent reforms of the institutional structure of CWB, multi-level CWB structures have become increasingly frequent in the past two decades in a number of EU countries (e.g. Boeri 2014; Brandl and Bechter 2018; European Commission 2014).

However, in the case of multi-level CWB, the structure also differs with respect to the degree of integrative interaction between CWB units at different levels. The interaction can be either *governed* or not. We refer to a governed interaction between bargainers at different levels to describe any (vertical) coordination or any kind of agreement about joint action, such as whether company level agreements can diverge from sector agreements within a jointly

defined framework. In this paper, we will use and define governed and ungoverned CWB according to Traxler's (1995) commonly used definition (e.g. European Commission 2014). For the member states of the EU in which actors at different levels exist, under this definition, CWB in Austria, Belgium, Denmark, Finland, France, Germany, Luxembourg, the Netherlands, Sweden, and Slovenia is considered to be governed and in Bulgaria, Croatia, Cyprus, Greece, Italy, Portugal, Slovakia, and Spain to be ungoverned.

There are differences between countries in the form and scope of governability. In some countries, the higher-level unit agrees a sectoral level base pay and defines wage corridors which allow some degree of flexibility for renegotiations of pay in another round of CWB at company and establishment level. Such types of vertically, i.e. between units at different levels, governed multi-level CWB systems are characteristic of Nordic countries (e.g. Stokke 2008). Another form of governability is that the higher level defines and sets explicit derogation clauses for bargaining units at the lower levels, which allows for opting out of a collective agreement (e.g. Traxler *et al*. 2001). These forms of vertically governed interaction can be observed in Austria and Germany where derogation from the sectoral base pay of lower levels is governed by defining very explicit opt-out conditions, e.g. in cases of economic hardship of companies (e.g. Traxler 1995). Again, these clauses aim to increase flexibility at company and establishment level by further agreements. In ungoverned systems, which are typical for Mediterranean countries, such collective bargaining units at different levels (often) deal independently from each other with the same subjects (e.g. Aumayr-Pintar *et al*. 2014). The legal systems in these countries, e.g. in Italy and Spain, guaranteed that independent and autonomous collective bargaining units at different levels do not have to compete with each other for the right to bargain, but also ensured that independent from which unit at which level struck a collective agreement, (usually) the most favorable agreement for the employee side applies. On the one hand, these systems guaranteed a high degree of plurality and organizational independence in the collective interest representation, but on the other hand, also lead to

redundancies and even to beggar-thy-neighbor strategies of some units which were against the long-term mutual interests of all units (e.g. Boeri 2014; Traxler *et al*. 2001).

Even though there are differences in the interaction between CWB units at different levels across countries, they all have in common that governed systems are characterized by the ability of higher level bargaining units, usually peak and central-level employers' organizations and trade unions, to impose rules and options for lower level CWB, while ungoverned systems do not include any such rules and options. Thus, CWB systems show significant differences which will be hypothesized to influence the incidence of VPS.

Apart from the level and integrative interaction between bargaining units, CWB also differs across countries and sectors regarding its relevance and scope, i.e. regarding CWB *coverage*. In some 'liberal' countries, such as the USA, UK, or Ireland, CWB covers only a relatively small share of the total number of employees, while in other countries, such as for example in 'Nordic countries' such as Denmark, Finland, and Sweden, almost all employees are covered by a collective agreement. Underlying these country differences are, sometimes substantial, within-country variations across different sectors. For example, CWB typically covers a higher fraction of workers in manufacturing than in service sectors (e.g. Bechter *et al.* 2012). Theoretically, these differences in CWB coverage will matter for the link between CWB and VPS, as very different shares of employees are affected by collective agreements. Methodologically, these differences necessitate that the unit of analysis is at least at the company level or, as differences might also exist across different establishments within countries, at the establishment level. Given this within country variation, we refer to CWB structures at the individual level as CWB arrangements rather than CWB systems, which is the terminology usually applied to country-level institutional structures.

There are also important differences across various *types of VPS*. All VPS are formal schemes that systematically link an employees' pay to the performance of the employee or to some kind of performance indicator, for example of a team or even the whole company.

They can be broadly divided into three main categories (e.g. Traxler *et al.* 2008). The first VPS category consists of *payment-by-results* (PbR) schemes and is based on *quantitative* output criteria and measures such as piece rates, provisions, brokerages or commissions. PbR schemes offer the highest degree of transparency, in the sense that employee representatives have a relatively high degree of certainty about the relationship between employees' actions and the consequences on pay. PbR schemes do not necessarily lead to a shift in control over pay determination away from employee representatives towards other parties, e.g. towards management discretion. In addition, employee representatives might see PbR schemes as sufficient to ensure procedural fairness. The second category of VPS consists of *Performance-related pay* (PrP) schemes which usually involve a *qualitative* assessment of employee performance. This assessment is usually made by management appraisal, which gives the employers discretion in the determination of pay. Compared to PbR, the uncertainty for employee representatives about the performance criteria and evaluation is higher and accompanied by a potential loss of procedural and substantive influence and control over pay determination. Both PbR and PrP schemes have in common that they target the performance of individual employees. In contrast, the third category of VPS consists of *team-related pay* (TrP) which is linked to the performance of a wider group of employees, which could be either a working group, a sub-team, a department, a branch or, in the case of profit-sharing schemes, even the whole company or establishment. The influence and controllability for individual employees and their representatives is lowest for TrP schemes, as the performance of various other contextual factors as well as other group members' matters. Many TrP schemes are also based on a qualitative assessment and dependent upon employers' discretion. Furthermore, TrP schemes are also often unconsolidated forms of payment, e.g. only paid for one year, and therefore continuously dependent upon employers' discretion.

In the following analysis we concentrate on these three VPS categories which cover 98 percent of all VPS schemes in our sample, i.e. of a representative sample of companies

and their establishments in all member states of the EU. However, we are aware that the categorization of VPS into three categories is coarse and a further differentiation would enable deeper insights and potentially reveal further interesting relationships, especially as different schemes might be used in different departments and different teams within the same establishment. Furthermore we are unable to consider share ownership schemes in this analysis, which account for the remaining 2 percent of VPS in our sample. First, for theoretical reasons, as the nature of share ownership schemes is different to all other categories and there are differences in the institutional and legal context of share ownership schemes (e.g. Kalmi *et al.* 2005; Pendleton 2010). Second, for empirical reasons, as the number of observations, i.e. establishments in which share ownership schemes can be observed, is very limited and concentrated in a few countries.

The Relationship between Variable Pay and Collective Wage Bargaining

In the following, we will investigate whether the incidence of VPS *per se*, as well as different types of VPS, is associated with different arrangements of CWB. We will argue that differences in the institutional and procedural structure of CWB are associated with the different needs and interests of actors at different levels who are involved in CWB, i.e. of trade unions and work councils on the one hand and employers as well as their associations on the other hand, to implement VPS in order to enable flexibility in pay setting at establishment level. Specifically, as regards differences in the incidence of VPS with respect to different CWB arrangements, we argue on the basis of Kalmi *et al.* (2012) that VPS is implemented in establishments in order to compensate for potential flexibility losses in cases where a higher level collective agreement exists. As regards differences in the incidence of different types of VPS, we will base our arguments on differences in the interests of actors involved in pay determination.

Specifically, as outlined in the introduction, the idea behind implementation of VPS in order to compensate for any flexibility constraints, is that higher level CWB tends to omit the establishment context and establishment performance. Hence, pay which is distributed via higher level CWB, i.e. sectoral, national and multi-level CWB, tends not only to allocate pay among employees relatively equally via base (or basic) pay, but also according to sectoral or national criteria and not according to the establishment context. Consequentially, higher level CWB does not (sufficiently) differentiate between employees with different levels of performance or other employee-specific characteristics in establishments and thus limits the ability of establishments to tie payment to establishment and employee-specific performance criteria. Consequently, the more collective agreements apply in cases of multi-level CWB, the more potentially constrained the establishments might be. This constraint on employee-specific pay setting holds even though collective agreements usually consider a differentiation in pay according to employee-specific characteristics via different job grades (Traxler *et al*. 2008).

In contrast, in establishments where pay is determined at the establishment level, i.e. in the case of no or establishment or company level CWB, a fine grained and flexible pay determination according to establishments' and individual employees' performances and characteristics can be achieved. Thus, in establishments which do not fall under any higher level collective agreement, there is less or even no need to implement VPS in order to ensure flexibility.

Consequently we can derive the first *hypothesis* (*H1*), that the incidence of VPS is higher in establishments in which pay is determined via a higher-level CWB arrangement including multi-level CWB, compared with establishments in which pay is determined via an establishment-level CWB arrangement or which do not fall under any collective agreement.

Even though we can basically expect that the incidence of VPS is higher for any form of higher level CWB, we do *not* necessarily expect that the effect is the same for different CWB arrangements. Against the background that different CWB arrangements adhere to

different norms and regulatory features and are associated with differences in their efficacy and encompassment of wage setting, i.e. on their ability to influence wage setting (e.g. Brandl 2012; Calmfors and Driffill 1988; Traxler *et al*., 2001), we expect that the effect on the incidence of VPS varies substantially between different CWB arrangements as well. In particular, we expect that the effect differs between single and multi-level CWB arrangements: the more collective agreements apply, the more limited the ability of companies to tie wages to establishment specific performance criteria and the higher the need for companies to implement VPS becomes. Moreover, we do not expect that the effect is the same for different multi-level CWB arrangements, and especially not if we differentiate between governed and ungoverned multi-level arrangements.

Specifically, in ungoverned CWB arrangements, where CWB units at each level act independently from each other, each bargaining unit has an incentive to regulate pay as pervasively and as comprehensively as possible according to its unit context, and therefore impedes establishment level flexibility even more. However, this double constraining effect might not apply in the case of governed multi-level arrangements where there is an integrative interaction between bargaining units at different levels, in the sense that duplication and potentially even offsetting outcomes between different levels can be avoided. While the integrative interaction is different between countries, governed arrangements have in common that higher-level units define a framework agreement and leave some leeway for establishment specific flexibility at lower levels. In any case, if CWB takes place at the establishment level, the establishment context and any flexibility demands can be considered in an establishment level agreement (e.g. Arrowsmith and Marginson 2011; Nergaard *et al*. 2009; Traxler *et al*., 2008). Thus, we hypothesize that the incidence of VPS is high for ungoverned CWB arrangements but not necessarily for governed arrangements (*H2*).

As regards the interests of actors in the implementation of VPS in general, there is a consensus in the literature that employers favor the implementation of VPS *per se* (e.g.

Freeman 1982). Most notably, because it enables them to tie pay flexibly to the company context and company ability to pay. Furthermore, employers tend to favor VPS in order to influence the performance and motivation of employees (e.g. Prendergast 1999). However, while there is evidence that VPS, in which an individual employee's payment is determined by her performance has positive effects on productivity and the performance of companies, i.e. for PbR, there is less evidence on the positive effect of VPS if individual payment depends upon the discretion of the employer (as for PrP) and instead depends upon the performance of others (e.g. a team or the whole company) and in addition, is unconsolidated (as often for TrP) (e.g. Lazear 2000).

As regards the interests in VPS by the employee side, i.e. of employee representatives, there is less consensus in the literature. There are a number of reasons why employee representatives oppose as well as favor the implementation of VPS. For example, employee representatives might oppose the introduction of VPS because it potentially weakens solidarity and unity among employees by increasing earning disparities and thus increases the heterogeneity of the workforce (e.g. O'Halloran 2013), which makes it difficult to organize employees' collective interests. Another reason why employee representatives might be critical towards VPS is that they conflict with a set of work rules about payment and working conditions which employee representatives previously agreed with the employer side (e.g. Kruse and Blasi 1995). Furthermore, employee representatives might oppose VPS because business risk is passed over to employees. In many VPS, pay depends on various factors which are out of the (individual) employees' control (e.g. Gerhart and Milkovich 1992). Finally, employee representatives might oppose VPS because many such systems rely on employers' discretion in the determination of pay.

However, the latter two reasons why employee representatives might oppose VPS refer to a potential shift in the controllability over procedural and substantive pay determination away from employee representatives' influence. They might not necessarily oppose types of

VPS which do not imply a shift in controllability. Also, employee representatives do not necessarily oppose all VPS schemes, particularly if they are able to influence and mitigate any potential adverse impacts on employees as well as make reference to procedural fairness issues (e.g. Marginson *et al.* 2008). Furthermore, VPS is a method of pay determination that enables employee representatives to participate in the distribution of company's profits in a flexible way in addition to other forms, e.g. in addition to base pay that is determined in collective bargaining. This (additional) form of flexible pay determination is especially favorable for employees and their representatives if the company performs well and profits can be distributed instantly, as well as if the process of pay determination is transparent with respect to the company's targets, goals and what the implications are for the behavior of individual employees (e.g. Arrowsmith *et al*. 2008). Furthermore, if pay is distributed in a sustainable way and is not unconsolidated as for many profit-sharing schemes and therefore is continuously dependent upon the discretion of the employer side, there is little or no reason to expect the employee side to object (e.g. Kessler and Purcell 2003). This means that there are various reasons why the employer and employee side favor and/or oppose VPS, depending on the type of VPS.

While employee representatives tend to oppose types of VPS which rely on employers' discretion in the evaluation and determination of pay and limit employee representatives' controllability over the distribution of pay, i.e. of PrP and TrP, this might not be the case for types of VPS which are based on piece rates, provisions, brokerages or commissions, where variable pay depends on easily measured outputs, i.e. for PbR (e.g. Freeman 1982). Thus, employee representatives' interests regarding the implementation of VPS can be expected to vary between different types of VPS. In fact, as the literature points out, employee representatives are also often actively involved in the implementation of different types of VPS (e.g. Arrowsmith *et al.* 2010; Bryson *et al.* 2011).

The previous reasoning on different interests in the implementation of different types of VPS implies that employee representatives favor types of VPS where they maintain

some control over pay determination, such as in particular PbR, rather than types such as TrP where they have less control. At the same time, employers might hold the opposite view and favor VPS such as TrP that allow them greater discretionary leeway, particularly as this might favor them in a changing economic environment. The type of VPS implemented in a specific firm then depends on the relative assertiveness of both parties. In terms of CWB arrangements, it stands to reason that more encompassing systems of CWB, i.e. those that cover establishments in whole sectors or the whole country and therefore include establishments in which the employee side is weak (e.g. Traxler *et al*. 2001), increase the assertiveness of the employee side. Thus we hypothesize (*H3*) that the incidence of types of VPS which are comparatively favored more by the employee side, such as in particular PbR, is higher under more encompassing CWB arrangements such as under sectoral, national and multi-level CWB arrangements, while the incidence of types of VPS favoring the employer side, such as TrP is relatively lower. We further expect that the incidence of PrP ranks in-between. In the following we test the above hypotheses in a multiple regression framework using establishment level data for all EU member states.

Data and Empirical Background

Our data source is the 2013 wave of the European Company Survey (ECS), see Eurofound (2015). This *data* is collected at the *establishment level* and is based on interviews with managers and employee representatives. The ECS was collected in spring 2013 across all current 28 EU member states. This data allows us to test our hypotheses on a comprehensive sample of different companies and establishments which are embedded in very different arrangements of CWB. Also, the data from the ECS is based on a standardized survey which allows a comparison across sectors and countries. Furthermore and against the background that there is a significant within-country, sector and even establishment variation in CWB and VPS,

the establishment level data of the ECS permits the identification and exact analysis of the situation pertaining to an individual establishment. Thus the data provides a more precise indication of the relationship between CWB and VPS than would be possible from national and sectoral studies.

The data is representative for businesses and organizations with 10 or more employees and includes both privately and publicly (i.e. if public authorities own more than 50%) owned companies. The sample size for our estimation sample consists of 18,500 establishments. Most importantly for our research question, the ECS contains detailed information about the CWB arrangement which applies, as well as about different VPS which exist in the establishments. Furthermore the ECS contains detail on various other industrial relations indicators which are relevant. In addition we combine establishment-level information from the ECS with information on characteristics of national CWB, i.e. on the governability of CWB if establishments are covered by a collective agreement, from Aumayr-Pintar *et al*. (2014).

In the following analysis we will investigate the incidence of the three different types of VPS schemes, i.e. of *payment-by-results* (PbR), *performance-related pay* (PrP) and of *team-related pay* (TrP), as well as on the incidence of any VPS along the different CWB arrangements. Regarding CWB we focus on two key dimensions of CWB arrangements: the level of bargaining and the degree of integrative interaction between CWB units at different levels, i.e. whether the interaction is vertically governed or not. This means that we are able to augment previous literature, i.e. Kalmi *et al*. (2012), with respect to the range and validity of the argument as well as with respect to the granularity of the CWB arrangement and different types of VPS. As regards the range and validity of the argument, we investigate if the relationships between CWB and VPS hold independently of the predominant norm. In terms of the granularity, we are able to differentiate further than Kalmi *et al*. (2012), both in terms of the different levels at which CWB takes place (i.e. for all our hypotheses) as well as between

different types of VPS (i.e. in H3), where we can differentiate between PbR and PrP rather than combining them as individual performance-based pay. Also, we consider (in H2) the integrative interaction between actors in CWB as a relevant factor that is able to explain differences in the incidence of VPS in establishments. Furthermore, our data base is considerably larger which allows us to test models in our analysis which consider and control for a wide range of contextual factors.

In the discussion and in our categorization of collective bargaining levels, we refer to the term 'company-level bargaining', which is common in the literature to denote all single employer bargaining arrangements, but in all places when we refer to the ECS and the results, we refer to the term 'establishment' which is the exact unit of analysis of the ECS. Table 1 gives a descriptive overview of the incidence of VPS along the different arrangements of CWB.

- Table 1 about here -

As we can see, the majority of establishments across all CWB arrangements, have implemented some form of VPS. It can also be seen that it is common practice to make use of a mix of VPS, i.e. to have different types of VPS implemented simultaneously, which is consistent with previous studies (e.g. Pendleton and Robinson 2017). However, the incidence varies from 60 percent of all establishments (national bargaining) to 76 percent (company or establishment bargaining). The least common type of VPS over all CWB arrangements is consistently PbR, while both PrP and TrP is more frequently implemented in companies. Some of the patterns observed in Table 1 are in line with our hypotheses derived in the previous section. For example, the incidence of VPS is higher in firms with multi-level bargaining than in all other single-level arrangements.

However, the comparisons in Table 1 are unconditional differences which do not control for any contextual factors such as country, sector, or establishment differences which

were mentioned earlier that affect the relationship between CWB and VPS. The following section considers these patterns in a regression framework that controls for the effects of a range of potential confounders. Table 1A in the appendix presents the means of all control variables used in the analyses. A correlation matrix for all variables can be found in the online appendix.

Modelling Strategy and Results

Against the background that the literature reports convincing evidence that contextual factors matter for the incidence of VPS (e.g. Brown and Heywood 2005; Gunnigle *et al.* 1998; Machin and Wood 2005; Pendleton *et al.* 2009), any generalizable answer to the question of whether CWB and VPS are complements or substitutes can only be found by taking contextual factors into account. Therefore we include in our specification a number of control variables which can be grouped into five categories.

The first category of variables control for *industrial relations* factors other than the structure of CWB, such as the presence of works councils and union representatives in the establishment, in order to control for institutional and procedural differences of establishment level employee representation as well as whether or not the company is a member of an employers' organization (e.g. Heywood *et al.* 1998). We do this as a proxy to control if agreements are extended to the establishment even though the establishment is not directly involved in collective bargaining via its membership in an employer organization (e.g. Traxler *et al*. 2001). The second category of variables control for differences between *firms* that potentially influence the incidence of VPS, such as establishment size, whether the firm is a headquarters or a subsidiary site, and in which sector the firm is placed. We do this as differences in sectors potentially also imply differences in the incidence of VPS, not only because of potentially different sector CWB traditions, but also because of various economic differences between sectors (e.g. Heywood and Jirjahn 2009; Nergaard *et al*. 2009). In addition,

we control for private or public ownership of the establishment, as the literature has documented differences in the incidence of VPS in the private and public sector (e.g. Marsden and Belfield 2010). The third category of variables control for *employment characteristics* and include the percentage shares (in categories) of employees with open ended contracts, who are women, are older than 50, hold a university degree, and work part-time. Although some of these factors are also captured by firm characteristics, they broaden the previous control variables by a further differentiation between different interests of the employee force in VPS (e.g. Jirjahn and Poutsma 2013; Kruse 1996). The fourth category of variables control for the presence of different aspects of high involvement *Human Resource* (*HR*) *practices* and include: whether planning and execution of daily tasks is decided by managers or supervisors or both, whether job rotation can be found and how it relates to skills and training needs and training activities of employees (e.g. Pérotin and Robinson 2003). Given that the incidence of VPS also depends on the financial ability of establishments to afford extra payments (e.g. Blinder 1990) we also control, in a fifth category with establishment *business* variables, for factors which reflect the financial situation. Against the background that the interests of both the employee and the employer side in the implementation of VPS depends on the financial situation of the establishment, the inclusion of these control variables is needed. In addition, in all models we introduce country fixed effects in order to control fully for any eventual country variation. All effects for our focal variables that are reported in the following tables and discussed in the following analyses also hold in more parsimonious models that exclude most control variables.

Some of our variables which refer to institutional characteristics of industries and countries, such as for example CWB at the national level, vary at a higher aggregation level than the establishment level. This potentially leads to an overstatement of the precision of the estimates (Moulton 1986). Given the relatively low number of countries, simply adjusting the estimated standard errors for clustering at the highest aggregation level of the variables of interest is potentially problematic. Therefore we compute standard errors in three different

ways, using the usual heteroscedasticity-robust standard errors, standard errors adjusted for clustering on the country level and a parametric correction factor for the standard errors based on a recommendation by Angrist and Pischke (2009). All three sets of results can be found in the online appendix. All lead to the same substantive conclusions. The tables in the paper use heteroscedasticity-robust standard errors.

In our empirical analysis we first look at the incidence of any type of VPS in different arrangements of CWB and start with a simple specification, (a) which only distinguishes between single-level and multiple-level CWB arrangements which is followed by (b), where three types of single-level bargaining as well as all types of multi-level bargaining are distinguished. The subsequent specification (c), differentiates further by splitting multi-level bargaining into governed and ungoverned arrangements in order to investigate the role of an integrative interaction between different levels of CWB. Our omitted base category is establishments not covered by any collective agreement. However, as for any categorization, that between governed and ungoverned CWB arrangements is not always clear, e.g. for Italy, and there is some degree of uncertainty whether the classification is adequate. To test the robustness of our results to such uncertainty, we re-estimate our models omitting all observations from each country in turn. The tests which are available upon request show that our results are robust to any reclassification and therefore we only show in Table 2 those that reflect the operationalizations and classifications discussed earlier. Furthermore, for reasons of space, in Table 2 we only report the results of our key variables of interest: the estimation results of the control variable in Table 2A are shown in the appendix.

- Table 2 about here -

Regarding the focal independent variables, Table 2 shows that the incidence of VPS varies across different arrangements of CWB. In model (a) we see from the coefficient for

multi-level bargaining that the incidence of VPS is considerably and significantly higher in establishments which fall under collective agreements that originate from multi-level CWB compared with establishments in which CWB is absent. We also see that the incidence of VPS is not significantly different in establishments which are covered by collective agreements that originate from single-level CWB. In model (b), single-level CWB arrangements are differentiated according to the level at which bargaining takes place and it can be seen that the incidence of VPS in establishments which are covered by a company and sector level agreement is not different to establishments without any collective agreement. We also see that the incidence in VPS is lower in establishments which are covered by a national collective agreement compared to establishments which are not covered by any agreement at all.

The latter result is in line with research by Kalmi *et al*. (2012) that in some centralized CWB arrangements which include the national level, institutional norms and regulatory features of the CWB arrangement and also the CWB system itself can have an inhibiting effect on the implementation of VPS. The implication of the results shown in (a) and (b) for our first hypothesis (*H1*), i.e. the incidence of VPS is higher in establishments in which pay is determined via any CWB arrangement compared to establishments without any collective agreement, is that it can only be conditionally accepted, as it holds for multi-level but not for single-level CWB arrangements. For single-level CWB arrangements, the hypothesis must be rejected as the incidence of VPS for company and sector level CWB is similar to no CWB at all. Moreover, for national CWB the incidence is even negative. The latter result might be explained by the fact that the nature and topics covered in national level CWB differ both to VPS and pay flexibility. As regards estimation results in model (c) in which multi-level arrangements are split into governed and ungoverned arrangements, we see that in ungoverned arrangements the incidence of VPS is significantly higher, while in governed arrangements the incidence does not differ in comparison to the incidence of VPS in establishments without any collective agreement. This implies that we can fully accept our second hypothesis (*H2*), i.e. the

incidence of VPS is higher for ungoverned CWB arrangements but not necessarily for governed arrangements.

Table 2A in the appendix shows the estimated coefficients for all control variables, ranging from firm, business, industrial relations, employment, and HR practices, as suggested in the literature and discussed before. As can be seen, many of the control factors are able to explain substantial differences in the incidence of VPS. Without being able to discuss the estimation results of all control variables in detail we will focus in the following on the industrial relations characteristics but would like to emphasize that the estimates of all other control variables are generally in line with relevant literature.

As regards the role of industrial relations factors, we see that if the establishment is a member of an employers' organization, the incidence of VPS is significantly higher. As membership in an employers' organization was argued to be an indicator for the involvement of establishments in collective bargaining, or at least to have same say in the collective bargaining process and outcome, this positive relationship between membership of an employers' organization and the incidence of VPS suggests that if establishments are collective bargaining makers rather than takers, they more actively implement VPS. Furthermore, we also see that if a works council exists in the establishment, the incidence of VPS is significantly higher. However, as regards the presence of a trade union representative in the establishment, the incidence for VPS is significantly lower than in the case of its absence. On the one hand, the result that different types of representatives of the employee side at establishment level have different, i.e. opposite, effects on the incidence of VPS confirms literature which underlines that no universal relationship exists (e.g. Barth *et al*. 2008). On the other hand, it also points towards the need for a more differentiated analysis with respect to the interaction of different types of employee representatives with the wider industrial relations system. As regards the need for a more differentiated analysis of different types of employee representatives on the incidence of VPS, there is clear evidence in the literature that the industrial relations framework

clearly matters. For example Arrowsmith *et al*. (2010) show that in some countries, e.g. Austria, works councils are (legally) equipped with the right to negotiate the implementation of VPS if supported by a higher-level collective agreement, while in others countries, e.g. Spain, this right is not only opaque but also dependent upon wider trade union support. Furthermore, as shown for example by Nergaard *et al*. (2009), the role of different types of employee representatives with respect to the implementation of VPS also depends on how governed the interaction between the company and higher level of collective bargaining is, as well as if (or not) VPS is already an integral part of a higher-level collective agreement. Such a detailed analysis on the role of different types of employee representatives would go beyond the scope of this analysis which concentrates on the role of the CWB arrangement. In any case, this implies for the interpretation of the estimates of our control variables that any inferences on the role of works councils and trade unions *per se* should be made with much caution, as a differentiated analysis between different types of works councils and the role of trade unions in different countries, as well as in interaction between trade unions at different levels, would be needed in order to be able to draw reliable conclusions.

We also hypothesized in *H3* that the incidence of VPS will vary regarding different types of VPS. In the following discussion we concentrate on the association between different CWB arrangements and the relative incidence of each type of VPS. Table 3 shows the estimation results which are based on the same specifications as in Table 2. For reasons of space, we do not show estimation results for the control variables but focus on the focal independent variables. We also concentrate on the three different types of VPS alone rather than combinations of them. As we are particularly interested in the question of whether the associations between CWB arrangements and the incidence of VPS differs across the three types, we formally test the equality of coefficients across the three equations in a seemingly unrelated regression (SURE) framework (e.g. Cameron and Trivedi 2010). As will be discussed in more detail below, we cannot reject the Null of equal effects across outcomes for PbR and

PrP, but find statistically significant differences in effects between PbR on the one hand and TrP on the other. Specifically, the effects of national CWB and governed multi-level CWB are statistically different at the conventional levels of significance (i.e. up to a 10 % significance level). This result supports our conjecture that different interests of employers and employees might lead to differences in the relative incidence of the polar cases of VPS, i.e, PbR on the one extreme and TrP on the other. Furthermore, we also estimated a trivariate Probit, where we allowed the unobservables across the three outcome equations in Table 3 to be correlated. The results lead to the same substantive conclusions and are in the online appendix.

- Table 3 about here -

By examining the coefficients which are significant in Table 3 and by comparing them with the coefficients of the same category of CWB in Table 2, it is apparent that the relationships between CWB arrangements and PbR and PrP are very similar to those found in Table 2 for any VPS. The only difference is that the coefficients for national level bargaining are no longer consistently significant for both PbR and PrP. For PrP, we also find less of a difference between the effects of governed and ungoverned multi-level CWB than for PbR and in Table 2.

For TrP however the picture is slightly different. In line with H3, we find more strongly negative links between more encompassing (higher-level) CWB arrangements. This finding is also supported by the formal tests of equality of coefficients across the 3 models, which shows statistically significant differences in the models for TrP on the one hand and PbR and PrP on the other. These results suggest that types of VPS which are characterized by a relatively high degree of employee side control over pay determination, i.e. PbR, are more commonly implemented in establishments compared with TrP in which employees and their

representatives have relatively little control over pay determination and are dependent upon continuous employers' discretion.

Conclusions and Implications

In this paper we have analyzed differences in the incidence of VPS *per se* as well as for different types of VPS in establishments dependent on the institutional structure and the procedures of the CWB arrangements in which they are embedded. Our analysis and hypothesis tests, which were conducted on the basis of comprehensive and representative establishment level data from all EU member states, showed that companies are actively using VPS to compensate for possible flexibility constraints which emanate from different CWB arrangements. Specifically, we were able to show that in multi-level CWB arrangements the incidence of VPS is higher compared to single-level CWB arrangements (as well as in the absence of any CWB). Moreover, amongst multi-level arrangements, ungoverned arrangements were associated with a higher incidence of VPS as compared to those with governed arrangements (and also single-level arrangements). The distinction between ungoverned and governed arrangements has not previously been investigated in a quantitative analysis. Since we expected ungoverned multi-level arrangements to constrain establishments' flexibility, this result confirmed our hypotheses that VPS is implemented in such arrangements to compensate for any flexibility loss due to one or more collective agreements which apply. Furthermore, we were able to augment and generalize results and reasoning from previous studies on the relationship between CWB systems and different types of VPS (e.g. Kalmi *et al*. 2012) since we showed that (nowadays) the effect of CWB arrangements on the incidence of VPS *per se* as well as with respect to different types of VPS, holds independent of the predominant norm and level of the national CWB system in which establishments are embedded.

The result of our analysis, that VPS is common in multi-level CWB arrangements is of particular interest for two reasons. First, because multi-level arrangements are becoming increasingly common in all EU member states due to recent institutional reforms (e.g. Brandl and Bechter 2018) and therefore their efficacy regarding their ability to guarantee wage flexibility needs to be clarified. Second, because multi-level CWB arrangements were sometimes critically portrayed in terms of their ability to enable wage flexibility (e.g. Boeri 2014; OECD 2018). Against this background our result that multi-level CWB, so long as relations between levels are governed, and VPS are compatible is of particular relevance.

These results also exemplify the advantages of analyzing a comprehensive country sample which allowed us to carry out a fine grained analysis with generalizable results. Future research could make further distinctions as the ECS did not allow us to differentiate within establishments between different groups of workers. Nevertheless, our results provide solid, systematic and comprehensive evidence on the efficacy of labor market institutions such as CWB institutions which could inform public policy debates. The analysis here contributes to and continues both old *academic debates* about the role and effects of different labor market institutions as well as on necessary reforms (e.g. Blanchard 2006) as well as to *policy oriented debates* by national and international policy makers such as the Organization for Economic and Co-operation Development (OECD), European Commission (EC) and International Monetary Fund (IMF) which all stress that institutional reforms should increase wage flexibility (e.g. Arpaia and Mourre 2009; Blanchard *et al.* 2014; OECD 2018). More precisely, the results here are directly relevant for current attempts to reform CWB arrangements in Europe in order to enable companies to react quickly to changing market conditions and shocks in a variable and flexible way (e.g. Heyes 2013, Lewis 2009). For this reason, the EC encouraged national policy makers to reform CWB systems to enable companies to vary the demand for labor as well as to tighten links between employee payment and performance criteria by fostering the implementation of VPS (e.g. European Commission 2009). The results here show that in

establishments in which collective agreements are struck at multiple levels, the incidence of VPS is even higher than in companies in which employees are covered by no collective agreement at all.

The bottom line however is that our analysis clearly shows that VPS and CWB are not contradictory, but compatible, even though the relationship is dependent not only on the type of VPS but fundamentally on the underlying institutional structures and procedures of the CWB arrangement or system.

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Tables

Table 1. Summary Statistics

	Percentage of companies	Percentage of companies with			
		Any variable pay system	**Payment by results (PbR)**	**Performance-related pay (PrP)**	**Team-related pay (TrP)**
No collective bargaining	38	72	42	52	50
Single-level bargaining	42	70	38	49	50
Only *company* bargaining	18	76	41	55	56
Only *sectoral* bargaining	15	69	40	47	49
Only *national* bargaining	10	60	28	42	40
Multi-level arrangements					
Multi-level bargaining	20	75	44	55	56
Governed multi-level bargaining	7	78	45	59	58
Ungoverned multi-level bargaining	13	73	43	53	55
Observations	18,524				

Note: The figures on the incidence of VPS are based on the question to (human resource) managers in establishments: "Now I am going to read out certain variable payment options on top of basic pay that might be in place in your establishment. Could you please tell me for each of these options, whether or not they are available to at least some employees?". The options given were: "Payment by results, for example piece rates, provisions, brokerages or commissions", "Variable extra pay linked to the individual performance following management appraisal", "Variable extra pay linked to the performance of the team, working group or department", "Variable extra pay linked to the results of the company or establishment (profit sharing scheme)". The latter two categories were collapsed in the analyses as they are capturing the non-individual performance. The answer categories were: "Yes", "No", "Don't know", and "No answer". The information on the incidence of the CWB level in establishments are analogously based on the question "Are employees in this establishment covered by any of the following collective wage agreements?". The following agreements/options were given: "A collective wage agreement negotiated at the establishment or company level", "A collective wage agreement negotiated at the sectoral or regional level", "A national cross-sectoral collective wage agreement". The answer categories were: "Yes", "No", "Don't know", and "No answer". Observations with replied "Don't know" and "No answer" are generally dropped from the estimation sample. Information on the governability of CWB is based on Aumayr-Pintar et al. (2014).

Table 2. Collective Wage Bargaining and the Incidence of Variable Pay Systems

	Models		
	(a)	**(b)**	**(c)**
Differentiation between levels:			
Single-level bargaining	-0.001		
	(0.008)		
Only *company* bargaining		0.015	0.016
		(0.010)	(0.010)
Only *sectoral* bargaining		-0.008	-0.009
		(0.011)	(0.011)
Only *national* bargaining		-0.034***	-0.032**
		(0.013)	(0.013)
Multi-level bargaining	0.033***	0.028***	
	(0.010)	(0.010)	
Differentiation in governability:			
Governed multi-level bargaining			-0.003
			(0.016)
Ungoverned multi-level bargaining			0.043***
			(0.012)
Pseudo R^2	0.1433	0.1439	0.1442
Observations	18,524	18,524	18,524

Note: Probit average marginal effects, robust standard errors in parentheses. */**/*** denote statistical significance on the 10 % level, 5% level, and 1% level. All estimates control for country fixed effects as well as further control variables which are listed in Table 2A. Reference category for CWB is no collective bargaining.

Table 3. Collective Wage Bargaining and the Type of Variable Pay System

	Models		
	(a)	**(b)**	**(c)**
Differentiation between levels:	**Outcome: Payment by results (PbR)**		
Single-level bargaining	-0.010		
	(0.009)		
Only *company* bargaining		-0.006	-0.005
		(0.011)	(0.011)
Only *sectoral* bargaining		-0.010	-0.013
		(0.013)	(0.013)
Only *national* bargaining		-0.024	-0.023
		(0.015)	(0.015)
Multi-level bargaining	0.048***	0.047***	
	(0.012)	(0.012)	
Differentiation in governability:			
Governed multi-level bargaining			0.021
			(0.017)
Ungoverned multi-level bargaining			0.061***
			(0.013)
Pseudo R^2	0.0837	0.0838	0.0840
Differentiation between levels:	**Outcome: Performance-related pay (PrP)**		
Single-level bargaining	-0.004		
	(0.009)		
Only *company* bargaining		0.011	0.011
		(0.011)	(0.011)
Only *sectoral* bargaining		-0.019	-0.020
		(0.013)	(0.013)
Only *national* bargaining		-0.025	-0.024
		(0.015)	(0.015)
Multi-level bargaining	0.054***	0.049***	
	(0.012)	(0.012)	
Differentiation in governability:			
Governed multi-level bargaining			0.038**
			(0.017)
Ungoverned multi-level bargaining			0.055***
			(0.014)
Pseudo R^2	0.0840	0.0840	0.0840
Differentiation between levels:	**Outcome: Team-related pay (TrP)**		
Single-level bargaining	-0.016*		
	(0.009)		
Only *company* bargaining		0.002	0.003
		(0.011)	(0.011)
Only *sectoral* bargaining		-0.027**	-0.030**
		(0.012)	(0.013)
Only *national* bargaining		-0.051***	-0.049***
		(0.015)	(0.015)
Multi-level bargaining	0.030***	0.025**	
	(0.011)	(0.011)	
Differentiation in governability:			
Governed multi-level bargaining			-0.024
			(0.017)
Ungoverned multi-level bargaining			0.050***
			(0.013)
Pseudo R^2	0.0943	0.0946	0.0946
Observations	18,524	18,524	18,524

Note: Probit average marginal effects, robust standard errors in parentheses. */**/*** denote statistical significance on the 10 % level, 5 % level, and 1 % level. See notes in Table 2 which apply also here.

Appendix

Table A1. Mean of control variables

Variable	Mean
Industrial relations characteristics	
Member of an employers' organization	0.374
Union representation in company	0.265
Works council present	0.265
Firm characteristics	
Industry classification (Ref = Manufacturing)	
Construction	0.085
Commerce and hospitality	0.241
Transport and communication	0.070
Financial services and real estate	0.044
Other services	0.220
Public sector	0.084
Establishment size (Ref = 10-49)	
50-249 employees	0.318
250+ employees	0.150
Establishment type (Ref = Single company)	
Headquarters of a multi-site company	0.206
Subsidiary site of a multi-site company	0.102
Employment characteristics	
Percentage of employees with open ended contract (categories, Ref = none)	
Less than 20%	0.042
20% to 39%	0.027
40% to 59%	0.043
60% to 79%	0.087
80% to 99%	0.389
All	0.392
Percentage of employees who are women (categories, Ref = none)	
Less than 20%	0.308
20% to 39%	0.229
40% to 59%	0.219
60% to 79%	0.135
80% to 99%	0.081
All	0.009
Percentage of employees older than 50 (categories, Ref = none)	
Less than 20%	0.449
20% to 39%	0.304
40% to 59%	0.133
60% to 79%	0.037
80% to 99%	0.009
All	0.001
Percentage of employees with university degrees (categories, Ref = none)	
Less than 20%	0.480
20% to 39%	0.183
40% to 59%	0.081
60% to 79%	0.055
80% to 99%	0.057
All	0.017
Percentage of employees working part-time (categories, Ref = none)	
Less than 20%	0.509
20% to 39%	0.095
40% to 59%	0.037
60% to 79%	0.026
80% to 99%	0.018
All	0.006
HR practices	
Planning and execution of daily tasks decided by (Ref = employee)	
Managers or supervisors	0.556
Both employees and managers or supervisors	0.393
Do any employees rotate tasks with other employees? (Ref = Most do)	
Yes, some do	0.460

No, none do	0.252
No, the high level of required skills or expertise prevents employees from rotating tasks	0.056
Percentage of employees who have received on the job training (categories, Ref = none)	
Less than 20%	0.219
20% to 39%	0.159
40% to 59%	0.101
60% to 79%	0.056
80% to 99%	0.060
All	0.199
Percentage of employees working in jobs that require at least one year of on the job learning to become proficient(categories, Ref = none)	
Less than 20%	0.167
20% to 39%	0.119
40% to 59%	0.089
60% to 79%	0.064
80% to 99%	0.080
All	0.136
Business characteristics	
Financial situation of company (Ref = very good)	0.496
Financial situation good	0.284
Financial situation neither good nor bad	0.077
Financial situation bad	0.014
Financial situation very bad	0.496
Change in financial situation since 2010 (Ref = improved)	
Financial situation remained about the same since 2010	0.382
Financial situation worsened about the same since 2010	0.314

Note: Ref = Reference category.

Table A2. Full control variables, Table 2

	Model (a)	(b)	(c)
Industrial relations characteristics			
Member of an employers' organization	0.022***	0.024***	0.025***
	(0.008)	(0.008)	(0.008)
Union representation in company	-0.022**	-0.025***	-0.025***
	(0.009)	(0.009)	(0.009)
Works council present	0.052***	0.051***	0.051***
	(0.009)	(0.009)	(0.009)
Firm characteristics			
Construction	-0.013	-0.012	-0.011
	(0.012)	(0.012)	(0.012)
Commerce and hospitality	0.034***	0.034***	0.035***
	(0.008)	(0.008)	(0.008)
Transport and communication	-0.029**	-0.030**	-0.030**
	(0.013)	(0.013)	(0.013)
Financial services and real estate	0.015	0.015	0.015
	(0.017)	(0.017)	(0.017)
Other services	-0.012	-0.011	-0.011
	(0.010)	(0.010)	(0.010)
Public sector	-0.142***	-0.140***	-0.140***
	(0.013)	(0.013)	(0.013)
50-249 employees	0.072***	0.072***	0.072***
	(0.008)	(0.008)	(0.008)
250+ employees	0.133***	0.132***	0.132***
	(0.010)	(0.010)	(0.010)
Headquarters of a multi-site company	0.045***	0.045***	0.046***
	(0.008)	(0.008)	(0.008)
Subsidiary site of a multi-site company	0.054***	0.053***	0.053***
	(0.011)	(0.011)	(0.011)
Employment characteristics			
Percentage of employees with open ended contract (categories)			
Less than 20%	0.041	0.042	0.039
	(0.026)	(0.026)	(0.026)
20% to 39%	0.011	0.012	0.011
	(0.029)	(0.029)	(0.029)
40% to 59%	0.020	0.021	0.020
	(0.027)	(0.026)	(0.026)
60% to 79%	-0.004	-0.003	-0.005
	(0.025)	(0.025)	(0.025)
80% to 99%	0.035	0.036	0.035
	(0.023)	(0.023)	(0.023)
All	0.010	0.011	0.010
	(0.022)	(0.022)	(0.022)
Percentage of employees who are women (categories)			
Less than 20%	-0.001	-0.001	-0.001
	(0.021)	(0.021)	(0.021)
20% to 39%	0.010	0.010	0.010
	(0.022)	(0.022)	(0.022)
40% to 59%	-0.018	-0.018	-0.018
	(0.022)	(0.022)	(0.022)
60% to 79%	-0.020	-0.019	-0.019
	(0.023)	(0.023)	(0.023)
80% to 99%	-0.044*	-0.044*	-0.043*
	(0.024)	(0.024)	(0.024)
All	-0.039	-0.041	-0.040
	(0.039)	(0.039)	(0.039)
Percentage of employees older than 50 (categories)			
Less than 20%	-0.001	-0.001	-0.001

	(0.012)	(0.012)	(0.012)
20% to 39%	-0.006	-0.006	-0.006
	(0.013)	(0.013)	(0.013)
40% to 59%	-0.009	-0.009	-0.009
	(0.015)	(0.015)	(0.015)
60% to 79%	-0.041**	-0.042**	-0.042**
	(0.020)	(0.020)	(0.020)
80% to 99%	-0.066*	-0.066*	-0.066*
	(0.036)	(0.036)	(0.036)
All	0.007	0.005	0.003
	(0.100)	(0.101)	(0.101)
Percentage of employees with university degrees (categories)			
Less than 20%	0.056***	0.055***	0.055***
	(0.011)	(0.011)	(0.011)
20% to 39%	0.082***	0.081***	0.080***
	(0.012)	(0.012)	(0.012)
40% to 59%	0.118***	0.117***	0.116***
	(0.015)	(0.015)	(0.015)
60% to 79%	0.103***	0.102***	0.101***
	(0.017)	(0.017)	(0.017)
80% to 99%	0.132***	0.132***	0.131***
	(0.017)	(0.017)	(0.017)
All	0.148***	0.147***	0.147***
	(0.024)	(0.024)	(0.024)
Percentage of employees working part-time (categories)			
Less than 20%	0.004	0.005	0.005
	(0.008)	(0.008)	(0.008)
20% to 39%	-0.036***	-0.035***	-0.035***
	(0.013)	(0.012)	(0.012)
40% to 59%	-0.060***	-0.059***	-0.059***
	(0.018)	(0.018)	(0.018)
60% to 79%	-0.063***	-0.062***	-0.062***
	(0.022)	(0.022)	(0.022)
80% to 99%	-0.077***	-0.076***	-0.076***
	(0.026)	(0.026)	(0.026)
All	-0.111***	-0.112***	-0.112***
	(0.042)	(0.042)	(0.042)
HR practices			
Planning and execution of daily tasks decided by Managers or supervisors	-0.002	-0.003	-0.002
	(0.015)	(0.015)	(0.015)
Both employees and managers or supervisors	0.025*	0.024	0.025*
	(0.015)	(0.015)	(0.015)
Do any employees rotate tasks with other employees?			
Yes, some do	0.002	0.001	0.001
	(0.008)	(0.008)	(0.008)
No, none do	-0.031***	-0.031***	-0.031***
	(0.009)	(0.009)	(0.009)
No, the high level of required skills or expertise prevents employees from rotating tasks	-0.026*	-0.026*	-0.026*
	(0.015)	(0.015)	(0.015)
Percentage of employees who have received on the job training (categories)			
Less than 20%	0.071***	0.071***	0.071***
	(0.010)	(0.010)	(0.010)
20% to 39%	0.091***	0.091***	0.091***
	(0.011)	(0.011)	(0.011)
40% to 59%	0.093***	0.094***	0.094***
	(0.013)	(0.013)	(0.013)
60% to 79%	0.105***	0.106***	0.106***
	(0.015)	(0.015)	(0.015)

80% to 99%	0.123***	0.123***	0.123***
	(0.015)	(0.015)	(0.015)
All	0.085***	0.086***	0.086***
Percentage of employees working in jobs that require at least one	(0.011)	(0.011)	(0.010)
year of on the job learning to become proficient(categories)			
Less than 20%	0.029***	0.029***	0.029***
	(0.009)	(0.009)	(0.009)
20% to 39%	0.047***	0.046***	0.047***
	(0.011)	(0.011)	(0.011)
40% to 59%	0.066***	0.066***	0.066***
	(0.012)	(0.012)	(0.012)
60% to 79%	0.050***	0.050***	0.050***
	(0.014)	(0.014)	(0.014)
80% to 99%	0.059***	0.060***	0.060***
	(0.012)	(0.012)	(0.012)
All	0.016	0.016	0.016
	(0.010)	(0.010)	(0.010)
Business characteristics			
Financial situation good	-0.032***	-0.032***	-0.032***
	(0.010)	(0.010)	(0.010)
Financial situation neither good nor bad	-0.064***	-0.064***	-0.064***
	(0.011)	(0.011)	(0.011)
Financial situation bad	-0.083***	-0.083***	-0.083***
	(0.016)	(0.016)	(0.016)
Financial situation very bad	-0.178***	-0.176***	-0.177***
	(0.030)	(0.030)	(0.030)
Financial situation remained about the same since 2010	-0.042***	-0.042***	-0.042***
	(0.008)	(0.008)	(0.008)
Financial situation worsened about the same since 2010	-0.026***	-0.025***	-0.025***
	(0.009)	(0.009)	(0.009)
Observations	18524	18524	18524

Note: See Table 2 for information regarding estimation details.