STUDIECENTRUM VOOR ECONOMISCH EN SOCIAAL ONDERZOEK

VAKGROEP PUBLIEKE ECONOMIE

How does increased foreign competition affect UK employment and wages ? An empirical exploration

Jozef Konings[1] and Hylke Vandenbussche[2]

Report 95/316

February 1995

[1] *LICOS, Catholic University of Leuven and European Bureau for Economic Research, Dublin.*
[2] *UFSIA, University of Antwerp and European Bureau of Economic Research, Dublin.*

We benefitted from a seminar at the University of Antwerp and from discussions with B. De Borger, S. Késenne and M. Tharakan.

Universitaire Faculteiten St.-Ignatius
Prinsstraat 13 - B 2000 Antwerpen
D/1995/1169/02

Abstract

This paper contributes to the sparse empirical literature on the effects of foreign and domestic competition on employment. For this purpose we estimate a structural labour demand equation on UK firm level panel data between 1985-1989. We also estimate several wage equations. We find that intensified foreign competition has no effect on wages but adjustment occurs via employment. The results suggest a negative effect of foreign competition in non-unionised firms, while this effect is counteracted in unionised firms. Thus unions seem to protect home employment. It is argued that modern trade theory should take into account the institutional aspects of labour market organisation.

JEL classification: F2, J3

I. Introduction

Fear has grown in the industrialised countries that free trade with low wage developing countries will harm domestic industry and employment. The recent debate in the United States on free trade with Mexico under the NAFTA agreement clearly demonstrates this fear. The emerging market economies in Eastern Europe add to this concern. Lobby groups like trade unions claim to protect domestic industries, in particular the labour intensive ones, to prevent employment loss or real wage declines due to the low wage competition from abroad[3]. However, there is hardly any empirical research on this important topic and arguments are therefore often put up in an ad hoc manner[4]. International economists and economic policy makers do not seem to agree on this issue. This paper investigates the effect of increased foreign competition on UK employment and wages, by using a unique UK firm level dataset including survey information on firm level unionisation and the extent of increasing foreign competition between 1982-89.

The plan of the paper is as follows. In section 2 we review the literature on the debate of trade liberalisation effects on wages and employment. In section 3 we describe the empirical methodology and the dataset we use, while in section 4 we report the empirical evidence. Section 5 summarises the paper and points out directions for further research.

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[3]Bhagwati (1994) in a recent survey article discusses nicely the current concern about free trade and competition from the "South".

[4]Revenga (1992), following Freeman and Katz (1991), investigates empirically the effects of increased import competition for the US, while Grossman (1986) investigates the effects of international competition in the US steel industry.

II. The Literature

The theoretical debate on the effect of foreign competition on employment is still in its early phases despite its practical relevance in trade policy. Gatt's article IX and VI, respectively the 'escape clause' and the 'antidumping code', are exceptions to Gatt's overall objective to safeguard free trade. Both types of trade regulation allow a member country to take protectionist action when evidence is provided that foreign imports have caused 'material injury' to one or more industries. The effect of foreign imports on domestic employment is only one among several indicators of injury but it is the argument people feel most sympathetically towards and which is consequently often used by policy makers to justify protection (see Vandenbussche 1992). The causality test between foreign imports and material injury, often fails to discriminate between employment loss as a result of foreign competition and employment loss due to other factors. Two of the few empirical studies in this area, Grossman (1986) and Revenga (1992) arrive at opposite results with respect to the effect of foreign competition on employment. Grossman (1986) analyses the effect of import competition on US employment in the steel sector using monthly industry-level data between 1976-1983. He fails to find any effect of import competition on employment other than the one caused by the appreciation of the dollar and the secular decline of the steel industry. Revenga (1992) uses industry-level panel data for the US manufacturing industries in the period 1980-1985. She reports a negative and significant effect of import competition on employment and wages.

From the theoretical side, the conclusions are just as blurry. The Hecksher-Ohlin theorem (HO) of the traditional trade theory predicts that free trade will result in North-South trade with inter-industry specialisation along relative factor endowments. This theory suggests that the North will mainly import labour intensive products from the South while exporting capital intensive goods to the South. Within this traditional framework, the Stolper-Samuelson (SS) theorem (1941) argues that North-South trade will lower wages in the North while raising wages in the South. Implicit in the SS-framework is the assumption of complete factor mobility and full employment both before and after trade. According to Stolper-Samuelson, free trade will not only lower wages in the North but will also result in the destruction of jobs in the labour intensive industry and a simultaneous creation of jobs in the capital

intensive industry. Job creation and job destruction cancel out leaving net employment unchanged after free trade.

Despite the appealing logic of the SS-theorem, several issues can be raised which may question the underlying assumptions and predictions. For one, the HO-theorem has limited explanatory power for the observed trade patterns in the North. Table 1 shows that the majority of the UK's imports come from the North. European imports and imports from other western industrialised countries account for 84% of the UK's imports in 1985. In that year only 16% of the imports came from the South. These figures show that North-South trade is present but less eminent than we would expect on the basis of HO.

The great proportion of North-North trade is not unique for the UK but characterizes most western markets. It has been shown that the majority of North-North trade is not inter-industry but intra-industry trade[5]. At the core of the theories which have tried to explain intra-industry trade lies consumers' preference for variety. This taste for variety results on the producers' side in product differentiation. Each country will specialise in the production of a small number of varieties, while importing other varieties. Producing only a few varieties gives rise to economies of scale. These will lower unit costs and consumer prices compared to autarky. The two welfare gains from intra-industry trade are therefore: increased variety for consumers and lower prices. The exploitation of increasing returns to scale which gives rise to the North-North trade is one of the elements which can offset or reduce the negative effect of trade liberalisation on wage levels and which can alter the net effect on employment in the North. Panagarya (1981) and Helpman and Krugman (1985) are two theoretical contributions in this area. They show that intra-industry trade can have a positive effect on wages. Whether this positive effect is sufficient to overcome the negative effect on wages predicted by Stolper-Samuelson and how this affects employment levels is still very much an open question.

A third reason which can alter the SS-predictions on wages and employment is the imperfect factor mobility between sectors. Employees laid off in one part of the economy may not have

[5]Tharakan (1983) gives an excellent overview of empirical studies in intra-industry trade.

the necessary requirements to be hired in another part of the economy. This could result in a net job destruction due to foreign competition and lead to a net employment loss. The hypothesis of mobility versus immobility of factors was tested by Magee (1980). His results clearly reject the factor mobility assumption for capital, implicit in Stolper-Samuelson. However, Magee (1980) fails to find conclusive evidence concerning the mobility of labour.

Moreover, international factor mobility is not taken into consideration in the SS framework. On the one hand, international capital mobility could lead to an inward shift of the labour demand curve (in a labour intensive industry in the North) leading to lower wages and employment. On the other hand, international labour mobility could lead to an outward shift of the labour supply curve resulting in lower wages, but higher employment. The presence of both factors leads to ambiguous net effects on employment.

A fourth reason why Stolper-Samuelson could be misleading, is the presence of imperfect product and labour markets in the North. An increase in foreign competition may force producers in the North either to lower price-cost margins, thereby reducing their market power without reducing wages or employment, or to safeguard price-cost margins at the expense of wages and employment, or a combination of both. The first possibility is the so-called imports-as-market-discipline hypothesis which has been confirmed by Levinsohn (1993) on the basis of Turkish data. Recently it has been suggested that foreign competition may also reduce the x-inefficiency of firms (Horn 1992). This means that foreign competition can force domestic firms to produce more output with the same input or the same output with less inputs. In case of the latter, foreign competition can result in worker layoffs. However up to this moment no empirical evidence is available on the x-inefficiency story.

Labour market imperfections in the North could also lead to different effects than the SS result. Wage cuts may be strongly opposed by trade unions. When wages are 'sticky', firms can only cut costs through worker layoffs. Trade liberalisation in the presence of unions may result in more job destruction than in job creation resulting in a net employment loss. However, modern trade theories do not incorporate the operation of labour markets.

At this moment there is no unifying theory taking several or all of the arguments we

presented into account. It is therefore fruitful to first embark upon an exploration of what the data tell us to find empirical patterns which need to be taken into account when forming a comprehensive theory. The remainder of this paper will focus on this aspect and tries to be a first step in that direction.

III. The Empirical Evidence and data

The basic data source we use, consists of the EXSTAT company accounts dataset from which we can draw information on UK firm level employment, output and wages, among other things. These firms are in employment terms large, with an average employment in 1986 of 3621 employees (median 818). The dataset is complemented with a survey carried out in the summer of 1990 (for more details of this survey see Gregg and Yates (1991)). In terms of employment, sales and industry affiliation, the respondents formed a representative sub-sample of the EXSTAT population. The survey drew usable responses from 558 companies across all industrial sectors and it inquired after the extent of union presence, union bargaining, changes in unionism, firm level competitiveness and changes in foreign competition that firms experienced. The focus will obviously be on the latter variable, increasing foreign competition. The advantage of this dataset is the availability of information at the firm level on foreign competition, rather than some industry proxy. We dropped missing observations on these two variables and required that companies had at least 6 continuous time observations. This left us an unbalanced panel dataset of in total 274 firms[6]. This period was characterized by a stable exchange rate which is why we did not include exchange rates as a separate explanatory variable. Tables 2 and 3 give an overview of the number of firms reporting increased foreign competition during the period 1982-84 and 1985-89 in the overall sample. The question asked to the managers was whether firms experienced a decrease, an increase or no change in foreign competition during the period 1982-84 and 1985-89. Our regression methodology (see below) implies that the relevant time period will be from 1985 onwards, instead of 1982, and therefore the relevant period to which changing competition has to refer is 1985-89. From table 2 it is striking that in the second half of the eighties relatively more firms experienced an increase in foreign competition. While in the

[6]With unbalanced we mean that in each year we observe a different number of firms.

first half of the eighties 52% of the firms in our sample experienced an increase in foreign competition, this increased to 70% for the second half of the eighties.

In our empirical model we want to investigate the effect of increased foreign competition on labour demand. To arrive at a testable labour demand equation, assume a production function with two inputs, labour (L) and capital (K). Furthermore, we assume neutral augmenting technical progress, A, so in general terms,

(1) $Q=AF(L,K)$,

where Q is output. Assuming a Cobb-Douglas specification it follows from cost minimization that the conditional demand for labour in firm i at time t may be written as[7]

(2) $l_{it} = fix_i + \alpha_0 q_{it} + \alpha_1 w_{it} + \alpha_2 r_{it} + \alpha_3 a_{it} + \alpha_t + \epsilon_{it}$

Where lower case letters denote natural logarithms, fix_i is a constant term for firm i, w_{it} is the log of the real wage, r_{it} is the log of the cost of capital in firm i at time t, q_{it} is output in firm i at time t, and α_t is a common time effect. Assuming perfect capital markets, r_{it}, will only vary over time without any differences between firms, so that in the estimation this cost of capital will be captured by time dummies.

The effects of competition enter the story via technical progress, a_{it}, in the following way,

(3) $a_{it} = a(UK_{it},FC_{it},UN_i,COM_i)$

Thus technological progress is a function of the intensity of UK competition firm i experiences (UK), the intensity of foreign competition (FC), the number of rivals firm i is facing (COM) and whether the firm is unionised or not (UN). There is evidence in the UK

[7]Of course, alternatives are possible here. For instance one could derive an unconditional demand for labour and by assuming that the product price depends on foreign and UK competition and on the number of rivals it is possible to arrive at a similar testable employment equation. The point made here is that we do not test any theory, we simply explore the empirical regularities.

suggesting that unionised firms have different productivity levels than non-unionised firms and it is therefore important to incorporate unionisation (Gregg et al., 1993). The underlying idea that technological progress is affected by increasing competition is that competition provides firms with an incentive to innovate and invest in cost reducing technology which has implications on their production. We will experiment with alternative specifications of (3).

To control for the unobservable fixed effect in (2), the model will be estimated in first difference form. First differencing of (2) yields

$$(4) \qquad \Delta l_{it} = \alpha_0 \Delta q_{it} + \alpha_1 \Delta w_{it} + \alpha_2 \Delta r_t + \alpha_3 \Delta a_{it} + \Delta \epsilon_{it},$$

Obviously this procedure will generate first order serial correlation in the error term. However, what matters is the absence of second order serial correlation in a first difference equation for first order serial correlation to be absent in a level equation. A test which is asymptotically N(0,1) will be reported.

In the empirical implementation ΔUK_{it} is proxied by a dummy equal to one if the firm experienced an increase in UK competition during the period 1985-89 and similarly ΔFC_{it} is proxied by a dummy equal to 1 if the firm experienced an increase in Foreign competition. Of course, the weakness of this approach is that we only have information of changed competition over a 4-year interval, while the other variables refer to one-year changes. However, it is reasonable to assume that increased competition is not a temporary one-year effect, but that firms experience this several years in a row. In equation (4) we shall treat output and the wage in firm i as endogenous, which is a reasonable assumption to make in micro data.

We shall also report *wage equations* in order to interpret the results better. Wages may be determined in several ways. There are several hypotheses in the literature, the two mostly discussed are the union bargaining and the efficiency wage hypothesis (Konings and Walsh, 1994). We therefore include variables capturing these hypothesis :

(5) $w_{it} = \beta_i + \beta_1 l_{it} + \beta_2 q_{it} + \beta' z + \beta_t + \eta_{it}$,

where z stands for a vector of several exogenous variables, like unionisation, competition, foreign competition, UK competition and industry wage. Employment is included in (5) to capture the fact that large firms tend to pay higher wages. Output is included in (5) to capture rent sharing under bargaining. The white noise error term is represented by η_{it}. Similar to what we did we with equation (2), equation (5) will be estimated in first difference form to eliminate the firm specific effect β_i and we treat employment and output as endogenous variables. We shall use equations (4) and (5) as our starting point and continue with testing some extra hypotheses, like differences between unionised vs. non-unionised firms and highly competitive vs. lowly competitive firms.

IV. Results

We estimate equations (4) and (5) using the General Methods of Moments Technique developed by Arellano and Bond (1991). The advantage of this methodology, over other commonly used estimation techniques for panel data with endogenous variables, exists in its efficient use of the number of instruments. Arellano and Bond (1991) show that valid instruments are the same variables, but dated t-2, t-3, etc.. In other words, as the panel progresses more valid instruments are available, which leads to a more efficient estimator than other proposed techniques. For example, valid instruments for the wage in equation (4) in 1985 is the wage in 1983, in 1986 valid instruments are the wage in 1983 and 1984, in 1987, valid instruments include the wage date 1983, 84 and 85, and so on. Thus the implied moment restrictions are $E(w_{it-2}, \Delta\epsilon_{it}) = 0$, for t=1985,1986,etc. To test the exogeneity of the instruments a Sargan test, which is asymptotically χ^2, is computed. Furthermore, first differencing implies first order serial correlation, however, second order serial correlation should be absent if the levels equation does not show any first order serial correlation. To test this, a serial correlation test is computed which is asymptotically N(0,1) distributed.

Table 4 gives the results of the *wage equations*. We start in columns (1) and (2) with reporting the effects of foreign and UK competition without taking into account any other factors. In column (1) there is no significant effect of increased UK nor of increased Foreign

competition on the real wage. It is often argued that the effects of increased foreign competition will be different or even only be present in firms where unions have bargaining power. If increased foreign competition implies a real wage decline or a reduction of output and hence employment, unions will try to seek protection for their members. We test this hypothesis in the second column. To do this we interacted the UK competition and the Foreign competition dummy with a dummy equal to 1 if the firm recognised unions for the purposes of bargaining over labour issues. We also included a variable capturing product market conditions, comp. We have firm level information on the number of rivals each firm faces. It was asked whether the firm was the dominant firm, whether it faced only a few competitors or whether it faced many competitors. If the response was one of the former two we constructed a dummy equal to 1 (comp), indicating that firms only faced a few rivals. We find no statistically significant effect of increasing foreign competition, but weakly significant effects of increasing UK competition. Increasing UK competition increases the wage in non unionised firms, but this effect is reduced when firms are unionised. In column (3) we include the other variables as well. When we estimated a static version of equation (5), the second order serial correlation test was statistically significant at the 5% critical level. We therefore continued with estimating (5) including lagged variables, which fitted the stochastic process underlying (5) better. We have included year dummies to control for aggregate shocks, like business cycle fluctuations. We also included the average industry wage. There are several reasons why this might be important. First, the average industry wage is the outside option for the workers. A change in the average industry wage might affect the effective labour productivity of workers if firms are paying efficiency wages. Alternatively, in the context of political economy the industry wage is often an indication of an industry's lobbying power, a high industry wage implying a higher probability of protection (Baldwin, 1982)[8]. Interestingly the industry wage is always insignificant, both in the wage and in the employment regressions. In table 4, the lagged wage is always significant and positive, indicating persistency in the wage. We concentrate, however, on the effects of increasing foreign competition on the wage. From column (3) in table 4 we see that intensified foreign competition has a positive effect on wages, which is consistent with the modern trade theory of intra-industry trade discussed in section II. There is no statistically significant effect of

[8]Ideally one wants to control for migration effects on wages and employment. However, we did not have this information at our disposal, moreover, this effect is most likely going to be small for the UK.

increased UK competition on the wages. The significant effect of foreign competition disappears when we investigate in column (4) the interaction with unions. Although the estimated coefficients of increased UK and foreign competition are negative, they are not statistically significant at conventional levels indicating that there is no significant difference between unionised and non-unionised firms. Moverover, also in non-unionised firms the coefficients are no longer statistically significant, but are still positive.

Table 5 gives the results for the *employment equation* (4). In columns (1) and (2) we did not include the traditional labour demand variables. We find a significant negative effect of foreign competition on home employment, but no effect of increasing UK competition. This is what we could have expected given the results of the wage equation, where the wage was not affected by increasing foreign competition. Thus adjustment occurs via employment, not via the wage. In columns (3) and (4) we estimate the full model. As expected, the real wage has a negative effect on employment demand, while output a positive one. It is interesting to note that the coefficient on output is always close to one, which could be an indication of constant returns to scale in production. With respect to competition we find no statistically significant effect of an increase in foreign competition, nor of an increase in UK competition. This simply means that the effect of increased foreign competition enters via the wage, without having an effect over and above the wage effect in the *employment equation*. This is consistent with the results reported in table 4, column (3) where there was a positive effect of foreign competition on the wage. In the fourth column we test whether there is any difference between unionised vs. non-unionised firms. Indeed, in non-unionised firms increasing foreign competition lowers home employment, by 11% over the period 1985-89 or on an annual basis this amounts to 2.2%. In contrast, unionised firms counteract this negative effect of increasing foreign competition in such a way that overall the effect becomes positive or $-0.11 + 0.18 = 0.07$. Thus unions seem to protect their members from increasing foreign competition. While non-unionised firms adjust employment in response to increased foreign competition, due to wage rigidities, and thus adjust their market share, unionised firms prevent employment losses. This could result in an increase in x-inefficiency of unionised firms, but a reduction of x-inefficiency of non-unionised firms. This raises immediately the question whether in the long run unionised firms will be able to survive and compete as international competition increases.

V. Summary and Conclusion

In this paper we investigated the effect of increased foreign and UK competition on UK wages and employment. This is the first empirical study using firm level panel data with detailed information of changing foreign competition in the UK. On the basis of theoretical arguments we expect different outcomes of increased foreign competition. The traditional trade theory suggests a negative effect on wages, but no effect on net employment, while the modern trade theory predicts a positive wage effect, but employment effects remain very much an open question. However, there is hardly any empirical evidence on the subject.

The empirical evidence reported in this paper suggests that there is no overall effect of increased foreign competition on wages, but that firms adjust via the number of workers they employ. Moreover this adjustment will be different in unionised than in non-unionised firms. In the latter, employment is reduced, while in the former employment is protected. It seems that the institutional organisation of the labour market seems to matter when one wants to explain the effects of international trade on home employment, yet modern trade theory pays little attention to factor market imperfections.

Our findings indicate that further research is needed taking into account the relationship between foreign competition and unionization, as well as sectoral concentration.

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Table 1: North-North and North-South imports in the UK in 1985

	IMPORTING COUNTRIES	IMPORTS IN UK (MIO ECU)	INDIVIDU-AL SHARES IN IMPORTS	SHARES OF NORTH and SOUTH TRADE
North	intra-EU	67,800	47%	84%
	West-Industrialised	52,409	37%	
South	Developing	19,468	13.6%	16%
	Central and East Europe	2,904	2%	
	State trading Ame-rica/Asia	664	0.4%	
	World	143,245	100%	100%

Source : EUROSTAT, External Trade and Balance of Payments, Statistical Yearbook Overview, 1958-1992

Table 2: Number of Firms Reporting Changing UK (Foreign) Competition

	UK Competition	Foreign Competition
Less (80-84)	20	2
No Change (80-84)	85	118
Increase (80-84)	150	133
Less (85-89)	2	1
No Change (85-89)	118	83
Increase (85-89)	133	190

Source: EXSTAT company accounts dataset

Table 3: Number of Manufacturing Firms Reporting Changing UK (Foreign) Competition

	UK Competition	Foreign Competition
Less (80-84)	14	1
No Change (80-84)	45	50
Increase (80-84)	76	84
Less (85-89)	19	0
No Change (85-89)	29	0
Increase (85-89)	99	120

Source: EXSTAT company accounts dataset

Table 4: Regression Results *Wage* Equations

explanatory variable	(1)	(2)	(3)	(4)
real $wage_{t-1}$	_	_	0.24* (0.08)	0.24* (0.09)
$output_t$	_	_	0.032 (0.04)	0.017 (0.044)
$output_{t-1}$	_	_	-0.02 (0.04)	-0.033 (0.048)
$employment_t$	_	_	-0.07** (0.04)	-0.057 (0.054)
$employment_{t-1}$	_	_	0.16* (0.05)	0.17* (0.053)
industry $wage_t$	_	_	0.23 (0.19)	0.28 (0.20)
industry $wage_{t-1}$	_	_	0.01 (0.09)	0.002 (0.027)
UK competition	0.007 (0.005)	0.018** (0.012)	0.001 (0.003)	0.029 (0.027)
Foreign competition	0.002 (0.005)	0.007 (0.009)	0.008* (0.004)	0.011 (0.025)
UK competition × union	_	-0.021** (0.013)	_	-0.038 (0.040)
Foreign Competition × union	_	-0.0049 (0.011)	_	-0.009 (0.043)
comp	_	-0.011** (0.007)	-0.007 (0.005)	_
union	_	0.002 (0.016)	-0.006** (0.004)	0.029 (0.033)
Second Order Serial Correlation	-0.736	-1.116	0.212	0.213
Sargan test	_	_	41.62 (40)	40.29 (38)
Number of Firms	274	274	274	274

*(**) denotes significant at the 5% (10%) critical level, between brackets are heteroscedastic consistent standard errors. Instruments for the wage, output and employment include all available moment restrictions from t-3 backwards.

Note: all equations include time dummies

Table 5: Regression Results of structural *Employment* equation for entire sample of UK firms

explanatory variable	(1)	(2)	(3)	(4)
real wage	_	_	-0.82* (0.17)	-0.75* (0.20)
output	_	_	0.90* (0.06)	0.85* (0.07)
industry wage	_	_	-0.01 (0.31)	0.21 (0.36)
UK competition	0.0046 (0.015)	0.03 (0.26)	-0.006 (0.01)	0.022 (0.059)
Foreign competition	-0.036* (0.015)	-0.049* (0.025)	-0.004 (0.009)	-0.11* (0.058)
UK competition × union	_	-0.06** (0.03)	_	-0.035 (0.085)
Foreign competition × union	_	0.036 (0.033)	_	0.18* (0.09)
union	_	-0.025 (0.032)	-0.015** (0.009)	-0.10** (0.06)
comp	_	-0.046 (0.017)	0.0013 (0.009)	_
Second order Serial Correlation Test	-0.095	-0.09	-0.138	0.585
Sargan test	_	_	38.13 (38)	34.022 (36)
Number of Firms	274	274	274	274

* (**) denotes significant at the 5% (10%) critical level, between brackets are heteroscedastic consistent standard errors. Instruments for the wage and output include all available moment restrictions from t-2 backwards.

Note: all equations include time dummies

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