



## Occupations, organizations, and the structure of wage inequality in the Netherlands



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### ABSTRACT

Recent studies have identified both occupations and organizations as important structures underpinning wage inequality in the labor market. In this article we investigate how the two structures might work together in explaining inequality. More specifically, we study how organizations affect between- and within-occupation inequality. Using a combination of Dutch linked employer-employee register data and the Dutch labor force survey, we find that organizations are more important in explaining wage differentials between occupations than wage inequality between workers with the same occupation. While organizations are far away from solely driving heterogeneity in pay among workers in the same occupation, we find that the sorting of high-paying occupations in high-paying firms (and vice versa) is an important mechanism by which both structures affect inequality. Our findings emphasize the importance of moving away from an isolated study of occupations or organizations towards an analytical integration of both structures for understanding wage inequality.

### 1. Introduction

Over the last decade, research on wage inequality has seen a resurgence in the social sciences (McCall & Percheski, 2010; Piketty, 2014). The rise of wage inequality in the United States (Morris & Western, 1999; Piketty & Saez, 2003) and Western European countries (e.g., Dustmann, Ludsteck, & Schönberg, 2009) has resulted in a renewed interest in understanding its causes. A substantial literature has identified occupations as the crucial structure underpinning wage inequality. Empirical studies find an increasing divergence of occupational mean wages (Mouw & Kalleberg, 2010; Williams, 2013; but see Kim & Sakamoto, 2008b) and link the growing importance of occupations to differences in skill composition (Liu & Grusky, 2013), tasks performed on the job (Firpo, Fortin, & Lemieux, 2011), and processes of social closure (Bol & Weeden, 2015; Weeden, 2002).

While occupations are argued to be an important driver of wage inequality, recent empirical evidence shows that firms were a major contributing factor to the take-off in wage inequality in several countries as well (e.g., Card, Heining, & Kline, 2013; Song, Price, Guvenen, Bloom, & von Wachter, 2019). For example, growing inequality between what similar workers get paid across firms (“firm-specific wage premiums”<sup>1</sup>) and an increased sorting and segregation of high-wage

workers into high-paying firms are identified as important explanations for growing inequality in Germany.

These findings affirm the long-standing demand from parts of the stratification literature to devote more attention to the role of organizations. Employers vary in the way they structure jobs, how they distribute available resources across internal positions, and whom they hire in the first place (Baron, 1984). From this perspective, occupations represent an incomplete unit of analysis that bypasses fundamental distributional processes taking place at the level of organizations (Baron & Bielby, 1980; Kim & Sakamoto, 2008b; Stainback, Tomaskovic-Devey, & Skaggs, 2010; Tomaskovic-Devey & Avent-Holt, 2018).

While a large literature addresses the link between occupations and wage inequality, very little is known on how occupation-based explanations for wage inequality intersect with other social structures like organizations. The main goal of this study is to understand the interrelation between occupations and organizations during the formation of wage inequality.

Our main contribution is that we explicitly focus on the simultaneous effect of organizations on between- and within-occupation inequality. Organizations may not only drive heterogeneity in pay within an occupation (i.e. inequality among workers with the same occupation) but also affect differences in pay between occupational groups

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<sup>1</sup> That is additional rates of pay that are specific to a firm relative to what their employees could earn in another workplace given their unobserved individual characteristics.

(i.e. inequality between workers with different occupations). How organizations affect within-occupation inequality relates to how wages for workers with the same occupation depend on their workplace. In turn, the effect on the between-occupation inequality sheds light on sorting processes: To the extent that workers in high-paying occupations cluster in high-paying organizations, both structures become conflated during the generation of wage inequality.

Using variance function regressions with occupation and organization fixed effects, we delineate both types of effects in the same analysis. In doing so, we are the first study to compare the relative magnitude of both channels explicitly in order to receive a complete picture of how occupations and organizations relate to each other while generating inequality.

Empirically we rely on a combination of Dutch linked employer-employee register data and the Dutch labor force survey. The wage data from the registers are of very high quality: it comprises the wages of the full workforce, the wages are not top-coded, and there are very few missings. The large number of observations in the register data allow us to estimate firm wage premiums very precisely using an AKM decomposition (Abowd, Kramarz, & Margolis, 1999). The AKM-approach allows to discern the specific effects that organizations have on wages by separately identifying firm and worker fixed effects for a connected set of organizations that are linked by workers moving between them. We use these estimated firm wage effects to trace the impact of organizations on wage inequality between and within occupations and to perform counterfactual analyses: how much (occupational) wage inequality would there be if firm wage premiums would be the same across organizations?

## 2. Occupations and organizations as contrasting explanations

### 2.1. Occupations and wage inequality

Occupations have long been considered as the “backbone of the entire reward system of modern Western society” (Parkin, 1971, p.18) and play a prominent role in stratification research. An ongoing literature has substantiated the case for occupations by empirically demonstrating a substantial amount of variation in mean occupation wages in countries such as the US (Mouw & Kalleberg, 2010; Weeden, Kim, Di Carlo, & Grusky, 2007), the UK (Williams, 2013), and Germany (Bol & Weeden, 2015).

Explanations of wage inequality that focus on occupations rest mainly on the work they carry out. One argument is that occupations represent functional roles in the division of labor that are characterized by distinct skill profiles that these workers possess and tasks that they can perform on the job (Firpo et al., 2011; Liu & Grusky, 2013). Occupations proxy homogenous groups in terms of workers' skills and capacities. As a consequence, unequal wages between occupations arise from productivity differentials that can be traced back to the properties of individual workers (Le Grand & Tåhlin, 2013).

Other scholars argue that occupational wage inequality is explained by structural characteristics of occupations, independent of workers' skills. For example, studies highlight processes of social closure (Parkin, 1979; Sørensen, 1996, 2000). Here the core argument is that occupations represent institutionalized units that engage in rent-seeking by restricting the supply of workers, channeling demand to their services, and signaling the quality of their work (Bol & Weeden, 2015; Weeden, 2002). Occupational actors achieve this by various strategies, for example, by erecting legal barriers in the form of credential requirements or licensure. Such processes generate wage rents in excess of a counterfactual labor market price in a fully competitive market.

On a coarser level of aggregation, Goldthorpe (2000) argues that broader groups of occupations proxy different kinds of employment relationships. Depending on the nature of work performed by occupations, employers design differing contractual arrangements to solve agency problems. Workers in occupations that require high levels of

specialized knowledge and whose work is difficult to monitor can negotiate more favorable contractual arrangements. This is reflected in wage differences, as employers will be inclined to pay an efficiency wage to privileged occupations in order to prevent shirking (Akerlof & Yellen, 1986; Shapiro & Stiglitz, 1984) and losses of investments in human capital (Williamson, 1981).

Albeit for different reasons, the outlined explanations have the common underlying assumption that the occupation is the main structure to focus on in order to understand wage inequality. However, the strong emphasis on occupations is paired with a neglect of organizations. The occupational returns to skills, tasks, and closure as well as their employment relationships are implicitly assumed to be very similar across different organizations. This implies that differences in mean wages between occupations are argued to be a stronger driver of wage inequality compared to variations in pay within these groups.

### 2.2. Organizations and inequality within occupations

Other sociological studies have repeatedly questioned the singular focus on occupations in understanding wage inequality. The exclusive attention to the occupational structure renders important organizational processes invisible that independently influence the dispersion of pay throughout the labor market (Baron & Bielby, 1980; Kim & Sakamoto, 2008b; Stainback et al., 2010). For example, Kim and Sakamoto (2008b) document substantial unexplained wage variation within occupations and make an explicit case for a stronger focus on organizations to account for such within-group inequality.

Why are wages for workers with the same occupation expected to differ across organizations? First, following relational inequality theory (Tomaskovic-Devey & Avent-Holt, 2018), wages are negotiated and set in the context of local social exchanges in actual firms. Here economic resources are pooled from market activity and subsequently distributed among employees. Organizational decisions concerning the allocation of job rewards are seen to depend crucially on a process of ongoing negotiations and the political resources used by actors to legitimize their claims (Bidwell, Briscoe, Fernandez-Matteo, & Sterling, 2013; Cobb, 2015; Tomaskovic-Devey, 2014). In particular, the relative strength of management in relation to other workers is a key factor in generating differing reward distributions across organizations (Avent-Holt & Tomaskovic-Devey, 2010; Shin, 2014).

Such local distributional struggles over organizational resources do not only play out between employers and employees, but also among different occupational groups within the same organization. The division of labor in an organization represents an important arena for the allocation of rewards as well. Differing occupational groups compete for the overall recognition of being the most competent to perform certain tasks (Abbott, 1988, 2005; Collins, 1979), thereby strengthening their overall bargaining position to claim rewards in the local setting of the firm. As seen from this perspective, occupational groups are most clearly defined and delineated based on the concrete division of labor present in their actual workplace (Vallas, 2001, 2006). Following this reasoning, wages of occupations are highly contingent on the firm context. For example, production engineers in firm A might find themselves in a better bargaining position when negotiating wages than the ones working in firm B depending on their degree of involvement with the core product or service of the firm.

Second, research in the tradition of dual labor market theory argues that the economic organization of firms is an important basis of wage inequality (Wallace & Kalleberg, 1981). Scholars have long tried to answer whether independent effects of organizations on wages arise due to their unequal market position in the overall economy. At the core is the argument that differences in profitability between firms result in rent sharing premiums for individual workers (Abowd, Kramarz, & Margolis, 1999; Blanchflower, Oswald, & Sanfey, 1996). This view diverges from the standard competitive model and grants organizations a greater independent role in the shaping of overall inequality by seeing

firms as “wage setters rather than wage takers” (Furman & Orszag, 2015). In crucial contrast to the relative bargaining power arguments, wage rents are seen to be passed on deliberately by management to workers to reinforce productivity (Kristal, Cohen, & Mundlak, 2011). New evidence substantiates that organizations have a pronounced independent effect on labor market returns (Card, Heining, & Kline, 2013; Card, Cardoso, Heining, & Kline, 2017), but particularly in the case of the U.S., this is strongly attributable to sorting processes of workers to firms (Song et al., 2019).

Recent research has also highlighted the underlying mechanisms that lead to a heightened distinction of organizations and the wages they pay. While the dominant position of buyer firms have a depressing effect on the wage structure of dependent supplier firms (Wilmers, 2018), increasingly unequal consumers trigger processes of vertical differentiation of firms within the same product market (Wilmers, 2017).

Both lines of argumentation stress that workers with the same occupation can receive differing wages depending on where they work. For example, a lawyer at a private firm might be able to negotiate a larger paycheck than the one working for a public institution. Rather than paying an encompassing market price for comparable work, organizations are argued to represent different inequality regimes with idiosyncratic wage determination processes that arise out of local social relations and interactions with other firms. Despite these compelling arguments, very little is yet known about whether organizations directly weaken occupations as a structure underlying wage inequality by driving heterogeneity in pay within them.

**H1.** Wage inequality among workers with the same occupation is explained by the organizations they are employed in.

### 3. Occupations and organizations as complementary explanations

The main goal of this article is to understand how occupations and organizations work together in establishing wage inequality. We argue that there are two central mechanisms: (1) sorting, and (2) occupational bargaining power within firms.

#### 3.1. Occupational sorting between firms

The highly stylized delineation of occupations and organizations as two contrasting explanations of wage inequality masks potential complementarities. For one, both structures become blurred when high-wage occupations sort into high-paying organizations and low-wage occupations sort into low-paying organizations. For example, occupations such as finance professionals and cleaners are increasingly likely to work for separate firms that pay their workforce differently. Estimates from German linked employer-employee data shows that 42 % of the increase in wage inequality between occupations over a period of 25 years stems from such sorting processes (Card, Heining, & Kline, 2013). Similar processes of occupational concentration across organizations are also evident in the U.S. (Handwerker & Spletzer, 2015).

Ongoing research has started to scrutinize the origins of these sorting processes. Here scholars point to the increased fissuring of workplaces. Due to heightened pressure in capital markets, profitable firms have shifted their focus on a narrower set of core competencies. At the same time, they have reconfigured their organizational boundaries by relying more strongly on non-standard work arrangements in secondary domains of work (Cappelli, 2001; Weil, 2014). Workers in such non-standard employment relationships like sub-contracting, outsourcing, and temporary help work are argued to be systematically excluded from the revenue streams of the highly-profitable core organization (Cobb & Lin, 2017; Tomaskovic-Devey & Avent-Holt, 2018).

When it comes to low-wage service occupations, outsourced workers earn on average less than their counterparts in the same occupation who work in standard employment relationships and these

losses are linked to differing wage rates paid by firms (Dube & Kaplan, 2010; Goldschmidt & Schmieder, 2017). To the extent that the restructuring of organizational boundaries is selective on occupations, such dynamics result in increased workplace segregation. While high-paying occupations remain with the highly profitable firms and can share into the returns, low-paying occupations become systematically excluded due to withheld organizational citizenship.

On the other hand, externalization of employment might also entail opportunities for specific high-paid segments of the occupational structure (Kunda, Barley, & Evans, 2002). Specialized professional service providers represent organizations with a homogenous occupational workforce that can generate substantial revenue outside of large integrated firms. For example, 54 % of specialized medical professionals in the Netherlands work on a fee-for-service basis that is directly negotiated with hospitals (Wammes, Jeurissen, Westert, & Tanke, 2017). Such arrangements might come with an advantage of securing larger returns for professionals by dictating their terms of the deal as a unified collective, thereby underscoring the idea of occupations as actively operating economic interest groups (Weeden & Grusky, 2005). The benefits of subcontracting for professionals is highlighted by the fact that professional service firms often carry the characteristic of a “class-inverted” organization where the wages of core workers exceed the ones of management (Tomaskovic-Devey, 2014).

**H2.** Wage inequality between occupations is driven by the distribution of occupational groups across different organizations (sorting)

#### 3.2. Occupational bargaining power within firms

Even when there is limited sorting of high paying occupations into high paying firms, and occupations are equally distributed across organizations, wage inequality between occupations can emerge as a result of organizational pay practices. This applies when firm wage premiums accrue to specific occupations within the high-paying organizations. This reflects the relative bargaining power view on within-firm distributional dynamics but with occupational groups as important categorical distinctions generally underlying such power (i.e. Goldthorpe, 2000; Kalleberg, Wallace, & Althaus, 1981). Following this view, some occupations should benefit more than others from favorable firm contexts across multiple localities.

The occupational literature has stressed that the social recognition of occupations rests on broadly shared values and beliefs in society (Zhou, 2005), thereby transcending organizational boundaries. In turn, external institutional pressures often result in similar practices across a broad set of organizations (DiMaggio & Powell, 1983; Fligstein, 1987). Tilly (1998) highlights processes of emulation in which specific categories underlying inequality are widely diffused across organizations. He argues that widespread forms of inequality carry stronger societal legitimation and are thus more justifiable solutions to local problems of distribution. Thus, when selective occupations benefit due to specific organizational practices like bonus payments or efficiency wages, this increases inequality between occupations first locally and with a wide diffusion of such practices in the labor market also globally.

Empirical research has abundantly demonstrated the presence of such interactive effects between organizational practices and occupational bargaining power. Profit-sharing schemes, as well as employer-provided benefits, favor in particular managerial and professional occupations (Hanley, 2011; Kristal, 2017) and these bonus payments increasingly accrue to the workers in the upper strata of the organizational pay-distribution (Schweiker & Groß, 2017). A smaller dispersion of industry wage premiums is found among lower occupational classes, while at the same time the margin is increasing for the higher classes, thereby being indicative of growing differences in the ability to profit from rent-sharing practices within firms (Kim & Sakamoto, 2008a; Morgan & Tang, 2007).

Managerial occupations benefit from labor-cost cutting employment

practices both in terms of employment opportunities and remuneration that bring workers in other occupations under heightened income insecurity (Goldstein, 2012). Moreover, corporate restructuring can have a differential impact on the wage structure of production workers and managers within the same firm (Dencker & Fang, 2016). In short, that occupations represent crucial roles in the distributive outcomes within organizations appears to be a widespread pattern rather than an isolated incidence.

**H3.** Wage inequality between occupations is driven by the differing firm-level bargaining power of occupational groups (organization-occupation interaction)

#### 4. The Dutch labor market context

In the spirit of the polder model, the Dutch labor market is historically characterized by extensive collective bargaining that involves consensual decision-making between unions, employer associations, and the state. Nowadays, around 80 % of all employees are covered by a collective labor agreement (Hayter, 2015). These collective labor agreements are commonly negotiated sector-wide and involve multiple employers. They are often declared generally binding by the government and are in this manner legally extended to all employees in a sector. As such, they contain wage scales that can be linked to specific jobs within the sector in order to determine the actual pay of employees. At the same time, the system leaves room for collective bargaining at the firm-level. Firms can be granted an exemption from sector-wide agreements, especially when firm-specific agreements have been negotiated (de Beer, Been, & Salverda, 2017).

The institutional structure of the Dutch labor market yields important qualifications for our analysis. Due to the predominance of sectoral agreements, the role of firms in the wage determination process is constrained. In that sense, the Dutch context is a stringent test case for the existence of firm effects in a cross-national perspective. Given the strongly centralized wage coordination in the Netherlands, organizations have less capacity to independently influence wages compared to institutional contexts where wage setting is more decentralized, such as in the U.S. Particularly, the impact of firms on heterogeneity in pay within the same occupation should be more limited, especially in the case of occupations that are strongly concentrated in the same sector.

At the same time this does not preclude any form of independent firm effect on wages. The presence of collective agreements first and foremost imposes a shared wage floor across organizational boundaries within a sector. Concerning the wage ceiling, organizations have more leeway in setting their own pay.

Firms have various options to raise wages of their workers. First, opting for a firm-level collective agreement might be an explicit rent-sharing device of successful organizations that elevates pay beyond the wages stipulated in sector-wide agreements. Second, even when falling under sector-wide agreements, organizations can differ to the extent that they grant bonuses or accelerate workers along collectively negotiated pay scales. In addition, employers can top up wages in specific circumstances beyond what is laid down in the collective labor agreements using the instrument of “arbeidsmarkttoelage”. For example, while university professors fall under the collective bargaining agreement of Dutch universities, in specific circumstances (i.e., exceptional scholars) universities can pay wages above the fixed pay laid down in the collective bargaining agreements. Third, a specific set of often high-paying jobs (positions in higher management) are less often covered by collective bargaining agreements at all, thereby leaving room for individualized bargaining within organizations. In support of this argument, potential firm effects are empirically reflected in the fact that negotiated hourly wages lag behind actual hourly wages in the Netherlands, particularly in the finance sector and at the top-end of the wage distribution (Salverda, 2018).

## 5. Data and methods

### 5.1. Data and sample

We use a combination of Dutch register data and the Dutch Labor Force Survey (*Enquete Beroepsbevolking*, (EBB)) for the period 2006–2018. The registers contain precise information on wages and hours worked. Single observations represent jobs during an indicated reporting period that usually comprise a month. Uniquely identified workers may hold multiple jobs at the same time, sometimes with the same employer. A considerable advantage of this data in comparison to similar data from other countries is that wages are not top-coded.

The register data contains an organization identifier that links individual workers to their employer in the public and private sector. The identified organizational units are defined as “factual actors in the production process” (CBS, 2019, p.10) that are externally oriented, autonomous, and maintain an independent accounting. They do not necessarily represent the most proximate workplace of the individual worker. For example, if a supermarket chain centrally pays out wages, its workers will be registered with the headquarters rather than with the local branches of the company. These are the units to which we refer to as organizations and firms throughout the text. We consider this as a viable unit of analysis, given recent evidence that earnings inequality occurs mainly between firms rather than within firms but between establishments (Song et al., 2019).

The Dutch registers do not contain information on the occupations of workers. For this reason, we use the Dutch Labor Force Survey (EBB) which includes occupations measured with the ISCO-08 classification at the 4<sup>th</sup>-digit level. The EBB is a quarterly reported survey with a rotating panel design. In order to facilitate the matching between the labor force survey and the registers, we restrict the EBB sample to one unique observation for each respondent per calendar year.

The analysis focuses on the main job of a person that is defined as the highest paying organization affiliation of a person existing in a given calendar year. This definition affects the data processing of the registers in the following ways. First, we treat multiple job IDs of the same worker at the same organization as one job and sum all earnings and hours. Second, if a person works for more than one organization in the calendar year, we designate the person-organization combination with the highest absolute earnings as the main job. We exclude all other jobs from the analysis. Third, since additional benefits are commonly paid out on an irregular basis (e.g., end of the year), we aggregate all wages and hours for each main job over the full calendar year.

The observations of the EBB and the main job data are merged based on the unique person identifiers and the exact date on which the labor force survey was administered. Main jobs that do not coincide with the timing of the survey are dropped from the analysis. The matched data is pooled over the whole period of available data between 2006 and 2018 and restricted to workers between the age of 16 and 65. In cases, where the same person appears in multiple calendar years due to the labor force survey’s panel design or renewed selection into the sample, we restrict the sample to the first observation in time of that person.

### 5.2. Variables

The dependent variable in the analysis is the logged hourly wage of a respondent. Our wage measure does not contain overwork compensation and -hours.<sup>2</sup> The hourly wages are adjusted for inflation by utilizing the yearly consumer price index (CPI) with 2015 as the reference point. In our analysis, we follow the literature and focus on the variance

<sup>2</sup> Working overtime and its compensation might be unequally distributed across occupations and firms. While this is a potential factor underlying occupation- and firm-based wage inequality that deserves specific attention, we focus here on regular hours to better align with the previous literature.

of log hourly wages as a measure of aggregate inequality (e.g., [Mouw & Kalleberg, 2010](#)).

Our two key independent variables are organizations and occupations. We draw here on the available identifiers and codes as outlined in the previous section. We restrict the analysis to organizations with a size of at least 20 employees to facilitate appropriate cluster sizes. In addition, organizations and occupations with realized cluster sizes below ten respondents in the final sample are dropped from the analysis (e.g. a firm with 20+ actual employees but only 5 workers sampled in the labor force survey between 2006 and 2018.is dropped).<sup>3</sup> Following standard practice, we exclude members of the armed forces from the analysis. The final sample contains 473,469 unique individuals working in 9488 organizations and spanning across 455 occupations (see [Table 1](#)).

In addition to the categorical organization identifiers, we supplement the sample with estimated organization fixed effects from a separate AKM decomposition ([Abowd, Kramarz, & Margolis, 1999](#)). The intuition behind the AKM decomposition is that it estimates organization fixed effects based on workers that switch jobs. By adding person fixed effects, all time-invariant unobserved worker characteristics are controlled for in the model. The AKM decomposition is based on the universe of main jobs of workers aged 16–65 in firms with 20 or more employees found in the register data between 2006 and 2018.<sup>4</sup> We merge the estimated organization fixed effects to the sample based on the organization IDs and use them as a measure of firm wage premiums. We treat these estimates as a general indicator of low-paying and high-paying organizations net of their workforce composition that influences occupational wages.

The individual-level control variables are based on the labor force survey and comprise gender and age. Age is included as a linear and quadratic term in the models. We refrain from further individual-level controls to not over-control for some of the occupational and organizational effects that are, for example, mediated via educational credentials or job tenure.

Three organization-related controls allow us to trace where firm wage premiums emerge in the Dutch labor market. A broad categorical measure of firm size indicates the size of an organization’s workforce corresponding to the calendar year of the sampled worker’s observation. A sector by ownership control indicates whether the organization is privately owned, public, or part of a third segment that comprises non-governmental non-profit organizations. A third measure indicates the industry to which an organization belongs. Our industry variable comprises 19 categories and is based on the first level of the Dutch Standard Industrial Classification (SBI). In addition, we use this measure of industry as a proxy of sector-wide collective bargaining.

The data are weighted by accounting for working hours, representation of calendar years, and organizational characteristics. First, full-time and part-time workers are both included in the analysis, but the observations are weighted by a part-time factor as generally done in the literature (e.g., [Lemieux, 2006](#)). Second, the data is weighted so that observations of each calendar year contribute equally to the analysis. Third, the selection procedure that requires a minimum number of ten sampled cases per organization results in an underrepresentation of smaller organizations (e.g. firms with 20 employees) in the sample. Since we know the true cell sizes of industry–firm size combinations based on the full universe of workers in the register data, we can construct organizational weights to take this into account. We divide

<sup>3</sup> This criterium is easily passed by large firms given the higher chance of sampling multiple co-workers of large organizations while drawing a random sample for the labor force survey. We acquire enough cases for the smallest firms considered (i.e. firms with 20 employees) by pooling observations across calendar years. This sample selection criterium results in an underrepresentation of smaller firms that we account for by constructing weights.

<sup>4</sup> See next section for estimation details.

**Table 1**  
Sample descriptive statistics (weighted), Source: EBB / POLIS 2006-2018.

	Source	n	Mean	SD	Min	Max
<b>Dependent variable</b>						
Log hourly wages (incl. benefits)	POLIS	473,469	2.9794	0.5250	-3.0161	8.5364
<b>Ind. Controls</b>						
Female	EBB	473,469	0.4093		0	1
Age	EBB	473,469	40.1366	12.1586	16	65
<b>Org. Controls</b>						
Firm wage premium	POLIS (AKM model)	473,469	0.0107		-1.6020	0.8202
	<b>Source</b>	<b>N</b>			<b>Min</b>	<b>Max</b>
<b>Structures</b>						
Organizations	POLIS	9488			10	8,641
Occupations	EBB	455			10	19,025

the relative frequencies of main jobs in each industrial sector-size combination in the registers by the relative industrial sector-size frequencies in the sample and use this as an organizational weight. The three weights are all multiplied with the yearly EBB survey weights. The EBB survey weights are rescaled to sum one in each calendar year. These four weights together form the final weight in the analysis.

### 5.3. Methods

We employ variance function regression with occupation and organization fixed effects to model wage inequality, using an approach similar to [Mouw and Kalleberg \(2010\)](#).<sup>5</sup> We begin with a model for the conditional mean of log hourly wages that includes occupation dummies and at a later stage organization dummies:

$$\ln wage_{ijg} = \beta X_{ijg} + \alpha_j occ_i^j + \gamma_g org_i^g + \varepsilon_{ijg} \tag{1}$$

where  $\ln wage_{ijg}$  is the log hourly wage of individual  $i$  in occupation  $j$  and organization  $g$ ,  $X_{ijg}$  is a set of control variables including gender, age, age<sup>2</sup>, and year dummies,  $occ_i^j$  is an occupation dummy variable (one for each  $j$ ),  $\alpha_j$  is the fixed effect of occupation  $j$ ,  $org_i^g$  is an organization dummy variable (one for each  $g$ ), and  $\varepsilon_{ij}$  is a heteroskedastic error term. We recover the estimated fixed effects  $\alpha_j$  and use them as the *mean occupational wage net of controls*.

In a second step, we use the square of the estimated residuals in Eq. 1 as the dependent variable for our model of the conditional variance:

$$\varepsilon_{ijg}^2 \equiv [\ln wage_{ijg} - (\hat{\beta} X_{ijg} + \hat{\alpha}_j occ_i^j + \hat{\gamma}_g org_i^g)]^2 = \phi X_{ijg} + \delta_j occ_i^j + \theta_g org_i^g + \omega_{ijg} \tag{2}$$

We again recover the estimated fixed effects  $\delta_j$  and use it as the *estimated variance of log wages in each occupation net of controls*.

In a third step, the estimated mean and variance fixed effects for occupations are used to calculate the estimates of overall between- and within-group wage inequality, employing the following equation where  $p_j$  is the proportion of workers in occupation  $j$ .

$$Var [\ln wage | occ, X] = \sum_j p_j (\alpha_j - \bar{\alpha})^2 + \sum_j p_j \delta_j \tag{3}$$

$\underbrace{\hspace{10em}}$ 
 $\underbrace{\hspace{10em}}$

Between
Within

<sup>5</sup> In this paper, we focus mainly on a decomposition by occupations. In principle, the same analysis can be carried out while decomposing by organizations. We carried out such an analysis leading to broadly similar conclusions. Estimates are available upon request.

First, we carry out this decomposition simply with the occupation dummies to establish a baseline in terms of their explanatory power for aggregate wage inequality (Model 1). Second, we add the individual-level controls to the model to additionally account for differences in the demographic composition of the groups (Model 2). Third, we add the categorical organization identifiers as an additional covariate. We do so in order to assess how much between- and within-occupation inequality is explained by their composition in terms of organizations (Model 3).

One shortcoming of Model 3 is that it does not allow to discern whether the effect of the organizational composition is mainly driven by organization-specific wage effects or by a favorable composition of workers that would receive higher wages also in any other organization. To contrast between these alternatives, we follow the approach of [Abowd, Kramarz, & Margolis, 1999](#) and estimate an additive worker-organization fixed effect decomposition utilizing the universe of main jobs in firms with 20 or more employees found in the register data between 2006 and 2018.

$$\ln wage_{it} = \psi_{G(i,t)} + \alpha_i + \beta x'_{it} + \varepsilon_{it} \tag{4}$$

where  $\psi_{G(i,t)}$  represents the organization-specific effects,  $\alpha_i$  the worker-specific effects, and  $x'_{it}$  a vector of time-varying observable covariates including age, age<sup>2</sup>, and year dummies. The function  $G(i,t)$  yields the organization  $g$  that employs worker  $i$  in year  $t$ . The organization- and worker-specific effects are separately identified for a connected set of firms that are linked via the movement of workers between firms.  $\psi_g$  is centered with a mean of 0 at the level of organizations. We interpret  $\psi_g$  as a wage premium of firm  $g$  shared by all employees. Some descriptive information on the estimated AKM model is displayed in [Table 2](#).

Having obtained these estimates, we add in Model 4 the firm wage premiums for a more detailed analysis. We employ the same regression framework but include in each step of the estimation  $\psi_g$  as a covariate instead of the organization dummies. The re-aggregated adjusted variance components can then be compared to the components retrieved from the previous specifications (baseline with individual controls and organization dummies) and give us an idea how sorting into high-paying and low-paying organizations affect between- and within-occupation wage inequality.

However, this does not consider potential variations in how far occupations can profit from high-wage firm environments. In order to account for such effects, we drop the assumption of a uniform effect of the firm wage premiums across all occupational groups by allowing for varying slopes. Expressed in terms of the basic equation we add an interaction effect between  $\psi_g$  and the occupation dummies  $occ_i^j$ .

$$\ln wage_{ijg} = \beta X_{ijg} + \alpha_j occ_i^j + \gamma_g \psi_g + \varphi_{jg} \psi_g * occ_i^j + \varepsilon_{ijg} \tag{5}$$

**Table 2**  
Estimation results of the AKM model (Source: (S)Polis 2006–2018).

	AKM model (2006–2018)
<b>Person &amp; organization parameters</b>	
Nr. of person effects (i)	9,525,241
Nr. of organization effects (j)	84,901
<b>Selected parameter estimates</b>	
SD of organization effects	0.1278
R <sup>2</sup>	0.8530
<b>Addendum</b>	
SD of log hourly wages	0.5996
Sample size	80,144,753

Note: Results from separately estimated AKM model with the full universe of main jobs found in the register data between 2006 and 2018 (see Eq. 4). Time-varying covariates include age and age<sup>2</sup>. The sample comprises male and female workers as well as full-time and part-time workers.

We recover the occupation-specific effects of a standard deviation increase of the estimated firm wage premiums on log hourly wages ( $\gamma_g + \varphi_{jg}$ ) to get a general idea whether the effect varies across occupational groups.

In Model 5–6, we compare the effect of the derived firm wage premiums on occupational inequality against a model where we control for industry as a proxy for the level of collective bargaining. If firms independently influence wage inequality beyond partaking in specific sector-wide collective agreements, the measure of firm wage premiums should account for an additional share of variance even after taking industry differences into account.

In a last step, we perform a counterfactual analysis by constructing a fictitious wage distribution as if everyone received the same firm wage premium. We do so by subtracting the point estimate of  $\psi_g$  from the actual log hourly wage of a person:

$$\ln wage_{i [Counterfactual]} = \ln wage_{i [Factual]} - (\psi_g) \tag{6}$$

The derived counterfactual wage of person  $i$  is now lower for persons working in an organization that pays an above-average wage premium and higher for persons working in an organization with a below-average wage premium. With these adjusted hourly wages, we can estimate counterfactual means and variances for each occupational group. The total counterfactual variance components of between- and within-occupation wage inequality can then be explicitly compared to the factual variance components.

## 6. Results

### 6.1. Aggregate wage inequality - occupations vs. organizations

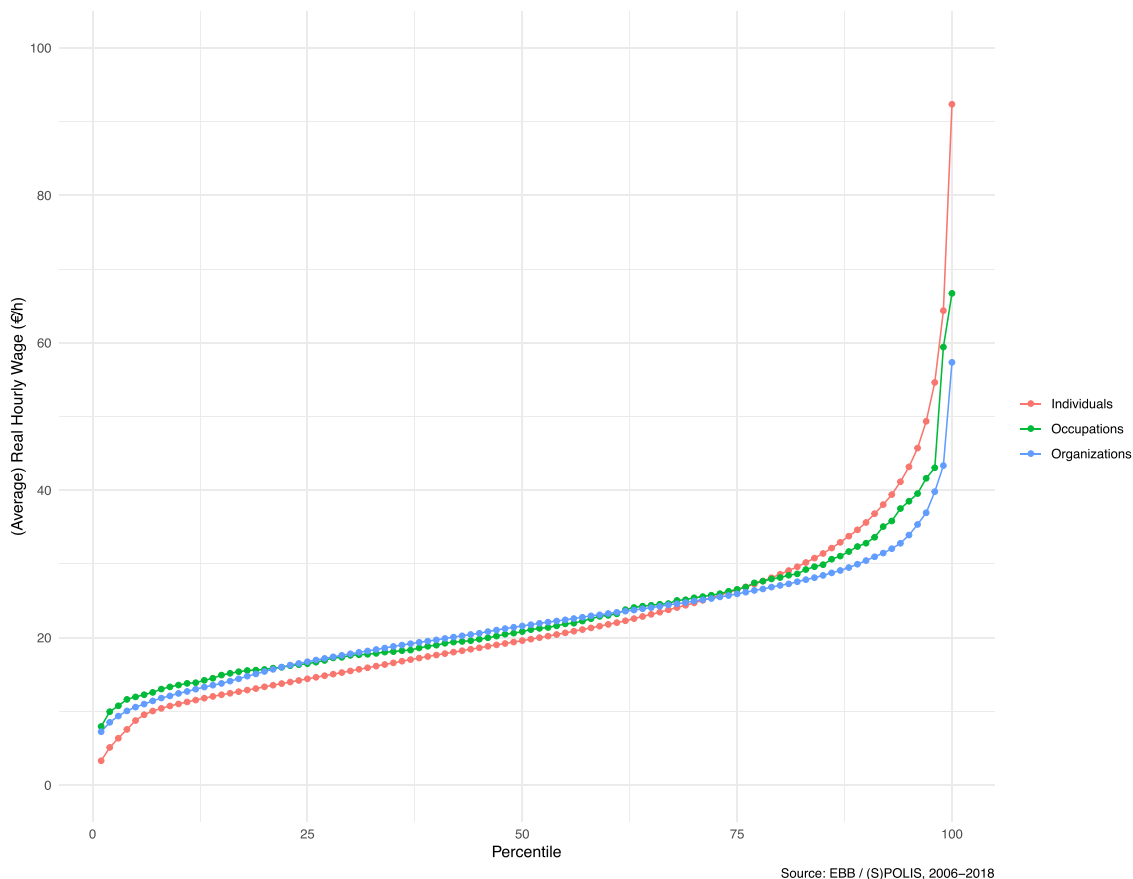
[Fig. 1](#) outlines the shape of wage inequality in the Netherlands. We find a dispersion of individual hourly wages that stretches from a median of 3.30 €/hour in the lowest percentile to 92.35 €/hour in the highest percentile. The overall median is an hourly wage of 19.69 €/hour.

Further, [Fig. 1](#) displays the dispersion of mean occupation- and organization-level wages. In the lowest percentile of mean occupational wages (median of 7.95 €/hour) we find for example street food salespersons (7.01 €/hour) and shelf fillers (7.95 €/hour). The highest paying occupations (99<sup>th</sup> percentile of mean occupational wages with a median of 66.70 €/hour) are, for example, mining managers (64.70 €/hour), trade brokers (68.69 €/hour) and aircraft pilots (68.94 €/hour).

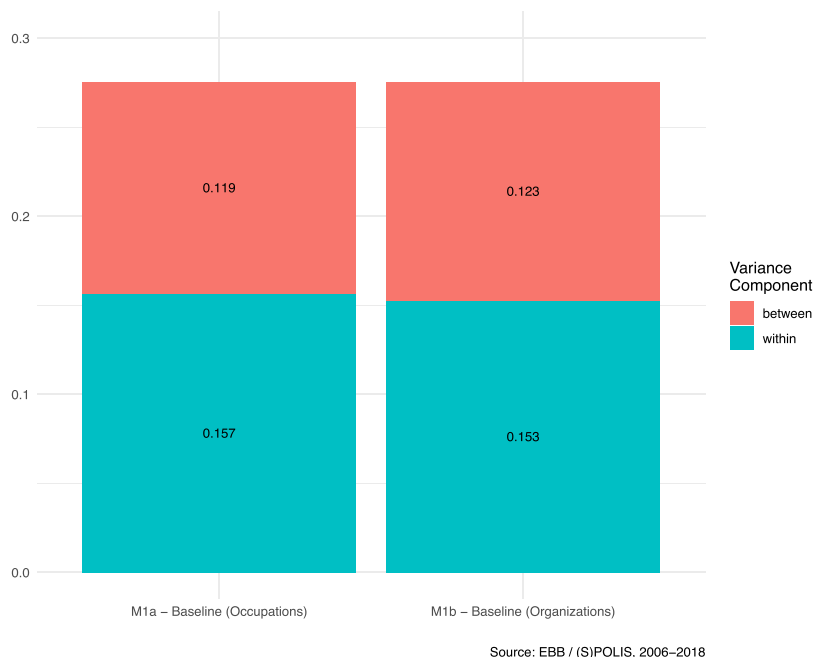
There is considerable wage dispersion across organizations too. Among the organizations with the on average lowest wages (lowest percentile), we find a median of 7.24 €/hour, among the organizations with the highest wages this median is 57.34 €/hour. [Fig. 1](#) clearly indicates that the distributions of mean occupation and mean organization wages overlap strongly, except for the right tail, where mean occupational wages outpace mean organizational wages.

The strong overlap between the organizational and occupational wage distribution is confirmed by a variance decomposition ([Fig. 2](#)). The decompositions are based on regressions where we use either occupations (M1a) or organizations (M1b) as the sole predictor of log hourly wages, and then recover the fixed effects to calculate the variance components (see Eq. 3). Differences between workers in different occupations (the between-component) explain about 43 % of the overall variance in log hourly wages, the rest (57 %) is explained by differences between workers in the same occupation (the within-component). These numbers are very similar for organizations: differences between workers in different organizations explain about 45 % of the overall variance in log hourly wages.

On first sight, this suggests an equal importance of both structures in accounting for wage inequality. The observable importance of both labor market structures appears to be a plausible reason for the lasting



**Fig. 1.** Cumulative distribution of (average) real hourly wages.  
 (Note: Each percentile is represented by the median value among units in that percentile. Percentiles of individuals are based on personal hourly wages. Percentiles of occupations/organizations are based on group averages of real hourly wages. Hourly wages are inflation-adjusted and represent Euros in 2015.)



**Fig. 2.** Estimated variance components by occupations and organizations.  
 (Note: Estimates come from linear regression models predicting log hourly wages and the squared residuals of the preceding model. Two sets of regressions are performed one time with occupations and one time with organizations as sole predictors.)

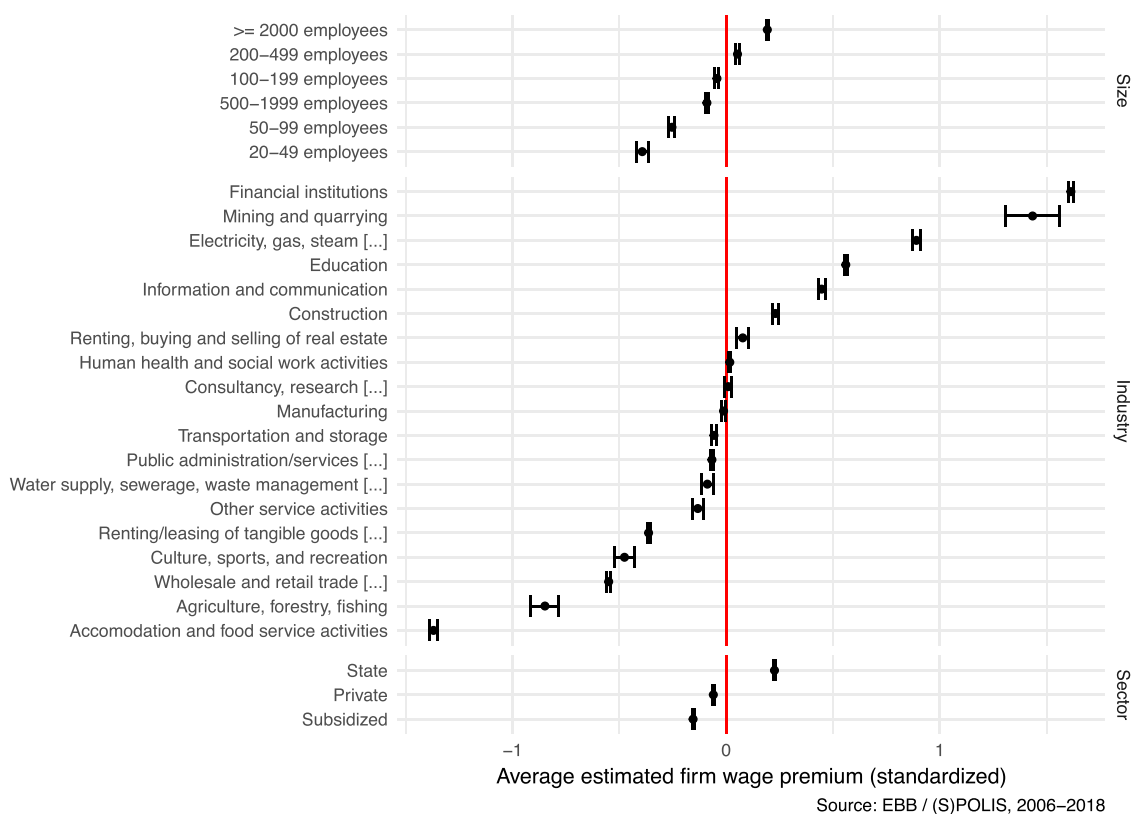


Fig. 3. Average standardized firm fixed effects by various sub-groups.

(Note: Firm wage premiums (i.e. firm fixed effects) are derived from a separately estimated AKM model with the full universe of main jobs found in the register data between 2006 and 2018. The average standardized firm wage premiums by group are based on the sample derived from the EBB.)

separated co-existence of the occupational and organizational literature in sociology.

In a last descriptive step, we look at the firm wage premiums obtained from the AKM model and investigate along what dimensions variations in firm effects emerge in the Netherlands. In Fig. 3, we show how firm wage premiums vary across (a) organizations with different firm size, (b) public or private sector, and (c) industry. First, we find that better paying firms tend to be the larger organizations. Among workers employed in organizations with more than 2000 employees, the average firm fixed effect is 0.19 standard deviations above the mean, while it is 0.39 standard deviations below the mean for firms with 20–49 employees. Second, organizations in the public sector (+0.23 sd) constitute on average more favourable contexts than non-governmental non-profit organizations (-0.15 sd), while private firms take an intermediate position (-0.06 sd). Third, higher-paying firms are concentrated in specific industries such as finance (1.61 sd) and mining (1.43 sd), while lower-paying firms cluster in agriculture (-0.85 sd) and the accommodation and food service industry (-1.37 sd). Importantly, the dispersion of average firm wage premiums is the most substantial across industry categories. This underlines the importance of taking the industry level into account when investigating the effect of organizations on wage inequality between and within occupations in the Netherlands.

## 6.2. Within-occupation inequality and organizations

Do organizations drive heterogeneity in pay among workers that work in a similar occupation in the Dutch labor market? Do wages among general office clerks differ because one works for firm A and one for firm B?

To answer this question, we first estimate a series of fixed-effects models of the mean and variance of wages (Eqs. 1 and 2). We then

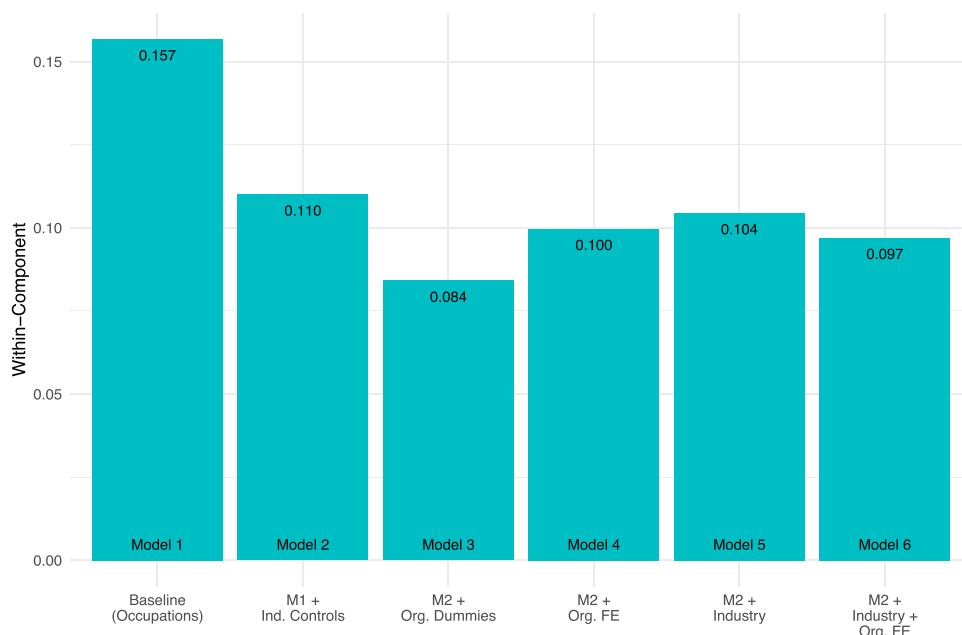
recover the occupation fixed effects and use Eq. 3 to decompose wage inequality within occupations. Fig. 4 shows that the overall variance of log wages within occupations is 0.157 given the baseline model 1 (see also Fig. 2). Adding the individual-level covariates (gender, age, and age<sup>2</sup>) in Model 2 reduces the estimated within-component to 0.110, indicating that roughly 30 % of the inequality among workers in the same occupation can be accounted for by wage differences related to gender and age.

In Model 3, the full set of organization dummies is added to the regression model in addition to the individual-level covariates. The estimated within-component drops further to 0.084. Relative to Model 2, an additional share of around 24 % of the yet unexplained wage inequality among workers in the same occupation can be accounted for by the fact that they work in different organizations.

In Model 4, the organizational dummies are replaced by the firm wage premiums derived from the AKM model. To what extent can we explain wage inequality within-occupations by considering that workers are employed in organizations with varying firm wage premiums? By only adding the firm wage premium indicator the estimated within-component still decreases, but only from 0.110 to 0.100 (a relative reduction in size of 9 % compared to Model 2). In comparison to adding the organization dummies, this model provides a more conservative estimate of the effect of organizations on within-occupation inequality.

In Model 5–6, we benchmark the effect of organizations on within-occupation inequality against industry. Model 5 reveals that controlling for industry alone explains around 5.45 % of within-occupation inequality relative to Model 2, as the size of the estimated component is 0.104. In Model 6, the firm wage premiums are added as another control in addition to industry. The within-occupation component decreases further to 0.097 compared to 0.104 in Model 5 (a relative decrease of 6.73 %). In other words, firms account for a minor portion of

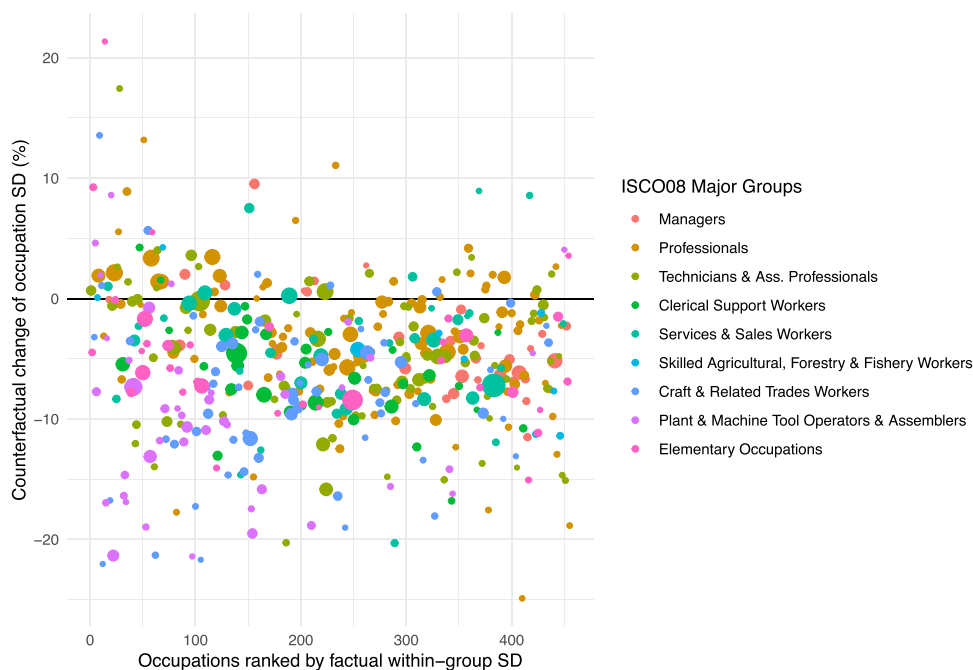




Source: EBB / (S)POLIS, 2006–2018

Fig. 4. Estimated within-occupation variance components.

(Note: Estimates come from linear regression models predicting the squared residuals of a preceding model predicting the log hourly wage. Models contain controls as indicated.)



Source: EBB / (S)POLIS, 2006–2018

Fig. 5. Relative change in the standard deviation of log hourly wages by occupations.

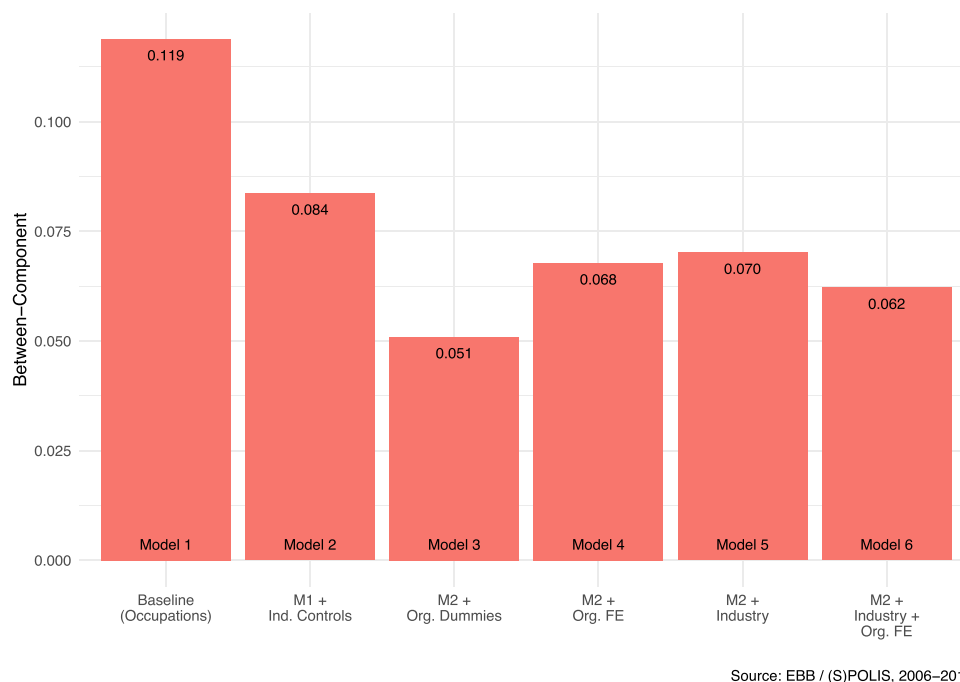
(Note: Counterfactual change indicates the size of the counterfactual relative to the actual standard deviation of log hourly wages. Counterfactual scenario = all firm wage premiums on average.)

within-occupation inequality within the same industry.

Finally, we investigate to what extent wage inequality within each occupation would differ under the counterfactual scenario that organizations pay uniform wages. In this counterfactual scenario, wages are set as if the firm wage premiums would be equal across all organizations. Fig. 5 displays the results. The y-axis shows the relative change between the observed and counterfactual within-occupation dispersion in wages, on the x-axis occupations are ranked based on their factual

within-occupation wage inequality (with the lowest to the highest within-occupation wage inequality from left to right).

Most occupations show a negative relative change, which means that hypothetically eliminating the variation of firm wage premiums decreases the wage inequality among workers in the same occupation in most cases. Around two-thirds of all occupations see a reduction between 0 and 10 % of within-group inequality. At the same time this drop in within-occupation inequality is quite universal across the



**Fig. 6.** Estimated between-occupation variance components.

(Note: Estimates come from linear regression models predicting the log hourly wage. Models contain controls as indicated.)

occupational spectrum and does not seem to be larger for occupations with higher within-occupation inequality. In contrast, the counterfactual within-group inequality is larger in around 17 % of all occupations with street vendors (+21.35 %) and forestry technicians (+17.44 %) being strong outliers. Counterfactual increases in within-group inequality are more predominant in occupations with the lowest actual within-group wage dispersion. The bottom line of Fig. 5 is that the impact of organizations on within-group inequality varies by occupation although mostly with a similar magnitude.

The counterfactual standard deviations can be further used to calculate an aggregated counterfactual within-occupation inequality component. In the counterfactual scenario we find an estimated within-occupation variance component of 0.142, smaller than the observed variance component of 0.157. In other words, total within occupation-inequality would be about 9.5 % smaller if firm wage premiums were equal for all workers.

In summary, organizations do account for a certain portion of within-group inequality of occupations. Around a tenth of the wage inequality among workers in the same occupation stems from them working for different employers, while a large substantial share of within-group inequality remains unexplained by organizations.

### 6.3. Between-occupation inequality and organizational sorting

Does the unequal distribution of occupations across low-paying and high-paying organizations constitute a channel that drives occupational wages apart? Do finance professionals earn higher wages than fast-food preparers partly because they more often work in firms that pay better wages?

In this section, we focus on the between-occupation components of the variance decomposition (Eq. 1–3). Fig. 6 shows that the total variance of log wages between occupations is 0.119 given the baseline Model 1 (see also Fig. 2). With the addition of the individual-level covariates in Model 2, the size of this between-component decreases to 0.084. In other words, around 29 % of the between-occupation wage inequality can be accounted for by the differing demographic composition in terms of gender and age across occupations. For example, the low mean wage of the occupation of shelf fillers is largely explained by

comprising a very young workforce.<sup>6</sup>

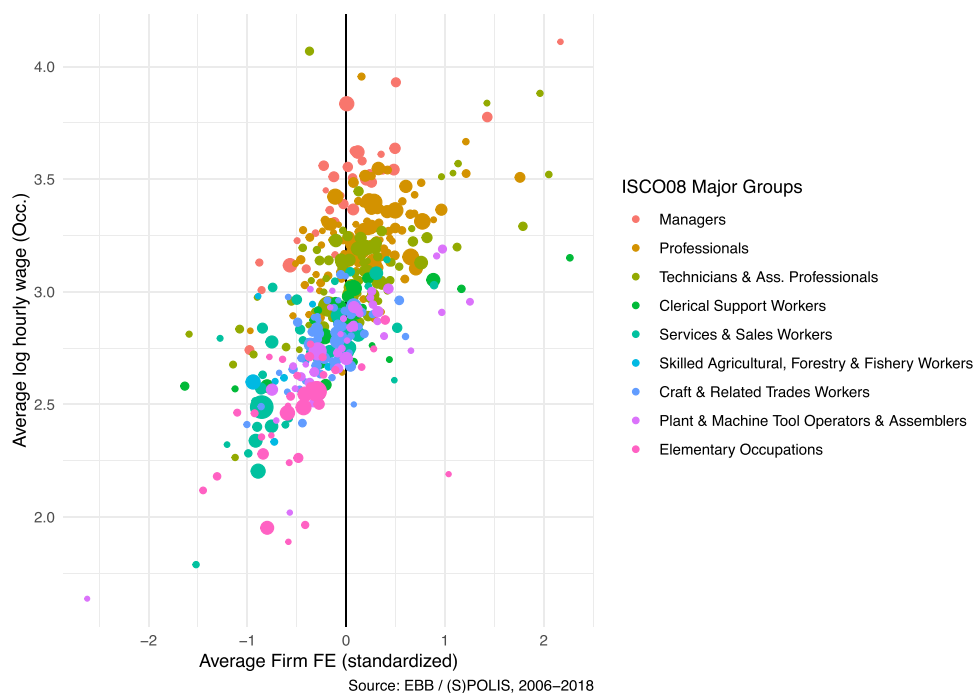
In Model 3, we add the organizational dummies as covariates. The estimated between-occupation component drops to 0.051. Relative to Model 2, around 39 % of the yet unexplained wage inequality between occupations can be accounted for by them working in different organizations. Employing the firm wage premiums derived from the AKM model in Model 4 yields a more conservative estimate with a component size of 0.068. Relative to Model 2, this amounts to a reduction of the between-component by roughly 19 %. In other words, the sorting of occupations into organizations seems to be a substantive aspect for understanding wage inequality between occupations.

In Model 5–6, we benchmark the effect of organizations on between-occupation inequality against the effect of industry. Given Model 5, the between-occupation component drops from 0.084 to 0.070 relative to Model 2. In other words, accounting for the composition of occupations across industries explains an additional share of around 16.67 % of between-occupation wage inequality. In Model 6, we control for both industry and firm wage premiums. Compared to Model 5, the estimated between-occupation component decreases from 0.070 to 0.062. Thus, variations in what organizations pay explain an additional 11.43 % of inequality between occupations after taking the industry level into account.

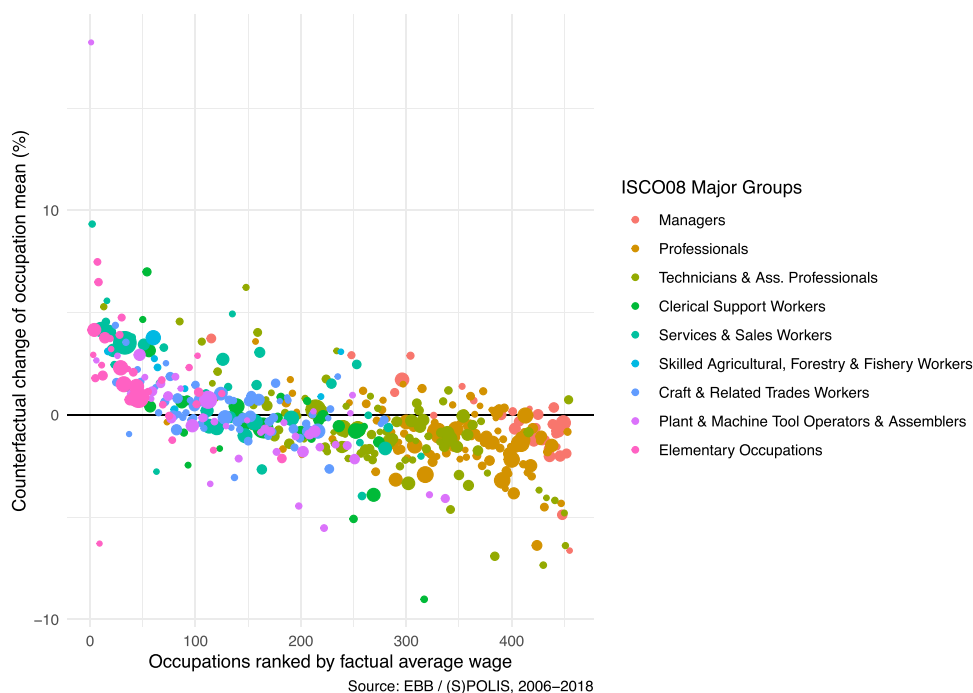
How do organizations affect between-occupation wage inequality? To better understand this, we look at the distribution of firm wage premiums across occupations (Fig. 7). The key finding from Fig. 7 is that the occupations that are on average working in the highest paying firms tend to be the occupations with the highest average wages as well.

Overall, it is mainly the professions, the technicians and associate professionals, as well as some managerial groups that work on average in higher-paying firms. In particular, occupations associated with the petroleum industry (like petroleum and natural gas refining plant operators (with an average firm fixed effect of 2.05 standard deviations

<sup>6</sup> This is related to the presence of youth wage scales in the minimum wage legislation and the collective agreement of the retail sector for workers under the age of 22 in the Netherlands. The average age among shelf fillers in the sample is 18 years.



**Fig. 7.** Average firm wage premium by occupation.  
 (Note: Firm fixed effects are derived from a separately estimated AKM model with the full universe of main jobs found in the register data between 2006 and 2018. The average log hourly wage and the average standardized firm fixed effect by occupation are based on the sample derived from the EBB.)



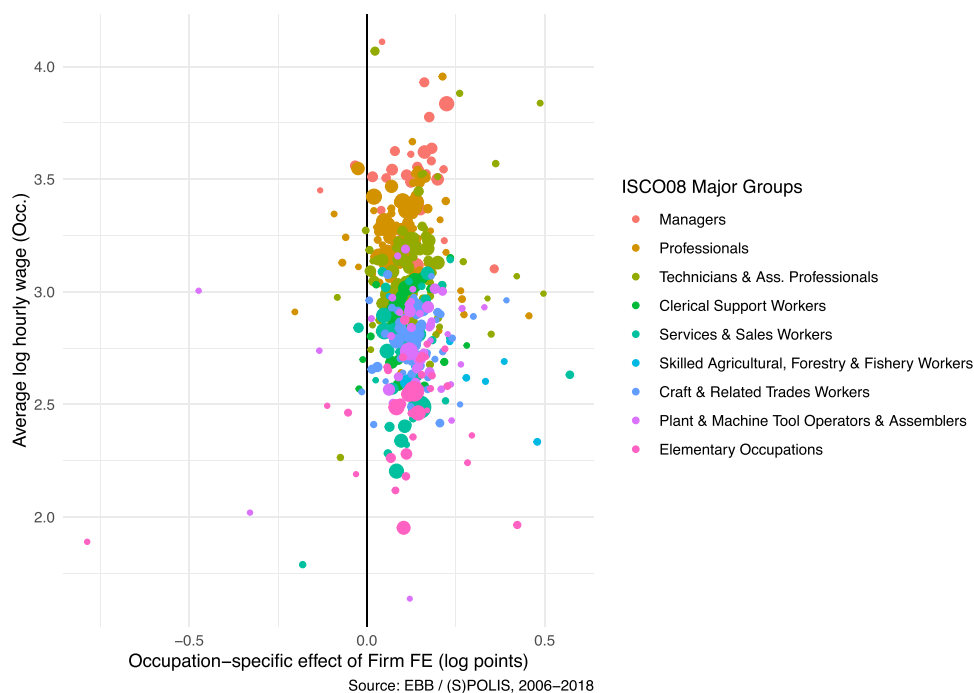
**Fig. 8.** Relative change in average log wages by occupations.  
 (Note: Counterfactual change indicates the size of the counterfactual relative to the actual average log hourly wages. The Counterfactual scenario = all firm wage premiums on average.)

above the mean), and mining managers (2.17 sd) as well as the finance industry (like securities and finance dealers and brokers (1.96 sd), and financial and insurance services branch managers (1.43 sd)) work mostly in firms that pay better wages.

Exceptions among the (associate) professions include occupations such as interior designers and decorators (-0.94 sd), as well as chefs (-1.08 sd). These occupations work on average in low-paying

organizations. The same is true for many occupations that fall in the major group of elementary occupations as well as services and sales workers. Occupations such as domestic housekeepers (-1.28 sd), fast food preparers (-1.31 sd), and crop farm laborers (-1.447 sd) work more predominantly for low-paying firms.

Similar to the within-occupation decompositions, we perform a counterfactual analysis for the differences in wages between



**Fig. 9.** Effect of firm wage premiums conditional on occupations.

(Note: Occupation-specific wage effects for a one standard unit increase of the firm wage premium measure are derived from a linear regression model on log hourly wages with separately estimated firm fixed effects fully interacted with occupational dummies and additional controls (Eq. 6).)

occupations: what would the average log hourly wages of occupations be if wage premiums were equal across all organizations? Fig. 8 shows a clear pattern: counterfactual mean wage increases are concentrated among low-paid occupations, whereas counterfactual mean wages would drop for high-paying occupations. For example, services and sales workers in large occupations like waiters and bartenders (+4.06 %) or cashiers and ticket clerks (+4.17 %) would profit. In contrast, (associate) professions and managerial occupations predominantly face a decrease in average wages.

We calculate the counterfactual between-occupation variance component by summing the squared differences between the counterfactual grand mean and the counterfactual occupation means weighted by group size. The estimated counterfactual between-group component has a size of 0.096 compared to the factual component of 0.119. In other words, the sorting across organizations accounts for around 19.33 % of the inequality between occupations. This indicates that organizations have a stronger relative effect on the inequality between occupations compared to the wage inequality within these groups.

#### 6.4. Heterogeneous effects of firm wage premiums across occupations

As outlined in the theory section, occupational sorting is only one part of the story of how organizations can undergird inequality between occupations. Up to now, the implicit assumption has been that firm wage premiums are equally shared among all employees disregarding their occupation. However, some occupations might be able to reap a more significant slice of the cake compared to their co-workers in favorable firm environments. In order to probe into such interactive effects, we recover the occupation-specific effects of a standard unit increase of the firm wage premium on log hourly wages (see Eq. 5).

As Fig. 9 shows, the point estimates of the occupation-specific effects are quite uniform throughout the occupational structure, providing little evidence for heterogeneous effects. For around 80 % of all occupations, it lies within 0 and 0.2 log points, indicating that the relative wage gains of working in a high-paying organization are

relatively similar across occupations. There is a negative effect of an increasing firm wage premium only in a limited number of occupations. This group partly consists of professions such as general legal professionals (-18.32 %), dentists (-8.80 %), and specialist medical practitioners (-2.47 %). One possible interpretation of this result is that these professions earn more when working for firms with lower general wage premiums for all employees but that have a higher sensitivity for individual performance (i.e., private vs. public service provider).

## 7. Discussion and conclusion

An ongoing debate in sociology centers around the question whether occupations represent a crucial unit in understanding wage inequality relative to other social structures such as organizations (Kim & Sakamoto, 2008b; Mouw & Kalleberg, 2010). At the same time, there is suggestive evidence for a connection of both structures in shaping aggregate wage inequality, particularly due to an increased sorting of high-wage occupations into high-paying firms and low-wage occupations in low-paying firms (Card, Heining, & Kline, 2013; Goldschmidt & Schmieder, 2017).

In this study, we extend existing research on inequality by simultaneously studying occupations and organizations as structures underlying wage inequality. We analyze a combination of Dutch register data and the Dutch labor force survey using variance function regressions to investigate how both structures conjointly influence wage inequality in the Netherlands.

Our findings suggest that variation in what firms pay to their employees (“firm wage premiums”) explains around 10 % of the wage inequality between workers within detailed occupational groups. This means that within-occupation wage differences can to some extent be understood by looking at organizations. At the same time, heterogeneity in pay among workers in the same occupation is not solely driven by firms. In other words, occupations still represent a meaningful structure underlying inequality in the Netherlands whose effect on wages commonly transcend organizational boundaries.

In contrast, we find that organizations leave a stronger mark on understanding wage differences between occupations. Variations in the composition of firm membership and their associated pay premiums across occupations can account for around 20 % of the difference in mean wages between detailed occupational groups. Our results provide strong evidence that high-wage occupations are situated in high-paying firms, while the opposite holds for low-wage occupations. Sorting is an important way by which organizations and occupations work together in establishing wage inequality.

We also find that firm wage premiums have an equal effect across the occupational structure with few occupations being able to profit exceptionally much from such beneficial firm contexts relative to other workers in the same occupation. This suggests that access into these favorable firms appears to be a more pronounced driver of inequality between occupations rather than negotiating a piece of the cake within these firms. Again, this finding underscores that a substantial amount of wage inequality in the Netherlands is a joint product of both occupations and organizations.

How can we interpret these findings in the Dutch context? The finding that organizational effects are substantial in the Netherlands is noteworthy considering the extensive coverage of collective wage agreements in the Dutch labor market. Indeed, in countries where firms have more leeway in setting wages, we might expect even larger effects of organizations. That firm effects remain important in the context of coordinated wage setting becomes clear when we compare the explanatory power of organizations with the explanatory power of industries. Collective bargaining agreements are set at the industry level, but we find that firms account for a substantial portion of inequality between occupations even within the same industry. This re-affirms the demand of sociological scholars to pay attention to firms as important structures underpinning inequality, even in countries where labor markets are strongly coordinated.

Of course, our study comes with limitations, that we use to identify directions for further research. First, we stay largely agnostic about *why* variations in firm wage premiums emerge: why do some firms pay more than others? The dimensions of firm size and ownership (public, private, non-governmental non-profit) account only for a small portion of the heterogeneity in pay premiums among organizations. One possibility is that firm wage premiums reflect differences in the surplus of organizations and thus variations in the amount of overall resources that can be distributed among employees. Investigating the role of distributable resources in shaping unequal organizational contexts remains a high priority for further research.

Second, while we briefly looked at the time trends in wage inequality (see Appendix A2), the co-evolution of occupation- and organization-based inequality over time needs to be scrutinized in more detail. We need more knowledge on whether changes in inequality are

mainly driven by an ongoing sorting of occupations across firms (e.g. via outsourcing), a divergence of firm wage premiums (i.e. increasing inequality among what organizations pay) or both. Discerning these factors will advance our understanding of the processes underlying rising wage inequality.

Third, more research should also be devoted to the presence of firm effects in the context of collective bargaining. For example, why do firm effects on within-group inequality vary by occupations and how is this related to collective agreements? For some occupations, collective agreements establish a common minimum standard of pay that serves as a widely accepted benchmark. For other occupations, the incentives for individual firms to attract and retain the most talented workers might be higher and deviations from common standards more plausible. Consequentially, are the wages of some occupations more sensitive to firm effects given specific occupational properties (e.g. restricted worker supply) that lead firms to individually amend collectively negotiated pay?

Our finding of a strong connection between occupation- and organization-based inequality raises an intriguing conceptual question. Which of the two structures holds the analytical prior in understanding inequality? From the perspective of organizations, firms matter as the immediate environments where resources are pooled, and decisions concerning the shape of employment relationships are made. Distributional outcomes in the labor market cannot be fully understood without taking these aspects into account. At the same time, our findings suggest that occupations are an important indicator of being employed in the most favorable organizations. This suggests that their underlying structure of tasks, skills, and perceived competence serves as an entry ticket to (or grounds of exclusion from) the most favorable firms. To the extent that occupational careers might be increasingly characterized as sequences of working either for high-paying or low-paying firms over the life course, they become a crucial category underlying persistent inequality by themselves.

This tight-knit relationship necessitates to move away from an isolated study towards an analytical integration of both structures in research on wage inequality. Doing justice to the complex interplay between organizations and occupations will help to better understand the processes underlying wage inequality in contemporary society.

## Acknowledgements

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## Appendix

Table A1 and A2

Table A1

OLS regression with Occupation fixed effects and / or organization fixed effects.

	Model 1a		Model 1b		Model 2		Model 3	
	Log Wages	Residual <sup>2</sup>	Log Wages	Residual <sup>2</sup>	Log Wages	Residual <sup>2</sup>	Log Wages	Residual <sup>2</sup>
Female					-0.0585*	-0.0114*	-0.0499*	-0.0057*
					(0.0006)	(0.0007)	(0.0006)	(0.0006)
Age					1.0594*	-0.2213*	0.9449*	-0.2707*
					(0.0038)	(0.0040)	(0.0035)	(0.0037)
Age <sup>2</sup>					-0.8397*	0.2077*	-0.7478*	0.2458*
					(0.0037)	(0.0039)	(0.0034)	(0.0036)
Firm wage premium								
Constant	2.9794*	0.1568*	2.9794*	0.1529*	2.9564*	0.1101*	2.9622*	0.0841*
	(0.0006)	(0.0007)	(0.0006)	(0.0007)	(0.0005)	(0.0006)	(0.0006)	(0.0006)
Occupation FE	x	x			x	x	x	x
Organization FE			x	x			x	x
Year FE					x	x	x	x
Industry FE								
Occ.*Wage premium								
n Observations	473,469	473,469	473,469	473,469	473,469	473,469	473,469	473,469
N Occupations	455	455	455	455	455	455	455	455
N Organizations	9,488	9,488	9,488	9,488	9,488	9,488	9,488	9,488
R <sup>2</sup>	0.431	0.035	0.445	0.071	0.608	0.040	0.711	0.099
Adj. R <sup>2</sup>	0.431	0.035	0.434	0.052	0.607	0.039	0.705	0.079

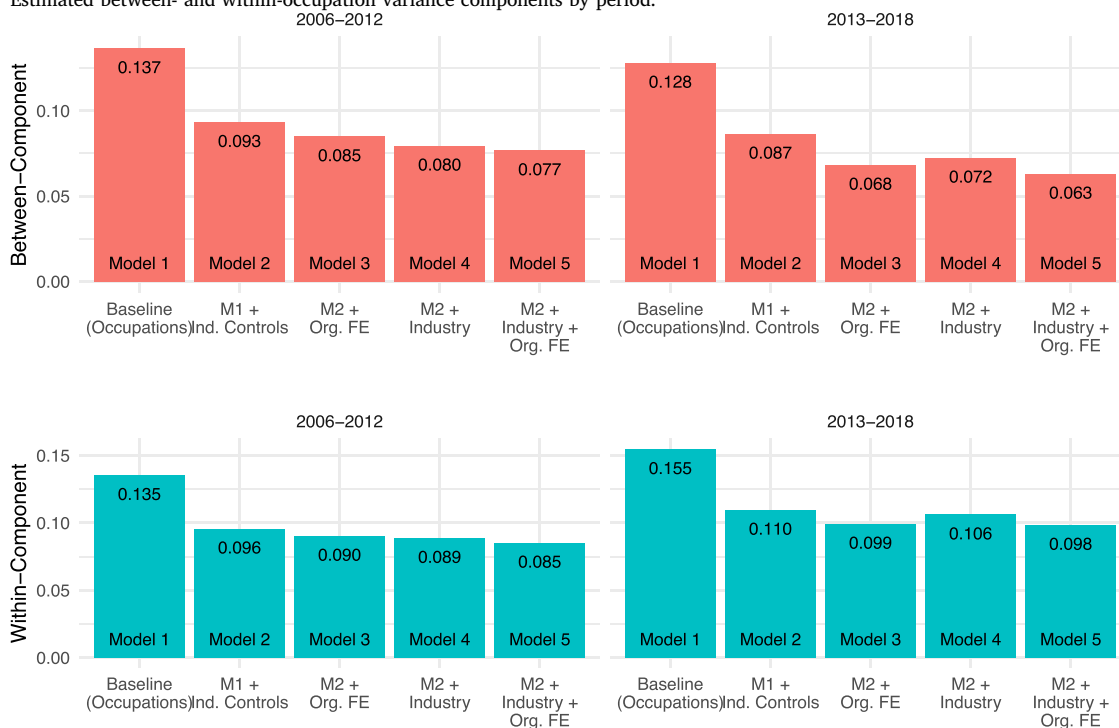
  

	Model 4		Model 4 -Interaction		Model 5		Model 6	
	Log Wages	Residual <sup>2</sup>	Log Wages	Residual <sup>2</sup>	Log Wages	Residual <sup>2</sup>	Log Wages	Residual <sup>2</sup>
Female	-0.0557*	-0.0096*	-0.0549*	-0.0578*	-0.0109*	-0.0547*	-0.0095*	
	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0007)	(0.0006)	(0.0006)	
Age	1.0055*	-0.2222*	1.0027*	1.0222*	-0.2452*	0.9860*	-0.2402*	
	(0.0036)	(0.0038)	(0.0035)	(0.0037)	(0.0041)	(0.0035)	(0.0039)	
Age <sup>2</sup>	-0.7936*	0.2079*	-0.7911*	-0.8134*	0.2275*	-0.7812*	0.2226*	
	(0.0035)	(0.0037)	(0.0035)	(0.0036)	(0.0040)	(0.0035)	(0.0038)	
Firm wage premium	0.1133*	0.0030*	0.1474*			0.1077*	0.0009	
	(0.0005)	(0.0005)	(0.0097)			(0.0005)	(0.0006)	
Constant	2.9609*	0.0997*	2.9617*	2.9585*	0.1045*	2.9598*	0.0970*	
	(0.0005)	(0.0005)	(0.0006)	(0.0006)	(0.0006)	(0.0005)	(0.0006)	
Occupation FE	x	x	x	x	x	x	X	
Organization FE								
Year FE	x	x	x	x	x	x	X	
Industry FE					x	x	x	
Occ.*Wage premium			x					
n Observations	473,469	473,469	473,469	473,469	473,469	473,469	473,469	
N Occupations	455	455	455	455	455	455	455	
N Organizations	9,488	9,488	9,488	9,488	9,488	9,488	9,488	
R <sup>2</sup>	0.647	0.038	0.654	0.622	0.043	0.653	0.041	
Adj. R <sup>2</sup>	0.646	0.037	0.653	0.622	0.042	0.653	0.040	

Standard error in parentheses.

\*p &lt; 0.001.

**Table A2**  
Estimated between- and within-occupation variance components by period.



Source: EBB / (S)POLIS, 2006–2018

Note: Estimates come from linear regression models predicting the log hourly wage. Models contain controls as indicated. The sample is based on 225,470 respondents for the period 2006–2012 and 229,696 respondents for the period 2013–2018. Both samples are restricted to a common set of 358 occupations. Organization fixed effects are calculated based on two separate AKM decompositions for each time period. Organizational weights are calculated based on the relative frequencies during each period.

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