

Has International Trade Affected Workers' Bargaining Power?

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Abstract: In this paper, we investigate whether globalization has affected workers' bargaining power in the Belgian manufacturing industry over the period 1987–1995 using a sample of more than 20,000 firms. We find little evidence of international trade and inward foreign direct investment having an impact on the workers' bargaining power. We find some evidence that technological change has a positive impact on the workers' bargaining power. JEL no. C23, D21, F16, F23, J50, L13

Keywords: Rent sharing; international trade; instrumental variables; panel data

1 Introduction

During the past decades, the labour market consequences of international integration have been at the centre of lively debate. Antiglobalization protests surrounding the WTO, IMF and World Bank meetings reveal that many people fear that they may lose their job or may be confronted with lower wages because of the threat of fiercer international competition.

Remark: This paper was written while Ellen Brock was a visiting researcher at the Indian Statistical Institute (ISI, Bangalore) and a lecturer at the National University of Ireland, Maynooth. We are grateful to N.S.S. Narayana (ISI, Bangalore), Sanjay Nath (ISI, Bangalore) and Probhal P. Ghosh (ISI, Bangalore), Torben Andersen (University of Aarhus), Alison Booth (Australian National University), Freddy Heylen (SHERPPA, Ghent University), Joep Konings (K.U.Leuven), Jacques Mairesse (CREST-INSEE), Hylke Vandenbussche (Université Catholique de Louvain), Niels Haldrup (University of Aarhus) and participants at the ETSG Conference (Madrid, 2003), GEP Conference (Nottingham, 2004), Irish Economic Association Conference (2004) and SMYE (Warsaw, 2004) for helpful comments and suggestions. We also benefited from valuable comments of an anonymous referee. All remaining errors are ours. Many thanks to Koen De Backere for providing the Belgian firm level data and the foreign direct investment data. Sabien Dobbelaere is Postdoctoral Fellow of the Fund for Scientific Research – Flanders (Belgium). Financial support from the Belgian Program on Interuniversity Poles of Attraction, contract n° P5/21, is gratefully acknowledged. This paper presents the view of the authors and not the view of General Electric. Please address correspondence to Ellen Brock, John F. Welch Technology Centre, 122, EPIP, Phase 2, Hoodi Village, Whitefield Road, Bangalore 560 066, India; e-mail: ellen.brock@ge.com

In this paper, we rely on a rent-sharing framework to investigate the impact of globalization on the workers' bargaining power in Belgium. We argue that there are at least two valid reasons for doing so. First, the Belgian economy is characterized by the presence of wage negotiations between firms and their workers at the national, the sectoral and the firm level.¹ Hence, this makes a rent-sharing framework very valid to explain wages in the Belgian economy. Second, Belgium is one of the most open economies in the world. More specifically, the export/GDP ratio equals 85 per cent in 2002 compared to 10 per cent in the United States.²

Theoretically, there exist three channels through which globalization can influence wages in a rent-sharing framework. International trade can affect the bargaining outcome through movements in the firm's financial conditions, the firm's and the workers' threat points and the workers' bargaining power. While the first two channels have been investigated empirically,³ there is no direct evidence of the last channel so far.

Dobbelaere (2004a), Vandenbussche et al. (2001) and Veugelers (1989) for Belgium and Svejnar (1986) for the United States point out that there is a lot of cross-industry variation in the bargaining power coefficient. Svejnar (1986) and Veugelers (1989) further examine the determinants of this cross-industry variation. Although a well-developed theory of the determinants of bargaining power is lacking, these authors link the sectoral bargaining power parameters to variables relating to the economic bargaining environment such as the sectoral unemployment rates and several variables capturing output market concentration. However, they do not relate the workers' bargaining power to globalization. We contribute to the literature by studying whether the globalization process has led to a shift in bargaining power from labour to capital. More specifically, we use a two-stage approach in which we first estimate the workers' bargaining power for each sector and each year following Svejnar (1986) and Veugelers (1989). Our unique data set encompassing the entire population of Belgian firms in the manufacturing industry over the period 1987–1995 enables us to split up our data into

¹ The most important level is the sectoral level, although in recent years there has been a sharp rise in the number of collective agreements concluded at the enterprise level (European Foundation 2003).

² The data are obtained from the OECD *International Trade Statistics* and the OECD *Main Economic Indicators* (see <http://www.oecd.org>).

³ See Abowd and Lemieux (1993) for Canada and Kramarz (2003) for France for the first channel and Biscourp and Kramarz (2002) and Kramarz (2003) for France for the second one.

several sectors. In the second stage, we relate the workers' bargaining power of each sector and each year to a broad range of globalization measures such as trade, outsourcing, tariffs and measures related to foreign direct investment (FDI).

We find little evidence of international trade and inward FDI having an impact on the workers' bargaining power. We find some evidence that technological change has a positive impact on the workers' bargaining power.

The organization of the paper is as follows. In Section 2, we describe the theoretical framework and discuss how globalization can affect wages in a collective bargaining framework through changes in the workers' bargaining power. Section 3 concentrates on the regression results of the first stage. Section 4 focuses on the determinants of the workers' bargaining power and hence deals with the regression results of the second stage. The paper ends with a summary of the results.

2 Theoretical Framework

The methodology in this paper borrows from the rent-sharing literature. Several papers deal with this issue and investigate the link between a firm's ability to pay and the workers' wages. Within this framework, workers no longer obtain the competitive wage but are able to capture a fraction of the firm's profits per worker in the form of higher wages.⁴

In this section, we first describe the efficient bargaining framework. Then, we focus on the effect of globalization on the bargaining outcome through changes in the workers' bargaining power.

2.1 Efficient Bargaining Framework

The union and the firm are involved in an efficient bargaining procedure with both real wages w and employment N as the subject of agreement (McDonald and Solow 1981). The motivation for relying on the efficient bargaining model is twofold. First, it accords with stylized facts about Belgian industrial relations. Belgian collective agreements do not only deal with

⁴ In the literature, three models predict a positive wages-profit correlation with firm profitability determining the level of pay: the modified competitive model, the optimal labour contract model and the rent-sharing bargaining model (Blanchflower et al. 1996). In accordance with the wage determination system in Belgium, our analysis relies on the rent-sharing bargaining model.

wages but also with employment issues like hours of work and part-time labour policies (Bughin 1996). Microeconomic evidence in favour of efficient bargaining for Belgium has been provided by e.g. Bughin (1993) and Dobbelaere (2004a). Second, it captures the possibility that firms are not operating on their demand for labour. In other words, it allows for the fact that powerful unions may obtain a higher wage without suffering a decrease in employment, at least in the short run (Blanchard and Giavazzi 2003).

The union is risk neutral.⁵ Its objective function is specified in a utilitarian form: $U(w, N) = Nw + (\bar{N} - N)w_a$, where N is the employment level, \bar{N} is union membership ($0 < N \leq \bar{N}$), w is the real wage and $w_a \leq w$ is the alternative wage expressed in real terms.

The firm's utility equals its real profits π , with $\pi(w, N) = \Theta R(N) - wN - F$, where $R(N)$ stands for real value added and Θ for a revenue shifter that depends on product market conditions (product demand) and F for all other costs associated with production. For simplicity, we assume that labour is the only variable input for the firm. Hence, F represents fixed costs. It can be shown that this assumption on the fixed nature of inputs other than labour does not affect the bargaining outcome provided that union preferences do not depend on those inputs (Bughin 1996).

The threat point for the union is assumed to equal the alternative wage w_a . If no revenue accrues to the firm when negotiation breaks down, the firm's fall-back utility equals $-F$. The outcome of the bargaining is the asymmetric generalized Nash solution to:

$$\max_{w, N} \Omega = \{Nw + (\bar{N} - N)w_a - \bar{N}w_a\}^{\phi} \{\Theta R(N) - wN\}^{1-\phi}, \quad (1)$$

where $\phi \in [0, 1]$ represents the union's bargaining power.

Maximization of (1) with respect to the wage rate w gives the following equation:

$$w = w_a + \frac{\phi}{1 - \phi} \left[\frac{\Theta R(N) - wN}{N} \right]. \quad (2)$$

Maximizing (1) with respect to employment N leads to the following first-order condition:

$$w = \Theta R_N + \frac{\phi}{1 - \phi} \left[\frac{\Theta R(N) - wN}{N} \right]. \quad (3)$$

⁵ See Svejnar (1986) and Veugelers (1989) among others for the derivation in the case of a risk-averse union.

By solving simultaneously both first-order conditions, we obtain an expression for the contract curve, which results from the tangency between iso-profit curves and union indifference curves: $\Theta R_N = w_a$. This equation shows that the employment level depends on the alternative wage w_a but not on the negotiated wage w (Brown and Ashenfelter 1986).

In equation (2), wages are determined by the outside option and the profits per worker. However, in the empirical part of the paper we opt to work with value added per worker as a measure for the firm's ability-to-pay. The reason is that the wage variable is present both at the left and right hand side of (2) and hence will create a downward bias in the estimation of the parameter $(\phi/1 - \phi)$. In order to deal with this bias, we decided not to work with profits but with value added as a measure for firm rents.⁶ More specifically, we rewrite (2) and obtain the following expression where wages are a function of value added per worker:

$$w = (1 - \phi)w_a + \phi \frac{\Theta R(N)}{N}. \quad (4)$$

Although we bypass the 'direct' endogeneity problem using value added rather than profits per worker, value added may also be endogenous. We will turn to this issue when we turn to the empirical results (see Section 3).

2.2 The Effect of Globalization on Wages through Changes in the Workers' Bargaining Power

Theoretically, there are three channels through which product market integration (globalization) can affect wages during the bargaining process (see (4)). First, international trade can induce movements in the firm's financial conditions through the revenue shifter Θ , affecting the *size* of the rents (or the 'pie') that can be shared between the workers and the firm.⁷ Second, international trade can affect the bargaining outcome through movements in the firm's and the workers' threat points and outside options w_a (Biscourp and Kramarz 2002 and Kramarz 2003 for France). Third, globalization can affect wages in a collective bargaining framework through movements in the workers' bargaining power parameter ϕ . This third channel is the focus of this paper.

In the interpretations given below, globalization enters the story through its effect on the general economic climate and the unemployment level in

⁶ See also Esteveao and Tevlin (2003) and Martins (2004) among others for a discussion.

⁷ See Abowd and Lemieux (1993) for Canada and Kramarz (2003) for France.

particular. First, in models where parties discount the future and hence, where delay of a settlement diminishes the present value of the result, the workers' bargaining power will be higher if workers have a lower discount rate than the employers.⁸ Reasoning in this way, Lindén (1995) defines ϕ as a measure of labour market tightness, i.e. the ratio of the hiring rate from the unemployed to the sum of the hiring rate and the rate of filling vacancies in an equilibrium search model. The more impatient the employer or the tighter the labour market, the higher the bargaining strength of the union and vice versa. Therefore, measures related to globalization could have an impact on the tightness of the labour market and hence on the union's bargaining power. Higher import competition (export competition) could decrease (increase) the workers' bargaining power as the labour market becomes less (more) tight. Second, ϕ can be interpreted as the ratio of the parties' perceived risk that the other party will leave the bargaining table (Binmore et al. 1986; McDonald and Suen 1992; Teulings and Hartog 1998). More specifically, the bargaining power of the union and the firm is related to the costs or benefits of both parties in delaying an agreement (Layard et al. 1991; Smith 1996).⁹ If a bargaining partner receives extra income in case of a disagreement, this partner is more willing to tolerate disagreement and hence bargains for a larger share of the 'pie'. In some studies (see e.g. Doiron 1992), these costs are interpreted as strike costs in case the negotiating parties use strikes as a dispute resolution mechanism. Among other things, higher inventories, more liquid assets and lower capital intensity are shown to reduce a firm's strike costs and hence to increase its bargaining power (see e.g. Clark 1991, 1993; Doiron 1992). For workers, these strike costs could be related to the availability of strike funds or temporary jobs elsewhere. The probability of obtaining this alternative employment is inversely related to the rate of unemployment in the economy. Therefore, higher unemployment lowers the unions' bargaining power. Other factors, such as globalization, are therefore also able to affect the union's bargaining power as these might have an impact on the rate of unemployment.

An informal theory regarding the determinants of the union's bargaining power is given by McDonald and Suen (1992). The authors argue that the

⁸ Gibbons (1992) refers to the parties' discount rate as the time value of money, i.e. a dollar received at the beginning of one period that can be put in the bank to earn interest.

⁹ As discussed by Smith (1996), these costs or benefits can have an effect on the workers' bargaining power through changes in their relative time preference.

bargaining power of the workers is related to the amount of support workers are prepared to give to a wage claim. If workers feel that the wage claim is unfair, they are less eager to support it. In other words, restricting wages is felt to be important in periods of unfavourable economic conditions as large wage increases are considered to be dangerous to economic activity in general and jobs in particular. One direct indicator of the economic climate is the level of unemployment which can be affected by increased globalization.

As one of the first, Rodrik (1997) has pointed out that increased globalization has lowered the workers' bargaining power. More specifically, he argues that the closer substitutes domestic and foreign workers are, due to e.g. international trade, outsourcing and FDI, the lower the enterprise surplus ending up with workers. As a consequence, unions might have become weaker. Indirect empirical evidence for weaker unions is given by the study of Slaughter (2001) who investigates the hypothesis that trade liberalization has contributed to increased labour demand elasticities. Using sectoral-level data, his empirical results are mixed and show that mainly time effects determine changes in labour demand elasticities. However, a number of trade-related variables (such as outsourcing, net exports, etc.) are found to have the predicted effect on the labour demand elasticity of especially non-production workers.¹⁰ As pointed out by Rodrik (1997) and Slaughter (2001), finding increased labour demand elasticities in the case of increased foreign competition could be consistent with a story of a shift from labour towards capital bargaining power over rent distribution in firms enjoying extra-normal profits.

A study addressing indirectly the effect of FDI on the workers' bargaining power is Schreve and Slaughter (2002). They investigate whether FDI has an effect on the workers' feeling of insecurity. On the one hand, multinational presence can increase the workers' economic insecurity by raising the volatility of wages and employment. On the other hand, the authors argue that workers in foreign-owned firms might get compensated more because they are facing a higher risk of plant shut down. Therefore, the impact of FDI on the workers' economic insecurity is unclear. When the authors test their hypothesis, FDI is found to increase the workers' perception of economic insecurity measured as a person's stress/anxiety about

¹⁰ Among others, Bruno et al. (2004) for several OECD countries, Fajnzylber and Maloney (2000) for Chile, Colombia and Mexico, Greenaway et al. (1999) for the United Kingdom, Hasan et al. (2003) for India, Jean (2000) for France, Krishna et al. (2001) for Turkey and Paes de Barros et al. (1999) for Brazil have also investigated this issue.

one's economic misfortune. Hence, they provide evidence of FDI creating a general atmosphere of uncertainty in which workers might be less likely to press for higher wages in the form of obtaining a part of the firms' profits.

Budd and Slaughter (2004) and Budd et al. (2005) analyse the impact of increased globalization on workers' bargaining power in another context. They investigate whether rent sharing extends across national borders, conditioned by corporate or labour organizational ties and/or by trade unions. Their empirical results provide strong evidence of international dimensions of rent sharing.

In this paper, we further investigate whether globalization has indeed an effect on the workers' bargaining power as first pointed out by Rodrik (1997). We use a broad range of globalization measures such as trade, outsourcing, tariffs and measures related to FDI. In the next section, we proceed with the stage-one regressions where we estimate the workers' bargaining power parameters. Subsequently, we relate these parameters to several globalization measures.

3 Stage-One Regressions: Estimating Workers' Bargaining Power

To identify the effect of international trade on the workers' bargaining power, our estimation strategy consists of two stages. In the first stage, we estimate the workers' bargaining power ϕ for 15 sectors in the Belgian manufacturing industry over the period 1987–1995. In the second stage, we regress the estimated workers' bargaining power coefficients on several measures of trade, FDI, technology and control variables. These stage-two regressions try to identify the factors explaining the workers' bargaining power.

3.1 Specification and Data Description

The econometric specification that acts as the basis for the stage-one regressions is derived from (4) and is given by:

$$w_{ijt} = \alpha_i + \delta_1 \ln \bar{w}_{jt} + \phi \left(\frac{VA}{N} \right)_{ijt} + \alpha_t + \varepsilon_{ijt}, \quad (5)$$

with ϕ the workers' bargaining power. Index ijt stands for firm i in sector j at time t .

To estimate (5), we use an unbalanced panel of the entire population of Belgian firms in the manufacturing industry over the period 1987–1995. All variables are taken from annual company accounts that are collected by the National Bank of Belgium (NBB). The dependent variable is the average real annual wage in firm i . In our empirical analysis, the workers' outside option (w_a in (4)) is proxied by the real minimum wage per worker of the sector in which the firm operates (see e.g. Veugelers 1989 and Vandebussche et al. 2001). We also experimented with the average real annual wage per worker and the sectoral unemployment rate as a measure for the workers' alternative wage.¹¹ Our estimates of the ϕ parameter turned out to be robust to whether the first or the second measure of the alternative wage is used in our estimations where we pool all firms together. Since the data of the sectoral unemployment rate are however less disaggregated in comparison to the data of the minimum wage, it is not possible to use this variable together with the average real annual wage per worker when we turn to our estimations of the ϕ parameter for each sector separately year by year. Therefore, we opted to take the real minimum wage per worker of the sector in which the firm operates.¹² To capture the firm's financial conditions, we use value added that is constructed from the company accounts database as sales minus material costs. This measure reflects economic rents instead of accounting rents. Although we decided to focus on value added as a rent measure, we also report some consistency checks using both economic and accounting profits. More specifically, economic profits are constructed as value added minus the wage bill (see e.g. Blanchflower et al. 1996) while accounting profits are directly taken from the company accounts database. All annual wages are expressed as real wages, i.e. nominal wages divided by the consumer price index with 1990 as reference year. The consumer price index has been drawn from the Belgostat source of the NBB.¹³ Value added is also expressed in real terms, i.e. nominal value added divided by the sector-specific producer price index. The producer price index is obtained from the Ministry of Economic Affairs.¹⁴ Average wages and value added are

¹¹ The unemployment variable is obtained from the Rijksdienst voor Arbeidsvoorziening (RVA).

¹² This variable is constructed at the four-digit NACE classification, while the other proxy for the alternative wage is determined at the two-digit sectoral classification that matches closely our 15 sectors that are used to estimate sectoral bargaining power parameters that vary year by year (see Appendix A).

¹³ These data can be downloaded from <http://www.nbb.be/belgostat/>.

¹⁴ These data can be downloaded from <http://ecodata.mineco.fgov.be>.

constructed by dividing annual labour costs and value added by the average number of employees in each firm for each year respectively. ε_{ijt} represents a white noise error term and α_i individual firm effects. We also include time dummies to capture possible unobservable aggregate shocks common to all firms in a given year (α_t).

Our data are expressed in levels rather than in logs. The reason is that specification (5) is most consistent with our theoretical model and using logs would drop loss-making firms from our sample. Table 1 includes some summary statistics of the key explanatory variables for the period 1987–1995. This table clearly shows that the rent-sharing variable is more volatile than the wages.

Table 1: *First-Stage Regression: Summary Statistics*

Variables	1987–1995		
	No of. obs.	Sample mean	Sample st. dev.
Firm-average real wage per worker ($\times 100\,000$ BEF)	140,434	9.699	4.840
Firm-average real value added per worker ($\times 100\,000$ BEF)	139,681	16.266	32.326
Sector-average real minimum wage per worker ($\times 100\,000$ BEF)	140,434	1.992	1.630

Source: Own calculations.

3.2 Estimation Strategy

To exploit the data's panel aspect, we estimate (4) using two approaches to balancing time-series and cross-sectional pooling. The first approach pools all 15 sectors over all years. This yields one manufacturing-wide rent-sharing parameter ϕ over the period 1987–1995. However, since the Belgian economy is characterized by a high degree of industry-level bargaining between employer associations and unions that are strongly organized per sector, a cross-section study of bargaining power is appropriate. Therefore, to allow some variation within manufacturing and over time, the second approach provides estimates of ϕ for each sector separately year by year. The latter estimates are used in the second-stage regression where we try to identify the determinants of the workers' bargaining power.

Ordinary least squares estimates of (5) will be biased for basically three reasons. First, efficiency-wage theory explains how higher wages might induce more productive workers such that rents are also determined by wages. Second, the estimates of ϕ will be biased if rents per worker are measured with error as it might be difficult to accurately measure what financial conditions workers are concerned with (Estevao and Tevlin 2003). Measurement error can also be caused by the level of employment that is entering both the wage and profit per worker variables (see Van Reenen 1996 among others for a discussion). Third, a simultaneity issue occurs if the assumption of efficient bargaining is relaxed and a right-to-manage model is used. In this model, both the workers and the firm bargain over the wage but the firm unilaterally determines the employment level. In this case, the employment level of the firm is related to the wage rate instead of the alternative wage like in the efficiency wage model.

In other words, performing an OLS regression on (5) would lead to an endogeneity bias. One way to deal with this bias is to find appropriate instruments that are correlated with the rent-shifting parameter Θ and do not influence wages. However, Bound et al. (1995), Staiger and Stock (1997) and Oswald (1996) discuss several difficulties in finding appropriate instruments. Another route is to follow a recursive equation approach where wages are regressed on lagged values of profits per worker. Hence, movements in previous internal conditions are treated as predetermined.¹⁵ In what follows we choose this approach. More specifically, we regress wages on the one-year lagged value added per worker.¹⁶

3.3 Empirical Results

In this section, we discuss the empirical results of the two approaches.

3.3.1 First Approach: Pooling over Sectors and over Years

In this section, we provide manufacturing-wide estimates of the rent-sharing parameter over the whole period. As we have panel data, we first tested using

¹⁵ As a robustness check, we also performed two-stage least squares estimates where we used the one-period lagged value of the value added per worker variable as instrument. These results, which are available upon request, are in line with the recursive equation estimates and show slightly higher estimates. See Blanchflower et al. (1996), Budd and Slaughter (2004), Christofides and Oswald (1992).

¹⁶ Using higher order lags, our results did not turn out to be statistically significantly different from zero.

Table 2: *Wage Equation, First Approach: Pooling over Sectors and over Years*

Estimation method	(1)	(2)
Value added per worker	0.073*** (0.013)	—
Value added per worker t_{-1}	—	0.019*** (0.004)
Sectoral minimum wage	0.090*** (0.011)	0.059*** (0.011)
Year effects	Yes	Yes
Number of observations	139,681	108,894
R^2	0.09	0.01

Note: ***, **, * denotes significance at the 1, 5 and 10 per cent level respectively. Robust standard errors in parentheses. The dependent variable is the firm-average real wage per worker.

Hausman tests whether the fixed effects or the random effects model should be used. In all cases, these tests indicated that the fixed effects model is more appropriate. In the first column of Table 2, we report the fixed effects results using the contemporaneous value of the value added per worker variable. All our estimations are reported using White-heteroscedastic standard errors. The estimated rent-sharing parameter amounts to 0.07 and is highly significant. This point estimate clearly shows that symmetric Nash bargaining, in which case we would have a coefficient of the bargaining power equal to 0.5, can easily be rejected. In the second column, we use the one-year lagged value added per worker. We find a rent-sharing parameter of 0.01 that is lower than the rent-sharing coefficient without using lags. Calculating the implied elasticities based on these regression coefficients, we multiply the regression coefficients with the average of the value added per worker divided by the average wage per worker (16.266/9.699, see Table 1). In the case of the contemporaneous value added measure, the wage-profit elasticity equals 0.12 while this elasticity equals 0.03 when the lagged rent-sharing variable is used. Calculating Lester's range that is a measure for profit-variability explaining wage-variability, we find that the variability in value added per worker explains about 47 (12) per cent of the wage variability in case the contemporaneous (one-period lagged) value added per worker is used.¹⁷

¹⁷ If one assumes a distribution of rents that is four standard deviations wide, then the range of value added per worker is 129,304 or 7.943 relative to the mean of value added per worker. Multiplying this with the elasticity of 0.12 (0.03) when the current (one-period lagged) value of value added per worker is used, we obtain a range of 95 (23) per cent. Considering the ratio of the mean versus the standard deviation of wages of 2, we obtain that profit variability explains about 47 per cent (95/2) of wage variability in case current

Focusing on the sectoral minimum wage, we find that a higher sectoral minimum wage per worker induces higher firm-level wages per worker.

In what follows, we also report three consistency checks. In the first consistency check, we use economic profits as a measure of rents. More specifically, we subtract the firm's wage bill from value added and divide by the firm's employment level. Our rent-sharing coefficients drop considerably. Without considering lags, we obtain a small but positive statistically insignificant coefficient of 0.01. As explained before, the 'direct' endogeneity bias might be an explanation for this result. When using lags of the economic profit measure, the coefficient becomes positive and statistically significant but is very low and equals 0.005 (see also Martins 2004, for similar results). Our firm-level data set also contains accounting profits. Running the regressions using these accounting measures, we found that the contemporaneous value and the one-period lag of the profit measure are not statistically significantly different from zero.¹⁸

For the second consistency check, we regressed the log of the firm-level wages on value added per worker as is done in quite a few papers. We argued that using levels instead of logs is more consistent with our theoretical model. Moreover, the log of wages is rather used in studies with worker-level data rather than firm-level data (see e.g. Budd et al. 2005). Our regression results using the lag of the value added per worker variable, leads to a rent-sharing coefficient of 0.001 implying a wages-profit elasticity of 0.01 that lies in line with our earlier elasticity of 0.03 in our levels specification.

The third consistency check introduces capital intensity per worker as an extra variable in regression equation (5). The reason is that our firm-level data set is not able to control for worker characteristics. We therefore follow Budd et al. (2005) and Martins (2004) and use capital intensity per worker as a proxy for observable wage controls. Bronars and Famulari (2001) argue that capital-intensive firms are more likely to hire workers with higher observable and unobservable skills. Therefore, higher rent-sharing coefficients might pick up higher unobserved ability. Our capital intensity variable turned out to be positive but only statistically significant in the regressions using the one-year lagged value added per worker variable. More importantly, our rent-sharing coefficients did not change in comparison to

rent-sharing variables are used while this number equals 12 per cent (23/2) when lagged rent-sharing variables are used.

¹⁸ Using higher order lags, the profit-sharing coefficients also turned out to be statistically insignificant.

our specification without the capital intensity variable.¹⁹ In what follows, we only focus on the specification excluding the capital intensity variable.

3.3.2 *Second Approach: Per Sector and per Year*

So far, we have restricted all sectors to share the same rent-sharing parameter. To investigate whether rent-sharing behaviour differs across sectors, we performed F-tests. More specifically, we created interaction terms where we interacted value added per worker with dummies that vary according to sector and year. These F-tests reject the poolability across sectors and years.²⁰ Therefore, to address the important issue of heterogeneity in workers' bargaining power across sectors, we first split up the manufacturing industry into 15 sectors. An overview of the different sectors is given in Table A1 of Appendix A. The sectoral classification is based on the availability of the sectoral classification of the variables used in the second stage and the availability of the number of firms within each of these sectors.

For each sector-year, we regress firm-level wages per worker on firm-level value added per worker. When the one-period lagged value of value added per worker is used as explanatory variable, the results show that about 80 per cent of the estimates are statistically significant with 70 per cent of the estimates statistically significant at the 1 per cent level.²¹ The rent-sharing parameters vary considerably over time and over sector. Table 3 gives, for each sector, the summary statistics of the estimated rent-sharing parameters.²² Considering the estimates of all sectors, we observe that the mean of the estimated rent-sharing parameter amounts to 0.128 and the standard deviation to 0.066. The mean value is highest for the sectors office and computing machinery, electrical machinery and professional goods and other transport equipment and amounts to 0.188 and 0.183 respectively. In the sector of manufacture of pulp, paper and board, the mean is lowest. It is in this sector that we even find two negative values. However, only one rent-sharing coefficient is statistically significant and the coefficient equals

¹⁹ Our rent-sharing coefficients were also robust for our estimations per sector and per year. However, the sign of the capital intensity variable was in half of the cases negative rather than positive.

²⁰ The F-statistic equals $F(119, 86 \ 126) = 3.11$. The same result is obtained by Dobbelaere (2004a) for Belgium but only variation in the bargaining power across sectors and not across time is tested.

²¹ Results not reported, but available upon request.

²² More detailed estimates are not reported but are available upon request.

Table 3: *Wage Equation, Second Approach: Bargaining Power per Sector and per Year*

Sector	Sector name	Mean	Standard deviation	Minimum	Maximum
All	All sectors	0.128	0.066	-0.0005	0.309
1	Food, beverages and tobacco	0.128	0.054	0.006	0.189
2	Textiles	0.139	0.047	0.073	0.19
3	Wearing apparel and leather and products	0.151	0.029	0.100	0.187
4	Wood products and furniture and fixtures	0.142	0.060	0.062	0.233
5	Manufacture of pulp, paper and board	0.007	0.017	-0.0005	0.050
6	Printing and allied industries	0.132	0.039	0.073	0.205
7	Chemical industry and man-made fibres	0.124	0.061	0.043	0.204
8	Rubber and plastic products	0.119	0.032	0.068	0.167
9	Non-metallic mineral products	0.103	0.027	0.066	0.144
10	Basic metal industries	0.085	0.054	0.013	0.164
11	Metal products	0.158	0.042	0.095	0.232
12	Non-electrical machinery	0.146	0.076	0.053	0.259
13	Office and computing machinery, electrical machinery and professional goods	0.188	0.049	0.117	0.264
14	Other transport equipment	0.183	0.098	0.059	0.309
15	Other manufacturing	0.118	0.070	0.026	0.210

-0.0005. Considering the time-variation in the rent-sharing parameters, no clear trend that is uniform across sectors can be discovered as for some sectors the rent-sharing parameter increases while for other sectors the rent-sharing parameter declines between 1989 and 1995.

4 Stage-Two Regressions: Determining the Workers' Bargaining Power

4.1 Specification and Data Description

The empirical methodology for the stage-two regressions borrows from Slaughter (2001) who investigates the impact of international trade on labour demand elasticities. As pointed out by Svejnar (1986), no literature exists on an appropriate functional form of the determinants of the

workers' bargaining power. In other words, we could not estimate one or more structural equations based on a theoretical model. Therefore, we estimate a reduced-form equation of estimated workers' bargaining power parameters ϕ on several explanatory variables derived from an implicit structural model.

More specifically, we use the following reduced-form regression:

$$\widehat{\phi}_{jt} = X_{jtk+1}\beta_{k+1} + \lambda_j + \lambda_t + \xi_{jt}, \quad (6)$$

with ϕ_{jt} a set of estimated rent-sharing parameters obtained from the first-stage regressions with subscripts j and t denoting sector and year respectively. X_{jtk+1} refers to a vector of explanatory variables that vary by sector-year, with k representing the total number of explanatory variables. λ_j refers to a sector-specific dummy for sector j , λ_t to a time dummy for year t and ξ_{jt} represents the error term. The sector dummies capture variables that are sector-specific and time-invariant such as differences in job type and the type of product in a certain sector, differences in union density etc.²³ The time dummies control for factors that change the workers' bargaining power over time such as government measures, the national unemployment rate, taxes, interest rates, etc.²⁴

Table 4 provides summary statistics for our explanatory variables. These variables are at the sectoral level and are constructed such that they match the sectoral classification of the second approach of the first-stage analysis. Table A1 in Appendix A gives an overview of the sectoral classification used to determine the workers' bargaining power per sector each year. More specifically, we have five variables related to international trade, three variables related to FDI, three technology variables and four control variables. Some of these variables have been used in earlier studies of the determinants of workers' bargaining power (see e.g. Svejnar 1986 and Veugelers 1989). As argued before, we further analyse this issue and introduce a richer specification such that we are able to investigate whether globalization has an effect on the workers' bargaining power. In what follows, we describe the explanatory variables of (6) together with their hypothesized effect on the workers' bargaining power. This effect is also shown in the last column of Table 4.

²³ See e.g. Doiron (1992), McDonald and Suen (1992) and Smith (1996) for a further discussion on these issues.

²⁴ See e.g. Doiron (1992) and Svejnar (1986) for a discussion.

Table 4: *Second-Stage Regression: Summary Statistics*

Explanatory variable	No. of obs.	Sample mean	Sample standard deviation	Hypothesized effect on bargaining power (B)
Import ^(WORLD) /production	120	1.051	1.224	B < 0
Import ^(OECD) /production	120	0.819	0.627	B < 0
Import ^(CEE) /production	120	0.006	0.007	B < 0
Import ^(NICs) /production	120	0.038	0.093	B < 0
Import ^(other NON-OECD) /production	120	0.222	0.664	B < 0
Export ^(WORLD) /production	120	0.474	0.608	B > 0
Export ^(OECD) /production	120	0.847	0.697	B > 0
Export ^(CEE) /production	120	0.007	0.007	B > 0
Export ^(NICs) /production	120	0.048	0.146	B > 0
Export ^(other NON-OECD) /production	120	0.194	0.546	B > 0
Outsourcing narrow ^a	30	0.170	0.129	B < 0
Outsourcing broad ^a	30	0.360	0.101	B < 0
Tariffs ^a	30	7.422	3.176	B > 0
Relative number of foreign-owned firms	105	0.089	0.081	B < 0
Relative employment of foreign-owned firms	105	0.444	0.237	B < 0
Relative value added of foreign-owned firms	105	0.400	0.228	B < 0
R&D/output	120	0.012	0.192	B > 0 or B < 0
Patents/output	120	0.055	0.068	B > 0 or B < 0
Percentage change in TFP	120	0.036	0.133	B > 0 or B < 0
Unemployment rate	120	0.130	0.059	B < 0
Short-term unemployment rate	120	0.059	0.030	B < 0
Herfindahl index	120	0.046	0.045	B > 0 or B < 0
Capacity utilization ^b	112	0.788	0.042	B > 0
Skill intensity	120	0.143	0.077	B > 0

^a These data were only available for the years 1991 and 1995. – ^b Sector 49 of the NACE-70 was dropped because of data limitations.

Source: Own computation based on data described in Appendix B.

- *Trade variable 1*: the ratio of imports to production. The imports consist of all merchandise trade (intermediate and final goods). We expect that the higher this measure is in a certain sector, the lower the workers' bargaining power will be because increased import competition leads to less favourable labour market conditions such that workers might end up with a smaller share of the rents.
- *Trade variable 2*: the ratio of exports to production. Exports also consist of all merchandise trade (intermediate and final goods). In the case of export expansion, the opposite result holds: workers are expected to be able to extract a larger share of the rents in sectors with a strong export performance. In our regression analysis, we split up our export and import variable to various destinations/origins: OECD countries, Central and Eastern European (CEE) countries, Newly Industrialising Countries (NICs) and other NON-OECD countries.
- *Trade variable 3*: narrow outsourcing divided by production. Our outsourcing variable is obtained from the Belgian input-output tables and is defined as intermediate imports (Feenstra and Hanson 1999). Narrow outsourcing refers to intermediate imports in a given sector coming from the same sector (corresponding to the diagonal elements of the import-use matrix). We expect this outsourcing variable to have a negative effect on the workers' bargaining power. Like in many other OECD countries, a lot of outsourcing takes place in Belgium, mostly of standardized products. As pointed out by a survey of the Federal Planning Bureau (2000), lower labour costs in the host country are the main motive for outsourcing. A priori, we however expect that outsourcing is accompanied by less favourable labour market conditions for Belgian workers. Consequently, workers' bargaining power is expected to be lower.
- *Trade variable 4*: broad outsourcing divided by production. In contrast to narrow outsourcing, this measure also includes intermediate imports coming from other sectors. The expected effect of this variable on the workers' bargaining power is the same as for the narrow outsourcing variable.
- *Trade variable 5*: refers to tariffs. As discussed in Budd and Slaughter (2004), tariffs shield domestic markets from foreign competition. As a consequence, we expect a positive link between tariffs and the workers' bargaining power.
- *FDI variable 1*: the number of foreign-owned firms relative to the total number of firms. We have experimented with several variables related

to inward FDI.²⁵ As pointed out by Boeri et al. (2001), the effect of FDI on the workers' bargaining power in Europe depends on the motives for FDI. If product market capture or market expansion is the main motive, workers might end up in a stronger bargaining position. If FDI is however motivated by labour market considerations, workers bargaining power might be diminished as firms can claim to shift production abroad. Since the Belgian domestic market is rather small, it is less likely that product market considerations will be the main motivation for inward FDI flows. Consequently, the effect on the workers' bargaining power is expected to be negative. In a related context, Budd and Slaughter (2004) and Dobbelaere (2004b) investigate whether rent sharing is dependent on the firm's ownership structure. The empirical results of the former study reveal that rent sharing is not higher in multinational enterprises. The authors argue that this result stems from additional complexities of multinational ownership. An alternative explanation is given by the footloose nature of multinationals firms. As mentioned above, the idea is that multinationals can shift their production partly or entirely to another country in case the present circumstances are unfavourable (Caves 1996).²⁶ Focusing on Bulgaria, Dobbelaere (2004b) finds that rent sharing is far less pronounced in foreign firms compared to state-owned firms. The author points to the high value added profile of foreign firms and their footloose nature as potential explanations.

The footloose nature of multinational companies is further documented by Bernard and Jensen (2002) for the United States, Fabbri et al. (2003) for the United Kingdom and Görg and Strobl (2003) for Ireland. These authors basically find that multinational companies are more likely to shut down operations compared to domestic firms or non-multinationals.

While direct evidence of the footloose nature of multinationals in the Belgian economy is lacking, De Backer and Sleuwaegen (2003) find that inward FDI discourages entry and stimulates exit of Belgian domestic entrepreneurs. However, this crowding-out effect might be moderated

²⁵ Because of data availability, we are not able to test for the effect of outward FDI on the workers' bargaining power. As pointed out by Slaughter (2001), this measure can be used as an alternative proxy for outsourcing.

²⁶ For Belgium, the loss of union power due to increased firm mobility is exemplified by the Renault case. In 1997, the Renault plant in Vilvoorde (Belgium) was closed at the same time as the plant in Valladolid (Spain) was expanded. Union reactions to the relocation were fierce, partly because the closure was unanticipated and partly because of the globalization aspect (Kuhlmann 1998).

or even reversed in the long term because of learning, demonstration, networking and linkage effects between foreign and domestic firms.

- *FDI variable 2 (and 3)*: refers to the employment (value added) of foreign-owned firms relative to the total employment (value added). The expected effect on the workers' bargaining power is the same as that for the first FDI variable.
- *Technology variable 1*: investment in Research and Development (R&D) divided by production, used as a measure for innovative input. It is often argued that technological change, instead of international trade, lies at the basis of changes in the labour market (e.g. Berman et al. 1994; Krugman and Lawrence 1996). The effect of technological change on the workers' bargaining power is ex ante unclear. As discussed in Betcherman (1991), technological change can have an effect on the distribution of the 'pie' between employers and employees by affecting the nature of the production process.²⁷ First, Betcherman (1991) argues that workers will have more bargaining power in case labour costs do not constitute a large part of the firm's total costs. The reason is that when labour costs are less important, an increase in the price of labour will not induce a large increase in the production price and hence will not exert a strongly negative effect on the firm's product demand. The author states that the impact of technological change on the importance of labour costs is a priori unclear and depends on the type of technological change. Second, he points out that the workers' essentiality in the production process is another channel through which the impact of technological change on the workers' bargaining power can be explained. When employees are essential to production, they have strong bargaining power during wage negotiations. The essentiality of workers in the production process depends on how critical their skills and their knowledge are and how costly a strike would be for the firm. Technological change can affect the workers' essentiality although the direction of the effect is again not clear. On the one hand, technological change can be labour-demanding in the sense that the introduction of new production processes and technologies necessitates more labour input. On the other hand, technological change can also be labour-saving when invest-

²⁷ This author however proxies the workers' bargaining power by the union/non-union wage differential. Moreover, he uses a story of shifts in labour demand elasticities to explain the effect of technological change on the workers' bargaining power. A related study by Horn and Wolinsky (1988) develops the argument that the nature of the production process in terms of complementarities and substitutability of workers in production affects the workers' bargaining power.

ment in new technology requires less labour input. The latter mechanism could be very important in Europe in general and Belgium in particular where high labour costs prevail (Abraham and Verret 1996). The empirical results of Betcherman (1991) reveal that the bargaining strength of blue-collar workers is lower in firms which introduced process computerization. Skilled workers also lose bargaining power but general occupations strengthen their bargaining position in case of process computerization.

- *Technology variable 2*: patents divided by production, a measure related to innovative output. The expected effect of this variable on the workers' bargaining power equals the one of the first technology variable.
- *Technology variable 3*: the percentage change in Total Factor Productivity (TFP), used as a measure of technological change. Again, we expect a priori the same effect on the workers' bargaining power as for technology variables 1 and 2.
- *Control variable 1*: the sectoral unemployment rate. This variable has also been used by other authors investigating the determinants of workers' bargaining power.²⁸ As already discussed in Section 2.2, we expect a negative coefficient for this variable. We also experiment with the sectoral short-term unemployment rate as an alternative. During wage negotiations workers might be more concerned with short-term unemployment than with total unemployment. The reason is that short-term unemployed people are more readily employable, and therefore better alternatives for existing workers. Short-term unemployed people refer to those who became unemployed less than one year ago.
- *Control variable 2*: the Herfindahl index, representing the sum of the squares of market shares of firms in an industry (Martin 1993: 165). A higher Herfindahl ratio is consistent with less fierce product market competition. As discussed in Veugelers (1989), higher output market concentration enables non-competitive pricing behaviour. Therefore, producers are less sensitive to wage increases since they can shift cost increases to domestic consumers. In other words, a higher Herfindahl index is expected to exert a positive impact on the workers' bargaining power. However, Veugelers (1989) also argues that more market power in the product market could be transferred to power positions in the input market such that the workers' bargaining power would be eroded. Therefore, the effect of the Herfindahl index on the workers' bargaining power can go in both directions and depends on which of the two mechanisms prevails.

²⁸ See among others, McDonald and Suen (1992), Svejnar (1986) and Veugelers 1989.

- *Control variable 3*: the sectoral capacity utilization ratio. This variable captures the general state of the economy. A higher capacity utilization ratio reflects a better economic situation and hence should allow workers to press for higher wages. We therefore expect a positive coefficient for this variable.
- *Control variable 4*: the skill intensity. This variable refers to the ratio of skilled versus total employment in a sector. Skilled workers are defined as those who obtained higher education. The effect of skill intensity on the workers' bargaining power is a priori unclear. On the one hand, one could expect that the workers' bargaining power is increasing in education since skilled workers are harder to replace than unskilled ones and hence are more powerful (Kramarz 2003). On the other hand, Acemoglu et al. (2001) argue that the bargaining power of unions decreases with the share of skilled labour. This is because of the higher outside options for skilled workers which undermines the coalition among skilled and unskilled labour in support of unions (OECD 2002).

4.2 Estimation Strategy

As indicated earlier, our estimation strategy closely follows the empirical methodology of Slaughter (2001) who investigates the effect of international trade on labour demand elasticities.²⁹ While other authors investigating the determinants of the union's bargaining power have estimated one single equation (see Doiron 1992; Svejnar 1986; Veugelers 1989 among others), we prefer to estimate (6) using each of the explanatory variables separately. As pointed out above, the reason is that there is no formal theory explaining the workers' bargaining power. In what follows, we discuss three important issues regarding our estimation strategy.

The first issue deals with the exogeneity of the regressors. Variables related to international trade and technology are endogenously determined inputs. Regarding the trade variables, we expect our tariff measure to be the most exogenous variable.³⁰ To tackle the endogeneity problem, we adopt several solutions such as (1) introducing lags of the trade and technology variables and (2) using instrumental variables (IV) where these variables are instrumented with their lags. The two estimation techniques

²⁹ Paes de Barros et al. (1999) also rely on the two-stage strategy to estimate the effect of international trade on labour demand elasticities.

³⁰ See also Haskel and Slaughter (2003) for a discussion.

produced similar results. We decided to report the estimates using the lags.

The second issue handles the fact that the dependent variable in (6) is a parameter which is estimated in the first stage. Therefore, the error term in this equation is heteroscedastic with zero mean and variance equal to the variance of the error term from the true regression plus the variance of the estimated bargaining power of the workers ϕ . Following Anderson (1993) and Slaughter (2001), we correct for this form of heteroscedasticity by weighing less heavily those observations for which the estimated variance of the bargaining power is larger. More specifically, we perform an ordinary least squares (OLS) regression on (6) from which we take the squared residuals. Subsequently, we regress these squared residuals on the estimated variance of the bargaining power coefficients, together with these estimated variances squared and cubed. Finally, we use the inverse of the predicted values of this regression as weights in an OLS regression of (6).

The third issue is related to our regression specification. First, there is no real theoretical model predicting which variables to use in a regression equation explaining workers' bargaining power. As pointed out above, we perform univariate regressions. This avoids potential multicollinearity problems between the explanatory variables. As a robustness check, we also estimate (6) using various significant explanatory variables from the univariate regressions.

4.3 Empirical Results

Table 5 reports the regression results of (6), using one single explanatory variable each time. For the trade (except outsourcing and tariffs), technology and inward FDI variables, the one-period lagged values are used in the OLS regressions.

We have estimated (6) with no sector and time fixed effects, only sector fixed effects, only time fixed effects and sector as well as time fixed effects. The results reveal that the sign and the significance of the estimated effect of the variables in the specifications without fixed effects accord with those in the specifications with only time fixed effects. Both specifications focus on the inter- as well as on the intra-sectoral variation of the variables. Similarly, the sign and the significance of the estimated effect of the variables in the specifications with sector fixed effects equal those of the specifications with both time and sector fixed effects. When sector fixed effects are included, we use the time-series information of the variables. In other words, the focus

Table 5: *Second-Stage Univariate Regression Results: Determinants of the Workers' Bargaining Power*

Explanatory variable	Hypothesized effect on bargaining power (B)	Time fixed effects	Sector & time fixed effects	No. of obs.
<i>Trade variables</i>				
Import ^(WORLD) /production	B < 0	0.004 (0.004)	0.024 (0.020)	120
Import ^(OECD) /production	B < 0	0.011 (0.008)	0.038 (0.036)	120
Import ^(CEE) /production	B < 0	0.982 (0.659)	1.038 (1.593)	120
Import ^(NICs) /production	B < 0	0.036 (0.063)	0.137 (0.247)	120
Import ^(other NON-OECD) /production	B < 0	0.004 (0.009)	0.036 (0.036)	120
Export ^(WORLD) /production	B > 0	-0.026*** (0.006)	-0.130*** (0.041)	120
Export ^(OECD) /production	B > 0	0.009 (0.007)	0.057** (0.027)	120
Export ^(CEE) /production	B > 0	0.948 (0.909)	-1.232 (1.314)	120
Export ^(NICs) /production	B > 0	0.008 (0.043)	0.027 (0.170)	120
Export ^(other NON-OECD) production	B > 0	0.005 (0.011)	0.052 (0.046)	120
Outsourcing narrow ^a	B < 0	0.056 (0.095)	0.288*** (0.087)	30
Outsourcing broad ^a	B < 0	-0.036 (0.160)	0.102 (0.145)	30
Tariffs ^a	B > 0	-0.007** (0.003)	-0.091** (0.034)	30
<i>Inward FDI variables</i>				
Relative number of foreign-owned firms ^b	B < 0	-0.137** (0.067)	0.532 (0.511)	90
Relative employment of foreign-owned firms	B < 0	0.005 (0.026)	-0.316 (0.454)	90
Relative value added of foreign-owned firms	B < 0	0.007 (0.026)	-0.014 (0.221)	90
<i>Technology variables</i>				
R&D/output	B > 0 or B < 0	0.462** (0.231)	-1.392 (1.680)	120
Patents/output	B > 0 or B < 0	0.137* (0.078)	0.081 (0.133)	120
Percentage change in TFP	B > 0 or B < 0	0.044 (0.035)	0.048** (0.022)	120

Table 5: *Continued*

Explanatory variable	Hypothesized effect on bargaining power (B)	Time fixed effects	Sector & time fixed effects	No. of obs.
<i>Control Variables</i>				
Unemployment rate	B < 0	0.121 (0.092)	-0.178 (0.330)	120
Short-term unemployment rate	B < 0	-0.067 (0.183)	-0.289 (0.231)	120
Herfindahl index	B > 0 or B < 0	-0.181* (0.098)	-0.306 (0.256)	120
Capacity utilization ^c	B > 0	-0.198 (0.133)	0.006 (0.239)	112
Skill intensity	B > 0	-0.017 (0.078)	0.135 (0.129)	120

***, **, * significant at the 1, 5 and 10 per cent level respectively. Robust standard errors in parentheses.

^a These data were only available for the years 1991 and 1995. – ^b These data are only available from 1989 onwards. – ^c Sector 49 of the NACE-70 was dropped because of data limitations.

Source: Own calculations.

is on the intra-sectoral variation of the variables, i.e. on how the workers' bargaining power moves over time. For the sake of brevity, we only report in Table 5 the results of the specifications with time fixed effects and both time and sector fixed effects.

As far as the international trade variables are concerned, we find very little evidence of international trade having an impact on the workers' bargaining power. Regarding the import variables, none of the regression coefficients is statistically significant. In general, most of the regression coefficients of the export variables carry the correct sign. We find evidence that when exports to OECD countries rise, the workers' bargaining power is increased. However, considering total exports we find the opposite. Regarding the tariff and the outsourcing variables, we find that our statistically significant variables carry the wrong sign. More specifically, workers in sectors that are shielded from foreign competition in the form of higher import tariffs are not able to cream off a larger share of the rents.

When controlling for only time fixed effects, our results show that workers have a lower bargaining power in those sectors with a lot of foreign-owned firms relative to the total number of firms. Before, we have put forward several explanations for this result.

For some specifications using our technology variable, strong statistically significant results emerge from our variables of innovative input (R&D divided by output) and innovative output (patents divided by output) when only considering the time dummies. In those sectors with more technological change in the form of higher R&D expenditures and more patents granted, workers are eager to press for higher wages as these workers might be essential in production and/or labour costs might become less important because of technological change. Considering the specification with both the time and the sector fixed effects, only a positive statistically significant effect is found for the TFP variable.

Regarding the control variables, only the Herfindahl index has a statistically significant negative coefficient in the case when only time dummies are introduced. This indicates that more market power in the output market is transferred to power positions in the input market such that the workers' bargaining power is eroded.

We also experimented with regression specifications where we combine each time one trade variable with one inward FDI variable, one technology variable and one control variable.³¹ We find that the overall results are not sensitive to using these multivariate specifications.

5 Conclusion

In this paper, we investigate the hypothesis that globalization has affected workers' bargaining power in the Belgian manufacturing industry over the period 1987–1995 by using a rent-sharing framework. We explore the link between globalization and the workers' bargaining power by introducing measures related to import and export competition, outsourcing, tariffs and inward FDI. Using a sample of more than 20 000 firms, we find little evidence of international trade having an impact on the workers' bargaining power. We provide also minor evidence of inward FDI having an impact on the workers' bargaining power. Our results show stronger evidence of technology exerting a positive effect on the workers' bargaining power. We have put forward explanations such as workers becoming more essential in production and/or declining labour costs because of technological change.

There might be different reasons for finding little evidence of globalization affecting the workers' bargaining power. First, globalization might be

³¹ Results not reported but available upon request.

a complex multidimensional issue. Second, globalization might influence the workers' bargaining power of different skill groups differently.³² Third, one could put forward that the workers' bargaining power is to some extent a structural parameter. Therefore, the impact of globalization might also have a structural component, which does not show up when using a rather short time period. Finally, our results might suggest that globalization affects labour market outcomes in Belgium via other channels than the workers' bargaining power. Movements in the firm's financial conditions or the firm's and the workers' threat points might be more direct channels.³³

Appendix A

Table A1: *Sectoral Classification for the First-Stage Regressions*

	Sector	No. of firms ^a	NACE-70	NACE-Bel
Sec 1	Food, beverages and tobacco	2,392	41 + 42	15 + 16
Sec 2	Textiles	866	43	17
Sec 3	Wearing apparel and leather and products	869	44 + 45	18 + 19
Sec 4	Wood products and furniture and fixtures	1,380	46	20 + 36.1
Sec 5	Manufacture of pulp, paper and board	227	471 + 472	21
Sec 6	Printing and allied industries	1,883	473 + 474	22
Sec 7	Chemical industry and man-made fibres	492	25 + 26	24
Sec 8	Rubber and plastic products	505	48	25
Sec 9	Non-metallic mineral products	787	24	26
Sec 10	Basic metal industries	85	22	27
Sec 11	Metal products	2,197	31	28
Sec 12	Non-electrical machinery	715	32	29
Sec 13	Office and computing machinery, electrical machinery and professional goods	883	33 + 34 + 37	30 – 33
Sec 14	Other transport equipment	301	35 + 36	34 + 35
Sec 15	Other manufacturing	435	49	36 – 36.1

^a The number of firms in each sector is computed as the average number of firms over the period 1987–1995.

³² Since our data set does not allow us to estimate separate coefficients for the bargaining power of skilled versus unskilled labour, we can not test the latter hypothesis.

³³ Since our globalization variables are defined at the *sectoral* level, we are not able to test jointly the effect of globalization on movements in the firm's financial conditions, the firm's and the workers' threat points and the workers' bargaining power.

Appendix B

The sectoral classification for the second-stage regressions is based on Table A1 and covers the period 1989–1995, except for the tariff data, inward FDI and the outsourcing variables.

The data for the trade variables are obtained from the OECD International Trade by Commodities Statistics (ITCS). These data are in the Standard Industrial Trade Classification (SITC) and are converted to the NACE-70 classification with a correspondence table obtained from the OECD.³⁴ The production data are obtained from the OECD (1999) *Stan Database for Industrial Analysis*. Our narrow and broad outsourcing variables are derived from the 1990 and 1995 input-output tables for the Belgian economy.³⁵ The data for 1990 are in the NACE-clio classification for which a conversion was used, while the data for 1995 are in the NACE-Bel classification (see Table A1 for a conversion to the NACE-70 classification). The tariff data are based on Messerlin (2001) and refer to the average most favoured nation (MFN) tariffs of the European Union. These tariff data cover the years 1990 and 1995. For some sectors, the data are more disaggregated than the sectoral classification of Table A1. Hence, we used sectoral import shares as a weight to construct tariff data based on the classification of Table A1.

Regarding inward FDI, we experiment with three variables: the number of foreign-owned companies relative to the total number of companies, the total employment of foreign-owned firms relative to the total Belgian employment and the total value added of foreign-owned firms relative to the total Belgian value added for each sector in the manufacturing industry. The Belgian Federal Planning gathers data on all multinationals in the Belgian economy. A multinational firm is defined as a firm that is at least 50 per cent foreign-owned.³⁶

We experiment with three technology variables. We use the sectoral R&D intensity, which is defined as R&D expenditures divided by output, as a measure for innovative input. The R&D data are obtained from the Dienst voor Wetenschappelijke, Technische en Culturele Aangelegenheden (DWTC, Belgian Federal Science Policy Office).³⁷ For the years 1989, 1990 and 1991, missing observations are filled in with the aid of a spline interpolation technique. The data are in the NACE-Bel classification and are converted to the NACE-70 classification based on NIS (1997). The production data are obtained from the OECD (1999) *Stan Database for Industrial Analysis*. We also use granted patent data as a measure of innovative output. These patent data are obtained from the EPO (European Patent Office) and are converted to the NACE-70 classification based on the conversion table of Verspagen et al. (1994).³⁸ The patent variable used is patents divided by pro-

³⁴ The data were first converted through the International Industrial Classification (ISIC) and subsequently converted to the NACE-70 based on Schumacher (1992).

³⁵ See <http://www.plan.be/>.

³⁶ See De Backer (2002) and De Backer and Sleuwaegen (2003) for a further description of this data set.

³⁷ See <http://www.belspo.be/>.

³⁸ Again, the conversion has occurred through the ISIC-classification.

duction times milliards. The third technology variable is total factor productivity (TFP). This variable is expressed in indices where 1990 is the base year. The percentage change of TFP can be expressed as follows:

$$\hat{A} = (\hat{Q} - \hat{L}) - \alpha(\hat{K} - \hat{L}). \quad (\text{B1})$$

In this expression, the first term reflects the percentage change in the output-labour ratio. In the second term, α refers to the capital share in production. Therefore, $(1 - \alpha)$ is the labour share in production, which is calculated as the average share of labour costs in value added. $(\hat{K} - \hat{L})$ refers to the percentage change in the capital-labour ratio. We construct our capital stock data starting from real investment data from the OECD (1999) *Stan Database for Industrial Analysis* and using a perpetual inventory method following Griliches (1979).³⁹ We first compute an initial capital stock for 1990. If we assume that both the depreciation rate δ and the annual growth rate η of investments prior to 1990 are constant, the initial capital stock K_{1990} equals:

$$\begin{aligned} K_{1990} &= I_{1990} + (1 - \delta)\lambda I_{1990} + (1 - \delta)^2\lambda^2 I_{1990} + (1 - \delta)^3\lambda^3 I_{1990} \\ &= I_{1990} \left(\frac{1}{1 - \lambda(1 - \delta)} \right), \end{aligned} \quad (\text{B2})$$

where $\lambda = 1/(1 + \eta)$. The growth rate η is estimated as the mean annual growth rate of investments over the period 1985–1990. Like Maskus (1991), we use a depreciation rate of 13.33 per cent. After having obtained the initial capital stock, deflated investment series are accumulated and depreciated from 1989 onwards. The deflators are calculated from the value added series in the OECD (1999) *Stan Database for Industrial Analysis*.

The sectoral unemployment rate is a first control variable and is obtained from the Rijksdienst voor Arbeidsvoorziening (RVA). The short-term unemployment rate is obtained from the Belgian Labour Force and is related to those workers who lost their job less than one year ago. Another control variable is the Herfindahl index, representing the sum of the squares of market shares of firms in an industry (Martin 1993: 165). This index lies between 0 and 1. The Herfindahl index equals 0 if the number of equally sized firms goes to infinity. If a monopolist exists, the Herfindahl index equals 1. This ratio is computed with the aid of the Belgian National Bank Balance sheet data using the sales variable. A third control variable is the capacity utilization rate which is obtained from the Belgostat database of the Belgian National Bank.⁴⁰ These data are provided quarterly and are disaggregated according to the different sectors in the manufacturing industry. For some sectors, the data are more disaggregated than the sectoral classification

³⁹ A more complete description of how the capital series are constructed is available from the authors upon request.

⁴⁰ These data can be downloaded from <http://www.nbb.be/belgostat/>.

mentioned in Table A1. First, we compute the average utilization rate in each sector.⁴¹ Some sectors are aggregated up using the value of production as weights. The sector “Other Manufacturing” (sector 49 of the NACE-70) was lacking. Therefore we did not use this sector in our estimations.

References

- Abowd, J., and T. Lemieux (1993). The Effects of Product Market Competition on Collective Bargaining Agreements: The Case of Foreign Competition in Canada. *Quarterly Journal of Economics* 108 (4): 983–1014.
- Abraham, F., and N. Verret (1996). De Internationale Positie van de Belgische Economie in Toekomstperspectief. Verbond van Belgische Ondernemingen. Brussels.
- Acemoglu, D., P. Aghion, and G. Violante (2001). Deunionization, Technical Change and Inequality. CEPR Discussion Paper 3764. Centre for Economic Policy Research, London.
- Anderson, P. M. (1993). Linear Adjustment Costs and Seasonal Labor Demand. *Quarterly Journal of Economics* 108 (4): 1015–1042.
- Berman, E., J. Bound, and Z. Griliches (1994). Changes in the Demand for Skilled Labor within US Manufacturing. Evidence from the Annual Survey of Manufacturers. *Quarterly Journal of Economics* 109 (2): 367–397.
- Bernard, A. B., and J. B. Jensen (2002). The Death of Manufacturing Plants. NBER Working Paper 9026. National Bureau of Economic Research, Cambridge, Mass.
- Betcherman, G. (1991). Does Technological Change Affect Union Bargaining Power? *British Journal of Industrial Relations* 29 (3): 447–462.
- Binmore, K., A. Rubinstein, and A. Wolinsky (1986). The Nash Bargaining Solution in Economic Modelling. *RAND Journal of Economics* 17 (2): 176–188.
- Biscourp, P., and F. Kramarz (2002). *The Impact of Imports on the Firm’s Production Process: A Firm-Level Analysis for France*. Paris: CREST, Centre de Recherche en Economie et Statistique.
- Blanchard, O., and F. Giavazzi (2003). Macroeconomic Effects of Regulation and Deregulation in Goods and Labor Markets. *Quarterly Journal of Economics* 118 (3): 879–908.
- Blanchflower, D. G., A. J. Oswald, and P. Sanfey (1996). Wages, Profits and Rent-Sharing. *Quarterly Journal of Economics* 111 (1): 227–251.
- Boeri, T., A. Brugiavini, and L. Calmfors (2001). *The Role of Unions in the 21st Century*. Oxford: Oxford University Press.

⁴¹ Taking averages also filters out seasonal fluctuations. Another option would be to use a filtering technique such as the Census X-11 method.

- Bound, J., D. Jaeger, and R. Baker (1995). Problems with Instrumental Variables Estimation When the Correlation between the Instruments and the Endogenous Explanatory Variable Is Weak. *Journal of the American Statistical Association* 90 (430): 443–450.
- Bronars, S., and M. Famulari (2001). Shareholder Wealth and Wages: Evidence for White-Collar Workers. *Journal of Political Economy* 109 (2): 328–354.
- Brown, J., and O. Ashenfelter (1986). Testing the Efficiency of Employment Contracts. *Journal of Political Economy* XCIV (3): S40–S87.
- Bruno, G., A. M. Falzoni, and R. Helg (2004). Measuring the Effect of Globalization on Labour Demand Elasticity: An Empirical Application to OECD Countries. CESPRI Working Paper 153. Centre for Research on Innovation and Internationalisation, Bocconi University.
- Budd, J. W., and M. Slaughter (2004). Are Profits Shared Across Borders? Evidence on International Rent Sharing. *Journal of Labor Economics* 22 (3): 525–552.
- Budd, J. W., J. Konings, and M. J. Slaughter (2005). Wages and International Rent Sharing in Multinational Firms. *Review of Economics and Statistics* 87 (1): 73–84.
- Bughin, J. (1993). Union-Firm Efficient Bargaining and Test of Oligopolistic Conduct. *Review of Economics and Statistics* 75 (3): 563–567.
- Bughin, J. (1996). Trade Unions and Firms' Product Market Power. *Journal of Industrial Economics* XLIV (3): 289–307.
- Caves, R. E. (1996). *Multinational Enterprise and Economic Analysis*. Cambridge: Cambridge University Press.
- Christofides, L. N., and A. J. Oswald (1992). Real Wage Determination and Rent-Sharing in Collective Bargaining Agreements. *Quarterly Journal of Economics* 107 (3): 985–1002.
- Clark, S. J. (1991). Inventory Accumulation, Wages and Employment. *Economic Journal* 101 (405): 230–238.
- Clark, S. J. (1993). The Strategic Use of Inventories in an Infinite Horizon Model of Wage and Employment Bargaining. *Scottish Journal of Political Economy* 40 (2): 165–183.
- De Backer, K. (2002). *Multinational Firms and Industry Dynamics in Host Countries: The Case of Belgium*. Leuven: Katholieke Universiteit Leuven, Faculteit der Economische en Toegepaste Economische Wetenschappen.
- De Backer, K., and L. Sleuwaegen (2003). Does Foreign Direct Investment Crowd Out Domestic Entrepreneurship? *Review of Industrial Organisation* 22 (1): 67–84.
- Dobbelaere, S. (2004a). Estimation of Price-Cost Margins and Union Bargaining Power for Belgian Manufacturing. *International Journal of Industrial Organization* 22 (10): 1381–1398.
- Dobbelaere, S. (2004b). Ownership, Firm Size and Rent Sharing in Bulgaria. *Labour Economics* 11 (2): 165–189.

- Doiron, D. J. (1992). Bargaining Power and Wage-Employment Contracts in a Unionized Industry. *International Economic Review* 33 (3): 583–606.
- Esteveao, M., and S. Tevlin (2003). Do Firms Share their Success with their Workers? The Response of Wages to Product Market Conditions. *Economica* 70 (280): 597–617.
- European Foundation for the Improvement of Living and Working Conditions (2003). Belgium—Collective Bargaining, <http://www.eurofound.eu.int/emire/BELGIUM/COLLECTIVEBARGAINING-BE.html>.
- Fabbri, F., J. Haskel, and M. Slaughter (2003). Does Nationality of Ownership Matter for Labor Demands? *Journal of the European Economic Association* 1 (2–3): 698–707.
- Fajnzylber, P., and W. F. Maloney (2000). Labor Demand and Trade Reform in Latin America. World Bank Policy Working Paper 2491. World Bank, Washington, D.C.
- Federal Planning Bureau (2000). *Delokalisatie, een Element van Industriële Dynamiek. De Studie over Delokalisatie, Innovatie en Werkgelegenheid. Syntheserapport*. Brussels: DWTC, Dienst voor Wetenschappelijke, Technische en Culturele Aangelegenheden.
- Feenstra, R. C., and G. H. Hanson (1999). The Impact of Outsourcing and High-Technology Capital on Wages: Estimates for the United States, 1979–1990. *Quarterly Journal of Economics* 114 (3): 907–940.
- Gibbons, R. (1992). *A Primer in Game Theory*. New York: Harvester Wheatsheaf.
- Görg H., and E. Strobl (2003). ‘Footloose’ Multinationals. *Manchester School* 71 (1): 1–19.
- Greenaway, D., R. C. Hine, and P. Wright (1999). An Empirical Assessment of the Impact of Trade on Employment in the United Kingdom. *European Journal of Political Economy* 15 (3): 485–500.
- Griliches, Z. (1979). Issues in Assessing the Contribution of Research and Development to Productivity Growth. *Bell Journal of Economics* 10 (1): 92–116.
- Haskel, J., and M. Slaughter (2003). Have Falling Tariffs and Transportation Costs Raised US Wage Inequality? *Review of International Economics* 11 (4): 630–650.
- Hasan, R., D. Mitra, and K. V. Ramaswamy (2003). Trade Reforms, Labor Regulations and Labor-Demand Elasticities: Empirical Evidence from India. NBER Working Paper 9879. National Bureau of Economic Research, Cambridge, Mass.
- Horn, H., and A. Wolinsky (1988). Worker Substitutability and Patterns of Unionisation. *Economic Journal* 98 (391): 484–497.
- Jean, S. (2000). The Effect of International Trade on Labor-Demand Elasticities: Intersectoral Matters. *Review of International Economics* 8 (3): 504–516.
- Kramarz, F. (2003). Wages and International Trade. CEPR Discussion Paper 3936. Centre for Economic Policy Research, London.

- Krishna, P., D. Mitra, and S. Chinoy (2001). Trade Liberalization and Labor Demand Elasticities: Evidence from Turkey. *Journal of International Economics* 55 (2): 391–409.
- Krugman, P., and R. Lawrence (1996). Trade, Jobs and Wages. In P. Krugman (ed.), *Pop Internationalism*. Cambridge: MIT Press.
- Kuhlmann, R. (1998). Information, Consultation and Preparing Decisions in the Age of Globalization: Conclusions from the Renault Case. In E. Gabaglio and R. Hoffmann (eds.), *European Trade Union Yearbook*. Brussels: European Trade Union Institute.
- Layard, R. M. G., S. J. Nickell, and R. L. Jackman (1991). *Unemployment: Macroeconomic Performance and the Labour Market*. Oxford: Oxford University Press.
- Lindén, J. (1995). Job Search and Wage Bargaining Power. Uppsala University Working Paper 95:14. Department of Economics, Uppsala.
- Martin, S. (1993). *Advanced Industrial Economics*. Oxford: Blackwell.
- Martins, P. (2004). Rent-Sharing before and after the Wage Bill. IZA Discussion Paper 1376. Institute for the Study of Labor, Bonn.
- Maskus, K. (1991). Comparing International Trade Data and Product and National Characteristics Data for the Analysis of Trade Models. In P. Hooper and J. D. Richardson (eds.), *International Economic Transactions*. Chicago: University of Chicago.
- McDonald, I. M., and R. M. Solow (1981). Wage Bargaining and Employment. *American Economic Review* 71 (5): 896–908.
- McDonald, I. M., and A. Suen (1992). On the Measurement and Determination of Trade Union Power. *Oxford Bulletin of Economics and Statistics* 54 (2): 209–225.
- Messerlin, P. (2001). *Measuring the Costs of Protection in Europe: European Commercial Policy in the 2000s*. Washington, D.C.: Institute for International Economics.
- National Bank of Belgium (various issues). Balanscentrale. National Bank of Belgium, Brussels.
- NIS (Nationaal Instituut voor de Statistiek) (1997). *Activiteitennomenclatuur NACE-Bel met Toelichtingen*. Brussels: NIS.
- OECD (Organisation for Economic Co-Operation and Development) (1999). *The OECD Stan Database for Industrial Analysis*. Paris: OECD.
- OECD (Organisation for Economic Co-Operation and Development) (2002). *Employment Outlook*. Paris: OECD.
- Oswald, A. (1996). Rent-Sharing in the Labor Market. University of Warwick Department of Economics Research Paper 474. University of Warwick, Warwick.
- Paes de Barros, R., C. H. Corseuil, and G. Gonzana (1999). Labor Market Regulations and the Demand for Labor in Brazil. IPEA Working Paper 656. Institute of Applied Economic Research, Rio de Janeiro.
- Rodrik, D. (1997). *Has Globalization Gone Too Far?* Washington, D.C.: Institute for International Economics.

- Schreve, K., and M. Slaughter (2002). Economic Insecurity and the Globalization of Production. *Journal of Political Science* 48 (4): 662–674.
- Schumacher, D. (1992). A Note on Human Capital Intensity of EC Trade. *Cahiers Économiques de Bruxelles* (133): 3–19.
- Slaughter, M. (2001). International Trade and Labor-Demand Elasticities. *Journal of International Economics* 54 (1): 27–56.
- Smith, J. C. (1996). Effet de Pouvoir de Négociation et du Marché Local du Travail sur la Détermination des Salaires. *Economie et Prévision* 126 (1): 1–17.
- Staiger, D., and J. H. Stock (1997). Instrumental Variables Regression with Weak Instruments. *Econometrica* 65 (3): 557–586.
- Svejnar, J. (1986). Bargaining Power, Fear of Disagreement and Wage Settlements: Theory and Evidence from US Industry. *Econometrica* 54 (5): 1055–1078.
- Teulings, C., and J. Hartog (1998). *Corporatism or Competition? Labour Contracts, Institutions and Wage Structures in International Comparison*. Cambridge: Cambridge University Press.
- Van Reenen, J. (1996). The Creation and Capture of Rents: Wages and Innovation in a Panel of UK Companies. *Quarterly Journal of Economics* 111 (1): 195–226.
- Vandenbussche, H., R. Veugelers, and J. Konings (2001). Unionization and European Antidumping Protection. *Oxford Economic Papers* 53: 297–317.
- Verspagen, B., T. van Moergastel, and M. Slabbers (1994). MERIT Concordance Table: IPC-ISIC (rev.2). Merit Research Memorandum 2/94–004. MERIT, Maastricht.
- Veugelers, R. (1989). Wage Premia, Price Cost Margins and Bargaining Power in Belgian Manufacturing. *European Economic Review* 33 (1): 169–180.