IAW-Diskussionspapiere

Discussion Paper

35

What a Difference Trade Makes

Export Activity and the Flexibility of Collective Bargaining Agreements

Wolf Dieter Heinbach
Stefanie Schröpfer

December 2007

ISSN: 1617-5654

Institut für
Angewandte
Wirtschaftsforschung

Ob dem Himmelreich 1
72074 Tübingen
T: (0 70 71) 98 96-0
F: (0 70 71) 98 96-99
E-Mail: iaw@iaw.edu
Internet: www.iaw.edu

IAW-Diskussionspapiere

Das Institut für Angewandte Wirtschaftsforschung (IAW) Tübingen ist ein unabhängiges außeruniversitäres Forschungsinstitut, das am 17. Juli 1957 auf Initiative von Professor Dr. Hans Peter gegründet wurde. Es hat die Aufgabe, Forschungsergebnisse aus dem Gebiet der Wirtschafts- und Sozialwissenschaften auf Fragen der Wirtschaft anzuwenden. Die Tätigkeit des Instituts konzentriert sich auf empirische Wirtschaftsforschung und Politikberatung.

Dieses **IAW-Diskussionspapier** können Sie auch von unserer IAW-Homepage als pdf-Datei herunterladen:

http://www.iaw.edu/Publikationen/IAW-Diskussionspapiere

ISSN 1617-5654

Weitere Publikationen des IAW:

- IAW-News (erscheinen 4x jährlich)
- IAW-Report (erscheinen 2x jährlich)
- IAW-Wohnungsmonitor Baden-Württemberg (erscheint 1x jährlich kostenlos)
- IAW-Forschungsberichte

Möchten Sie regelmäßig eine unserer Publikationen erhalten, dann wenden Sie sich bitte an uns:

IAW Tübingen, Ob dem Himmelreich 1, 72074 Tübingen,
Telefon 07071 / 98 96-0
Fax 07071 / 98 96-99
E-Mail: iaw@iaw.edu

Aktuelle Informationen finden Sie auch im Internet unter: http://www.iaw.edu

---

What a Difference Trade Makes

Export Activity and the Flexibility of Collective Bargaining Agreements[†]

Wolf Dieter Heinbach[*] Stefanie Schröpfer[**]

December 2007

Abstract

The prevalence of opening clauses in collective bargaining agreements may indicate a tendency to a higher decentralised wage settlement. Increasing competition on international product markets is assumed to be one reason for wage-setting decentralisation, whereas theoretical explanations focus currently on the change of production structure and the impact of exogenous shocks. Incorporating stylised facts about exporting firms, new trade models suggest a different way of adjustment to increasing competition depending on a firm's nature. While the most productive exporters expand into new markets, small, less productive non-exporters are threatened by import competition. Based on the model from Bernard et al. (2003), we apply the theoretical implications to explain why decentralisation in bargaining may arise. We examine in a second step whether small, less productive, non-exporting firms paying low average wages, possess a higher propensity to use opening clauses than more productive, large exporters with a high wage level. Based on IAB Establishment Data covering the German Manufacturing, our results indicate that firms exporting to EMU countries – but not exporters in general – have a lower propensity of using opening clauses than non-exporters. However, inconsistent with theory, slight evidence suggests a rising propensity with increasing firm size and increasing wage level.

[†] Corresponding Author: Stefanie Schröpfer, Institute for Applied Economic Research (IAW), Ob dem Himmelreich 1, 72074 Tübingen, Germany, steffi.schroepfer@freenet.de. Financial Support from the German Science Foundation (DFG) is greatfully acknowledged (grant-no. RO 532-7/2). We would like to thank Claudia Buch, Bernd Fitzenberger and Jörn Kleinert as well as the participants of the seventh workshop „Potentials for Flexibility in Heterogeneous Labor Markets" for useful comments and valuable discussions. We are thankful to Martina Huber for data processing and accomplishing the data protection checks at the Research Data Centre (FDZ) of the Federal Employment Service (BA) in the Institute for Employment Research (IAB).

[*] IAW Tübingen, Universität Hohenheim

[**] Universität Hohenheim, IAW Tübingen

Zusammenfassung

Die zunehmende Verbreitung von tarifvertraglichen Öffnungsklauseln stellt tendenziell eine Verlagerung der tariflichen Lohnsetzung auf die Betriebsebene dar, die häufig mit steigendem internationalen Wettbewerb auf den Gütermärkten begründet wird. Bisherige theoretische Ansätze führen diese Dezentralisierungstendenzen vor allem auf eine wachsende Heterogenität der Betriebe hinsichtlich ihrer Produktionsstruktur und der Betroffenheit von exogenen Schocks zurück. Neue Außenhandelsmodelle, die stilisierte Fakten zu betrieblichen Unterschieden zwischen Exporteuren und Nicht-Exporteuren berücksichtigen, weisen hingegen auf eine verschiedenartige Anpassung von Betrieben an den steigenden Wettbewerb hin. Während sehr produktive Exporteure in neue Märkte expandieren, gefährden Importkonkurrenten in stärkerem Maße die weitere Existenz von nicht exporttätigen Betrieben mit geringer Produktivität. Wir verwenden Implikationen des Modells von Bernard et al. (2003), um zu zeigen, wie eine Dezentralisierung der tariflichen Lohnsetzung ausgelöst werden kann. Im Weiteren untersuchen wir empirisch, ob kleine, wenig produktive, nicht exporttätige Betriebe mit geringem betrieblichen Lohnniveau eine höhere Neigung besitzen, Öffnungsklauseln anzuwenden als sehr produktive, große Exporteure mit hohem Lohnniveau. Die Ergebnisse von Logit-Schätzungen auf Basis des IAB-Betriebspanels und zusätzlichen Informationen über die Verbreitung von Öffnungsklauseln lassen vermuten, dass Betriebe, die in EWU-Länder exportieren, eine geringere Wahrscheinlichkeit besitzen, Öffnungsklauseln anzuwenden als nicht exportierende Betriebe. Entgegen der theoretischen Grundlage gibt es jedoch Anzeichen dafür, dass sich die Anwendungsneigung mit steigender Betriebsgröße und wachsendem Lohnniveau erhöht.

1 Introduction

With regard to the persistent high unemployment and a stiffer international competition on product markets, social agents are often criticised for undifferentiated collective wage agreements. In the public debate, a stronger firm-level differentiation of collectively agreed wages is often demanded. Remuneration should be more align with a firm's profit situation since dissimilarities would increase between firms within an industry by rising competition. A higher decentralised wage settlement in terms of a larger magnitude of wage flexibility on the firm level would allow firms to counter occurring crisis situations by reducing wages temporarily in order to avoid staffing cutbacks.

Regarding firms covered by collective wage agreements of the German Manufacturing,[1] bargaining takes place predominantly on the industry level. Wage differentiation between regions and qualifications varies substantially between collective bargaining agreements. Contemplating the extent to which firms possess the possibility of adjusting wages to the firm's situation, firms covered by a collective bargaining agreement are unrestrictedly allowed to differentiate wages above the general pay scale (*übertarifliche Entlohnung*). This can also be a matter of additional variable remuneration depending in its extent on the performance of the firm or on the job (Kurdelbusch 2002). Firms remunerating above the general pay scale have the possibility to offset a collectively agreed wage rise against these wage elements (e.g. Bahnmüller et al. 1999). Hence, wages above the general pay scale allow firms to adapt the remuneration to their performance to a certain extent, even though an agreement between management and work council (*betriebliche Bündnisse*) might be necessary in order to reduce or revoke these wage elements (e.g. Hübler 2005). The possibility to undercut collectively agreed wages on the firm level has emerged in the beginning of the nineties, when so-called opening or hardship clauses started to be introduced into collective wage agreements. While opening clauses on working time are often associated with a reduction of wages by introducing flexible working hours, opening clauses on wages allow firms to under-run the collective wage directly (Bispinck/WSI-Tarifarchiv 2003, Heinbach 2007, Kohaut/Schnabel 2007).

Keeping the demand on a higher decentralised wage bargaining in mind, so far no evidence exists on the question whether the use of opening clauses as an element of local wage flexibility is related to an increase in international competition on product markets. In this paper, we ana-

[1] The coverage of firms has declined in recent years. In 2005, around 41% of all manufacturing plants in West Germany have been covered by collective bargaining agreements (calculation based on German IAB Establishment Data).

lyse theoretically why internationalisation in this terms may lead to a higher decentralised wage settlement. As internationalisation increases, heterogeneity between the firms' advantages of collective bargaining may decline (Berthold/Fehn 1996, Kohaut/Schnabel 2007). Furthermore, internationally active firms are hit by exogenous shocks more frequently than nationally focused ones and therefore may demand a higher flexibility in wage-setting (Barba-Navaretti/Venables 2004). Alternatively, the implications of the trade model from Bernard et al. (2003), which incorporates firm-level differences, can be used to explain how a different way of adjustment to increased competition leads to a rise in heterogeneity of individual labour demand and thus possibly to a higher decentralised wage formation. Using establishment-level data of German Manufacturing, we test the hypothesis whether small, less productive, non-exporting firms paying low wages, have a higher propensity of using opening clauses than high-productive, large exporters exhibiting a high wage level.

This paper is organised as follows. Section 2 gives a definition of decentralisation and sheds some light on the question to which extent opening clauses can be seen as an indication for a higher decentralised wage settlement. At the beginning of Section 3, the current approaches explaining decentralisation as a result of internationalization are outlined. Then, we present a new theoretical approach based on the model from Bernard et al. (2003) and provide previous empirical evidence on the prevalence and usage of opening clauses. In Section 4 we investigate the formulated hypothesis empirically. We describe the data base initially and present a way to improve the information on the prevalence of opening clauses of the IAB Establishment Panel using additional data on collective bargaining agreements. Then, we give first insights by descriptive statistics and present our estimation results subsequently. Section 5 concludes.

2 Opening Clauses – Indication of Wage-Setting Decentralisation?

As a process, the decentralisation of the collective wage settlement denotes the displacement of the bargaining level from the sector or industry to the firm level. Traxler et al. (2001) distinguish between organised decentralisation and disorganisation. While disorganisation takes place when a firm leaves the coverage and negotiates on the firm or individual level, organised decentralisation emerges if the employers' association achieves an enhancement of their member-firms' authority to decide about the wage rate. Though wages are negotiated on the central level further on, the firm is permitted to adapt the remuneration to the company's situation based on the bargaining result. The extent of the wage flexibility within the collective

bargaining regime depends on the building-up of the bargaining agreement. At best – as seen by a firm – the negotiated wage rate is of recommendatory nature. A firm is endowed with less decision-making authority if the collectively agreed wage rate constitutes a binding minimum requirement (Traxler et al. 2001).

A way to offer firms more flexibility within a collective bargaining are opening clauses. The question to which extent the introduction of opening clauses constitutes a process of organised decentralisation should be discussed considering the flexibility a firm gains thereby. First, the use of opening clauses requires a firm to be in a certain economic situation, for instance in financial distress or threatened by a deterioration of its price competitiveness. Second, the degree of the firm's possibility to deviate from the agreed wage varies substantially. Governed by collective bargaining agreements, some firms are allowed to reduce the basic remuneration or the collectively agreed extra payments (e.g. extra vacation payment) by a certain percentage, while other firms have merely the possibility to postpone the date of outpayment. Third, the firm's flexibility is determined by the level of decision-making about the use of opening clauses. Some collective bargaining agreements allow negotiating on the local level, between management and work council, while others require an agreement at a higher level, between the respective trade union and the employers' association.[2] Although the use of opening clauses is strongly regularised by bargaining agreements and one might rank the firms' gain in flexibility as minor, opening clauses can be seen as local elements of wage bargaining and thus their introduction as a process of organised decentralisation.

3 Internationalisation and Decentralisation of Wage Settlement – Theoretical Background

3.1 Production Structure and Exogenous Shocks

Since the beginning of the seventies, a reduction in communication, information, and transport costs, and a liberalisation of product and financial markets has been observed. Considering internationalisation as a possible reason for a higher decentralised wage bargaining, one has to account for interdependencies between internationalisation, technological progress, and structural change. An increased intensity of product market competition is associated with a downsized price setting margin of firms. In order to maintain price competitiveness, firms are under

[2] See Heinbach (2005, 2007) and Heinbach/Schröpfer (2007) for more detailed information on types and design of opening clauses.

a strengthening pressure to invest in more efficient technologies. Launching novel products reduces the cost pressure and raises the product-specific market power. From a macroeconomic point of view, a growing intensity of competition increases the incentives for technological progress. Rising international division of labour – reflected in a growing share of imported inputs in revenue and labour-saving technological progress – affects structural changes on the labour market.

One might assume a collective change of firms' interests should bear on the behaviour of an employers' association in a way that the result of wage negotiations being alike and affordable for all firms. Hence, a tendency towards a higher decentralised wage bargaining should be initiated by a rising divergence of firms' interests. On this note, certain changes aroused by internationalisation must affect firms differently and might be reflected in an increased heterogeneity of the individual labour demand functions. Some theoretical approaches exist to explain how internationalisation could have led to higher decentralised wage bargaining.

Berthold/Fehn (1996) argue for a firm-level settlement of wages by reason that firms should possess sufficient power-making authority to be able to take information and reaction advantages over competitors to implement new technologies. Kohaut/Schnabel (2007) consider in this context that a firm's advantage of low transaction costs due to collective bargaining decreases with growing firm heterogeneity.

An increase in firm heterogeneity may also be traced back to a change in production structure (Post-Fordism) accelerated by internationalisation, which Katz (1993) claims to be the reason for an higher decentralised wage formation. In comparison to mass production, the fabrication of highly qualitative and customised goods exhibits less in-plant division of work. This requires an adjustment of work processes and organisation structures and therefore a relaxation of collectively agreed regulations relating to working time and wage-setting. For Berthold/Fehn (1996), the coexistence of both, post-Fordist and mass production, would lead to dehiscing firm interests.

An alternative approach to explain why tendencies to a higher decentralised collective wage-setting may be traced back to internationalisation concerns the exposure by and the reaction on exogenous demand and supply shocks (Barba-Navaretti/Venables 2004). Explaining a firm's need for a higher decentralised wage-setting, three possible effects can be pointed out. Firstly, companies are more frequently hit by an exogenous shock if they are internationally active (exporting or abroad-producing firms). These firms might need more flexibility in working

time and remuneration than nationally focused ones in order to smooth demand fluctuations. Secondly, which firms are harder hit by exogenous shocks– and hence, need more flexibility to adjust wages – depends on the magnitude and correlation. Thirdly, a firm's reaction on labour market shocks may vary with its international openness. Internationally active firms might exhibit a higher elasticity of labour demand, so a rise in wages would entail a more severe reduction in employment compared to nationally focused firms.[3]

3.2 Heterogenous Firms - Conclusions on a Trade Model

The coexistence of firms with new and old production structure and the differences between firms regarding the impact of exogenous shocks are two approaches to explain tendencies of a higher decentralised wage-setting as a result of internationalisation. However, a growing firm heterogeneity may also appear as a diverging performance of firms in consequence of increasing international competition on product markets. Starting point is the assumption that each firm is exposed to international competition to the same extent. Stylised facts about the correlation of firm size, productivity and export behaviour give reason to imagine a different way of adjustment of firms to tougher competition depending on a firm's attributes. Empirical evidence suggests that firm-level productivity is crucial for whether a firm exports or not. While the most productive firms are larger and can afford to export, the less productive ones are small in size and focus on the domestic market.[4] Furthermore, export costs obviously increase with the distance to the export destination. Empirical results uncover that only the most productive firms appear to be able to export in countries beyond the euro zone (Wagner 2007c). Examining wage-level differences in dependency on export status, Bernard/Wagner (1997) find evidence for a significantly larger share and a higher average wage of white-collar employees in exporting firms. This so-called export premium seems to increase with rising export intensity.[5] Using linked employee and plant data, results from Schank et al. (2007) do not indicate a significant difference of average wages in exporting and non-exporting firms, but an increasing wage disparity with higher export intensity for both blue and white-collar employees. These results even hold when controlling for employee characteristics.

[3] Regarding the opposite direction of causality, Traxler et al. (2001) argue that an increased international openness of firms may give rise to a strengthened bargaining power of the employers' association since the influence and the coverage of collective wage agreements ceases on the country's boundaries, while firms are able to shift production abroad. In this connexion, the upper bound of wage claims should be adapted to labour costs in other, comparable countries. Otherwise decentralisation tendencies would be provoked.

[4] Arnold/Hussinger (2005) and Wagner (2007b) provide empirical evidence based on different plant-level data from West-Germany. Wagner (2007a) gives a survey on empirical results of several countries.

[5] Empirical results refer to plant-level data of Lower Saxony.

Recent developments in trade theory incorporate dissimilarities of firms. Hence, besides analysing the consequences of trade to a country as a whole, firm-specific performance and therefore reallocation processes in production within a country can be examined. In the Bernard et al. (2003) trade model, firm-level heterogeneity is created by differences in technological efficiency between firms. Transport costs are the only trade barrier, which accrue from export activity and depend on production costs. In a framework of Bertrand competition, each country potentially produces a certain good, but exclusively demand from the (possibly foreign) supplier serving the lowest costs and therefore charging the lowest price.[6] Bernard et al. (2003) show that, in a world with a finite number of countries, producers select themselves into exporting and non-exporting firms depending on their production and transport costs. It turns out that the most efficient producers possess the highest productivity and serve foreign markets. Although they set the highest mark-up to maximise profit, they charge a lower price than domestic or foreign rivals. Due to their export activity and as a result of attaining higher revenues in the domestic market, high-efficient producers are larger in size. By contrast, low-efficient suppliers are less productive, set lower mark-ups, and focus on the domestic market.

Considering domestic suppliers of any country and keeping these firm-level differences in mind, how does an increase of intensity of product market competition affect firms in detail? Bernard et al. (2003) show that a rise in competition modelled as a global reduction in transport costs enables the most productive suppliers to increase their revenues. High-productive exporters launch goods in new markets, while more productive firms among the non-exporters start to export. By contrast, the least productive producers are confronted with a falling cost advantage over their next foreign competitor. Some of them must leave the market as foreign suppliers obtain cost advantages over them.

Regarding the labour market of any country and keeping wages constant, one might assume increasing employment in expanding firms, while firms losing their cost advantage might shed labour to compensate a decline in revenues. However, trying to draw conclusions on how labour demand is affected by an increase in competition, the general equilibrium model has to be considered. In equilibrium, workers are compensated by the market-clearing wage rate, hence, situations of unemployment are not possible, and institutional facts like trade unions are not accounted for. Overall, even though the model reveals implications referring to differences in firm performance caused by rising competition, a possible change of firm-level (and aggregated) labour demand is ignored.

[6] In the related popular trade model from Melitz (2003), firms compete as monopolists on product markets. Since the assumption of Bertrand competition is appropriate in our context, we decide for the Bernard et al. (2003) model. The qualitative results of both models are similar.

Albeit this fact, basic consequences concerning the labour demand might be derived from this model, additionally assuming that firms commit to pay a collectively agreed wage. Rethinking the effect of a rise in product market competition, less productive, small non-exporters are threatened by market exit. They are forced to reduce employment due to increased cost pressure and a worsened profit situation. Lower wages might secure their existence and thus jobs. High-productive exporters are in the opposite situation. They expand in new markets and, as a result of the quantity effect, they raise their employment and might even increase wages. Consequently, a potential dissimilarity of firms may arise in a growing variance of individual labour demand curves and thus in more heterogenous wage-setting interests of employers. Tendencies towards a higher decentralised wage-setting may come up when social agents attempt to avoid a reduction of employment in crisis-ridden firms on the one hand side. Simultaneously, trade unions want their members to participate in increasing profits of prosperous firms.[7] To reach both, local elements of wage-setting like opening clauses might be a possible outcome of negotiations between trade unions and the employers' associations. Actually, as the application of opening clauses is conditioned on a certain firm level situation, often a bad profit situation is required, the introduction of opening clauses into collective agreements seems to indicate a more decentralised wage bargaining accounting for a firm's situation. Alternatively, firms not being able to bear the collectively agreed wage any longer might leave the coverage in order to enforce a wage reduction. However, the firm's duty to pay collectively agreed wages even after terminating the employers' association's membership (*Nachwirkungspflicht*) might bar firms – at least in the short run – from lowering remunerations by downscaling the wage formation to the firm level.

To shed some light on the question, which firms rely on opening clauses, we examine potential firm-level determinants of the application of opening clauses empirically. We test the hypothesis whether small, less productive non-exporters paying low average wages, possess a higher propensity to use opening clauses than more productive, large, exporting firms exhibiting a high wage level.

[7] In this context, a reduction in transport costs in general equilibrium leads to an increase in aggregated productivity and a change in firm composition due to market exists and reallocation processes of production. From a dynamic point of view it might affect the general framework of next wage negotiations since the impact of large firms would increase. However, this should not be of interest at this point.

3.3 Previous Empirical Evidence

Opening clauses allowing firms to go below collectively agreed minimum standards are widely spread in Manufacturing. For Baden-Wuerttemberg, Heinbach/Schröpfer (2007) find that 91% of all employees in firms covered by bargaining agreements have been potentially concerned by opening clauses in 2001. 83% of employees in covered firms could have been concerned by opening clauses which allow to undercut the agreed wage. Furthermore, opening clauses exist obviously more frequently in large firms (Heinbach 2006).

Kohaut/Schnabel (2007) provide the first and currently sole empirical evidence on firm-level determinants of the application of opening clauses based on the IAB Establishment Data. While factors determining the application of opening clauses on working time have not been detected, the use of opening clauses on wages is obviously influenced by several variables. The likelihood to apply opening clauses increases significantly with negative expectations regarding the future profit situation and the development of workforce. Likewise, firms with a condition of technology evaluated as obsolete show a higher propensity of using opening clauses than firms whose condition of technology was evaluated as new. Firm size measured in number of employees and export activity seem to be irrelevant.

Like Kohaut/Schnabel (2007), we use the IAB Establishment Data in order to test the formulated hypothesis. Since Kohaut/Schnabel (2007) also comprises firms of industries producing non-tradables, a separate analysis of the Manufacturing Sector may reveal different results in particular concerning export activity. Moreover, we modify the database to mitigate problems with endogeneity and missing information about the availability of opening clauses.

4 Empirical Investigation

4.1 Data

For our empirical analysis we take data from the Establishment Panel of the Institute for Employment Research (IAB). The Establishment Panel is a representative sample of German establishments employing at least one employee according to social insurance contributions (see e.g. Kölling 2000). Among comprehensive establishment-specific information, the cross-section in 2005 provides information on whether an establishment is covered by an industry-wide col-

lective wage agreement, a firm-specific wage agreement or by no collective agreement at all. In 2005, firms reported for the first time whether the collective bargaining agreement contains opening clauses and - if so - whether they have made use of them. We confine the data basis to firms of the Manufacturing Sector in West Germany which have been covered by a central collective bargaining agreement in 2005.[8] We focus only on those establishments whose bargaining agreement provides opening clauses.

In their study, Kohaut/Schnabel (2007) report that 23% of all establishments under collective bargaining coverage in Western Germany do not know whether opening clauses are provided or not, while only 13% stated to underlie bargaining agreements containing opening clauses. Using a data set from official statistics (German Salary and Earnings Survey, Verdienststrukturerhebung) and an own survey of the prevalence of opening clauses in the Manufacturing Sector of Baden-Wuerttemberg (IAW data set on opening clauses), Heinbach (2006) reports that in 2001 the relevant bargaining agreements provide wage-related opening clauses for 81% of all collectively covered employees. For another 10% of all collectively covered employees, the bargaining agreements contain opening clauses on working time.[9] Although Heinbach (2006) focusses only on employees in Baden-Wuerttemberg, the share of establishments covered by a collective bargaining agreement with opening clauses in (Western) Germany should be higher than reported in Kohaut/Schnabel (2007). Obviously, collectively covered firms do not know much about the prevalence of opening clauses.

As the firm-specific knowledge on the prevalence of opening clauses within the relevant collective bargaining agreements seems to be less reliable, we add information whether the dominating collective agreement within a collective bargaining area contains opening clauses.[10] For 104 out of 126 collective bargaining areas information is then available. We distinguish four types of opening clauses (Heinbach/Schröpfer 2007, Heinbach 2007): „no opening clauses", „wage relevant opening clauses", „working-time opening clauses" or „other opening clauses". A collective bargaining area is classified if at least 80% of the covered establishments apply the same type of opening clauses.[11] Adding this information to the IAB Establishment Panel reduces

[8] We consider solely firms with collective bargaining agreements. Establishments with firm-specific wage agreement are excluded, even though they apply the corresponding collective agreements.

[9] The share of collectively covered establishments is higher in the Manufacturing Sector but achieves its maximum in the mining and energy sector in Western Germany, where 28% of all establishments report that opening clauses are available.

[10] The collective bargaining areas are built out of 7 regions and 18 sectors (on the two-digit Nace Rev 1.1 level). There are $7 \cdot 18 = 126$ such areas.

[11] The classification of the collective bargaining areas is taken from the combination of the German Salary and Earnings Survey (GSES) and the IAW data set of opening clauses. The GSES 2001 cross-section is a linked-employer-employee data set from official statistics. It provides information on establishments from the Man-

the share of establishments answering „do not know / not applicable" by 14 percentage points. Table 1 exhibits a comparison of the original IAB data and IAB data with added information on opening clauses in collective bargaining agreements (IAB data with CBA-information). Afterwards, no additional information on opening clauses is available for merely 5% (instead of 19%) of the covered establishments in the Manufacturing Sector in Western Germany, while the share of firms with opening clauses increases from 18% to 72%.[12]

Table 1: Establishments covered by collective bargaining agreements with opening clauses. A comparison of IAB data and IAB data with CBA-information, Manufacturing Sector in West Germany

Establishments...	IAB data in %	IAB data with CBA-information in %
...with opening clauses	18	72
...without opening clauses	64	23
...do not know / not applicable	19	5
Total	100	100
# Observations	1192	1203

Source: IAB Establishment Panel (Wave 2005) and IAW data set on opening clauses, own calculations (controlled remote data access via FDZ).

By adding the opening clauses information, we assume that all covered firms which belong to the same collective bargaining area can make use of the same opening clause type. This assumption ignores the fact that firstly, firms in the same industry are sometimes covered by different (collective bargaining) agreements (Fitzenberger et al. 2007) and secondly, some firms adapt bargaining agreements from a different industry (Heinbach 2005).

Since firms were asked if they are using opening clauses at the moment, we do not know when they started to. If a firm has been using opening clauses for a while, it might be the case that

ufacturing Sector in Germany as well as information of their workforce. The data reports for each worker the collective bargaining agreement which is applied exactly. This creates an interface to add the IAW data set on opening clauses. The collective bargaining information is aggregated in two steps. On the establishment level, the collective bargaining agreement is selected which is applied to the majority of workers. Then the collective bargaining agreement is classified according to its opening clauses type. In the second step, the establishments are aggregated to the collective bargaining area level. On the collective bargaining area level, if the majority of firms ($> 80\%$) is classified the same type of opening clauses the collective bargaining area is classified analogously.

[12] No information is available for 22 collective bargaining areas as the share of establishments classified the same type of opening clauses is less than 80%: „manufacture of food products and beverages" (2 regions), „manufacture of paper and paper products"(4), „manufacture of wood and wood products except furniture"(5), „recycling"(5), „manufacture of fabricated metal products, exclusive machinery"(1) , „manufacture of machinery and equipment" (1), „manufacture of motor vehicles, trailers and semi-trailers"(1), „manufacture of furniture, jewelery and musical instruments"(2), „construction"(1).

the data already reflects an improvement in the firm's economic situation. Hence, an endogeneity problem may occur when the separation of causes and effects of using opening clauses is difficult. On this account, we remove firms using opening clauses which evaluated their profit situation as good. Since the use of opening clauses is not restricted to firms in a bad economic situation, but also possible if a firm is in danger of a deterioration of its price competitivness, we keep those firms which reported a good profit situation but constant or decreasing sales.

4.2 Variables

Table 2: Operationalisation of potential determinants

Determinant	Operationalisation
Firm size	Dummies, number of employees (5 categories) reference: 1–9 employees
Export	Productivity ranking: Dummy, Export destination level: EMU countries ($= 1$) Dummy, Export destination level: EU ($= 1$) Dummy, EU Export destination level: other countries ($= 1$) reference: firm does not export ($= 0$)
Industry Import Shares	Imports of industry/(imports + gross value added in industry)
Wage level	Wage bill/number of employees, adjusted for industry-level mean
Share of high-skilled	Share of employees with university (or university of applied sciences) degree, adjusted for industry-level mean
Wages above general pay scale	Dummy (1 = yes, exists)
Performance-depending payments	Dummy (1 = yes, exists)
Profit situation	Dummy, evaluation of the firm 0 good (rank 1, 2) 1 bad (rank 3 to 5)
Development of sales	Dummy, evaluation of the firm 0 certain expectations 1 uncertain expectations
Multiple-site establishment	Dummy (1 = yes)

Adjustment for industry-level means by division.

Potential firm-level determinants of using opening clauses and their operationalisation are described in Table 2. According to the model's implications, only the most productive firms should export. Theoretically, exporting firms have higher mark-ups compared to non-exporting firms, but charge a lower price. Hence, exporters are larger due to export sales, realise higher revenues on the domestic market. Triggered by an increase in competition, exporting firms face a better

profit situation than less productive non-exporters and are expected to pay higher wages. Following our hypothesis, we focus on export as productivity measure, firm size, wage level and profit situation as key variables to explain the application of opening clauses.

Since export costs increase with the distance from the production location, only the most productive firms can afford to export to far-off countries, while the less productive ones focus on the domestic market. Hence, the distance to the farthest region to which a firm exports should reflect its productivity. To rank the productivity of firms by the firm's farthest export area, three dummy variables are included, which distinguish between exports to member states of the European Monetary Union (EMU), exports to countries of the European Union (EU), but non-EMU states, and exports beyond the EU, to non-EU countries. Firms exporting to countries beyond the EU are presumed to possess the highest productivity, non-exporting firms to have the lowest productivity. According to our hypothesis, firms exporting to adjacent countries are expected to show a lower propensity of using opening clauses than non-exporting firms, but might be more likely to use them compared to firms exporting to far-off countries.[13]

To control for import competition, which in particular non-exporting firms are exposed to, we examine the corresponding industry-specific effect. We include a variable measuring the import openness on industry level as import shares in the sum of imports and gross value added of each industry. We expect the marginal effect to be positive, as firms in industries with high import shares would be more likely to use opening clauses than firms in industries with low import shares.

The probability of using opening clauses might diminish with increasing firm size measured as number of employees subdivided into five categories.

In a crisis-ridden situation, a firm is supposed to be more likely to apply opening clauses. The own evaluation of the firms' profit situation is included as binary variable. It takes the value 1 if the profit situation is evaluated as bad (0 otherwise).

Adjusted for the industry-level mean, we include the wage level of a firm. Since theoretically more productive exporting firms have a higher mark-up compared to non-exporters, they may afford a wage level above the industry average and they are supposed to be less likely to use

[13] In order to test whether export, i.e. the used dummy variables for the farthest export areas, is an appropriate measure for ranking the productivity, we use the gross value added (sales minus intermediate inputs) per employee as productivity measure instead of the export dummies. But since predominantly large firms regularly do not declare their sales (Jensen/Rässler 2007), the estimation results are not representative for firms of all sizes.

opening clauses. A second negative effect of the wage level arising from the use of opening clauses and strengthening the first one is expected to be negligible for two reason. Firstly, the extent to which firms may deviate from the present wage level is pretty low (see Heinbach (2007)). Secondly, in particular due to the emuneration above the general pay scale, the variation of wage levels between firms may sufficiently high to ignore a potential negative impact of lowering wages by using opening clauses.

A dummy variable indicating if a firm remunerates above the general pay scale (value 1) or not (value 0) is included. Since those wage elements can be conditioned on the firm performance and allow firms therefore to adjust wages to the profit situation to some extent, a binary variable taking the value 1 if a variable remuneration exists (0 otherwise) should account for a potential negative impact on the propensity to use opening clauses.

A wage level above the industry-level mean might be traced back to a larger share of high-skilled employees. So a potential negative impact of the wage level on the probability of using opening clauses might diminish. For this reason, we introduce the share of a firm's employees with university degree (or university of applied sciences degree) adjusted for the industry-level mean as well. The share of high-skilled is also used to indicate an impact of production structure on the application of opening clauses since firms with post-Fordist production structure are typically more human-capital-intensive than others.

Accounting for differences in the exposure to exogenous shocks, an additional dummy variable is included indicating uncertain expectations of a firm regarding the development of its sales (value 1).

Since our data base provides information on the establishment level, we have to account for the fact that establishments being part of an enterprise with more than one site (multiple-site establishment) might behave differently in applying opening clauses than one-site enterprises. For this reason, a dummy variable is included taking the value 1 if the establishment is part of a multi-site enterprise and 0 if the establishment is a one-site enterprise.[14]

Industry dummy variables control for potential remaining industry-specific effects on the application of opening clauses, whereas „machinery and equipment" is used as reference industry.

[14] The model from Bernard et al. (2003) assumes one-product suppliers with one manufacturing base. This implies that firm size effects in theory should correspond to establishment size effects in the data.

4.3 Descriptive Evidence

In the Manufacturing Sector, 41% of all firms in Western Germany are covered by a collective bargaining agreement (see Table 3).

Table 3: Share of establishments covered by collective bargaining agreements. Manufacturing Sector in Western Germany

	CB-coverage in %
Total	41
1 to 19 employees	39
20 to 199 employees	45
200 and more employees	69
Exporters	37
Non-exporters	42

Source: IAB Establishment Panel (Wave 2005)
own calculations (controlled remote data access via FDZ).

In 2005 the share of covered firms is higher, the larger the firm and also higher among non-exporters. Overall, opening clauses have been available for 72% of the covered firms, whereas they are less prevalent in small firms than in large[15] ones (see Table 4). A comparison of the figures based on IAB data with and without additional CBA-information reveals that mainly small and medium-sized firms do not know about the existence of opening clauses in their collective bargaining agreements. Among firms endowed with opening clauses, 34% of the largest firms and 35% of non-exporters apply them.[16] Consistent with theory, only 8% of exporters do so.

Descriptive statistics depicted in Table 5 provide a first insight regarding the empirical relevance of the theoretically derived conclusions on the interrelationship between firm size, export activity and other explanatory variables.

Obviously, more than half of the plants with more than 200 employees are multiple-site establishments. Also, the fraction of multiple-site exporters seems to be higher than the share of non-exporters being part of a multiple-site enterprise.

Large and exporting firms appear to be more likely to remunerate above the industry average wage: Among large firms, 84% of the establishments pay above the industry average, while this

[15] Large firms have 200 and more employees. Data protection rules prohibited to publish descriptive statistic for a more detailed categorisation.

[16] As the share of covered firms with opening clauses has risen after adding information from the IAW data set on opening clauses, the share of firms using opening clauses is smaller than reported in Kohaut/Schnabel (2007).

Table 4: Descriptive statistics. Establishments covered by collective bargaining agreement, Manufacturing Sector in Western Germany

	Number of employees					
	1–19	20–199	> 200	Non-exporters	Exporters	Total
Opening clauses provided (IAB data)	*11*	*28*	*61*	*35*	*12*	*18*
Opening clauses provided	71	73	88	71	78	72
Opening clauses used (IAB data with CBA-information)	*	21	34	35	8	16

* insufficient number of cases
Source: IAB Establishment Panel (Wave 2005) and IAW data set on opening clauses, own calculations

is only the case in 37% of the smallest firms. The share of exporters paying above the industry average amounts to 77% compared to a share of 38% among non-exporters. Consequently, the respective fractions of firms paying wages above the general pay scale and firms with variable remuneration are highest among the largest firms and among exporters. Also the fraction of firms with shares of high-skilled employees above the industry average is highest in large and in exporting firms. Medium-sized firms are obviously more likely to evaluate their profit situation as bad compared to the largest ones. Among the non-exporters, 91% reported to be confronted with a bad profit situation, while this is case for 76% of the exporters. Also, uncertainty about future sales seems to be slightly higher in non-exporting firms. Overall, in particular regarding an higher wage level in large, exporting firms these findings are consistent with theoretical conclusions drawn in the previous section. Whether these large exporters with wage levels above the industry average exhibit a lower propensity of applying opening clauses is examined next.[17]

4.4 Econometric Results

Based on year 2005 of the IAB Establishment Panel, we estimate cross-section logit models.[18] The results discussed in this section refer to the average marginal effects and the marginal effects at the mean of the exogenous variables (see Appendix B for details). Both kinds of marginal effects are depicted in Table 6.

[17] Table 7 in the appendix provides information on the means and standard deviations of the regressors for firms applying and not applying opening clauses, respectively.
[18] The use of the panel dimension of the data set would had led to a substantial reduction of observations since we focus on the Manufacturing Sector.

Table 5: Descriptive statistics based on IAB data with CBA-information. Establishments covered by collective bargaining agreement with opening clauses, Manufacturing Sector in Western Germany

	Number of employees					
	1–19	20–199	> 200	Non-exporters	Exporters	Total
Wage level above average	37	72	84	38	77	48
Share of high-skilled above average	*	34	63	5	41	15
Wages above general pay scale	52	70	75	53	71	58
Firm-performance depending payments	5	22	51	5	32	12
Profit situation evaluated as bad	92	76	64	91	76	87
Uncertain expectations about sales	11	5	6	10	7	9
Multiple-sites establishment	5	21	62	7	26	12

* insufficient number of cases
Source: IAB Establishment Panel (Wave 2005) and IAW data set on opening clauses, own calculations

All estimated models indicate that firms exporting solely to EMU member states do obviously have a slightly lower propensity of using opening clauses than non-exporters. Depending on the specification, the marginal effects of the corresponding variable are significant at the 5%- or 1%-level. However, there seems to exist no difference in the propensity of usage between non-exporters and exporters supplying countries beyond the euro zone since the marginal effects of both corresponding dummy variables referring to the export destination levels „EU countries" and „other countries" remain insignificant.[19] This might have several reasons. Firstly, using the three dummy variables for the farthest export area to rank the productivity might be an imprecise productivity measure. Concretely, relative distance differences to several export countries do not coincide with the intended productivity ranking generated by the dummy variables. For example, the distance to Switzerland (captured by „other countries") is shorter than to Greece (EMU countries). Secondly, we rely on the theory assuming the distance to export regions to reflect the firm's productivity.[20] Thirdly, assuming the export variables as productivity measure to be precise and appropriate, the result may indicate further impact sources, which compensate the productivity advantage of firms exporting to non-EMU countries over non-exporters, i.g. currency effects.

[19] Including a binary variable indicating the export status of a firm instead of the three export dummies (results not depicted), we find no significant difference between exporting and non-exporting firms in using opening clauses.
[20] Taking the gross value added per employee instead of the export dummy variables, there are no significant effects of productivity on the propensity of using opening clauses. However, we have to keep in mind, that the results are not representative for large firms (results not depicted).

Table 6: Determinants of using opening clauses, Manufacturing Sector, Western Germany, ML-Logit estimation, marginal effects.

	(1)		(2)		(3)		(4)	
	MEM	AME	MEM	AME	MEM	AME	MEM	AME
10-49 employees	0.0381	0.0569	0.0122	0.0202	0.0033	0.0041	0.0190	0.0391
(ref.: 1-9 employees)	(0.033)	(0.063)	(0.027)	(0.043)	(0.042)	(0.054)	(0.025)	(0.048)
50-249 employees	0.2044	0.2301	0.0768	0.1013	0.0820	0.0923	0.1253	0.1716
	(0.080)**	(0.097)**	(0.064)	(0.079)	(0.089)	(0.127)	(0.090)	(0.109)
250-499 employees	0.2493	0.2636	0.0592	0.0811	0.0721	0.0824	0.1154	0.1604
	(0.118)	(0.110)**	(0.065)	(0.078)	(0.089)	(0.117)	(0.109)	(0.118)
500 and more employees	0.2079	0.2284	0.0546	0.0759	0.0709	0.0812	0.1268	0.1722
	(0.110)*	(0.109)	(0.070)	(0.084)	(0.109)	(0.137)	(0.142)	(0.146)
Export destination level: EMU	-0.0271	-0.0461	-0.0251	-0.0468	-0.0367	-0.0476	-0.0186	-0.0467
	(0.011)**	(0.020)**	(0.010)***	(0.022)**	(0.017)**	(0.027)*	(0.006)***	(0.021)**
Export destination level: EU	0.0578	0.0785	0.0422	0.0607	0.0443	0.0522	0.0315	0.0572
	(0.064)	(0.079)	(0.066)	(0.084)	(0.077)	(0.090)	(0.046)	(0.073)
Export destination level: other countries	-0.0095	-0.0159	-0.0072	-0.0127	-0.0124	-0.0163	-0.0018	-0.0041
	(0.013)	(0.020)	(0.011)	(0.020)	(0.018)	(0.026)	(0.009)	(0.021)
Profit situation: bad (ref.: good)	0.0250	0.0430	0.0227	0.0424	0.0327	0.0428	0.0170	0.0427
	(0.009)***	(0.035)	(0.009)**	(0.035)	(0.014)**	(0.032)	(0.006)***	(0.035)
Wage level			0.0328	0.0014	0.0440	0.0009	0.0294	0.0232
			(0.017)*	(0.034)	(0.042)	(0.045)	(0.014)**	(0.032)
Industry import share					0.0376	0.0472		
					(0.069)	(0.094)		
Share of high-skilled employees							-0.0014	0.0000
							(0.001)	(0.002)
Wages above general pay scale							-0.0160	-0.0356
							(0.015)	(0.019)*
Performance depending payment							-0.0046	-0.0107
							(0.007)	(0.018)
Sale expectations: uncertain							-0.0213	-0.0498
(ref.: certain)							(0.007)***	(0.023)**
Multiple site establishment							-0.0083	-0.0200
							(0.009)	(0.017)
Observations		937		849		847		824
Log-Likelihood		-169.0461		-143.89162		-164.67119		-130.5784
Pseudo-R^2		0.1861		0.2213		0.1108		0.2617
LR-test. model specification		103.6***		122.45***		257.93***		162.13***
Wald-test. firm size dummies		22.79***		6.43		3.85		14.89***
Wald-test. firm industry dummies		18.39		21.78**				23.85**

Standard errors in parentheses, AME average marginal effect, MEM marginal effect at the mean.
* significant at 10%; ** significant at 5%; *** significant at 1%
source: IAB Establishment Panel (Wave 2005) and IAW data set on opening clauses,
own calculations (controlled remote data access via FDZ).

Including the import share in model (3), we find no industry-level effect of import competition on the use of opening clauses since the marginal effects are positive as expected but not significant. Hence, regarding the propensity of using opening clauses, there are obviously no differences between firms of different industries c.p. However, testing for the joint significance of the estimated coefficients of the industry dummy variables by applying a Wald-test, the results in model (2) and (4) indicate that other differences seem to exist between industries.

The firm's profit situation seems to be relevant as the marginal effects at the means are significantly positive in all specifications. Firms with a profit situation evaluated as bad have at least a two percentage points higher probability of applying opening clauses than firms in prosperous situations.

Regarding the firm size, only model (1) indicates an effect on using opening clauses. Compared to a small firm with maximum 9 employees, larger firms have a higher average propensity of using opening clauses with the exception of the largest firms with at least 500 employees. The firm size effect disappears by introducing the wage level (model 2). Based on the Wald-test, the estimated coefficients (not reported) of the firms size dummy variables are tested on joint significance. Even though we control for the wage level, the null hypothesis of zero-coefficients is rejected in model (4) at a 1%-level.[21]

Inconsistent with theory, there is slight evidence for a positive impact of the wage level indicating that firms with a high wage level use opening clauses more frequently. Even though the average marginal effect is insignificant in all specifications, the marginal effect at the average wage level is significant at a 10%-level. Controlling for the share of high-skilled employees and the existence of collective wages above the general pay scale (compared to non-existence) in specification (4), the respective marginal effects are insignificant, whereas the average marginal effect of the dummy variable shows slight significance. Obviously, the existence of collective wages above the general pay scale has a negative impact on the propensity to use opening clauses. Contrarily, the existence of variable wage elements seems to have no effect.

By taking the share of high-skilled as indicator to give insights into the causality between production structure and a tendency towards higher decentralised wage bargaining, we would have expected a positive impact on the application of opening clauses. Since the corresponding marginal effects are insignificant, we find no evidence for a relation of production structure and the usage of opening clauses.

Firms with uncertain expectations about the development of sales are obviously less likely to apply opening clauses than firms with certain expectations. Regarding the theory about the varying exposure of shocks depending on a firms international activity, this result does not indicate that in particular firms with high production fluctuations need a higher flexibility.

[21] One has to keep in mind that the share of large firms allowing to use opening clauses is higher than the fraction of small firms (Heinbach 2006).

5 Summary and Outlook

Based on a new trade model from Bernard et al. (2003) we present a new approach to explain wage-setting decentralisation as a result of internationalisation in terms of increasing competition on product markets. Theoretical implications suggest that small, less productive, non-exporting firms paying low average wages, possess a higher propensity to use opening clauses than more productive, large exporters exhibiting a high wage level. We use the IAB Establishment Panel and add information on the prevalence of opening clauses on collective bargaining area level. This improves the data as the share of establishments not knowing if the relevant collective bargaining agreement provides opening clauses can be reduced notably. Based on the IAB Establishment Panel with CBA information, empirical findings on our hypothesis exhibit an ambiguous picture for the Manufacturing in West Germany.

Summarising the results and in line with theory, firms exporting to EMU countries as farthest export destination obviously have a lower propensity to use opening clauses than non-exporters. There seems to exist no difference between non-exporters and firms exporting to non-EU or other countries. Consistent with theory, firms with a profit situation evaluated as bad have a higher probability of using opening clauses than prospering firms. The results concerning firm size and wage level are ambiguous. The effect of a rising probability of using opening clauses with increasing number of a firm's employees vanishes controlling for the wage level of the firm. Even so, we find the coefficients of the firm size dummy variables jointly significant. Although the marginal effect of the wage level is predominantly insignificant, there exists slight evidence for a rising propensity to use opening clauses when the wage level increases. Overall, our results indicate that a firm's export activity matters regarding its decision of using opening clauses or not.

To come back to increasing international competition on product markets as a cause of higher decentralised wage settlement, the results of this paper give only a first insight into a potential relationship. Referring to a growing heterogeneity of the labour demand firstly, further research must incorporate the panel dimension to account for the development of firms and the use of opening clauses. Inversely, examining the impact of the usage of opening clauses on firm performance would enlighten a potential relationship between internationalisation and wage-setting decentralisation.

References

Arnold, M./K. Hussinger (2005): Export Behavior and Firm Productivity in German Manufacturing: A Firm-Level Analysis, in: *Review of World Economics (Weltwirtschaftliches Archiv)*, 141(2), p. 219–243.

Bahnmüller, R./R. Bispinck/A. Weiler (1999): Tarifpolitik und Lohnbildung in Deutschland am Beispiel ausgewählter Wirtschaftszweige, Diskussionspapier 79, WSI, Düsseldorf.

Barba-Navaretti, G./A. Venables (2004): *Multinational Firms in the World Economy*, Princeton University Press.

Bartus, T. (2005): Estimation of marginal effects using margeff, in: *The Stata Journal*, 5, p. 309–329.

Bernard, A. B./J. Eaton/J. B. Jensen/S. Kortum (2003): Plants and Productivity in International Trade, in: *American Economic Review*, 93(4), p. 1268–1290.

Bernard, A. B./J. Wagner (1997): Exports and Success in German Manufacturing, in: *Review of World Economics (Weltwirtschaftliches Archiv)*, 133(1), p. 134–157.

Berthold, N./R. Fehn (1996): Evolution von Lohnverhandlungssystemen - Macht oder ökonomisches Gesetz?, in: Zohlnhöfer, W., Editor, *Die Tarifautonomie auf dem Prüfstand*, Duncker und Humblot, Berlin, p. 57–94.

Bispinck, R./WSI-Tarifarchiv (2003): Tarifliche Öffnungsklauseln. Eine Analyse von rund 30 Tarifbereichen, Elemente qualitativer Tarifpolitik Nr. 52, Düsseldorf.

Cameron, A. C./P. K. Trivedi (2005): *Microeconometrics. Methods And Applications*, Cambridge University Press, Cambridge (MA).

Fitzenberger, B./K. Kohn/A. Lembcke (2007): Union Wage Effects in Germany: Union Density or Collective Bargaining Coverage?, Discussionpaper, Goethe-University, Frankfurt a. M.

Greene, W. H. (2003): *Econometric Analysis*, Prentice Hall, Upper Saddle River, NJ.

Hübler, O. (2005): Sind betriebliche Bündnisse für Arbeit erfolgreich?, in: *Jahrbücher für Nationalökonomie und Statistik*, 225(6), p. 630–652.

Heinbach, W. D. (2005): Ausmaß und Grad der tarifvertraglichen Öffnung, in: *IAW-Report*, 2005(2), p. 51–70.

Heinbach, W. D. (2006): Immer mehr Tarifverträge sehen Öffnungsklauseln vor, in: *Statistisches Monatsheft Baden-Württemberg*, 2006(11), p. 44–47.

Heinbach, W. D. (2007): Wages in wage-setting regimes with opening clauses, in: *AStA – Wirtschafts- und Sozialstatistisches Archiv*, 1(3-4), p. 233–245.

Heinbach, W. D./S. Schröpfer (2007): Typisierung der Tarifvertragslandschaft - Eine Clusteranalyse der tarifvertraglichen Öffnungsklauseln, in: *Jahrbücher für Nationalökonomie und Statistik*, 227(3), p. 1–17.

Jensen, U./S. Rässler (2007): The effects of collective bargaining on firm performance: New evidence based on stochastic production frontiers and multiply imputed German establishment data, IAB Forschungsbericht 3/2007, IAB, Nürnberg.

Katz, H. (1993): The Decentralization of Collective Bargaining: A Literature Review and Comparative Analysis, in: *Industrial and Labor Relations Review*, 47, p. 3–22.

Kölling, A. (2000): The IAB-Establishment Panel, in: *Schmollers Jahrbuch. Zeitschrift für Wirtschafts- und Sozialwissenschaften*, 120(2), p. 291–300.

Kohaut, S./C. Schnabel (2007): Tarifliche Öffnungsklauseln - Verbreitung, Inanspruchnahme und Bedeutung, in: *Sozialer Fortschritt*, 2007(2), p. 33–40.

Kurdelbusch, A. (2002): *Variable Vergütung in deutschen Großunternehmen. Entgeltsysteme zwischen Flexibilisierung und Flächentarifvertrag*, PhD thesis, Ruhr-Universität Bochum.

Melitz, M. (2003): The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity, in: *Econometrica*, 71(6), p. 1695–1725.

Rogers, W. H. (1993): Regression standard errors in clustered samples, in: *Stata Technical Bulletin*, 13, p. 19–23.

Schank, T./C. Schnabel/J. Wagner (2007): Do exporters really pay higher wages? First evidence from German linked employer-employee data, in: *Journal of International Economics*, 72(1), p. 52–74.

Train, K. E. (2003): *Discrete Choice Methods with Simulation*, Cambridge University Press, Cambridge (MA).

Traxler, F./S. Blaschke/B. Kittel (2001): *National Labour Relations in Internationalized Markets. A Comparative Study of Institutions, Change, and Performance*, Oxford University Press, Oxford.

Wagner, J. (2007a): Exports and Productivity: A survey of the evidence from firm level data, in: *The World Economy*, 30(1), p. 60–82.

Wagner, J. (2007b): Exports and Productivity in Germany, Workingpaper 41, Universität Lüneburg. *forthcoming in: Applied Economics Quarterly*.

Wagner, J. (2007c): Productivity and Size of the Export Market: Evidence for West and East German Plants, 2004, Workingpaper 43, Universität Lüneburg. *forthcoming in: Jahrbücher für Nationalökonomie und Statistik.*

A Tables

Table 7: Descriptive statistics. Potential determinants of using opening clauses, Manufacturing Sector, Western Germany

	opening clauses not used (Y=0), n=890			opening clauses used (Y=1), n=114		
Variable	Obs.	Mean	St. Dev.	Obs.	Mean	St. Dev.
1-9 employees	875	0.520	0.500	114	0.275	0.448
10-49 employees	875	0.328	0.470	114	0.308	0.463
50-249 employees	875	0.109	0.312	114	0.314	0.466
250-499 employees	875	0.024	0.152	114	0.056	0.231
500 and more employees	875	0.020	0.139	114	0.048	0.214
Export (1=yes)	831	0.251	0.434	106	0.375	0.486
Export destination level: EMU	831	0.091	0.288	106	0.032	0.176
Export destination level: EU	832	0.017	0.128	106	0.084	0.279
Export destination level: other countries	874	0.149	0.357	114	0.267	0.444
Industry import share	873	0.480	0.129	114	0.493	0.101
Profit situation: bad (ref.: good)	875	0.866	0.340	114	0.920	0.273
Share of high-skilled employees	873	0.955	5.013	114	1.714	4.459
Wage level	790	0.981	0.460	100	1.305	0.380
Wages above general pay scale (1=yes)	870	0.573	0.495	114	0.668	0.473
Performance depending payment (1=yes)	866	0.113	0.317	112	0.188	0.393
Productivity	581	0.879	3.635	76	2.426	6.482
Sale expectations: uncertain (ref.: certain)	867	0.098	0.298	114	0.016	0.125
Multiple site establishment (1=yes)	863	0.121	0.327	113	0.174	0.381

Number of observations varies due to missing values.

B Econometric Model

For estimation purposes, we use a model consisting of a dependent variable ANW^*, which is explained by a set of exogenous variables x:

$$ANW^* = x'\beta + \varepsilon \tag{1}$$

ANW^* represents the unobserved propensity of using opening clauses and β is the vector of coefficients. A vector ε contains the independent and logistic distributed errors with mean 0 and variance $\pi^2/3$ (see Greene 2003, 688pp.). The decision of applying opening clauses $(ANW = 1)$ or not $(ANW = 0)$ depends on a threshhold parameter κ. If the unobserved variable ANW^* is greater than κ, the indicator ANW equals one:

$$ANW = \begin{cases} 1 & \text{if } ANW^* = x'\beta + \varepsilon > \kappa \\ 0 & \text{otherwise.} \end{cases} \tag{2}$$

We use Maximum likedlihood (ML) with robust standard errors to estimate the logit model.

In contrast to an ordinary linear model with least squares, the coefficients cannot be interpreted as partial derivative. Hence, we compute marginal effects evaluated at the mean of the explanatory variables. Besides the probability of using opening clauses of the average firm, the overall effect is also of interest. Therefore, we compute average marginal effects, which are the average probabilities of using opening clauses (Cameron/Trivedi 2005 and Train 2003). The corresponding standard errors are calculated using the Delta-method (Bartus 2005). Varying the value of a continuous variable, both kinds of the marginal effects denote the difference in probability of applying opening clauses expressed in percentage points. In case of binary variables, the marginal effect corresponds to the change in probability when the dummy alters its value. In the majority of specifications we include industry dummies to control for industry effects. In order to estimate a potential impact of the industry-specific import share (see 4.2) on the propensity of using opening clauses and to control for residual industry effects at the same time, we estimate model (3) with data clustered by industries instead of using industry dummies (Rogers 1993).

IAW-Diskussionspapiere

Bisher erschienen:

Nr. 1 (September 2001)
Das Einstiegsgeld – eine zielgruppenorientierte negative Einkommensteuer: Konzeption, Umsetzung und eine erste Zwischenbilanz nach 15 Monaten in Baden-Württemberg
Sabine Dann / Andrea Kirchmann / Alexander Spermann / Jürgen Volkert

Nr. 2 (Dezember 2001)
Die Einkommensteuerreform 1990 als natürliches Experiment. Methodische und konzeptionelle Aspekte zur Schätzung der Elastizität des zu versteuernden Einkommens
Peter Gottfried / Hannes Schellhorn

Nr. 3 (Januar 2001)
Gut betreut in den Arbeitsmarkt? Eine mikroökonomische Evaluation der Mannheimer Arbeitsvermittlungsagentur
Jürgen Jerger / Christian Pohnke / Alexander Spermann

Nr. 4 (Dezember 2001)
Das IAW-Einkommenspanel und das Mikrosimulationsmodell SIMST
Peter Gottfried / Hannes Schellhorn

Nr. 5 (April 2002)
A Microeconometric Characterisation of Household Consumption Using Quantile Regression
Niels Schulze / Gerd Ronning

Nr. 6 (April 2002)
Determinanten des Überlebens von Neugründungen in der baden-württembergischen Industrie – eine empirische Survivalanalyse mit amtlichen Betriebsdaten
Harald Strotmann

Nr. 7 (November 2002)
Die Baulandausweisungsumlage als ökonomisches Steuerungsinstrument einer nachhaltigkeitsorientierten Flächenpolitik
Raimund Krumm

Nr. 8 (März 2003)
Making Work Pay: U.S. American Models for a German Context?
Laura Chadwick, Jürgen Volkert

IAW-Diskussionspapiere

Nr. 9 (Juni 2003)
Erste Ergebnisse von vergleichenden Untersuchungen mit anonymisierten und nicht anonymisierten Einzeldaten am Beispiel der Kostenstrukturerhebung und der Umsatzsteuerstatistik
Martin Rosemann

Nr. 10 (August 2003)
Randomized Response and the Binary Probit Model
Gerd Ronning

Nr. 11 (August 2003)
Creating Firms for a New Century: Determinants of Firm Creation around 1900
Joerg Baten

Nr. 12 (September 2003)
Das fiskalische BLAU-Konzept zur Begrenzung des Siedlungsflächenwachstums
Raimund Krumm

Nr. 13 (Dezember 2003)
Generelle Nichtdiskontierung als Bedingung für eine nachhaltige Entwicklung?
Stefan Bayer

Nr. 14 (Februar 2003)
Die Elastizität des zu versteuernden Einkommens. Messung und erste Ergebnisse zur empirischen Evidenz für die Bundesrepublik Deutschland.
Peter Gottfried / Hannes Schellhorn

Nr. 15 (Februar 2004)
Empirical Evidence on the Effects of Marginal Tax Rates on Income – The German Case
Peter Gottfried / Hannes Schellhorn

Nr. 16 (Juli 2004)
Shadow Economies around the World: What do we really know?
Friedrich Schneider

Nr. 17 (August 2004)
Firm Foundations in the Knowledge Intensive Business Service Sector. Results from a Comparative Empirical Study in Three German Regions
Andreas Koch / Thomas Stahlecker

IAW-Diskussionspapiere

Nr. 18 (Januar 2005)
The impact of functional integration and spatial proximity on the post-entry performance of knowledge intensive business service firms
Andreas Koch / Harald Strotmann

Nr. 19 (März 2005)
Legislative Malapportionment and the Politicization of Germany's Intergovernmental Transfer System
Hans Pitlik / Friedrich Schneider / Harald Strotmann

Nr. 20 (April 2005)
Implementation ökonomischer Steuerungsansätze in die Raumplanung
Raimund Krumm

Nr. 21 (Juli 2005)
Determinants of Innovative Activity in Newly Founded Knowledge Intensive Business Service Firms
Andreas Koch / Harald Strotmann

Nr. 22 (Dezember 2005)
Impact of Opening Clauses on Bargained Wages
Wolf Dieter Heinbach

Nr. 23 (Januar 2006)
Hat die Einführung von Gewinnbeteiligungsmodellen kurzfristige positive Produktivitätswirkungen? – Ergebnisse eines Propensity-Score-Matching-Ansatzes
Harald Strotmann

Nr. 24 (März 2006)
Who Goes East? The Impact of Enlargement on the Pattern of German FDI
Claudia M. Buch / Jörn Kleinert

Nr. 25 (Mai 2006)
Estimation of the Probit Model from Anonymized Micro Data
Gerd Ronning / Martin Rosemann

Nr. 26 (Oktober 2006)
Bargained Wages in Decentralized Wage-Setting Regimes
Wolf Dieter Heinbach

IAW-Diskussionspapiere

Nr. 27 (Januar 2007)
A Capability Approach for Official German Poverty and Wealth Reports: Conceptual Background and First Empirical Results
Christian Arndt / Jürgen Volkert

Nr. 28 (Februar 2007)
Typisierung der Tarifvertragslandschaft – Eine Clusteranalyse der tarifvertraglichen Öffnungsklauseln
Wolf Dieter Heinbach / Stefanie Schröpfer

Nr. 29 (März 2007)
International Bank Portfolios: Short- and Long-Run Responses to the Business Cycles
Sven Blank / Claudia M. Buch

Nr. 30 (April 2007)
Stochastische Überlagerungen mit Hilfe der Mischungsverteilung
Gerd Ronning

Nr. 31 (Mai 2007)
Openness and Growth: The Long Shadow of the Berlin Wall
Claudia M. Buch / Farid Toubal

Nr. 32 (Mai 2007)
International Banking and the Allocation of Risk
Claudia M. Buch / Gayle DeLong / Katja Neugebauer

Nr. 33 (Juli 2007)
Multinational Firms and New Protectionisms
Claudia M. Buch / Jörn Kleinert

Nr. 34 (November 2007)
Within-Schätzung bei anonymisierten Paneldaten
Elena Biewen

Nr. 35 (December 2007)
What a Difference Trade Makes – Export Activity and the Flexibility of Collective Bargaining Agreements
Wolf Dieter Heinbach / Stefanie Schröpfer