HAS INTERNATIONAL TRADE AFFECTED WORKERS' BARGAINING POWER ?*

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ABSTRACT

In this paper, we investigate whether international trade has affected workers' wages in general and their bargaining power in particular in the Belgian manufacturing industry over the period 1987-1995. Using a sample of more than 12 000 firms, we provide evidence of three channels through which international trade has an impact on workers' wages in a bargaining framework. First, international trade has an effect on the workers' outside option. Our results show that in sectors actively importing goods, workers' wages have decreased while the opposite is true for sectors actively exporting goods. Second, international trade affects the size of the firms' profits. Our results reveal that increased foreign competition in the form of lower export prices reduces both wages per worker and profits per worker. Third, international trade has a direct effect on the workers' bargaining power. In sectors characterised by high tariffs, workers are able to cream off a larger share of the rents whereas the opposite holds for sectors with strong import competition.

JEL Classification : C23, D21, F16, F23, J50, L13.

Key Words : Rent Sharing, International Trade, Instrumental Variables, Panel Data.

* We are grateful to Freddy Heylen (SHERPPA, Ghent University), Joep Konings (LICOS, K.U.Leuven), Hylke Vandenbussche (LICOS, K.U.Leuven), Niels Haldrup (University of Aarhus) and participants at the GEP Conference (Nottingham, 2004) and SMYE (Warsaw, 2004) for helpful comments and suggestions. All remaining errors are ours. Many thanks to Koen De Backere for providing the Belgian firm level data and the foreign direct investment data. Financial support from the Flemish Fund for Scientific Research (FWO) is gratefully acknowledged. Additional support has been provided by the Belgian Programme on Interuniversity Poles of Attraction, contract n° P5/21.

1. INTRODUCTION

1.1. Motivation

During the past decades, the labour market consequences of international integration have been at the centre of lively debate. Anti-globalisation 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.

In this paper, we rely on a rent-sharing framework to investigate the impact of international trade on labour market outcomes in Belgium. We argue that there are at least two valid reasons for doing so. First, the Belgian economy is characterised 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% in 2002 compared to 10% in the US.[2] Krugman (1995) among others argues that globalisation cannot explain US labour market developments because the US economy is just not open enough for trade to matter a lot. Turning this argument around, we expect to find significant labour market effects from trade in Belgium.[3] As a first indication supporting this hypothesis, Table 1 contains reduced form equations of bargained wages and profits per worker in the Belgian manufacturing industry over the period 1987-1995. Explanatory variables are exogenous sector-specific prices of imported goods and exported goods expressed in US dollars, sector-specific effective exchange rates[4] and year dummies. As expected, the sector-specific price of exports has a positive and statistically significant effect on real wages per worker and real profits per worker. This means that increased foreign competition in the form of lower sector-specific export prices reduces both wages per worker and profits per worker. A rather unexpected result is that the price of imports affects both wages per worker and profits per worker significantly negatively. As expected, the sector-specific exchange rate has a positive and statistically significant effect on real wages per worker and on real profits per worker. The results in Table 1 suggest that international trade has a significant effect on both wages and profits per worker.

[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). Explanations for the high openness ratio in Belgium are the close proximity to its trading partners, low transport costs and a supportive financial structure (Johnson and Stafford, 1999).

[3] One may legitimately wonder whether these effects are to be found on unemployment or on wages. In Belgium, the unemployment rate is high. Among other things, high minimum wages and bargaining agreements covering all type of workers tend to generate wage rigidity. The public opinion seems to believe that globalisation is responsible for the high unemployment. However, evidence is virtually nonexistent. Compared to other European countries, Belgium is characterised by a medium level of wage rigidity (see e.g. Berthold et al., 1999; Layard et al., 1991; Vinals and Jimeno, 1997).

[4] An increase in the exchange rate means a depreciation of the Belgian franc.

Table 1 OLS Estimates of the Reduced Forms for Wages and Profits per Worker, 1987-1995.

DEPENDENT VARIABLE	Firm-average Real Wage per Worker	Firm-average Real Profits per Worker
Constant	0.052*** (0.006)	-0.026 (0.018)
Import Price	-0.037*** (0.005)	-0.026** (0.011)
Export Price	0.039*** (0.005)	0.028*** (0.010)
Exchange Rate	0.007*** (0.002)	0.013** (0.007)
Year dummies	Yes	Yes
# Obs.	73354	73383
R^2	0.01	0.001

***Significant at 1%; **Significant at 5%; *Significant at 10%. Robust standard errors in parentheses.
The dependent variables are the firm-average real wage per worker and the firm-average real profits per worker. Real wages are constructed as nominal wages divided by the consumer price index with 1990 as reference year and real profits as nominal profits divided by the sector-specific producer price index. All variables are expressed as natural logarithms and are first-differenced.

Theoretically, there exist three channels through which globalisation can influence wages in a collective bargaining 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 (see Section 2.2.). To shed light on the mechanisms underlying the results in Table 1, we focus on the following issues. In the first part of the paper, we concentrate on the effect of international trade on bargained wages through changes in the firms' rents and changes in the workers' outside option. To our knowledge, these issues have not been taken up for the Belgian economy. Goos and Konings (2001) and Veugelers (1989) examine the rent-sharing hypothesis using Belgian firm-level data and find a positive profit-wage relationship. However, these authors do not relate their rent-sharing framework to a story of globalisation. Whereas our first part analyses among other things the effect of globalisation through the *size* of the rents, we focus explicitly on the *distribution* of the rents in the second part of this paper. Dobbelaere (2003), Vandenbussche et al. (2001) and Veugelers (1989) for Belgium and Svejnar (1986) for the US point out that there is a lot of cross-industry variation in the relative 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 relative 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 globalisation. We contribute to the literature by studying whether the globalisation 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' (relative) bargaining power for each sector following Svejnar (1986) and Veugelers (1989). Our unique dataset encompassing the entire population of Belgian firms in the manufacturing industry over the period 1987-1995 enables us to split up our data into several sectors.[5] In the second stage, we relate the workers' (relative) bargaining power of each sector and each year to a broad range of globalisation measures such as trade, outsourcing, tariffs and measures related to foreign direct investment.

We find that international trade has an effect on workers' wages through changes in the workers' outside option, the firms' profits and the workers' bargaining power. Our results show that in sectors actively importing goods, workers' outside options (and hence workers' wages) have decreased while the opposite is true for sectors actively exporting goods. Increased foreign competition in the form of lower export prices reduces profits per worker and hence workers' wages. Although technological change, in the form of high R&D expenditures, seems to exert an important effect on the workers' relative bargaining power, we find that globalisation also matters. A robust finding is that in sectors characterised by high tariffs, workers are able to cream off a larger share of the rents whereas the opposite holds for sectors with strong import competition.

1.2. Existing Trade-Labour Literature

In this section, we survey very briefly the literature on the impact of international trade on the labour market.[6]

One strand of this literature has taken its outset in the integration of emerging economies. Compared to OECD countries, these countries have a relatively large supply of unskilled workers with low wages. Accordingly, it has been a concern whether the position of unskilled versus skilled workers in OECD countries would deteriorate. This could show up either in lower relative wages and/or higher unemployment for these unskilled workers.

A favourite framework of trade economists to study the impact of international trade on the labour market is the Hecksher-Ohlin-Samuelson theory (HOS) in which the Stolper-Samuelson (SS) theorem is an important building block. This theory is based on perfect competition in the product and the labour market and is used to explain trade between countries with different factor endowments. Therefore, international trade is mainly of the inter-industry type. According to the Stolper-Samuelson theorem, the relative (real) wages of unskilled workers in OECD countries decline if the integration process is associated with a decline in relative prices of commodities

[5] Our dataset has the advantage of being more exhaustive than the Amadeus firm-level dataset of Bureau van Dijck. The latter database only contains firms satisfying at least one of the following criteria: number of employees larger than 100, total assets and operating revenues exceeding 16 million and 8 million USD, respectively.

[6] It is not our intention to give an exhaustive overview but to outline the main developments in the trade-labour literature. For literature surveys, see among others, Brock (2003), Burtless (1995), Cline (1997), Deardorff and Hakura (1994), Gaston and Nelson (2000) and Greenaway and Nelson (2001).

using a lot of unskilled labour. However, a voluminous literature linking changes in product prices to changes in factor prices (see Haskel, 1999 and Slaughter, 2000 for a survey of these studies) has found that international trade can account for only a very small fraction of the deterioration of the position of unskilled workers. Instead, technological progress seems to be the main reason for observed relative wage changes. Allowing for intra-industry trade, which has become more important during the past decades (Coppel and Durand, 1999), the New Trade Theory (Helpman and Krugman, 1985) provides a framework for studying the impact of international trade in imperfectly competitive product markets. Compared to the HOS-theory, the effect of international trade on the relative wages and employment of skilled versus unskilled workers is less clear-cut. In general, the New Trade Theory predicts that intra-industry trade has a rather small effect on the income distribution and may lead to welfare gains for all agents (Manasse and Turrini, 2000). It is even possible that a reverse Stolper Samuelson effect arises, i.e. that scarce production factors in developed countries (unskilled workers) gain from trade (see Helpman and Krugman, 1985; Krugman, 1981). The impact on the relative demand of skilled versus unskilled workers is vague as this depends on how international trade results in an expansion or contraction of certain sectors (see e.g. Gasiorek et al., 1991).

Labour economists have mainly used the so-called Factor Content of Trade (FCT) approach. This approach uses input-output analysis to evaluate the effect of international trade on the labour market. For given wages, the amount of labour (possibly split-up between skilled and unskilled workers) embodied in a country's exports and imports is calculated. The net employment effect is calculated as the difference between labour embodied in export flows versus labour embodied in import flows. To assess the impact of international trade on wages, the changes in labour flows are linked to estimates of labour demand elasticities. Except for Wood (1995),[7] most authors also find a small to moderate impact of international trade on workers' wages.[8]

The studies mentioned above focus on factor revenues and do not address the capture or distribution of rents in response to international trade. A growing body of the trade-labour literature has relied on rent-sharing models to explain changes in wages by changes in rents in response to openness. Abowd and Lemieux (1993) for Canada, Borjas and Ramey (1995) for the US and Kramarz (2003) for France show how increased international competition triggers a shift in the rents from domestic to foreign firms. This leads to a change in profits of the domestic firm, which translates in wage changes in the domestic market. Fontagné and Mirza (2001) focus on trade

[7] Wood (1995) argues that standard FCT-studies underestimate the impact of international trade on the labour market. Important reasons are the presence of non-competing imports and the fact that international trade not only directly affects the labour market but also exerts an indirect effect on wages and employment. The idea is that international trade leads to defensive innovation, inducing productivity changes by focusing on labour-saving, cost-reducing innovations in advanced countries. Firm-level studies investigating this indirect effect are Bernard and Jensen (1999, 2001) for the US and Bernard and Wagner (1997) for Gemany. Studies at the sectoral level addressing this issue are Cortes and Jean (2001) for France, Germany and the US; and Lawrence (2000) for the US.

[8] See Borjas et al. (1992, 1997) for the US; Cortes et al. (1999) for France; De Grauwe et al. (1979) for Belgium; Messerlin (1995) for France and Schumacher (1984, 1989) for Belgium, France, Germany, Italy, the Netherlands and the UK.

volumes to address the international rent-sharing hypothesis in developed and developing countries. Their empirical results show that an increase in exports as well as domestic market shares induces higher wages in a number of industries in the OECD. In developing countries, such as the Mediterranean countries[9] and those in Latin America, similar rent-sharing effects are observed. However, these effects are not present in Asia. Besides taking into account the effect of globalisation through changes in the firm's rents, Kramarz (2003) provides evidence of international trade affecting bargained wages through changes in the workers' and the firm's threat points. Work related to the impact of increased globalisation on workers' bargaining power has been done by Budd and Slaughter (2004) and Budd et al. (2004). Their paper focuses on Canada and investigates whether profits are shared across international borders. More specifically, Canadian wages are regressed on Canadian and US profits, both interacted with several variables related to international linkages such as multinational ownership, union type and tariffs and transportation costs.

The organisation of the paper is as follows. In Section 2, we describe the theoretical framework and discuss three channels through which international trade can affect wages in a collective bargaining framework. Section 3 presents 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 main 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.[10]

In this section, we first describe the efficient bargaining framework. Then, we briefly discuss three channels through which international trade can affect wages during the bargaining process.

[9] Encompassing Cyprus, Egypt, Malta, Morocco, Tunisia and Turkey.

[10] 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.

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 stylised facts about Belgian industrial relations. Belgian collective agreements do not only deal with 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 (2003). 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.[11] Its objective function is specified in a utilitarian form: $U(w,N) = Nw + (\overline{N} - N)w_a$, where N is the employment level, $\overline{N}$ is union membership $(0 < N \leq \overline{N})$, 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 $\pi(w,N) = R(N) - wN - F$, where $R = \Theta Q$ stands for total real revenue $(R''_N < 0)$, Q for real output, Θ for a revenue shifter which 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.[12] 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 generalised Nash solution to:

$$\max_{w,N} \Omega = \left\{ Nw + \left(\overline{N} - N\right) w_a - \overline{N} w_a \right\}^{\phi} \left\{ R - wN \right\}^{1-\phi} \tag{1}$$

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

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

[12] According to the axiomatic approach, the threat point or disagreement payoff equals the inside option in the short run, i.e. income from strike funds for the union and profits while production is shut down for the firm. If the disagreement continues in the longer run, however, the threat point equals the outside option as the union and the firm will probably search for another bargaining partner (Booth, 1995). Hence, it is not necessary for the union's threat point to be equal to the alternative wage (see e.g. Layard et al., 1991 and McDonald and Suen, 1992 for a discussion).

Maximisation of Eq. (1) with respect to the wage rate (w) gives the following equation:[13]

$$w = w_a + \frac{\phi}{1-\phi}\left[\frac{R - wN}{N}\right] \tag{2}$$

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

$$\begin{aligned} w &= R_N + \frac{\phi}{1-\phi}\left[\frac{R - wN}{N}\right] \\ &\Updownarrow \\ w &= R_N + \phi\left[\frac{R - R_N N}{N}\right] \end{aligned} \tag{3}$$

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: $R_N = w_a$. 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).

2.2. Channels through which International Trade affects Wages in a Bargaining Framework

Theoretically, there are three channels through which product market integration (globalisation) can affect wages during the bargaining process (see Eq. (2)).

First, international trade can induce movements in the firm's profitability through the revenue shifter Θ, affecting the *size* of the rents (or the 'pie') that can be shared between the workers and the firm.[14] Abowd and Lemieux (1993) for Canada and Kramarz (2003) for France use foreign competition shocks as an exogenous source of variation in product market conditions to identify the effect of the firm's profitability on negotiated wages. The results of Abowd and Lemieux (1993) reveal that foreign competition in the form of lower import or export prices decreases both wages per worker and quasi-rents per worker. Moreover, the effect on quasi-rents is larger than on wages which implies that workers are not able to capture all the changes in quasi-

[13] Note that rents per worker $\left(\frac{R - wN}{N}\right)$ do not depend on the revenue shifter Θ when the elasticity of output with respect to employment is constant, i.e. when $Q(N)$ is Cobb-Douglas (McDonald and Solow, 1981).

rents induced by changes in import and export prices. Kramarz (2003) uses US export prices to determine the effect on (quasi-) rents and hence wages. He finds that higher export prices of US firms to OECD countries increase French quasi-rents, meaning that French firms benefit from the higher prices. US export prices to Eastern European countries and oil-producing countries decrease French quasi-rents. The author considers the former result as a potential proof of increased import competition while the latter can be consistent with an increase in oil prices, affecting profits in France negatively.

Second, international trade can affect the bargaining outcome through movements in the firm's and the workers' threat points. Biscourp and Kramarz (2002) and Kramarz (2003) show how intermediate imports may act as substitutes for part of the labour input. Firms that use intermediate inputs in the production process have to announce the amount of imports well in advance. In other words, these intermediate imports can be seen as investments that influence the firm's threat point and provide the workers with hold-up opportunities (Malcomson, 1997). More specifically, Kramarz (2003) shows that there is a positive relation between the firm's intermediate imports and the workers' wages. At the same time, imports of finished goods by the firm itself or by its competitors decrease the workers' outside options (Kramarz, 2003). During wage negotiations, the workers have possible access to other jobs in case bargaining breaks down. The availability of these temporary jobs is inversely related to the amount of imported finished goods in an industry (see Kramarz, 2003 for a discussion). The empirical results of Kramarz (2003) for France reveal that increased import competition not only affects wages through changes in quasi-rents but also through the workers' threat point, affecting their wages negatively.

The third channel through which international trade can affect wages in a collective bargaining framework is through the workers' bargaining power parameter ϕ. There are two solution concepts within the bargaining framework: the axiomatic approach and the strategic approach. The static axiomatic (normative) approach concentrates on the outcome of the bargaining process satisfying certain principles that might be achieved by an objective arbitrator in case of disagreement between the parties (Booth, 1995).[15] The dynamic game-theoretic (strategic) approach involves modelling the bargaining process in order to determine the actual outcome. It can be shown that in a simple 'alternating offers model' with no uncertainty, the game-theoretic solution equals the axiomatic or generalised Nash bargaining solution (see Binmore et al., 1986 and Sutton, 1986 for an extensive comparison of both approaches). More specifically, the outcome of a bargain can be compared to the division of a continuous supply of a cake between two parties (see Layard et al., 1991 for an interpretation). Binmore et al. (1986) show that when two assumptions

[14] As mentioned above, the workers' bargaining power ϕ cannot be identified from variations in the revenue shifter Θ if the production function is Cobb-Douglas.
[15] These axioms are invariance, Pareto efficiency, independence or irrelevant alternatives and anonymity or symmetry.

are fulfilled, the cake would be equally split. These assumptions are: both parties have the same discount rate and neither party gets any extra income from other sources while disagreement is going on.

The real advantage of the game-theoretic approach is that an economic interpretation can be given to the bargaining power parameter ϕ (see Booth, 1995). In the interpretations given below, globalisation enters the story through its effect on the general economic climate and the unemployment level in particular.[16] 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.[17] 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 globalisation 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 and 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 and Smith, 1996).[18] 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 and Doiron, 1992). For workers, these strike costs could be related to the availability of strike funds or temporary jobs elsewhere. Other family members' income could also form an alternative in case of disagreement during wage negotiations and it is even the case that these members are more motivated to apply for more temporary employment in case of disagreement. 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 globalisation, are therefore also able to affect the union's bargaining power as these might have an impact on the rate of unemployment.

[16] Note that the unemployment level affects the workers' outside option as well as the workers' bargaining power in this setting.
[17] Gibbons (1992, p. 68) 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.
[18] 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.

An informal theory regarding the determinants of the union's bargaining power is given by McDonald and Suen (1992). The authors argue that the bargaining power of the workers is related to the amount of support workers are prepared to give to a wage claim. One factor influencing this support is union leadership but it is difficult to find an empirical proxy for this determinant. Another factor is the workers' feeling about the fairness of the claim. If workers feel that the wage claim is unreasonable, 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. It is also in this context that increased globalisation can have an impact on the economic situation as e.g. higher import competition (export competition) can increase (decrease) unemployment and hence influence workers' bargaining power. As pointed out by McDonald and Suen (1992), the impact of unemployment on workers' bargaining power is not about the reduction in alternative job prospects or about the decline in the demand for labour but is instead related to the will of workers to press for a wage claim.[19]

As one of the first, Rodrik (1997) has pointed out that increased globalisation 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 foreign direct investment (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 liberalisation 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.[20] As pointed out by Slaughter (2001) and Rodrik (1997), 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.

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

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[19] McDonald and Suen (1992) argue that union density may be an indicator of the justness of union wage claims.

[20] Among others, Bruno et al. (2001) [several OECD countries], Fajnzylber and Maloney (2001) [Chile, Colombia and Mexico], Greenaway et al. (1999) [UK], Jean (2000) [France], Krishna et al. (2001) [Turkey], Levinsohn (1993) [Turkey] and Paes de Barros et al. (1999) [Brazil] have also investigated this issue.

In this paper, we further investigate whether globalisation has indeed an effect on the workers' bargaining power as first pointed out by Rodrik (1997). We use a broad range of globalisation measures such as trade, outsourcing, tariffs and measures related to foreign direct investment. While this is the focus of this paper, we also pay some attention to the first and the second mechanism of how international trade can affect wages in a collective bargaining framework. More specifically, we also analyse whether Belgian manufacturing wages are affected by international trade through changes in the firm's profits and changes in the workers' outside option. In the next section, we proceed with the stage-one regressions where we estimate the workers' relative bargaining power parameters. Subsequently, we relate these parameters to several globalisation measures.

3. STAGE-ONE REGRESSIONS: ESTIMATING WORKERS' (RELATIVE) 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' relative bargaining power $\left(\frac{\phi}{1-\phi}\right)$ for 15 sectors in the Belgian manufacturing industry over the period 1987-1995. In the second stage, we regress the estimated workers' relative bargaining power coefficients on several measures of trade, foreign direct investment, technology and control variables. These stage-two regressions try to identify the factors explaining the workers' relative bargaining power.

3.1. Specification and Data Description

The econometric specification that acts as the basis for the stage-one regressions is derived from Eq. (2) and is given by:

$$\ln w_{ijt} = \alpha_0 + \delta_1 \ln w^0_{jt} + \delta_2 \ln U_{jt} + \frac{\phi}{1-\phi} \ln\left(\frac{\pi}{N}\right)_{ijt} + \alpha_i + \alpha_t + \varepsilon_{ijt} \tag{4}$$

with $\left(\frac{\phi}{1-\phi}\right)$ the workers' relative bargaining power. Index ijt stands for firm i in sector j at time t.

To estimate Eq. (4), 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 which are collected by the National Bank of Belgium (NBB). The dependent variable is the natural logarithm of the average real annual wage in firm i. The workers' outside option (w_a in Eq. (2)) is proxied by the sector-average real annual wage per worker (w_{jt}^0) and the sectoral unemployment rate (U_{jt}). The latter variable is obtained from the Rijksdienst voor Arbeidsvoorziening (RVA). To capture the firm's financial conditions, we use accounting profits, which are taken directly from the company accounts database. In the analysis, we exclude loss-making firms.[21] 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.[22] Profits are also expressed in real terms, i.e. nominal profits divided by the sector-specific producer price index. The producer price index is obtained from the Ministry of Economic Affairs.[23] Average wages and profits are constructed by dividing annual labour costs and profits by the average number of employees in each firm for each year respectively. ε_{ijt} represents a white noise error term. We also include time dummies to capture possible unobservable aggregate shocks common to all firms in a given year (α_t). By taking the first difference of Eq. (4), we control for individual firm effects (α_i). As a consequence, our parameter estimates are consistent even if α_i were correlated with regressors. Table 2 includes some summary statistics of the key explanatory variables for the period 1987-1995.

Table 2 First-Stage Regression: Summary Statistics.

VARIABLES	**1987-1995**		
	# Obs.	**Sample Mean**	**Sample St. Dev.**
Firm-average Real Wage per Worker (x 100 000 BEF)	109208	9.859	6.952
Firm-average Real Profits per Worker (x 100 000 BEF)	108153	4.242	20.247
Sector Unemployment Rate (%)	122174	15.345	6.012
Sector-average Real Wage per Worker (x 100 000 BEF)	123421	8.722	0.963

Source: National Bank of Belgium (NBB).

[21] The reason is that for the sub-sample of loss-making firms, rent sharing is not an issue. By contrast, the wages-profit elasticity is found to be negative. Analysing wage setting behaviour of loss-making firms is beyond the scope of this paper.
[22] These data can be downloaded from http://www.nbb.be/belgostat/.
[23] These data can be downloaded from http://ecodata.mineco.fgov.be.

3.2. Estimation Strategy

Two Approaches to Balancing Time-series and Cross-section Pooling

To exploit fully the data's panel aspect, we report estimation results of Eq. (4) for two approaches to balancing time-series and cross-sectional pooling. The first approach pools all 15 sectors over all the years. This yields one manufacturing-wide rent-sharing parameter $\left(\frac{\phi}{1-\phi}\right)$ over the period 1987-1995. However, since the Belgian economy is characterised by a high degree of industry-level bargaining between employer associations and unions that are strongly organised 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 $\left(\frac{\phi}{1-\phi}\right)$ for each sector separately year by year. [24] The latter estimates will be used in the second-stage regression when we try to explain the determinants of the workers' relative bargaining power.

Econometric Problems

Ordinary least squares estimates of Eq. (4) will be biased for basically two reasons. First, our dependent variable, wages per worker, is negatively related to profits per worker by construction. Second, the estimates of $\left(\frac{\phi}{1-\phi}\right)$ will be biased if rents per worker are measured with error. Measurement error can be present since both our wage and profit variable are divided by employment (Van Reenen, 1996, among others for a discussion). In other words, performing an OLS regression on Eq. (4) would lead to an endogeneity bias. Therefore, we try to find appropriate instruments.

[24] In Belgium, collective agreements are concluded in joint committees and subcommittees. There are about 95 joint committees and 72 joint subcommittees. In principle, each firm belongs to only one joint committee. In practice, however, firms belong to different joint committees. For example, joint committees can be different for blue collar and white collar workers. To be specific, collective agreements applying to white collar workers are negotiated in one coordinating joint committee (joint committee n° 218) which groups white collar workers of a large number of industrial and service sectors. For this reason we can not split up the manufacturing industry in different sectors according to joint committees. (FPS Employment, Labour and Social Dialogue, 2003) Instead, we group sectors according to the NACE classification. From 2005-2006 onwards, however, NACE-codes will be linked to joint committees. This will allow us to split up the manufacturing industry according to collective bargaining agreements and to add the Belgian institutional framework to the analysis.

Instrumentation Strategy

The econometric problems described above show that instrumentation is a necessary strategy to obtain unbiased and consistent estimates of the rent-sharing parameter. Valid instruments must reflect changes in product market conditions inducing movements in rents per worker but they must be uncorrelated with the error term in the wage equation.

Our instrumentation strategy consists of two steps. In a first step, we use lagged levels of profits as instruments to estimate the rent-sharing parameters for the two approaches described above. For the sake of comparison, we also report the OLS results. Our second step aims at introducing one of the channels through which international trade might affect bargained wages, i.e. through movements in the firm's rents. More specifically, we use instruments representing exogenous demand shocks that enter the wage equation only through the profits per worker variable.

First, inspired by Abowd and Lemieux (1993) for Canada and Abowd and Allain (1996) and Kramarz (2003) for France, we use sector-specific export and import prices as a source of exogenous variation in the firm's product market conditions. The fact that Belgium is a small open economy justifies treating changes in sector-specific international prices as exogenous demand shocks since these prices are determined on the world market and are hence out of reach for Belgian firms. More specifically, we construct sector-specific unit value indices for Belgian imports and exports based on the OECD International Trade by Commodities database.[25] Following Kramarz (2003) but in contrast to Abowd and Lemieux (1993), we use sector-specific prices expressed in US dollars. Since exchange rates fluctuate quite a lot, their effect on the Belgian economy is difficult to determine and hence we have avoided converting the international prices in terms of Belgian francs.

Second, in line with Bertrand (1999) and Budd and Slaughter (2004), sector-specific exchange rates are also used as valid instruments. The reason is that in case there is imperfect competition in certain sectors, using export prices would no longer be a valid strategy (see also Revenga, 1992, for a discussion). Following Kramarz (2003), we could however have used US export prices since these variables are exogenous to the Belgian economy. However, due to a lack of reliable data for our period under study in the OECD Trade by Commodities database, we were not able to do this.[26] Moreover, using only US export prices makes it difficult to distinguish between the impact of import versus export competition on the firms' rents. Following Budd and

[25] The base year is 1990. Using this database to construct unit values as a proxy for import and export prices is frequently done in the literature (see e.g. Brenton and Pinna, 2002, among others).
[26] Kramarz (2003) however uses the same OECD dataset but uses a different time period.

Slaughter (2004), we have computed trade-weighted multilateral Belgian exchange rates for each sector and each year where we also weigh bilateral exchange rates with import shares.[27]

Since international prices and exchange rates are defined at the sectoral level, they cannot be used as instruments when estimating sector-specific rent-sharing parameters, as there is no cross-sectional variation in that case. Therefore, we only report the results at the most aggregated level, i.e. pooled over sectors and over years. Using sector-specific export and import prices on the one hand and sector-specific exchange rates on the other as instruments in our regression equations also serves as a consistency check for our estimations where we use the lags of the profit variable as instruments.

3.3. Empirical Results

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

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. The first part of Table 3 presents the Ordinary Least Squares estimates of Eq. (4). Controlling for year-, sector- and firm-level effects, the estimated wages-profits elasticity amounts to 0.095 and is strongly significant. It is somewhat higher than the one obtained by Goos and Konings (2001) who find an elasticity of 0.06. This point estimate also clearly shows that symmetric Nash bargaining, in which case we would have a coefficient of the relative bargaining power equal to one, can easily be rejected.

[27] We have only taken the trade flows of those countries for which their share in Belgian imports exceeds 2 percent.

Table 3 Wage Equation.

First Approach: Pooling over Sectors and over Years.

ESTIMATION METHOD	OLS	TSLS[a]	TSLS[b]	TSLS[c]	TSLS[d]
Constant	0.022*** (0.005)	0.037*** (0.008)	0.040*** (0.007)	0.040*** (0.006)	0.026*** (0.005)
Profits per Worker	0.095*** (0.005)	0.087** (0.035)	0.220** (0.088)	0.220*** (0.058)	0.090* (0.051)
Sectoral Unempl.	-0.042* (0.024)	-0.055** (0.028)	-0.005 (0.023)	-0.005 (0.021)	-0.016 (0.021)
Sectoral av. Wage	0.132 (0.098)	0.170* (0.090)	0.150 (0.121)	0.150 (0.121)	0.159 (0.120)
Year dummies	Yes	Yes	Yes	Yes	Yes
Sector dummies	Yes	Yes	Yes	Yes	Yes
Durbin-Wu-Hausman Test (p-value)	0.0025				
Hansen-Sargan IV Test (p-value)		0.139	0.880	0.946	0.290
Nullity of the Instruments (F-statistic)		56.25	4.28	4.02	4.15
# Obs.	73353	26078	73351	73351	73351
R^2	0.077	0.126	.	.	0.077

***Significant at 1%; **Significant at 5%; *Significant at 10%. Robust standard errors in parentheses.
The dependent variable is the firm-average real wage per worker. All variables are expressed as natural logarithms.
The instruments are in levels. Durbin-Wu-Hausman Test: test of endogeneity of real profits per worker.
Hansen-Sargan Instrument Validity Test: test of correlation among instruments and residuals, asymptotically distributed as χ^2_{df}. Nullity of the Instruments (F-statistic): tests the nullity of the instruments for real profits per worker.

A full stop in the R^2 box indicates that the calculated R^2 was negative and hence is not reported.

a: instruments: profits per worker $_{t-3}$, profits per worker $_{t-4}$.
b: instruments: export prices $_{WORLD,\ t-2,\ t-3}$, import prices $_{WOLRD,\ t-2,\ t-3}$.
c: instruments: export prices $_{OECD,\ t-3}$, export prices $_{CEE,\ t-3}$, export prices $_{NICs,\ t-3}$, export prices $_{other\ NON-OECD,\ t-3}$, import prices $_{OECD,\ t-3}$, import prices $_{CEE,\ t-3}$, import prices $_{NICs,\ t-3}$, import prices $_{other\ NON-OECD,\ t-3}$.
d: instruments: exchange rates $_{t,\ t-1,\ t-2,\ t-3,\ t-4,\ t-5}$.

However, as discussed above, OLS estimates are likely to be affected by endogeneity biases. We test the endogeneity of profits per worker in two ways. First, we use the Durbin-Wu-Hausman test. From Table 3, this test indicates that the OLS specification is rejected. Second, as suggested by Davidson and MacKinnon (1993), we perform an augmented regression test. More specifically, we regress the endogenous variable (profits per worker) on the set of instruments and the exogenous variables in the wage equation. We recuperate the residual of this regression and augment the wage equation with this residual. The exogeneity test amounts to testing whether the

coefficient of the residual equals zero in the wage equation. In line with the Durbin-Hausman-Wu test, this augmented regression test indicates that OLS is not consistent.[28]

In the second column of Table 3, we use the 3-period and the 4-period lagged value of profits per worker as instruments. The exogeneity of the instruments with respect to the error term is tested by the Hansen-Sargan test statistic, which is distributed as chi-squared. The specification test does not show evidence against our estimates: the Hausman-Sargan test does not reject the null hypothesis that our instruments are valid. To check the usefulness of the instruments, we report the F-statistic that tests the nullity of the instruments in the first-stage regression. This test statistic indicates that the nullity of the instruments in the first-stage regression is rejected. Taking into account endogeneity, we find a wages-profit elasticity of almost 0.09.

To check the robustness of the results, we now present three consistency checks, which also take into account the first and the second channel through which international trade can affect wages in a bargaining framework. The first two consistency checks are in line with the hypothesis that international trade has an effect on bargained wages through shifts in the size of rents (see last three columns of Table 3). The third consistency check investigates whether Belgian manufacturing wages are influenced by international trade through changes in the workers' outside option (see Table 4).

The third and the fourth column of Table 3 report the estimates of the rent-sharing parameter using sector-specific international prices as instruments. These sector-specific export and import prices represent exogenous demand shocks that increase product market competition in Belgium (for a proof see Appendix A). From these columns, it follows that the estimated wages-profits elasticity is considerably higher using sector-specific international prices as instruments than the ones using lagged profit values as instruments. In the third column, we use sector-specific international prices at the world level as instruments, in the fourth column we split up sector-specific international prices to various destinations/origins: OECD countries, CEE countries, NICs and other NON-OECD countries.[29] The point estimate of the rent-sharing parameter is in both cases 0.22. The specification tests do not reject the null hypothesis that our instruments are valid. The F-statistics reject the nullity of the instruments in the first-stage regression. The fifth column of Table 3 reports the results using sector-specific exchange rates from period t until period $(t-5)$ as instruments. The point estimate of the average manufacturing-wide wages-profits elasticity is 0.09.

[28] Results not reported but available upon request.

[29] The 4 destinations/origins which sum up to the WORLD are: (1) OECD countries: Australia, Austria, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Mexico, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, the US and the UK, (2) CEE countries: Albania, Bulgaria, the Czech Republic, the Slovak Republic, Romania, Poland and Hungary, (3) Newly Industrialising Countries (NICs): Hong Kong, Malaysia, Singapore, Taiwan, Thailand and Korea and (4) other NON-OECD countries: WORLD - OECD - CEE - NICs. Like other OECD countries, international trade of Belgium consists mainly of trade with other OECD countries. In 2002, the export/GDP (import/GDP) ratio is 69.06% (62.14%) when considering trade with other OECD countries while 1.76% (2.05%) when considering trade with NICs (http://www.oecd.org).

Again, we cannot reject the null hypothesis that the overidentifying restrictions are correct. The F-statistic indicates that the nullity of the instruments in the first-stage regression is rejected.

Our third consistency check is reported in Table 4. To control for the second channel through which international trade might affect bargained wages, i.e. through changes in the workers' outside option, we substitute the share of imports and the share of exports in total production at the sectoral level for the workers' outside option. The idea is that imports of goods are potential substitutes for labour. Hence, the higher the ratio of imports over production in a sector, the lower the employment opportunities and the lower the workers' outside option. The opposite reasoning holds for the ratio of exports over production. The OLS estimates are reported in the first column of Table 4. As expected, the higher the share of imports in total production in a sector, the lower the workers' wages and vice versa for the share of exports. As import and export quantities in a small open economy may not be fully exogenous since they depend on domestic demand and supply conditions, we test their exogeneity using the Davidson and MacKinnon (1993) test. This augmented regression test rejects the exogeneity of import and export quantities.[30] Therefore, we apply the same instrumentation idea as for profits per worker, i.e. sector-specific international prices defined at the world level as well as split up to various destinations/origins are used as instruments.[31] The second column of Table 4 shows the IV results with import and export as well as profits per worker instrumented by sector-specific international prices at the world level.[32] The point estimates of the share of imports and the share of exports are considerably larger compared to the OLS estimates but the direction of the effects is the same. The Hansen-Sargan IV test does not show evidence against our estimates. In column 3 of Table 4, the countries of destination/origin of exports and imports are distinguished. The results reveal that the destination/origin of exports and imports matters, even though the effects are not always precisely estimated. Workers' outside option and hence workers' wages are significantly negatively affected by imports of goods from OECD countries and NICs whereas workers benefit from exports to CEE countries. Contrasting OECD countries with the other groups of countries, we see that the coefficients on the share of imports from OECD countries and the share of exports to OECD countries are much larger than the ones of the other groups of countries. A possible explanation is that international trade of Belgium mainly consists of trade with other OECD countries (http://www.oecd.org).

[30] Results not reported but available upon request.
[31] For all specifications, the F-statistics -testing the usefulness of the instruments for the profit per worker variable and for import and export quantities- reject the nullity of the instruments in the first-stage regression. For the sake of brevity, these test statistics are not reported but are available upon request.
[32] Note that we do not use all the sector-specific prices as instruments but only those that passed the exogeneity test. That explains why the instrument set used in Table 3 differs from the one in Table 4.

Table 4 Wage Equation.

First Approach: Pooling over Sectors and over Years - Outside Option Channel.

ESTIMATION METHOD	OLS	TSLS[a]	TSLS[b]
Constant	0.035*** (0.007)	0.068*** (0.015)	0.034*** (0.011)
Profits per Worker	0.066*** (0.005)	0.147** (0.073)	0.180*** (0.057)
Import$^{(WORLD)}$/Production	-0.083*** (0.028)	-0.646*** (0.197)	
Import$^{(OECD)}$/Production			-0.291*** (0.089)
Import$^{(CEE)}$/Production			-0.009 (0.011)
Import$^{(NICs)}$/Production			-0.031** (0.013)
Import$^{(other\ NON\text{-}OECD)}$/Production			0.020** (0.010)
Export$^{(WORLD)}$/Production	0.038* (0.023)	0.478*** (0.133)	
Export$^{(OECD)}$/Production			0.082 (0.081)
Export$^{(CEE)}$/Production			0.016** (0.008)
Export$^{(NICs)}$/Production			-0.007 (0.016)
Export$^{(other\ NON\text{-}OECD)}$/Production			-0.023 (0.023)
Year dummies	Yes	Yes	Yes
Sector dummies	Yes	Yes	Yes
Hansen-Sargan IV Test (p-value)		0.401	0.091
# Obs.	41615	41615	41615
R^2	0.046	.	.

***Significant at 1%; **Significant at 5%; *Significant at 10%. Robust standard errors in parentheses.
The dependent variable is the firm-average real wage per worker.
All variables are expressed as natural logarithms. The instruments are in levels.
Hansen-Sargan Instrument Validity Test: test of correlation among instruments and residuals, asymptotically distributed as χ^2_{df}. A full stop in the R^2 box indicates that the calculated R^2 was negative and hence is not reported.

a: Imports/Production, Exports/Production and Profits per Worker instrumented.
Instruments: export prices $_{WORLD,\ t,\ t\text{-}1}$, import prices $_{WORLD,\ t,\ t\text{-}1}$.
b: Imports/Production, Exports/Production and Profits per Worker instrumented. Instruments:
export prices $_{OECD,\ t,\ t\text{-}3,\ t\text{-}4}$, export prices $_{CEE,\ t,\ t\text{-}3,\ t\text{-}4}$, export prices $_{NICs,\ t,\ t\text{-}3,\ t\text{-}4}$, export prices $_{other\ NON\text{-}OECD,\ t,\ t\text{-}3,\ t\text{-}4}$,
import prices $_{OECD,\ t,\ t\text{-}3,\ t\text{-}4}$, import prices $_{CEE,\ t,\ t\text{-}3,\ t\text{-}4}$, import prices $_{NICs,\ t,\ t\text{-}3,\ t\text{-}4}$, import prices $_{other\ NON\text{-}OECD,\ t,\ t\text{-}3,\ t\text{-}4}$.

Second Approach: Per Sector, 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. These tests reject the poolability across sectors. The same result is obtained by Dobbelaere (2003). Therefore, to address the important issue of heterogeneity in workers' (relative) bargaining power across sectors, we now split up the manufacturing industry into 15 sectors. An overview of the different sectors is given in Table B.1 of Appendix B. 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 profits per worker. In Table 5, we present both the OLS and the TSLS rent-sharing estimates for each sector separately year by year. Focusing on the OLS estimates, we find that 85% of the estimated wages-profits elasticities are statistically significant at the 1% level. As far as the TSLS estimates are concerned, the results show that 65% of the estimates are statistically significant at the 1% level, 8% at the 5% level and 24% are not significant. For almost all specifications, we find that the TSLS point estimates exceed the OLS point estimates. It is also clear that the wages-profits elasticities vary considerably over time and over sector. For 10 out of the 15 sectors, our results show that the estimated rent-sharing parameter is higher in 1995 than in 1991. Focusing on the TSLS estimates, the mean of the estimated wages-profits elasticities amounts to 0.11 and the standard deviation to 0.06. All sector-specific elasticities vary between 0.01 and 0.09.

Table 5 Wage Equation.

Second Approach: Per Sector, by Year.

Sector	Year	# Obs.	Wage-profits Elasticity (OLS)	# Obs.	Wage-profits Elasticity (TSLS[a])
Sec1	**1991**	1894	0.107*** (0.010)	844	0.151*** (0.018)
	1992	2018	0.092*** (0.009)	865	0.154*** (0.020)
	1993	2072	0.099*** (0.010)	903	0.131*** (0.018)
	1994	2093	0.115*** (0.010)	965	0.148*** (0.016)
	1995	2107	0.108*** (0.008)	1055	0.182*** (0.016)
Sec2	**1991**	695	0.088*** (0.013)	407	0.128*** (0.020)
	1992	661	0.076*** (0.013)	378	0.118*** (0.023)
	1993	652	0.069*** (0.013)	353	0.136*** (0.025)
	1994	676	0.090*** (0.015)	348	0.119*** (0.027)
	1995	620	0.103*** (0.016)	329	0.145*** (0.030)
Sec3	**1991**	786	0.073*** (0.012)	390	0.118*** (0.023)
	1992	762	0.073*** (0.011)	379	0.115*** (0.022)
	1993	727	0.072*** (0.012)	356	0.109*** (0.025)
	1994	720	0.073*** (0.014)	339	0.116*** (0.024)
	1995	679	0.083*** (0.012)	304	0.111*** (0.026)
Sec4	**1991**	1254	0.053*** (0.013)	641	0.081*** (0.021)
	1992	1341	0.027*** (0.012)	641	0.125*** (0.022)
	1993	1360	0.043*** (0.013)	653	0.112*** (0.023)
	1994	1364	0.073*** (0.012)	639	0.103*** (0.023)
	1995	1331	0.066*** (0.014)	641	0.076*** (0.021)
Sec5	**1991**	210	0.075*** (0.025)	116	0.035 (0.049)
	1992	200	0.076*** (0.027)	113	0.073 (0.056)
	1993	213	0.064** (0.034)	107	0.043 (0.031)
	1994	212	0.021 (0.025)	105	0.063** (0.031)
	1995	207	0.049** (0.024)	111	0.127*** (0.036)
Sec6	**1991**	1501	0.041*** (0.013)	601	0.063 (0.023)
	1992	1620	0.031*** (0.012)	616	0.051** (0.027)
	1993	1734	0.050*** (0.012)	648	0.075*** (0.029)
	1994	1803	0.050*** (0.011)	660	0.099*** (0.024)
	1995	1849	0.035*** (0.011)	764	0.111*** (0.023)

Sec7	**1991**	423	0.125*** (0.021)	236	0.192*** (0.035)
	1992	447	0.130*** (0.022)	252	0.292*** (0.051)
	1993	429	0.121*** (0.022)	215	0.262*** (0.051)
	1994	450	0.111*** (0.019)	227	0.203*** (0.039)
	1995	448	0.137*** (0.022)	238	0.201*** (0.034)
Sec8	**1991**	479	0.064*** (0.016)	258	0.055** (0.030)
	1992	473	0.033* (0.020)	248	0.056 (0.040)
	1993	486	0.072*** (0.019)	242	0.061* (0.035)
	1994	505	0.051*** (0.014)	240	0.084*** (0.029)
	1995	463	0.102*** (0.019)	241	0.135*** (0.034)
Sec9	**1991**	732	0.082*** (0.014)	392	0.164*** (0.030)
	1992	758	0.062*** (0.014)	407	0.163*** (0.029)
	1993	746	0.101*** (0.015)	385	0.090*** (0.025)
	1994	465	0.091*** (0.012)	418	0.070*** (0.026)
	1995	801	0.081*** (0.014)	443	0.091*** (0.026)
Sec10	**1991**	73	0.004 (0.044)	39	0.062 (0.074)
	1992	74	0.004 (0.058)	31	0.085 (0.075)
	1993	63	0.112* (0.062)	23	0.244* (0.141)
	1994	97	0.161*** (0.043)	36	0.112 (0.157)
	1995	91	0.171*** (0.041)	26	0.199 (0.165)
Sec11	**1991**	2115	0.043*** (0.009)	1013	0.087*** (0.016)
	1992	2099	0.035*** (0.009)	989	0.084*** (0.018)
	1993	1995	0.095*** (0.025)	977	0.079*** (0.024)
	1994	2053	0.480*** (0.031)	977	0.136 (0.101)
	1995	2129	0.496*** (0.028)	1014	0.038 (0.072)
Sec12	**1991**	643	0.060*** (0.015)	354	0.068*** (0.028)
	1992	655	0.038*** (0.013)	339	0.063** (0.031)
	1993	639	0.093** (0.041)	302	0.166*** (0.044)
	1994	586	0.570*** (0.053)	257	0.110 (0.174)
	1995	608	0.554*** (0.048)	259	0.124 (0.267)
Sec13	**1991**	782	0.069*** (0.017)	308	0.158*** (0.031)
	1992	823	0.092*** (0.017)	314	0.136*** (0.031)
	1993	826	0.083*** (0.017)	314	0.127*** (0.039)
	1994	755	0.485*** (0.037)	274	0.191 (0.105)
	1995	740	0.504*** (0.037)	276	0.206*** (0.090)
Sec14	**1991**	271	0.006 (0.018)	126	0.014 (0.052)
	1992	297	0.048** (0.024)	128	0.022 (0.022)
	1993	286	0.019 (0.020)	127	0.095* (0.054)
	1994	266	0.575*** (0.046)	115	0.029 (0.310)
	1995	262	0.624*** (0.053)	123	0.057 (0.184)
Sec15	**1991**	360	0.092*** (0.017)	146	0.145*** (0.034)
	1992	399	0.077*** (0.019)	163	0.125*** (0.036)
	1993	398	0.061*** (0.018)	154	0.085*** (0.028)
	1994	374	0.092*** (0.023)	121	0.076** (0.037)
	1995	380	0.093*** (0.021)	136	0.099*** (0.041)

***Significant at 1%; **Significant at 5%; *Significant at 10%. Robust standard errors in parentheses.
The dependent variable is the firm-average real wage per worker. All variables are expressed as natural logarithms.
a: instruments: profits per worker $_{t-3}$, profits per worker $_{t-4}$.

4. STAGE-TWO REGRESSIONS: DETERMINING THE WORKERS' (RELATIVE) 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' relative 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' relative bargaining power parameters $\left(\frac{\widehat{\phi}}{1-\phi}\right)$ on several explanatory variables derived from an implicit structural model.

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

$$\frac{\widehat{\phi_{jt}}}{1-\phi_{jt}} = X_{jtk+1}\beta_{k+1} + \lambda_j + \lambda_t + \xi_{jt} \tag{5}$$

With $\left(\frac{\widehat{\phi_{jt}}}{1-\phi_{jt}}\right)$ a set of estimated TSLS 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 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} represent 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. (see e.g. Doiron, 1992; McDonald and Suen, 1992 and Smith, 1996 for a further discussion on these issues). The time dummies control for factors that change workers' relative bargaining power over time such as government measures[33], the national unemployment rate, taxes, interest rates, etc. (see e.g. Doiron, 1992 and Svejnar, 1986 for a discussion).

Table 6 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 B.1 in Appendix B gives an overview of the sectoral classification used to determine the workers' relative bargaining power per sector each year. More specifically, we have five variables related to international trade, three variables related to foreign direct investment, three technology variables and five 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). However, the use of international trade and foreign direct investment variables to explain directly workers' bargaining power is new. As argued before, we further analyse this issue and introduce a richer specification such that we are able to investigate whether globalisation has an effect on the workers' relative bargaining power. In what follows, we describe the explanatory variables of Eq. (5) together with their hypothesised effect on the workers' relative bargaining power. This effect is also shown in the last column of Table 6.

[33] In 1993 the Belgian Federal Government launched "Het Globaal Plan voor de Werkgelegenheid, het Concurrentievermogen en de Sociale Zekerheid " (Global plan on Employment, Competitiveness and Social Security). Principally, it deals with following measures: introduction of an adjusted consumer price index used for automatic wage indexation, wage freeze for the period 1995-1996 and structural reduction of social security contributions on low wages (CRB, 2003). For brevity, we do not report the regression coefficients for these time dummies in the regression results. Our results indicate that the coefficient for the 1994 time dummy is never statistically

Table 6 Second-Stage Regression: Summary Statistics.

EXPLANATORY VARIABLE	# Obs.	Sample Mean	Sample St. Dev.	Sample Minimum	Sample Maximum	Hypothesised Effect on Bargaining Power (B)
Trade Variables						
Import$^{(WORLD)}$/Production	75	1.05	1.20	0.17	5.76	B < 0
Import$^{(OECD)}$/Production	75	0.81	0.60	0.17	2.83	B < 0
Import$^{(CEE)}$/Production	75	0.007	0.009	0.0003	0.05	B < 0
Import$^{(NICs)}$/Production	75	0.03	0.09	0.009	0.46	B < 0
Import$^{(other\ NON\text{-}OECD)}$/Production	75	0.22	0.66	0.001	3.04	B < 0
Export$^{(WORLD)}$/Production	75	0.47	0.61	0.02	2.26	B > 0
Export$^{(OECD)}$/Production	75	0.85	0.66	0.21	2.80	B > 0
Export$^{(CEE)}$/Production	75	0.009	0.008	0.0009	0.03	B > 0
Export$^{(NICs)}$/Production	75	0.05	0.15	0.0004	0.74	B > 0
Export$^{(other\ NON\text{-}OECD)}$/Production	75	0.19	0.55	0.004	2.54	B > 0
Outsourcing Narrow[a]	30	0.17	0.12	0.002	0.48	B < 0
Outsourcing Broad[a]	30	0.36	0.10	0.14	0.60	B < 0
Tariffs[a]	30	7.42	3.17	4.1	17.47	B > 0
Inward Foreign Direct Investment Variables						
Relative Number of Foreign-owned Firms	75	0.08	0.07	0.01	0.28	B < 0
Relative Employment of Foreign-owned Firms	75	0.40	0.22	0.05	0.77	B < 0
Relative Value-added of Foreign-owned Firms	75	0.44	0.23	0.05	0.84	B < 0
Technology Variables						
R&D/output	75	0.01	0.01	0.0008	0.07	B > 0 or B < 0
Patents/output	75	0.03	0.04	0	0.17	B > 0 or B < 0
% Change in TFP	75	0.05	0.12	-0.39	0.53	B > 0 or B < 0
Control Variables						
Unemployment Rate	75	0.13	0.06	0.03	0.34	B < 0
Short-term Unempl. Rate	75	0.07	0.03	0.02	0.20	B < 0
C5- Concentration Ratio	75	0.34	0.17	0.12	0.77	B > 0 or B < 0
Capacity Utilisation[b]	70	0.77	0.03	0.70	0.86	B > 0
Skill Intensity	75	0.15	0.07	0.05	0.36	B > 0

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

- ***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

significant while the one for the 1995 time dummy is significantly negative in a number of cases, especially when both time and sector dummies are taken up in the regression equation.

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 again split up our export and import variable to various destinations/origins: OECD countries, CEE 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 (see 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 standardised 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' relative 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' (relative) 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' relative bargaining power.
- ***Foreign direct investment variable 1:*** the number of foreign-owned firms relative to the total number of firms. We have experimented with several variables related to inward foreign direct investment.[34] 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

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

on the workers' relative bargaining power is expected to be negative. In a related context, Budd and Slaughter (2004) and Dobbelaere (2004) 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).[35] Focusing on Bulgaria, Dobbelaere (2004) 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 US, Fabbri et al. (2002) for the UK and Gorg 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. Therefore, the footloose nature of foreign-owned firms is able to create a general atmosphere of uncertainty in which workers are less likely to press for higher wages in the form of obtaining a part of the firms' profits. In this context, Schreve and Slaughter (2002) investigate whether foreign direct investment 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 foreign direct investment on the workers' economic insecurity is unclear. When the authors test their hypothesis, foreign direct investment is found to increase the workers' perception of economic insecurity measured as a person's stress/anxiety about one's economic misfortune.

While direct evidence of the footloose nature of multinationals in the Belgian economy is lacking, De Backer and Sleuwaegen (2003) find that inward foreign direct investment discourages entry and stimulates exit of Belgian domestic entrepreneurs. However, this crowding-out effect might be moderated or even reversed in the long term because of learning, demonstration, networking and linkage effects between foreign and domestic firms. Therefore, these results might add to the workers' feeling of insecurity and hence influence their bargaining power.

- ***Foreign direct investment variable 2 (and 3)*** refers to the employment (value added) of

[35] 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

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 foreign direct investment 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 (see e.g. Berman et al., 1994 and 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.[3637] 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 investment 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 computerisation. Skilled workers also lose bargaining power but general occupations strengthen their bargaining position in case of process computerisation. The potential difference of technology effects for unskilled versus skilled workers is an issue that we will address later.

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were fierce, partly because the closure was unanticipated and partly because of the globalisation aspect (Kuhlmann, 1998).

[36] These authors however proxy the workers' bargaining power by the union/non-union wage differential. Moreover, they use a story of shifts in labour demand elasticities to explain the effect of technological change on the workers' bargaining power.

[37] 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.

- ***Technology variable 2:*** patents divided by production, a measure related to innovative output. The expected effect of this variable on the workers' relative 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' relative bargaining power like 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 (see among others, McDonald and Suen, 1992; Svejnar, 1986 and Veugelers, 1989). 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 C5-concentration ratio, representing the sales of the top 5 firms in the sector divided by total sales.[38] A higher C5-concentration 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 C5-concentration ratio 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 also be transferred to power positions in the input market such that the workers' bargaining power would be eroded. Therefore, the effect of the C5-concentration ratio on the workers' bargaining power can go in both directions and depends on which of the two mechanisms prevails.
- ***Control variable 3:*** the sectoral capacity utilisation ratio. This variable captures the general state of the economy. A higher capacity utilisation 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. Following the results of Kramarz (2003) and Abowd and Kramarz (1993), we expect that the workers' bargaining power is increasing in education.

[38] We also re-ran our regressions using the Herfindahl index. Our regression results are similar and hence we do not report them. However, these results are available upon request.

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.[39] While other authors investigating the determinants of the union's (relative) bargaining power have estimated one single equation (see Doiron, 1992, Svejnar, 1986 and Veugelers, 1989, among others), we prefer to estimate Eq. (5) using each of the explanatory variables separately. As pointed out above, the reason is that there is no formal theory explaining the workers' relative bargaining power. In what follows, we discuss four important issues regarding our estimation strategy.

The first issue deals with the exogeneity of the regressors. Variables related to outsourcing and technology are endogenously determined inputs. As documented in other work (see e.g. Abowd and Lemieux, 1993) and as mentioned above, import and export quantities in a small open economy are -in contrast to export and import prices- not fully exogenous. Regarding the trade variables, we expect our tariff measure to be the most exogenous variable (see also Haskel and Slaughter, 2003 for a discussion). 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 produced similar results. We decided to report the estimates using the IV approach.[40]

The second issue handles the fact that the dependent variable in Eq. (5) is a parameter which is estimated in the first stage. Therefore, the error term in this equation is heteroskedastic with zero mean and variance equal to the variance of the error term from the true regression plus the variance of the estimated relative bargaining power of the workers $\left(\widehat{\frac{\phi}{1-\phi}}\right)$. Following Anderson (1993) and Slaughter (2001), we correct for this form of heteroskedasticity by weighing less heavily those observations for which the estimated variance of the relative bargaining power is larger. More variables to use in a regression equation specifically, we perform an Instrumental Variables (IV) regression on Eq. (5) from which we take the squared residuals. Subsequently, we regress these

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

[40] The regression results using the lags of the explanatory variables can be obtained from the authors upon request. Next to trade flows, we also included percentage changes in import and export prices. As argued earlier in this paper, these might be considered exogenous in a small open economy (see Section 3.2). More specifically, we expect that an increase (decrease) in import prices and export prices is associated with lower (higher) foreign competition. Hence, we expect a positive regression coefficient of these variables. Early OLS and

squared residuals on the estimated variance of the relative 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 a weighted Instrumental Variables regression of Eq. (5).[41]

The third issue is related to the fact that there is no real theoretical model predicting which explaining the workers' relative bargaining power. As pointed above, we first perform univariate regressions. This avoids potential multicollinearity problems between the explanatory variables. As a robustness check, we also estimate Eq. (5) using various significant explanatory variables from the univariate regressions. Moreover, we have also experimented with several combinations of sector and time fixed effects and have tried four different combinations like in Slaughter (2001) who performs regressions with no sector and time dummies, only sector dummies, only time dummies and a combination of both.

The last issue deals with the fact that -as widely documented in the trade-wages literature- globalisation and technological change have a different impact on skilled versus unskilled workers. Our dataset did not allow us to estimate separate coefficients for the bargaining power of skilled versus unskilled workers. To shed some light on the issue of skill heterogeneity at the sectoral level, we split our sample according to the sectoral skill intensity. More specifically, we computed an average skill intensity for each sector and our cutting point occurs at the median.[42]

4.3 Empirical results

Table 7 reports the regression results of Eq. (5), using one single explanatory variable each time. The trade (except outsourcing and tariffs), technology and inward FDI variables are instrumented with their 1-period lagged values. To test for serial correlation, we performed the Woolridge test (Woolridge, 2002). Since the null hypothesis of no serial correlation cannot be rejected, the use of 1-period lagged values as instruments is justified.[43]

IV regression results revealed that these variables were not statistically significant. Hence, we do not report these results but they can be obtained from the authors upon request.

[41] In the literature, there are two correction procedures for the use of estimated regressands in two-step equations. One method is proposed by Anderson (1993) and subsequently used by Slaughter (2001). Their correction is applicable when the second-stage regressand is a *parameter* which is estimated in the first stage. The other method is suggested by Feenstra and Hanson (1999) and adopted by Haskel and Slaughter (2001, 2003). Their correction is valid when the second-stage regressand is a *variable* which is estimated in the first stage. Given our empirical set-up, we follow completely the first method. The basic idea is that the errors in the stage-two regressions may be heteroskedastic due to the imprecision in the first-stage estimates. Since the source of heteroskedasticity is known, the estimated variance in the first-stage regressions can be used to create a weight for the weighted Instrumental Variables regression in the second stage.

[42] The skill-intensive sectors are: Printing and Allied Industries (Sector 6), Chemical Industry and Man-made Fibres (Sector 7), Rubber and Plastic (Sector 8), Non-Electrical Machinery (Sector 12), Office and Computing Machinery, Electrical Machinery and Professional Goods (Sector 13), Other Transport Equipment (Sector 14) and Other Manufacturing (Sector 15).

[43] The use of 2-period lagged values as instruments produces broadly the same results.

Table 7 Second-Stage Univariate Regression Instrumental Variables Results: Determinants of the Workers' Relative Bargaining Power.

EXPLANATORY VARIABLE	Hypothesised Effect on Bargaining Power (B)	Time Fixed Effects	Sector & Time Fixed Effects	# Obs.
Trade Variables				
Import$^{(WORLD)}$/Production	B < 0	-0.001 (0.003)	-0.01 (0.03)	75
Import$^{(OECD)}$/Production	B < 0	0.004 (0.007)	0.24 (0.83)	75
Import$^{(CEE)}$/Production	B < 0	1.30 (0.72)	2.52 (2.07)	75
Import$^{(NICs)}$/Production	B < 0	-0.05 (0.03)	-0.71* (0.39)	75
Import$^{(other\ NON\text{-}OECD)}$/Prod.	B < 0	-0.003 (0.005)	-0.07*** (0.01)	75
Export$^{(WORLD)}$/Production	B > 0	0.02** (0.01)	0.65 (2.38)	75
Export$^{(OECD)}$/Production	B > 0	0.01** (0.007)	0.82 (1.82)	75
Export$^{(CEE)}$/Production	B > 0	2.52*** (0.62)	0.04 (2.19)	75
Export$^{(NICs)}$/Production	B > 0	-0.01 (0.02)	-0.48** (0.19)	75
Export$^{(other\ NON\text{-}OECD)}$/Prod.	B > 0	-0.003 (0.006)	-0.09*** (0.02)	75
Outsourcing Narrow[a]	B < 0	0.04 (0.08)	0.04 (0.18)	30
Outsourcing Broad[a]	B < 0	-0.003 (0.10)	0.02 (0.16)	30
Tariffs[a]	B > 0	0.50*** (0.10)	1.21 (1.72)	30
Inward Foreign Direct Investment Variables				
Relative Number of Foreign-owned Firms	B < 0	0.21 (0.09)	-2.65*** (0.69)	75
Relative Employment of Foreign-owned Firms	B < 0	0.02 (0.02)	-0.39 (0.59)	75
Relative Value-added of Foreign-owned Firms	B < 0	0.02 (0.02)	3.02 (16.28)	75
Technology Variables				
R&D/output	B > 0 or B < 0	1.48*** (0.32)	-2.07 (11.91)	75
Patents/output	B > 0 or B < 0	0.04 (0.14)	0.01 (0.18)	75
% Change in TFP	B > 0 or B < 0	-0.04 (0.30)	-0.03 (0.08)	75
Control Variables				
Unemployment Rate	B < 0	0.14* (0.07)	-0.001 (0.22)	75
Short-term Unempl. Rate	B < 0	0.07 (0.14)	-0.11 (0.15)	75
C5- Concentration Ratio	B > 0 or B < 0	0.004 (0.02)	-0.01 (0.01)	75
Capacity Utilisation[b]	B > 0	-0.27** (0.13)	-0.01 (0.20)	70
Skill Intensity	B > 0	0.09 (0.09)	-0.04 (0.09)	75

***Significant at 1%; **Significant at 5%; *Significant at 10%. Robust standard errors in parentheses.
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.

In general, the regression results of this table reveal that -except for the control variables and some of the trade variables split up to various destinations/origins- the expected sign of the regression coefficients is obtained. In a number of cases, these regression coefficients are not always statistically significant as their significance depends on the inclusion of sector and/or time fixed effects.

Basic Results. As mentioned above, we have estimated Eq. (5) with no sector and time fixed effects, only sector fixed effects, only time fixed effects and sector as well as time fixed effects. The weighted IV 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 is on the intra-sectoral variations of the variables, i.e. on how the workers' relative bargaining power moves over time. For the sake of brevity, we only report in Table 7 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 some evidence of international trade having an impact on the workers' relative bargaining power.

In our estimations with only time fixed effects, statistically significant positive effects are found for the variables related to trade with the rest of the world, the OECD countries and the CEE countries. Sectors characterised by strong export performance to these countries enable workers to cream off a larger share of the rents. The same is true in sectors where higher tariffs apply which shield them from international competition.

In the regressions with both time and sector fixed effects, the variables related to imports coming from the NICs and the other NON-OECD countries are statistically significant. This implies that in the sectors confronted with stronger import competition the share of rents going to workers is squeezed. The tariff variable loses its statistical significance but still has the expected sign. Surprisingly, our regression results reveal that higher exports to the NICs and the other NON-OECD countries induce a negative effect on the workers' relative bargaining power.

When controlling for both time and sector fixed effects, our results show that workers have a lower relative 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.

In the specifications with only time fixed effects, a strong statistically significant result emerges from our variable of innovative input (R&D divided by output). In those sectors with more technological change in the form of high R&D expenditures, workers are more 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. No statistically significant effects are found for the TFP- and patent variables.

We do not obtain the expected sign for the regression coefficients of our control variables. The regression coefficient for the unemployment (capacity utilisation) variable in the specification with only time fixed effects has a statistically significant positive (negative) sign. This positive coefficient for the unemployment variable accords in some sense with the empirical results of other empirical work for Belgium, e.g. Abraham and De Bruyne (2000) find that higher unemployment has not led to wage moderation[44] and Veugelers (1989) points to a positive, although not significant, effect of unemployment on workers' bargaining power in the Belgian industry. We also take up short-term instead of total unemployment in a sector. In all the specifications, short-term unemployment does not appear to have any statistically significant effect on the workers' relative bargaining power.

Combination of Independent Variables. As a robustness check, we estimate Eq. (5) using a combination of the independent variables. The choice of the included regressors is based on the significance of these variables in the univariate regressions. We combine trade-variables split up to various destinations/origins with an FDI variable (the number of foreign-owned firms relative to the total number of firms), a technology variable (R&D divided by production) and three control variables (short-term unemployment, C5 ratio and skill intensity). We also take up time and sector fixed effects.

Including all these variables in a regression might cause one of them to lose its statistical significance due to multicollinearity problems. The reason is that the link between trade and FDI on the one hand and technology on the other hand occurs in two directions. Technological change spurs globalisation as technological progress diminishes the economic distance between countries. Also, increased international trade and inward FDI often trigger technological change (see Abraham and Brock, 2003; Bernard and Jensen, 1999, 2001; Doms and Jensen, 1998; Globerman et al., 1994; Lawrence, 2000 and Wood, 1995, among others). Likewise, multicollinearity might arise between the trade and FDI variables as they are often substitutes or complements (see Blomström et al., 1988; Lipsey and Weiss, 1981, among others).

[44] This finding is consistent with results of other European studies pointing to a weak effect of unemployment on wages (see e.g. Eichengreen, 1993 and Layard et al., 1991).

Table 8 reveals that the statistical significance of the trade variables depends on the destination/origin of exports and imports. Focusing on the results with trade with the rest of the world shows that the FDI variable loses its statistical significance while the export variable is significant at 5% (see first column of Table 8). Even stronger statistically significant trade-effects arise if trade with the OECD countries is considered (see second column). In this specification, strong import competition seems to squeeze the share of rents going to the workers while the opposite is true for strong export performance. When trade with the CEE countries is taken into account, we find that the trade variables lose their statistical significance while the FDI variable is significant at 1% (see third column). The fourth column of Table 8 reveals that no significant effects are found when we consider trade with the NICs. The results including trade with the other NON-OECD countries equal the ones including trade with the CEE countries, i.e. the trade variables lose their statistical significance in favour of the FDI variable (see last column). In all specifications, no statistically significant effects show up for the technology and control variables.

Table 8 Second-Stage Multivariate Regression Instrumental Variables Results: Determinants of the Workers' Relative Bargaining Power.

EXPLANATORY VARIABLE	**Hypothesised Effect on Bargaining Power (B)**	**Sector & Time Fixed Effects**				
Import$^{(WORLD)}$/Production	B < 0	-0.001 (0.07)				
Import$^{(OECD)}$/Production	B < 0		-0.34* (0.19)			
Import$^{(CEE)}$/Production	B < 0			-1.18 (1.46)		
Import$^{(NICs)}$/Production	B < 0				-3.51 (10.41)	
Import$^{(other\ NON\text{-}OECD)}$/Prod.	B < 0					-0.006 (0.70)
Export$^{(WORLD)}$/Production	B > 0	0.40** (0.19)				
Export$^{(OECD)}$/Production	B > 0		0.55** (0.25)			
Export$^{(CEE)}$/Production	B > 0			-0.04 (2.71)		
Export$^{(NICs)}$/Production	B > 0				1.38 (4.90)	
Export$^{(other\ NON\text{-}OECD)}$/Prod.	B > 0					-0.05 (0.85)
Relative Number of Foreign-owned Firms	B < 0	-4.81 (3.53)	-6.99 (6.62)	-3.16*** (1.29)	-4.45 (3.41)	-3.76** (1.70)
R&D/output	B > 0 or B < 0	-1.71 (17.1)	-4.47 (26.9)	3.94 (11.8)	10.70 (33.5)	2.54 (12.03)
Short-term Unempl. Rate	B < 0	0.001 (0.002)	0.005 (0.003)	0.11 (0.20)	0.34 (0.69)	0.12 (0.29)
C5- Concentration Ratio	B > 0 or B < 0	-0.02 (0.02)	-0.01 (0.03)	-0.022 (0.02)	-0.006 (0.04)	-0.017 (0.02)
Skill Intensity	B > 0	-0.32 (0.57)	-0.12 (0.34)	0.20 (0.52)	0.14 (0.95)	0 .29 (0.49)

***Significant at 1%; **Significant at 5%; *Significant at 10%. Robust standard errors in parentheses

Skill Effect. Table 9 reports the univariate regression results using a split sample according to the sectoral skill intensity. For both groups, we estimate the specifications with only time fixed effects and both time and sector fixed effects. Unfortunately, comparing the estimated trade-effects of the unskilled-intensive sectors with those of the skill-intensive sectors does not allow us to draw clear-cut conclusions.

From the first two columns of Table 9, it follows that increased import competition lowers the workers' relative bargaining power in the unskilled-intensive sectors. This effect is most pronounced when we consider trade with the rest of the world and the OECD countries. Regarding our export variable, workers in these sectors benefit most in terms of bargaining power when considering trade with the rest of the world, the OECD and the other NON-OECD countries. These workers are also able to cream off a larger share of the rents when tariffs are higher. They lose however, in terms of bargaining power, when confronted with a relatively high number of foreign-owned firms and when the share of patents is high.

The results of the skill-intensive sectors follow more closely the general results (reported in Table 7). In line with the general results, workers in sectors confronted with a lot of imports from other NON-OECD countries lose in terms of bargaining power while they benefit when the sector exports a lot to the rest of the world and the CEE countries. Similar to the general results, exports to the NICs and the other NON-OECD countries seem to affect the workers' relative bargaining power negatively. Regarding the inward foreign direct investment variables, the two specifications blur a clear picture. Consistent with the general results, we find again a strongly positive technology effect of R&D/production.

Table 9 Second-Stage Univariate Regression Instrumental Variables Results:
Determinants of the Workers' Relative Bargaining Power in (Un)skilled-Intensive Sectors.

	Unskilled-Intensive Sectors			**Skill-Intensive Sectors**		
EXPLANATORY VARIABLE	**Time Fixed Effects**	**Time & Sector Fixed Effects**	**# Obs.**	**Time Fixed Effects**	**Time & Sector Fixed Effects**	**# Obs.**
Trade Variables						
$Import^{(WORLD)}$/Production	-0.02* (0.01)	0.15 (0.09)	40	0.001 (0.004)	-0.07* (0.04)	35
$Import^{(OECD)}$/Production	-0.03** (0.01)	0.15 (0.09)	40	0.01 (0.01)	-0.03 (0.16)	35
$Import^{(CEE)}$/Production	0.36 (0.50)	-1.72 (1.18)	40	12.14** (4.31)	7.63 (4.84)	35
$Import^{(NICs)}$/Production	0.02 (0.19)	0.45 (0.57)	40	-0.06 (0.04)	-2.28 (2.50)	35
$Import^{(other\ NON\text{-}OECD)}$/Prod.	0.06 (0.02)	-0.58 (0.75)	40	-0.005 (0.006)	-0.09*** (0.02)	35
$Export^{(WORLD)}$/Production	0.008 (0.01)	0.35* (0.18)	40	0.14*** (0.02)	39.36 (80.79)	35
$Export^{(OECD)}$/Production	0.006 (0.02)	0.47** (0.23)	40	0.02 (0.009)	0.99 (3.40)	35
$Export^{(CEE)}$/Production	0.38 (0.68)	0.23 (0.94)	40	4.12*** (0.85)	-9.29 (5.17)	35
$Export^{(NICs)}$/Production	0.92 (0.73)	7.15 (9.80)	40	-0.02 (0.02)	-0.66** (0.24)	35
$Export^{(other\ NON\text{-}OECD)}$/Prod.	0.39** (0.17)	0.41 (1.61)	40	-0.005 (0.008)	-0.13** (0.02)	35
Outsourcing Narrow[a]	-0.06 (0.14)	-0.14 (0.16)	16	0.14 (0.11)	0.28*** (0.11)	14
Outsourcing Broad[a]	0.03 (0.16)	0.30 (0.38)	16	0.02 (0.13)	0.05 (0.15)	14
Tariffs[a]	0.69** (0.14)	2.04 (10.09)	16	0.34 (0.74)	-12.29 (15.43)	14
Inward Foreign Direct Investment Variables						
Relative Number of Foreign-owned Firms	-0.005 (0.10)	-2.30** (0.59)	40	0.49*** (0.11)	-8.50** (2.78)	35
Relative Employment of Foreign-owned Firms	-0.01 (0.03)	-0.60 (0.91)	40	0.06 (0.03)	-0.34 (0.76)	35
Relative Value-added of Foreign-owned Firms	-0.01 (0.03)	-3.85 (7.81)	40	0.05 (0.03)	-0.42 (1.30)	35
Technology Variables						
R&D/output	1.55 (2.06)	-1.86 (11.82)	40	1.89*** (0.36)	6.40 (14.21)	35
Patents/output	-0.64** (0.15)	0.38 (0.54)	40	0.36* (0.20)	0.43 (0.23)	35
% Change in TFP	-0.05 (0.13)	-0.06 (0.16)	40	-0.07 (0.21)	-0.12 (0.09)	35

***Significant at 1%; **Significant at 5%; *Significant at 10%. Robust standard errors in parentheses.
a: These data were only available for the years 1991 and 1995.

5. CONCLUSIONS

In this paper, we investigate the hypothesis that international trade has affected workers' wages in the Belgian manufacturing industry over the period 1987-1995 by using a rent-sharing framework. As a starting point, the results of reduced form equations of bargained wages and profits per worker have supported this hypothesis. Our analysis has uncovered three important mechanisms underlying these results. In the first part of the paper, we have shown that international trade affects wages through changes in the firms' rents and changes in the workers' outside option. Similar to other papers considering rent sharing in the Belgian economy, we find a positive relation between workers' wages and the firms' profits. Moreover, our regression results reveal that increased foreign competition in the form of lower export prices reduces both wages per worker and profits per worker. Concerning the effect of international trade on workers' wages through changes in the workers' outside option, we find that the higher the ratio of imports over production at the sectoral level the lower the workers' outside option (and hence workers' wages), while the opposite is true for the ratio of exports over production. The underlying idea is that imports of goods are potential substitutes for labour. When international trade flows are split up according to the countries of destination/origin, our results reveal that imports from OECD countries and NICs have a significantly negative effect on the workers' outside option whereas exports to CEE countries affect the workers' outside option significantly positively.

In the second part of the paper, we have provided evidence of globalisation affecting workers' bargaining power directly. We have explored the link between globalisation and the workers' relative bargaining power by introducing measures related to import and export competition, outsourcing, tariffs and inward foreign direct investment. Import and export competition and tariffs seem to have in general the expected effect on the workers' bargaining power. Regarding inward foreign direct investment, we have found that more foreign-owned firms in a sector reduce the workers' bargaining power. We have put forward several explanations such as the footloose nature of multinational companies and the crowding-out of domestic entrepreneurship.

Finally, a weakness of the theoretical model is that imperfect competition in the product market is not explicitly modelled. Product market conditions enter the model through a revenue shifter. In a follow-up paper, we aim at modelling imperfectly competitive product markets more rigorously.

APPENDIX A

To test whether changes in sector-specific international prices present pure demand shocks, we follow Abowd and Lemieux (1993) and Kramarz (2003). We compare Ordinary Least Squares estimates of supply equations (quantities as a function of prices) to Instrumental Variables estimates of the same supply equation in which the output price is instrumented by the sector-specific price of imports and the sector-specific price of exports. Least squares estimates of the elasticity of supply with respect to the output price could be either negative or positive, depending on the variance of demand and supply shocks and on demand and supply elasticities (see Abowd and Lemieux, 1993). Once these output prices are instrumented using sector-specific international prices, however, the elasticity should become positive if international prices are exogenous demand shocks that trace down the supply curve. In the first column of Table A.1., we estimate the relation between firm-level real sales and sector-level value-added prices, sector-level wages and a time trend in the cross-section dimension. In the second column, we control for firm-level fixed effects. In the third column, we instrument value-added prices using 4-period lagged sector-specific export and import prices. The estimated supply elasticity using the OLS and the fixed-effects estimation methods is negative and statistically significant, reflecting that supply shocks dominate demand shocks. On the other hand, the IV estimate points to a positive and significant supply elasticity. The elasticity is equal to 0.543, which is slightly above the one estimated by Abowd and Lemieux (1993) and very well in line with the one estimated by Kramarz (2003). The Hansen-Sargan test does not reject the joint validity of the instruments. The F-statistic rejects the nullity of the instruments in the first-stage regression. Our findings are hence consistent with the fact that international prices represent pure demand shocks that increase product market competition in Belgium.

Table A.1 Supply Equation, 1987-1995.

ESTIMATION METHOD	OLS	Firm Fixed Effects	TSLS[a]
Constant	25.889*** (6.545)	-48.546*** (1.387)	19.472*** (1.492)
Price of Value Added	-0.757*** (0.106)	-0.126*** (0.028)	0.539*** (0.204)
Time Trend	-0.010*** (0.003)	0.027*** (0.001)	-0.010*** (0.001)
Hansen-Sargan IV Test (p-value)			0.102
Nullity of the Instruments (F-statistic)			337
# Obs.	71594	71594	45390
R^2	0.001	0.026	.

***Significant at 1%; **Significant at 5%; *Significant at 10%. Robust standard errors in parentheses.
The dependent variable is firm-level real sales. The prices are measured at the sectoral level.All variables and instruments are expressed as natural logarithms. The price of value added is deflated by the CPI (1990=100), while sales are deflated by the producer price. Hansen-Sargan Instrument Validity Test: test of correlation among instruments and residuals, asymptotically distributed as χ^2_{df}. Nullity of the Instruments (F-statistic): tests the nullity of the instruments for the price of value added. A full stop in the R^2 box indicates that the calculated R^2 was negative and hence is not reported.
a: instruments: export prices $_{t-4}$, import prices $_{t-4}$.

APPENDIX B

Table B.1 Sectoral Classification for the First-Stage Regressions.

	Sector	# Firms[a]	NACE-70	NACE-Bel
Sec 1	Food, beverages and tobacco	2392	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	1380	46	20 + 36.1
Sec 5	Manufacture of pulp, paper and board	227	471+472	21
Sec 6	Printing and allied industries	1883	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	2197	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.

APPENDIX C

The sectoral classification for the second-stage regressions is based on Table B.1 of Appendix B and covers the period 1991-1995, except for the tariff data 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.[45] 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.[46] 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 B.1 of Appendix B 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 B.1. Hence, we used sectoral import shares as a weight to construct tariff data based on the classification of Table B.1.

Regarding inward foreign direct investment, 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% foreign-owned (see De Backer, 2002 and De Backer and Sleuwaegen, 2003 for a further description of this data set).

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).[47] For the years 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

[45] The data were first converted through the International Industrial Classification (ISIC) and subsequently converted to the NACE-70 based on Schumacher (1992).
[46] See http://www.plan.be/.
[47] See http://www.belspo.be/

conversion table of Verspagen et al. (1994).[48] The patent variable used is patents divided by production 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 Total Factor Productivity can be expressed as follows:

$$\hat{A} = \left(\hat{Q} - \hat{L}\right) - \alpha\left(\hat{K} - \hat{L}\right) \tag{C1}$$

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, $\left(1-\alpha\right)$ is the labour share in production, which is calculated as the average share of labour costs in value-added. $\left(\hat{K} - \hat{L}\right)$ 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).[49] We first compute an initial capital stock for 1990. If we assume that both the depreciation rate $\left(\delta\right)$ and the annual growth rate $\left(\eta\right)$ of investments prior to 1990 are constant, the initial capital stock K_{1990} equals:

$$\begin{aligned} K_{1990} &= I_{1990} + \left(1-\delta\right)\lambda I_{1990} + \left(1-\delta\right)^2 \lambda^2 I_{1990} + \left(1-\delta\right)^3 \lambda^3 I_{1990} \\ &= I_{1990}\left(\frac{1}{1-\lambda\left(1-\delta\right)}\right) \end{aligned} \tag{C2}$$

where $\lambda = 1/\left(1+\eta\right)$. The growth rate $\left(\eta\right)$ 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 percent. After having obtained the initial capital stock, deflated investment series are accumulated and depreciated from 1990 onwards. The deflators are calculated from the value-added series in the OECD (1999) Stan database.

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 C5- concentration ratio which refers to the five-firm concentration ratio. 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 utilisation rate which is obtained from the

[48] Again, the conversion has occurred through the ISIC-classification.
[49] A more complete description of how the capital series are constructed is available from the authors upon request.

Belgostat database of the Belgian National Bank.[50] 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 mentioned in Table B.1 of Appendix B. First, we compute the average utilisation rate in each sector.[51] 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. A last control variable is the sectoral skill intensity. We use the total amount of skilled to total employment as a measure for skill intensity. Skilled workers are defined as those workers who obtained higher education. These data are obtained from the Belgian Labour Force Survey.

REFERENCES

Abowd J. and L. Allain, 1996, "Compensation Structure and Product Market Competition", in: Annales d'Economie et de Statistique, 41/42, 207-17.

Abowd J. and F. Kramarz, 1993, "A Test of Negotiation and Incentive Compensation Models Using Longitudinal French Enterprise Data", in: Van Ours J.C., G. A. Pfann and G. Ridder (eds.), Labor Demand and Equilibrium Wage Formation, North Holland, Amsterdam.

Abowd J. and T. Lemieux, 1993, "The Effects of Product Market Competition on Collective Bargaining Agreements: The Case of Foreign Competition in Canada", in: The Quarterly Journal of Economics, 108(4), 983-1014.

Abraham F. and E. Brock, 2003, "Sectoral Employment Effects of Trade and Productivity in Europe", in: Applied Economics, 35, 223-238.

Abraham F. and K. De Bruyne, 2000, "Will Wage Policy Succeed in Europe? The case of Belgium?", in: Cahiers Economiques de Bruxelles, 0(168), 443-80.

Abraham F. and N. Verret, 1996, De Internationale Positie van de Belgische Economie in Toekomstperspectief, Verbond van Belgische Ondernemingen, 54 p.

Anderson P.M., 1993, "Linear Adjustment Costs and Seasonal Labor Demand", in: The Quarterly Journal of Economics, 108 (4), 1015-42.

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", in: The Quarterly Journal of Economics, 109(2), 367-97.

Bernard A.B. and J.B. Jensen, 1999, "Exceptional Exporter Performance: Cause, Effect of Both?", in: Journal of International Economics, 47(1), 1-25.

Bernard A.B. and J.B. Jensen, 2001, "Exporting and Productivity", NBER Working Paper 7135, National Bureau of Economic Research, Cambridge, MA.

[50] These data can be downloaded from http://www.nbb.be/belgostat/.

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

Bernard A.B. and J.B. Jensen, 2002, "The Death of Manufacturing Plants", NBER Working Paper 9026, National Bureau of Economic Research, Cambridge, MA.

Bernard A.B. and J. Wagner, 1997, "Exports and Success in German Manufacturing", in: Weltwirtschaftliches Archiv, 133(1), 134-57.

Berthold N., R. Fehner and E. Thode, 1999, "Real Wage Rigidities, Accommodative Demand Policies and the Functioning of EMU", in: Weltwirtschaftliches Archiv, 135(4), 545-72.

Bertrand M., 1999, "From the Invisible Handshake to the Invisible Hand? How Import Competition Changes the Employment Relationship", NBER Working Paper 6900, National Bureau of Economic Research, Cambridge, MA.

Betcherman G., 1991, "Does Technological Change Affect Union Bargaining Power?", in: British Journal of Industrial Relations, 29(3), 447-62.

Binmore K., A. Rubinstein and A. Wolinsky, 1986, "The Nash Bargaining Solution in Economic Modelling", in: RAND Journal of Economics, 17(2), 176-88.

Biscourp P. and F. Kramarz, 2002, "The Impact of Imports on the Firm's Production Process: A Firm-Level Analysis for France", CREST, Centre de Recherche en Economie et Statistique, Paris, mimeo.

Blanchard O. and F. Giavazzi, 2003, "Macroeconomic Effects of Regulation and Deregulation in Goods and Labor Markets", in: The Quarterly Journal of Economics, 118(3), 879-908.

Blanchflower D.G., A.J. Oswald and P. Sanfey, 1996, "Wages, Profits and Rent-sharing", in : The Quarterly Journal of Economics, 111(1), 227-251.

Blomström M., R.E. Lipsey and K. Kulchyck, 1988, "US and Swedish Direct Investment and Exports", in: R. Baldwin (ed.), Trade Policy Issues and Empirical Analysis, University of Chicago Press, Chicago and London, 259-97.

Boeri T., A. Brugiavini and L. Calmfors, 2001, The Role of Unions in the 21st Century, Oxford University Press, Oxford, 304 p.

Booth A., 1995, The Economics of the Trade Union, Cambridge University Press, Cambridge, 295 p.

Borjas G., R. Freeman and L. Katz, 1992, "On the Labor Market Effects of Immigration and Trade", in: Borjas G. and R. Freeman (eds.), Immigration and the Workforce, University of Chicago Press/ National Bureau of Economic Research, Chicago, 213-44.

Borjas G., R. Freeman and L. Katz, 1997, "How Much do Immigration and Trade affect Labour Market Outcomes?", Brookings Papers on Economic Activity, Vol. 1(1), The Brookings Institution, Washington, DC.

Borjas G. and V. Ramey, 1995, "Foreign Competition, Market Power and Wage Inequality", in: The Quarterly Journal of Economics, 110(4), 1075-110.

Brenton P., A.M. Pinna, 2002, "Trends in Disaggregated Import and Export Prices in Europe: Implications for the Trade and Wages Debate", in: Scottish Journal of Political Economy, 49(1), 1-21.

Brock E., 2003, The Impact of International Trade on European Labour Markets, Ph.D. Dissertation, K.U.Leuven, 215 p.

Brown J. and O. Ashenfelter, 1986, Testing the Efficiency of Employment Contracts", in: Journal of Political Economy, XCIV, S40-S87.

Bruno G., A.M. Falzoni and R. Helg, 2001, "Measuring the Effect of Globalization on Labor Demand", Università Bocconi, Milan, mimeo.

Budd J.W., J. Konings and M.J. Slaughter, 2004, "Wages and International Rent Sharing in Multinational Firms", in: Review of Economics and Statistics, forthcoming.

Budd J.W. and M. Slaughter, 2004, "Are Profits Shared Across Borders? Evidence on International Rent Sharing," Journal of Labor Economics, forthcoming.

Bughin J., 1993, "Union-Firm Efficient Bargaining and Test of Oligopolistic Conduct", in: Review of Economics and Statistics, August, 563-67.

Bughin J., 1996, "Trade Unions and Firms' Product Market Power", in: The Journal of Industrial Economics, XLIV(3), 289-307.

Burtless G., 1995, "International Trade and the Rise in Earnings Inequality", in: Journal of Economic Literature, 33(2), 800-16.

Caves R.E., 1996, Multinational Enterprise and Economic Analysis, Cambridge University Press, Cambridge.

Clark S.J., 1991, "Inventory Accumulation, Wages and Employment", in: Economic Journal, 101, 230-38.

Clark S.J., 1993, "The Strategic Use of Inventories in an Infinite Horizon Model of Wage and Employment Bargaining", in: Scottish Journal of Political Economy, 40, 165-83.

Cline W.R., 1997, Trade and Income Distribution, Institute for International Economics, Washington, DC, 305 p.

Coppel J. and M. Durand, 1999, "Trends in Market Openness", OECD Working Paper 221, Organisation for Economic Co-operation and Development, Paris.

Cortes O. and S. Jean, 2001, "The Impact of International Trade on Labour Productivity and Skill within Industries", in: Revue d'Economie Politique, 111(2), 271-90.

Cortes O., J. Sebastian and J. Pisani-Ferry, 1999, "Trade with the Emerging Countries and the Labour Market: the French Case", in: Dewatripont M., A. Sapir and K. Sekkat (eds.), Trade and Jobs in Europe: Much Ado About Nothing?, Oxford University Press, Oxford, 113-38.

CRB (Centrale Raad voor het Bedrijfsleven), 2003, http://www.ccecrb.fgov.be/crb/text/doc8.html.

Davidson R. and J.G. MacKinnon, 1993, Estimation and Inference in Econometrics, Oxford University Press, New York.

De Backer K., 2002, Multinational Firms and Industry Dynamics, Ph.D. Dissertation, K.U.Leuven, 166 p.

De Backer K. and L. Sleuwaegen, 2003, "Does Foreign Direct Investment Crowd Out Domestic Entrepreneurship?", in: Review of Industrial Organisation, 22, 67-84.

De Grauwe P., W. Kennes, T. Peeters and R. Van Staelen, 1979, "Trade Expansion with the Less Developed Countries and Employment: a Case Study of Belgium", in: Weltwirtschaftliches Archiv, 115(1), 99-155.

Deardorff A. and D. Hakura, 1994, "Trade and Wages: What are the Questions?", in: Bhagwati J. and M. Kosters (eds.), Trade and Wages: Levelling Wages Down? , American Enterprise Institute, Washington, DC, 36-75.

Dobbelaere S., 2003, "Joint Estimation of Price-Cost Margins and Union Bargaining Power for Belgian Manufacturing", Working Paper 03/171, Ghent University.

Dobbelaere S., 2004, "Ownership, Firm Size and Rent Sharing in Bulgaria", in: Labour Economics, 11(2), 165-89.

Doiron D.J., 1992, "Bargaining Power and Wage-Employment Contracts in a Unionized Industry", in: International Economic Review, 33 (3), 583-606.

Doms M.E. and J.B. Jensen, 1998, "Comparing Wages, Skills and Productivity between Domestically and Foreign-Owned Manufacturing Establishments in the United States", in: R. Baldwin, R. Lipsey and J.D. Richardson (eds.), Geography and Ownership as Bases for Economic Accounting, University of Chicago Press, Chicago, 235-55.

Eichengreen B., 1993, "Labour Markets and European Monetary Unification", in: Masson P. and M. Taylor (eds.), Policy Issues in the Operation of Currency Unions, Cambridge University Press, Cambridge, 130-62.

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, 2002, "Globalisation and Labour Demand Elasticities in Britain", mimeo.

Fajnzylber P. and W.F. Maloney, 2001, "Labor Demand and Trade Reform in Latin America", World Bank Working Paper 2491, World Bank, Washington, DC.

Federal Planning Bureau, 2000, "Delokalisatie, een Element van Industriële Dynamiek. De Studie over Delokalisatie, Innovatie en Werkgelegenheid", DWTC, Dienst voor Wetenschappelijke, Technische en Culturele Aangelegenheden Syntheserapport, 40 p.

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", in: The Quarterly Journal of Economics, 114 (3), 907-40.

Fontagné L. and D. Mirza, 2001, "International Trade and Rent Sharing in Developed and Developing Countries", CEPII Working Paper 01-09, Centre d'Etudes Prospectives et d'Informations Internationales, Paris.

FPS Employment, Labour and Social Dialogue, 2003, http://www.meta.fgov.be/pa/paa/framesetnlkg01.htm.

Gasiorek M., A. Smith and A. Venables, 1991, "Completing the Internal Market in the EC: Factor Demands and Comparative Advantage", in: Winters A. and A. Venables (eds.), European Integration: Trade and Industry, Cambridge University Press, Cambridge, 1-28.

Gaston N. and D. Nelson, 2000, "Globalisation and Wages in OECD Economies: Linking Theory with Evidence", in: Francois J., D. Roland-Holst and D. van der Mensbrugghe (eds.), Globalisation and Employment Patterns: Policy, Theory and Evidence, Oxford University Press and Centre for Economic Policy Research, Oxford.

Gibbons R., 1992, A Primer in Game Theory, Harvester Wheatsheaf, New York, 78 p.

Globerman S., J. Ries and I. Vertinsky, 1994, "The Economic Performance of Foreign Affiliates in Canada", in: Canadian Journal of Economics, 27, 143-56.

Goos, M. and J. Konings, 2001, "Does Rent-Sharing Exist in Belgium? An Empirical Analysis Using Firm Level Data", in: Reflets et Perspectives de la Vie Economique, XL (1-2), 65-79.

Gorg H. and E. Strobl, 2003, "Footloose Multinationals?", in: Manchester School, 71, 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", in: European Journal of Political Economy, 15(3), 485-500.

Greenaway D. and D. Nelson, 2001, "Globalisation and Labour Markets: Introduction", in: Greenaway D. and D. Nelson, Globalization and Labour Markets, Edward Elgar, Cheltenham.

Griliches Z., 1979, "Issues in Assessing the Contribution of Research and Development to Productivity Growth", in: Bell Journal of Economics, 10(1), 92-116.

Haskel J., 1999, "The Trade and Labour Approaches of Wage Inequality", CEPR Discussion Paper 2476, Centre for Economic Policy Research, London.

Haskel J. and M. Slaughter, 2001, "Trade, Technology and UK Wage Inequality", in: The Economic Journal, 111, 163-87.

Haskel J. and M. Slaughter, 2003, "Have Falling Tariffs and Transportation Costs Raised US Wage Inequality?", in: Review of International Economics, 11(4), 630-50.

Helpman E. and P. Krugman, 1985, Market Structure and Foreign Trade, MIT Press, Cambridge, 191 p.

Horn H. and A. Wolinsky, 1988, "Worker Substitutability and Patterns of Unionisation", in: The Economic Journal, 98(391), 484-97.

Jean S., 2000, "The Effect of International Trade on Labor-Demand Elasticities: Intersectoral Matters", in: Review of International Economics, 8(3), 504-216.

Johnson G. and F. Stafford, 1999, "The Labour Market Implications of International Trade", in: Ashenfelter O. and D. Card (eds.), Handbook of Labor Economics, Vol. 3, Elsevier, Amsterdam, 2215-88.

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", in: Journal of International Economics, 55(2), 391-409.

Krugman P., 1981, "Intra-Industry Specialization and the Gains from Trade", in: Journal of Political Economy, 89(5), 959-73.

Krugman P., 1995, "Growing World Trade: Causes and Consequences"', Brookings Papers on Economic Activity, 1, 327-77.

Krugman P. and R. Lawrence, 1996, "Trade, Jobs and Wages", in P. Krugman (eds.), Pop Internationalism, MIT Press, Cambridge, 35-48.

Kuhlmann R., 1998, "Information, Consultation and Preparing Decisions in the Age of Globalization: Conclusions from the Renault Case", in: Gabaglio E. and R. Hoffmann (eds.), European Trade Union Yearbook, European Trade Union Institute, Brussels.

Lawrence R., 2000, "'Does a Kick in the Pants Get You Going or Does it Just Hurt? The Impact of International Competition on Technological Change in US Manufacturing", in R.C. Feenstra (ed.), The Impact of International Trade on Wages, University of Chicago Press, Chicago, 197-224.

Layard, R.M.G., S.J. Nickell and R.L. Jackman, 1991, Unemployment: Macroeconomic Performance and the Labour Market, Oxford University Press, Oxford, 618 p.

Levinsohn J., 1993, "Testing the Imports-as-Market-Discipline Hypothesis", in: Journal of International Economics, 35(1-2), 1-22.

Lindén J., 1995, "Job Search and Wage Bargaining Power", Uppsala University Working Paper 95:14, Department of Economics, Uppsala, Sweden.

Lipsey R. E. and M.Y. Weiss, 1981, "Foreign Production and Exports in Manufacturing Industries", in: Review of Economics and Statistics, 63(4), 488-94.

Malcomson J.M., 1997, "Contracts, Hold-up and Labor Markets", in: Journal of Economic Literature, 35(4), 1916-57.

Manasse P. and A. Turrini, 2000, "Trade, Wages and Superstars", in: Journal of International Economics, 54(1), 97-117.

Maskus K., 1991, "Comparing International Trade Data and Product and National Characteristics Data for the Analysis of Trade Models", in: Hooper, P. and J.D. Richardson (eds.), International Economic Transactions, University of Chicago, Chicago, 17-60.

McDonald I.M. and R.M. Solow, 1981, "Wage Bargaining and Employment", in: American Economic Review, 81, 896-908.

McDonald I.M. and A. Suen, 1992, "On the Measurement and Determination of Trade Union Power", in: Oxford Bulletin of Economics and Statistics, 54 (2), 209-25.

Messerlin P., 1995, "The Impact of Trade and Capital Movements on Labour: Evidence on the French Case", in: Economics Studies, 24, Organisation for Economic Co-operation and Development, Paris.

Messerlin P., 2001, Measuring the Costs of Protection in Europe: European Commercial Policy in the 2000s, Institute for International Economics, Washington, DC, 22-23.

NIS, 1997, Activiteitennomenclatuur NACE-Bel met Toelichtingen, Nationaal Instituut voor de Statistiek, Brussels.

OECD, 1999, The OECD Stan Database for Industrial Analysis, Organisation for Economic Co-operation and Development, Paris, 372 p.

Paes de Barros R., C.H. Corseuil and G. Gonzana, 1999, "Labor Market Regulations and the Demand for Labor in Brazil", Departmento de Economia Puc-Rio Texto para Discussao 398, Pontificia Universidade Catolica, Rio de Janeiro.

Revenga A., 1992, "Exporting Jobs? The Impact of Import Competition on Employment and Wages in US Manufacturing", in: The Quarterly Journal of Economics, 107 (1), 255-84.

Rodrik D., 1997, Has Globalization Gone Too Far?, Institute for International Economics, Washington, DC, 128p.

Schreve K. and M. Slaughter, 2002, "Economic Insecurity and the Globalization of Production", NBER Working Paper 9339, National Bureau of Economic Research, Cambridge, MA.

Schumacher D., 1984, "North-South Trade and Shifts in Employment. A Comparative Analysis of Six European Community Countries", in: International Labour Review, 123(3), 115-27.

Schumacher D., 1989, "Employment Effects of the European Internal Market", in: Intereconomics, 24(6), 259-67.

Schumacher D., 1992, "A Note on Human Capital Intensity of EC Trade", in: Cahiers Economiques de Bruxelles, 0(133), 16.

Slaughter M., 2000, "What are the Results of Product Price Studies and What Can we Learn From Their Differences", in R.C. Feenstra (ed.), The Impact of International Trade on Wages, National Bureau of Economic Research, Cambridge, MA, 129-69.

Slaughter M., 2001, "International Trade and Labor-Demand Elasticities", in: Journal of International Economics, 54 (1), 27-56.

Smith J.C., 1996, "Effet de Pouvoir de Negocation et du Marche Local du Travail sur la Determination des Salaires", in: Economie et Prevision, 126, .1-17.

Sutton J., 1986, "Non-cooperative Bargaining Theory: An Introduction", in: Review of Economic Studies, 53 (5), 709-24.

Svejnar J., 1986, "Bargaining Power, Fear of Disagreement and Wage Settlements: Theory and Evidence from US Industry", in: Econometrica, 54, 1055-78.

Teulings C. and J. Hartog, 1998, Corporatism or Competition? Labour Contracts, Institutions and Wage Structures in International Comparison, Cambridge University Press, Cambridge.

Van Reenen J., 1996, "The Creation and Capture of Rents: Wages and Innovation in a Panel of UK Companies", in: The Quarterly Journal of Economics, 443, 195-226.

Vandenbussche H., R. Veugelers and J. Konings, 2001, "Unionization and European Antidumping Protection", in: 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.

Veugelers R., 1989, "'Wage Premia, Price Cost Margins and Bargaining Power in Belgian Manufacturing", in: European Economic Review, 33, 169-80.

Vinals J. and J.F. Jimeno, 1997, "Monetary Union and European Unemployment", CEPR Discussion Paper 1485, Centre for Economic Policy Research, London.

Wood A., 1995, North-South Trade, Employment and Inequality: Changing Fortunes in a Skill-Driven World, Oxford University Press, Oxford, 491p.

Woolridge J.M., 2002, Econometric Analysis of Cross-Section and Panel Data, MIT Press, Cambridge, 776p.