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Introduction

The wage bargaining framework in Belgium is determined by the amended 1996 Law on the Promotion of Employment and Preventive Safeguarding of Competitiveness. The Law was enacted in 1996, with the aim of aligning hourly labour cost developments in Belgium with expected trends for its three main trading partners, i.e. Germany, France and the Netherlands. The major change introduced in the 2017 amendment of the Law is the way in which the maximum available margin for real wage costs growth is calculated. This tightly regulated framework for wage negotiations is the counterpart to keeping automatic wage indexation. Because wage bargaining in Belgium is about real wage rises, while in the neighbouring countries it is about nominal increases, there is less bargaining room and the rigidity of real[1] wages is higher.

With this highly centralised and regulated wage-setting system, is there still enough wage differentiation in Belgium? How well are workers' characteristics reflected in their wages? The second question is about the role of productivity in wage-setting.

We examine these issues empirically and to this end use a matched employer-employee dataset combining the Structure of Earnings Survey (SES), a linked employer-employee dataset on wages, with the Structural Business Statistics (SBS) which contain various indicators on firm performance and other financial data at the individual company level. Both surveys are collected by Statbel[2].

Although the interprofessional level is a key part of wage-setting, consultations in the sectoral joint committees remain essential. Within these committees, sectoral realities shape not only the outcomes of interprofessional talks on wage margins but also inform negotiations on other key elements, such as hours worked and training. Sector-based minimum wages are also set at this level – an important springboard for wage differentiation between joint committees.

Unlike wages, productivity is for the average person more of an abstract notion without immediate and obvious measurement. Also, productivity figures at the individual level are difficult to obtain for the researcher. The production function approach proposed by Hellerstein and Neumark that we use here has the advantage of direct measurement of worker productivity, although at the firm level. The variation in time and between firms of workforce characteristics is used to identify employee characteristics that matter for productivity. As firm-level

1 In the remainder of this paper, all the nominal variables have been deflated. The estimated relationships concern variables in real terms.
2 The authors would like to thank Pieter Vermeulen and the microdata team from Statbel for providing ready access to the data.

productivity also depends on other factors than labour quality, like the size and the age of the firm, the capital-output ratio, the industry, the business cycle, etc., our model also controls for these factors.

The empirical analysis shows that the determinants of (real) labour productivity have impacts with the same sign as their effects on the (real) wage bill.

Still, wage (cost) differentials between industries in Belgium are sizeable although broadly in line with productivity differences. On the other hand, wage differentiation between firms within the same industry is limited, as shown by the OECD in its recent Productivity Review of Belgium (2019). In any case, firms always have the possibility of negotiating a collective agreement in-house. According to our analysis, firm-level collective agreements are positively related to firm productivity but also weigh on their wage bill.

The issues addressed in this paper are important for economic policy. Wages play an important role as an incentive for worker mobility. As differentiation in wages in Belgium is limited, workers from the least performing companies/industries may be discouraged from moving to a more productive employer/industry, while the best-performing firms may find it difficult to attract the staff they need.

From a macroeconomic perspective, there must be a link between productivity and wages. So, there should be some alignment between wages and productivity in the microdata as well. If workers with given characteristics are too costly with respect to their added value, firms are willing to substitute them with capital, outsource part of their activities or hire other workers for which the productivity-to-wage-cost ratio is more favourable. Most policies aiming to increase employability of job-seekers either try to foster their productivity (e.g. through specific training programmes) and/or reduce their wage costs (e.g. through lower payroll tax). Reductions in employer social security contributions are the most efficient to enhance wage-productivity alignment if the reductions are targeted at certain groups. However, if the gap is too large these reductions will not be effective given the budgetary constraint.

The remainder of the paper is organised as follows. The empirical strategy to estimate the relationship between employees' characteristics, wages and productivity is presented in the next section. Section two describes the dataset. Estimations on the effects of the composition of the workforce on the wage bill and productivity are presented in the next section. The last section summarises these findings.

1. Empirical strategy

1.1 Measuring productivity

Measuring productivity at the individual level of the worker is difficult. Some studies have used ratings given by superiors (Bishop, 1987) or results of psychometric tests that employers can collect during the hiring process. However, this approach remains unsatisfactory on several counts. First, it poses the problem of data availability and limitations. Ratings could be obtained from a given firm, but it will hardly be possible to get these data for a representative sample of firms. Second, these indicators are still imperfect. Productivity cannot be reduced to a set of individual cognitive or physiological capacities like these obtained via psychometric scores because, *inter alia*, one important aspect of work efficiency is the capacity to collaborate. Neither do these measures take into account possible compensatory strategies which may be put in place by the employees in a real work situation or implemented at the company level (for example adapted workstations or production process, best suited to the characteristics of their workforce, like age).

There are many possible measures of firm performance. For instance, there is labour productivity, defined here as (real) value added divided by the number of employees. Productivity is the result of collective action and of many other determinants, like the capital intensity of the firm, its size, its sector of activity, the business cycle, possibly

also factors entirely specific to the firm itself like the quality of its management, the ownership of a patent, etc. Relating the impact of individual workers' characteristics, like age or education, to productivity at the firm level will enable us to determine the overall impact of these characteristics on productivity as such. This, in a nutshell, is the intuition of the Hellerstein approach explained more in detail in the next section.

1.2 The Hellerstein approach

All other things being equal, does an increase in the weight of an age group in a firm's workforce lead to an increase or decrease in average productivity, for example ? The difficulty is isolating precisely what in a company's productivity is due to the productivity of each of the age groups. As explained above, productivity depends on many factors, some of which may be not observable. The difficulty will be therefore to control for all these other factors.

Hellerstein, Neumark and Troske (1999) use matched employer-employee data to estimate relative marginal products of various types of workers. Then they compare productivity differentials with wage differentials.

This production function approach has the advantage of providing a direct measurement of productivity, but because productivity is measured at the establishment level, the effects of worker characteristics are identified from across – establishment variation of productivity and from its change over time within each establishment related to the shares of the various types of workers in the different groups, not at the individual level. As van Ours and Stoeldraijer (2011) point out, "Establishing a relationship between a composite worker characteristic variable (like age) and a firm aggregate such as average productivity is very indirect. Nevertheless, except for special situations (piece-rate work, homogenous tasks, easy-to-monitor activities), there is no clear alternative" to the approach used here.

This method is used to measure the effects of workers' characteristics on the wage bill on the one hand, and on productivity on the other hand, thus enabling a comparison between wages and productivity. It can therefore be used to detect potential misalignments.

2. Data

Our empirical analysis relies on the combination of two large-scale data sources, covering the 2002-2019 period. The two datasets are collected by Statbel. The first is the Structure of Earnings Survey (SES), a matched employer-employee dataset based on a representative sample of firms operating in Belgium that employ at least 10 workers and belong to sectors within sections B to N of the NACE Rev.2 classification of economic activities, thus covering the private sector. The data is collected via the firms' human resources departments and are therefore very reliable. The information relates to the characteristics of the firm (e.g. economic activity sector, size, relevant joint committee, region of the local unit, etc.) and its workers (e.g. gender, age, education, occupation, tenure (with the current employer), wage, working time, etc.). It should nevertheless be noted that statistics for given items of remuneration in kind (company car, stock options, etc.) are not collected in the SES survey and are therefore ignored in this analysis. The second dataset is the Structural Business Statistics (SBS) which describe the structure and performance of businesses in Belgium. The SBS covers the "business economy'', the grouping of industry, construction and market services. Financial services are hardly covered by the SBS (banks are even excluded) because of their specific nature and the limited availability of most types of standard business statistics for this sector.

Statbel has matched the SES and the SBS datasets exactly, using the firm's social security number as identifier. The combination is representative of the population of firms employing at least 10 workers. As we will use

firm-level proportions of the workforce as regressors, smaller firms (less than 10 employees) are excluded. Only private firms are considered here. We have thus excluded a limited number of companies for which public financial control exceeds 50 percent: less than 5 % of the companies were dropped from our sample due to this selection rule.

To sum up, we have a very rich longitudinal linked employer-employee dataset, covering a period of 18 years and broadly representative for the population of private firms established in Belgium.

3. Results

3.1 Mincer equation at the firm level

According to the pioneering work by Mincer, a wage equation links wages to three groups of variables: those describing educational attainment, those describing experience (after entry into the labour market) and finally, other characteristics (characteristics of the worker, the employer and the job). Based on SILC data, recent estimates for Belgium (Saks, 2021) have shown that gross wages are largely determined by diploma levels, occupational skills and experience. More than 50 % of the variation in individual wages is explained by these characteristics. For a representative sample of employees aged between 20 and 64 years, the average nominal increase in gross wages is 2.5 % per year of experience, up to an (estimated) maximum of 35 years after labour market entry. Over the period 2012-2018, there were no striking changes in this return on experience. For people who had changed employer, there is on average a negative effect on earnings[1].

Because the focus of the paper is to examine potential misalignments between wage costs and productivity and productivity being a firm-level phenomenon, we need to estimate a wage equation at the firm level. The dependent variable is the real wage bill of the firm, taking into account net social security contributions (i.e. after social contribution reductions to which the firm can be entitled). This real wage bill is computed by employees. Four estimation results are presented, with [(3), (4)] or without [(1), (2)] control for the capital intensity of the firm.

The most important factors in terms of magnitude for the wage bill are educational attainment and the level of skills. But medium-skilled workers do not appear to weigh significatively more on the wage bill than low-skilled workers. The skill level is based on the international classification of occupations. High-skilled occupations are for example managers, professionals or technicians: while low-skilled occupations consist of simple and routine tasks which mainly require the use of hand-held tools and often some physical effort (cleaners, street vendors, janitors, concierges, doorkeepers, message or goods delivery jobs, etc.). The medium-skilled group is defined as a remainder. Because the share of blue-collar workers is now an estimate made by Statbel based on occupation (as there is no longer any administrative information on blue-collar/white-collar status for recent years, with the merger of the two statuses since 2014), the effect of skill level may appear less important with this specification which includes the share of blue-collar in the workforce. As expected, blue-collar workers are less costly than white-collar workers.

The capital intensity of the firm appears also to be an important factor. For measuring capital, we use here a simulated capital based on the level of the firm's investment, using the perpetual inventory method with a depreciation rate of 5 %. As expected, the inclusion of capital changes the values of the coefficients, and most notably the effect of the size and industry sectors dummies (see table 1). Other coefficients remain barely unchanged, indicating that the estimation appear robust.

1 No information is available about the voluntary character of the job change or whether the person had an unemployment spell before beginning with her new employer.

Table 1

Wage cost equation at the firm level

(standard errors are in brackets)

	Wage costs (1)	Wage costs (2)	Wage costs (3)	Wage costs (4)
Capital per capita (log)			0.033 (0.001)	0.033 (0.002)
Workforce characteristics of the firm				
Share of female workers	–0.261 (0.006)	–0.261 (0.008)	–0.262 (0.010)	–0.262 (0.011)
Share of young workers	–0.299 (0.010)	–0.299 (0.012)	–0.280 (0.017)	–0.280 (0.019)
Share of older workers	0.030 (0.014)	0.030 (0.018)	0.078 (0.021)	0.078 (0.028)
Share of workers with low educational attainment	–0.109 (0.005)	–0.109 (0.005)	–0.110 (0.008)	–0.110 (0.009)
Share of workers with high educational attainment	0.508 (0.009)	0.508 (0.012)	0.528 (0.014)	0.528 (0.017)
Share of part-timers	–0.696 (0.010)	–0.696 (0.015)	–0.566 (0.016)	–0.566 (0.024)
Share of temporary contracts	–0.072 (0.013)	–0.072 (0.021)	0.027 (0.021)	0.027 (0.027)
Share of low-skilled workers	–0.027 (0.007)	–0.027 (0.007)	–0.013 (0.011)	–0.013 (0.010)
Share of high-skilled workers	0.204 (0.008)	0.204 (0.011)	0.197 (0.013)	0.197 (0.015)
Share tenure between 2 and 4 years	0.041 (0.011)	0.041 (0.013)	0.038 (0.019)	0.038 (0.023)
Share tenure between 5 and 9 years	0.061 (0.011)	0.061 (0.013)	0.063 (0.018)	0.063 (0.022)
Share tenure 10 years or more	0.145 (0.009)	0.145 (0.011)	0.169 (0.016)	0.169 (0.019)
Share of blue-collar workers	–0.138 (0.007)	–0.138 (0.007)	–0.138 (0.010)	–0.138 (0.011)
Firm-level collective agreement	0.062 (0.003)	0.062 (0.003)	0.047 (0.004)	0.047 (0.004)
Size of the firm				
Between 20 and 49 employees	0.050 (0.004)	0.050 (0.005)	0.029 (0.008)	0.029 (0.009)
Between 50 and 99 employees	0.107 (0.004)	0.107 (0.005)	0.080 (0.007)	0.080 (0.008)
Between 100 and 199 employees	0.156 (0.005)	0.156 (0.005)	0.125 (0.007)	0.125 (0.008)
Between 200 and 499 employees	0.194 (0.005)	0.194 (0.006)	0.164 (0.007)	0.164 (0.008)
More than 500 employees	0.253 (0.007)	0.253 (0.007)	0.210 (0.009)	0.210 (0.009)
Region of the firm				
Brussels	0.038 (0.004)	0.038 (0.004)	0.038 (0.006)	0.038 (0.006)
Wallonia	–0.045 (0.003)	–0.045 (0.003)	–0.027 (0.004)	–0.027 (0.004)
Intercept	10.810 (0.012)	10.810 (0.014)	10.438 (0.024)	10.438 (0.031)
R^2	*59%*	*59%*	*61%*	*61%*

Source: Statbel (2022).

Note: Estimated coefficients of the regression, with (log) wage cost as dependent variable. For categorical covariates, the impact is relative to a reference category. The baseline person is a male worker, prime age (25-54 years old), with upper secondary school diploma (i.e. medium educational attainment), on permanent work contract, working full-time, semi-skilled, with a tenure of one year or less, white-collar worker, no collective agreement at the firm level, employed in manufacturing and in an establishment with less than 20 employees, in Flanders. Year and industry dummies are also included. (1) and (2) is the specification without capital per capita. (2) and (4) are with robust standard errors.

Even though official statistics show that the gender pay gap is smaller in Belgium than in most other European countries, the share of women has a lowering effect on the average wage bill. All other things being equal, women remain less costly than male employees, even if we control for education, occupation and sector of activity. We observe a large effect of part-time work as well. Part-time work appears to be relatively cheaper in terms of the absolute wage bill.

Younger workers (here defined as less than 25 years old) are less costly than the prime-age group, while older workers (55 years old and older) are on average paid 8 % more according to the preferred specification. Besides information on age, the SES data also contain precise data on tenure (the length of service at the current employer). Experience (statistically related to the age of the worker) and tenure (also called seniority) are both important for the wage bill. From previous work, we know that seniority is much more important for white-collar workers but not very relevant for blue-collar occupations. Employees with a tenure longer than 10 years tend to earn more than new entrants, whatever their age group. For a detailed discussion on the effect of tenure, see Gagliardi, Grinza and Rycx (2022).

The size of the employer is an important factor in the differentiation in workers' wages. The fact that large employers pay higher wages than small employers has long been recognised but there is less agreement on the rationale behind this empirical fact. The largest firms are often also the most productive, owing to economies of scale and/or capital intensity, and part of the resulting value is reflected in remuneration in their staff. There is also an efficiency wage argument, as it is probably more difficult to monitor the efforts of workers in large organisations than in small enterprises. In any case, the data exhibits a clear employer-size wage-cost premium, even here where the specification controls for the capital intensity as well as industry sectorial dummies.

The highly centralised wage bargaining framework in Belgium does not prevent companies from concluding collective agreements at the firm level, alongside sectoral and national agreements. According to the specification used, the wage bill of firms with a specific agreement is on average 5 % higher than for firms without any such kind of provision. In fact, it appears that companies with a firm-level agreement in Belgium are quite specific[1]. Certain firms in given joint committees have a tradition of such agreements, while others do not. Therefore, this characteristic at the firm level is also fairly constant in time and not, as might be expected, related to the business cycle for example (Garnero *et al.*, 2019).

The effect of the region of work (where the firm is established) indicate that wage cost is higher in Brussels than in Flanders (with an estimated effect of 4 %) and relatively lower in Wallonia (with an estimated effect of –3 %).

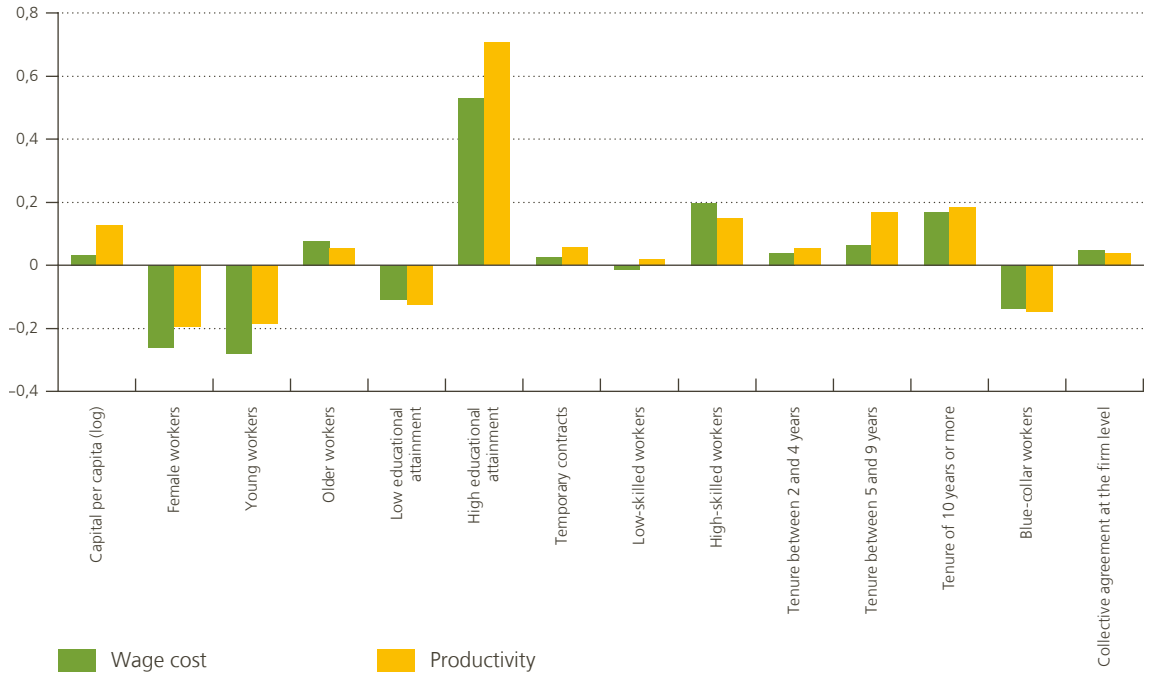
3.2 Productivity equation at the firm level

To make a statement about whether an employee is "well paid" or to explain the difference in earnings between different groups of employees has been made easier with the Mincer approach. Research work on wage discrimination in labour markets has long been done with a regression-based "decomposition" approach, asking whether raw wage or earnings differences between groups are attributable to well-defined (economically justified) factors, like education, skills or experience. For the economist, productivity-related factors do not imply that there is any discrimination. As explained by Neumark (2016), subsequent research – responding in large part to limitations of the simple decomposition technique – has moved on to other approaches, such as using firm-level data to estimate both marginal productivity and wage differentials.

1 Firm-level collective agreements are more frequent in some joint committees in manufacturing (steel, non-ferrous metals, chemicals and chemical products, as well as in particular segments of retailing (pharmaceutical and medical goods, etc.) as well as public transport. See Rusinek and Rycx (2013) for a detailed analysis.

Chart 1

Effects on the wage bill and on productivity: a comparison of the estimated elasticities



Source: Statbel (2022).
Note: Estimated coefficients of the two separate regressions, with (log) wage cost and (log) productivity, respectively, as dependent variables. See note in table 1 for the baseline. Not all estimated effects are presented in the chart.

In this section, we will regress each firm's labour productivity, measured as (real) value added by employee, on the same set of regressors as used in the wage cost equation. The comparison of the effects on the wage bill and on productivity, respectively, is presented in chart 1[1].

The broad picture does show that misalignments between wage cost and productivity appear limited. The effects are all of the same sign in both equations, except for the share of low-skilled workers. However, these effects are not statistically significant. The most striking gaps between wage cost and productivity are for capital intensity, the proportion of higher-educated workers, young workers and women. In terms of tenure, the contribution of those employees with a tenure between five and nine years is more positive on productivity than the impact of their wages on the average wage bill. The estimated large effect of part-time employment on the wage bill is matched by an equivalent large effect on productivity, indicating that part-time work does not imply any misalignment.

A simple way to check whether wage-productivity gaps are actually statistically significant is to compute the productivity-to-wage-cost ratio as dependent variable, as in van Ours and Stoeldraijer (2011). The results of this accounting exercise are presented in table 2. They are in line with our comparison based on the two separate regressions.

Let us first begin with the effects of employee characteristics. The most important effect on the productivity-wage cost gap is the share of employees with higher education. They tend to be better paid but their effect on productivity is even higher. Taken at face value, this result means that, on average, the profitability of the firm

1 The estimation results of the reduced-form productivity equation are presented in the Annex.

Table 2

Statistical analysis of the effects on the productivity-wage cost ratio (in log)

	Coefficient	Std. Err.
Capital per capita (log)	0.10	0.00
Workforce characteristics		
Share of female workers	0.07	0.01
Share of young workers	0.09	0.03
Share of older workers	–0.02	0.03
Share of workers with low educational attainment	–0.02	0.01
Share of workers with high educational attainment	0.19	0.02
Share of part-timers	–0.03	0.02
Share of temporary contracts	0.03	0.03
Share of low-skilled workers	0.04	0.02
Share of high-skilled workers	–0.04	0.02
Tenure between 2 and 4 years	0.01	0.03
Tenure between 5 and 9 years	0.10	0.03
Tenure of 10 years or more	0.01	0.02
Share of blue-collar workers	–0.01	0.02
Collective agreement at the firm level	–0.01	0.01
Size		
Between 20 and 50 employees	0.00	0.00
Between 50 and 100 employees	–0.02	0.01
Between 100 and 199 employees	–0.05	0.01
Between 200 and 499 employees	–0.06	0.01
More than 500 employees	–0.06	0.01
Industrial sectors		
Mining and quarrying	0.04	0.04
Energy, water and waste management	0.40	0.05
Water supply, sewerage, waste management	0.01	0.03
Construction	–0.07	0.01
Wholesale and retail trade	–0.03	0.01
Transport and storage	–0.06	0.01
Accommodation and food service activities	–0.07	0.02
Information and communication	–0.05	0.02
Financial and insurance activities	0.06	0.02
Real estate activities	0.58	0.05
Professional, scientific, and technical activities	–0.11	0.01
Administrative and support service activities	0.07	0.01
Region		
Brussels	–0.01	0.01
Wallonia	–0.05	0.01

Source: Statbel (2022).

In **bold** for the variables with an effect statistically significant at a level of 10 %.

Note: For categorical variables, the impact is relative to a reference category. The reference person is a male worker, prime age (25-54 years old), with upper secondary school diploma (medium educational attainment), on a permanent work contract, working full time, semi-skilled occupation, with a tenure of one year or less, white-collar worker, with no collective agreement at the firm level, in manufacturing, in an establishment with less than 20 employees, in Flanders. Year dummies are also included.

will increase if it could substitute lower-educated employees with more highly educated ones. This relative under-payment of employees with higher education is not a new result. Rycx *et al.* (2018) had a similar finding, with age as a moderating factor. The relative under-payment of employees with higher education disappeared for older workers. Bijnens and Dhyne (2021) also reach a similar conclusion, even more so for employees with STEM skills, i.e. having a higher education degree in Sciences or Engineering. The return on tenure is also positive: employees with higher tenure are better paid but the effect on firm-level productivity is even higher, more so for employees with a seniority between five and nine years.

Based on this accounting exercise, increasing the proportion of women or young employees is likely to have a positive effect on the profitability of the average firm. In other words, relative to their contribution to productivity, women seem to be under-paid. This is another indication of the remaining gender pay gap in Belgium, even after controlling for education, skills and firm's characteristics. Once again, age could be a moderating factor. Using Bel-first data, Vandenberghe (2013) found a negative gap for older women: for women in the 50+ age group, the decline in productivity was not matched by a similar decline in wage costs.

Among the other covariates which seem to be important is employer size. The employer-size wage cost premium is not offset by the average higher productivity of larger firms. Part of the higher wages earned in large firms cannot be justified with the available covariates[1]. As expected, capital is a key factor for firms' productivity, while this is not so much the case for the wage bill. As a result, capital-intensive firms are more profitable than those with a weaker capital stock.

In terms of productivity gap, there are no significative effects for firm-level collective agreements. The higher wages guaranteed by this type of agreement do not generally hamper the profitability of the firm significatively.

For Belgium's administrative Regions, there is no indication of any significative difference between Brussels and Flanders in terms of productivity-wage cost gap, while the balance appears to be negative for firms established in Wallonia with respect to Flanders.

The estimations also show some minor misalignments in the broadly defined sectors of activities, relative to manufacturing. The estimated gaps for two sectors, real estate activities and energy and utilities, seem to be fairly large, given that our specification already controls for differences in terms of capital/output ratio. A value added figure for the real estate sector is notoriously difficult to compute given the particular nature of its business.

Conclusion

More than 60 % of wage cost differences at the firm level can be explained by characteristics of the workforce, the employer and their relationship. Educational attainment, age and tenure are all key factors. A similar equation has been used to explain differences in firm-level productivity. The explanatory power was smaller than for the wage bill but remains satisfactory at 40 %.

The broad picture shows that misalignments between wage cost and productivity appear limited. The effects of available covariates are all of the same sign in both equations, except for the share of low-skilled workers, whose effects are not statistically significant. The most striking gaps between wage costs and productivity are for capital intensity, the proportion of higher educated workers, young workers and women. In terms of tenure, the impact of employees with a tenure between five and nine years is more marked on productivity than on the wage bill. Taken at face value, these results mean that, on average, the profitability of the firm will increase if it

1 Another complementary explanation could be that the net rate of social contributions (after reductions) is biased in favour of smaller firms.

could substitute lower-educated employees with more highly educated ones or become more capital-intensive. On the contrary, for women, even if their *ceteris paribus* contribution to the productivity of the firm appears to be lower than that of their male counterparts, the differences in wage costs overcompensate for this difference.

The results appear to be robust. Allowing for a different specification (excluding capital intensity or restricting the set of covariates to the year dummies) or restricting the sample period to only the recent past (2008-2019) yield very similar results in qualitative terms.

Wage differentials between industries in Belgium are high and the misalignments between wage costs and productivity at this level appear to be very limited. On the other hand, given the wage-setting framework in Belgium, wage differentiation between firms within the same industry is limited. In terms of productivity gap, there are no significative effects for firm-level collective agreements. The higher wages guaranteed by this type of agreement do not generally hamper a firm's profitability significatively.

Taking productivity into account to help set wages is a recommendation often made by international bodies, but it remains difficult to put into practice. The study shows that the results of wage bargaining in Belgium allow companies/sectors to work with wage costs that are, on the whole, fairly well aligned with productivity. It is at a finer level, such as within sectors or for given educational attainments, that differences appear.

Alternative methods of estimation and to test whether the estimated effects are similar across age classes are the subject of future work. The dataset may also help to better quantify the wage dispersion within broad sectors.

Annex

Table 3

Productivity equation at the firm level

(standard errors are in brackets)

	Value added per employee (1)	Value added per employee (2)	Value added per employee (3)	Value added per employee (4)
Capital per capita (log)			0.129 (0.002)	0.129 (0.003)
Workforce characteristics of the firm				
Share of female workers	–0.281 (0.012)	–0.281 (0.013)	–0.194 (0.018)	–0.194 (0.018)
Share of young workers	–0.211 (0.018)	–0.211 (0.020)	–0.184 (0.031)	–0.184 (0.033)
Share of older workers	–0.091 (0.025)	–0.091 (0.029)	0.056 (0.039)	0.056 (0.045)
Share of workers with low educational attainment	–0.138 (0.010)	–0.138 (0.009)	–0.126 (0.015)	–0.126 (0.015)
Share of workers with high educational attainment	0.666 (0.017)	0.666 (0.022)	0.708 (0.027)	0.708 (0.032)
Share of part-timers	–0.755 (0.018)	–0.755 (0.020)	–0.585 (0.030)	–0.585 (0.031)
Share of temporary contracts	–0.142 (0.024)	–0.142 (0.026)	0.057 (0.038)	0.057 (0.037)
Share of low-skilled workers	–0.038 (0.013)	–0.038 (0.012)	0.021 (0.020)	0.021 (0.018)
Share of high-skilled workers	0.139 (0.016)	0.139 (0.020)	0.149 (0.024)	0.149 (0.028)
Share tenure between 2 and 4 years	0.037 (0.020)	0.037 (0.023)	0.054 (0.035)	0.054 (0.038)
Share tenure between 5 and 9 years	0.142 (0.020)	0.142 (0.022)	0.168 (0.033)	0.168 (0.036)
Share tenure 10 years or more	0.136 (0.017)	0.136 (0.019)	0.186 (0.028)	0.186 (0.032)
Share of blue-collar workers	–0.179 (0.012)	–0.179 (0.013)	–0.146 (0.019)	–0.146 (0.019)
Firm-level collective agreement	0.069 (0.006)	0.069 (0.006)	0.038 (0.008)	0.038 (0.008)
Size of the firm				
Between 20 and 49 employees	0.036 (0.007)	0.036 (0.008)	0.005 (0.014)	0.005 (0.016)
Between 50 and 99 employees	0.064 (0.008)	0.064 (0.009)	0.032 (0.014)	0.032 (0.015)
Between 100 and 199 employees	0.109 (0.008)	0.109 (0.009)	0.068 (0.013)	0.068 (0.015)
Between 200 and 499 employees	0.284 (0.010)	0.284 (0.011)	0.105 (0.013)	0.105 (0.015)
More than 500 employees	0.406 (0.015)	0.406 (0.015)	0.155 (0.017)	0.155 (0.017)
Region of the firm				
Brussels	0.008 (0.007)	0.008 (0.009)	0.031 (0.010)	0.031 (0.012)
Wallonia	–0.085 (0.006)	–0.085 (0.005)	–0.072 (0.008)	–0.072 (0.008)
Intercept	10.751 (0.013)	10.751 (0.013)	9.463 (0.044)	9.463 (0.055)
R^2	*37%*	*37%*	*46%*	*46%*

Source: Statbel (2022).

(1) and (2) is the specification without capital per capita. (2) and (4) are with robust standard errors.

Note: For categorical variables, the impact is relative to a reference category. The baseline person is a male worker, prime age (25-54 years old), with upper secondary school diploma (medium educational attainment), on a permanent work contract, working fulltime, semi-skilled occupation, with a tenure of one year or less, white-collar worker, with no collective agreement at the firm level, in manufacturing, in an establishment with less than 20 employees, in Flanders. Year and industry dummies are also included.

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Conventional signs

%	per cent
e.g.	*exempli gratia* (for example)
et al.	*et alia* (and others)
etc.	*et caetera*
i.e.	*id est* (that is)

List of abbreviations

NACE	Nomenclature of economic activities of the European Community
OECD	Organisation for Economic Cooperation and Development
SBS	Structural Business Statitstics
SES	Structure of Earnings Survey
Statbel	Belgian Statistical Office

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