Determinants of Sectoral Average Wage and Employment Growth Rates in a Specific Factors Model with International Capital Movements

The Cases of CD and VES Production Functions[1]

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1. Introduction

Sectoral wages are the average of the wages for skilled and unskilled labour. Explaining their development has recently led to some controversies (see Freeman 1995). The major problems discussed are why do wages for skilled and unskilled labour diverge in the US and why has unemployment been heavily concentrated on low-skilled workers in Europe? These shifts can also be observed in Newly Industrialized Countries (NICs) (see Richardson 1995). The wage determination question, however, is of broader interest.

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Many economists using closed or open economy growth models would explain wage growth mainly as a consequence of technical progress. Labour market economists would tend to emphasize (sectoral) supply and demand with little weight on international aspects (see Richardson 1995). Trade economists would tend to ignore the supply of labour when using the Stolper-Samuelson theorem. However, in a multi sectoral world of international trade and capital movements it is tempting to take a broader perspective. Consequently, one may raise the question what the relative importance of the major determinants of (average) wage growth and employment – international trade or factor movements, technological change or labour market developments – is once one integrates all of them into one framework. In this paper we offer several theoretical frameworks to answer this question for average wages.

Lawrence and Slaughter (1993) and Krugman (1994) have argued that if international trade would have an impact on wages, it would occur via changes in the terms of trade. However, they indicated that the terms of trade of the US are almost unchanged and therefore changes in wages must be due to technical change. This argument leaves us with several open issues:

i) Results may be different for other countries than just the US.

ii) Results may change if we do not argue in terms of a two-sector model but at a more disaggregated level, because some of us will remember that in continental Europe the shipbuilding sector contracted in the 1970s, the automobile business was faced with increased competition from Japan in the early 1980s and the European consumer electronics sector lost ground in the 1980s and 1990s. Ultimately, protectionists lobby at the sectoral or even firm level and not at the macro level.

iii) Once international capital movements are taken into account, not only the terms of trade but also interest rates become an exogenous variable for a (model of a) country and their changes should have an impact on wage growth according to economic theory.

How did the literature treat these three issues? The only contribution on average wages so far is Lawrence and Slaughter (1993). Some other insights are gained from the wage inequality debate by

i) Lücke (1999), who has looked at data for OECD countries and Oscarsson (1997) for Sweden. Seemingly, for many other countries this has not been done (within an international trade framework). Oliveira Martins (1994), using an industrial economics rather than an international trade approach, also looks at several countries.

ii) Leamer (1996), who sees the point of relevance for single sectors, mentions apparel and textiles in the US. Krugman and Lawrence (1993) acknowledge that Japan threatened US textiles in the 1960s and semiconductors in the 1990s.

iii) Leamer (1993) takes international capital movements into account when making theoretical scenarios but not when running estimations. Wood (1994), as well as Sachs and Shatz (1994), also look at several sectors and international capital movements. However, they do not have an integrating framework but rather look at all aspects separately, running regressions that give some intuition on their idea that international trade, technology and international capital movements are all important. Thus, it seems to be worthwhile to investigate all of these points more closely.

Most of the wage inequality debate in international economics has been conducted in terms of Heckscher-Ohlin models (see Sachs and Shatz 1994, Baldwin and Cain 1997, Lücke 1999, Oscarsson 1997). Krugman and Obstfeld (1997) give a justification for this choice: although labour may not be mobile between sectors because its skills are specific to one sector only, reschooling could achieve the desired mobility after some time which would justify the mobility assumption of the Heckscher-Ohlin model. Against this we propose that before reschooling, labour is specific to one (or several) sector(s) and after reschooling it is specific to different sectors or just one. We prefer to capture this with a specific factors model that has an exogenously changing labour supply for each sector and allows for sectoral differences in wages, whereas the HO model does not (see Leamer 1994). Also, most of the literature uses the Stolper-Samuelson theorem for the analysis (see Leamer 1994, Richardson 1995, Baldwin and Cain 1997, Lücke 1999, Oscarsson 1997), which makes the latter heavily dependent on the empirical validity of the zero-profit conditions in every sector or period[2]. Using the cost-minimization part of a specific factors model with perfect competition and international capital movements can avoid this drawback and provides a simple way to include the supply of labour, technical change, international trade and factor movements in one framework. Yet, it does so at the cost of slightly exaggerating the immobility aspect of labour (which is now restricted to merely one sector). Other alternatives to the Stolper-Samuelson approach are presented in Francois (1996).

To allow for the treatment of more sectors as suggested under point ii) above we will construct a multi-sectoral, specific-factors model in section 2. The inclusion of international capital movements brings in interest rate changes in accordance with the motivation of point iii) above. Section 3 will discuss the policy conclusions which may be drawn from them. Section 4 describes some future steps of this research, addresses the limitations of our approach and gives some more guidelines for further research.

2. *The Cobb-Douglas Version of the Model*

The details of the model are as follows. For each product i we assume the following production function to be responsible for the generation of variable costs, where Y indicates output, K capital, L sector-specific labour and A technology:

$$Y^i = (K^i)^{\alpha^i}(A^i)^{\theta^i}(L^i)^{\beta^i}$$

[2] Note that the estimation of Jones' (1970) dynamic version of the zero-profit conditions uses data on factor shares (see Baldwin and Cain 1997), which consist of a cost term in the numerator and revenue terms in the denominator. If we (empirically) have zero-profits on average across time, we might guess from a business cycle perspective that there are losses in recessions and positive profits in booms. This yields higher than average values of cost shares in recessions and lower values in booms. In time series estimates this may bias the results, in particular in view of the possibility that capital and labour shares may be affected unequally because of the irreversibility (or costly reversibility) of the investment of capital which makes it difficult to reduce its cost in a recession.

α, β and θ are elasticities of the production of capital, labour and technology. If the sum of α and β is smaller, larger than or equal to one, we have decreasing, increasing or constant returns to scale and therefore upward, downward or constant sloping cost functions (for given technology A). We do not exclude any of these cases a priori.

From *cost minimization* we get (with w as the wage rate and r as the interest rate):

$$w^i = \lambda^i F^i{}_{L^i}$$
$$r = \lambda^i F^i{}_{K^i}$$

λ is the Lagrange multiplier of the technology constraint, whose economic interpretation is marginal costs. Lower indices K or L indicate a partial derivative with respect to K or L. The three equations given above allow us to find a solution for the value of the Lagrange multiplier λ. We get:

$$\lambda = \left(\frac{r}{\alpha}\right)^a Y^b A^c \left(\frac{w}{\beta}\right)^d$$

with

$$a = \frac{\alpha}{\alpha + \beta}, b = \frac{1 - \alpha - \beta}{\alpha + \beta}, c = \frac{-\theta}{\alpha + \beta}, d = \frac{\beta}{\alpha + \beta}$$

In the case of *perfect competition* marginal costs equal prices given from the world market (under the small country assumption) and marginal productivity conditions can therefore be rewritten as:

$$w^i = p^i F^i{}_{L^i}$$
$$r = p^i F^i{}_{K^i}$$

Rewriting the marginal productivity conditions in growth rates, using the Cobb-Douglas form of production functions, and the elimination of the term for capital yields an equation for several sectors in different countries (we do not write down a country index):

$$\hat{w}^i = \gamma_1 \hat{p}^i + \gamma_2 \hat{r} + \gamma_3 \hat{A}^i + \gamma_4 \hat{L}^i$$

with

$$\gamma_1 = \frac{1}{1-\alpha^i} > 0, \gamma_2 = -\frac{\alpha^i}{1-\alpha^i} \leq 0,$$

$$\gamma_3 = \frac{\theta^i}{1-\alpha^i} \geq 0, \gamma_4 = \frac{\beta^i + \alpha^i - 1}{1-\alpha^i} \leq 0$$

In this model, the terms of trade are exogenous in the case of perfect competition and the small country assumption. These assumptions are made in most of the related literature. With perfect capital movements the real interest rate, r, is given from the world market at each moment in time. Technology is exogenous by assumption and so is labour input because of the assumption that it is specific to each sector. Alternatively, we could have had employment as an endogenous variable and wages as an exogenous one. Then the equation would have to be solved for the growth rate of employment and it would try to help explaining the growth of employment of a sector in a country[3].

The right side of the above equation captures all variables that play a role in the debate on real wages. International trade is captured by changes in the terms of trade, technology is contained and international capital movements are represented by changes in the interest rate. Finally, factor supply is included which could not be done in a Stolper-Samuelson approach using the zero-profit assumption as the basic tool.

An estimate of this equation (not tried in this paper) at the firm level would give us a result for α, the elasticity of production of capital of a sector in a country, from either γ_1 or γ_2. Therefore we have to impose or test the constraint that

$$\gamma_1 + \gamma_2 = 1,$$

[3] In the standard partial equilibrium labour market diagram an increase in the labour supply would decrease wages. However, the increase in employment has an indirect effect via the marginal productivity of capital, which is increased by higher employment and therefore more capital is attracted from the world market. With the increase in capital, labour demand also increases which would increase wages. Under decreasing (constant) returns to scale the indirect demand effect is weaker than the direct supply effect (zero).

when doing the estimation. Having found a value for α we can deduct the value of β from γ_4 and that of θ from γ_3. The question whether or not we have increasing returns to scale can be answered by looking at γ_4. If it is less than, more than or equal to zero, we have decreasing, increasing or constant returns to scale in labour and capital. However, only if the previous coefficient restriction is accepted we may draw such a conclusion, for then we can suspect that the definitions of the other coefficients hold too. The assumption of perfect competition is only justified if we have non-increasing returns to scale. In the case of increasing returns to scale we have to resort to imperfect competition and endogenous prices. Therefore we must give up the small country assumption, because price determination by domestic firms and prices given from the world market are mutually exclusive concepts (see Helpman and Krugman 1989). If a sector is faced with a constant-elasticity demand function, $p^i = B^i Y^{i\phi} M_{eu}^{i\delta} M_{neu}^{i\varepsilon}$, with ϕ as an inverse of the price elasticity, M_{eu} as import quantities of competing products from the EU, M_{neu} as their non-European equivalent, B as a shift parameter which captures all other demand effects (such as effects of other imports coming into the country), and each product being produced by only one firm (as it would under monopolistic competition), profit maximization will yield $p^i = \lambda^i/(\phi^i + 1)$. Prices are now an endogenous variable because marginal costs (λ) are endogenous as they depend on output and wages. A division between European and non-European trade is made because competition from the Asian NICs has been of special interest in the recent debate. If trade has an impact we would expect $\delta, \varepsilon < 0$.

Equating prices from the first-order conditions with those of the demand function yields:

$$B^i Y^{i\phi} M_{eu}^{i\delta} M_{neu}^{i\varepsilon} = \lambda^i/(\phi^i + 1)$$

Taking growth rates of this equation, the marginal productivity conditions and the expression for λ gives us four linear equations for four endogenous variables: the growth rates of wages (w), capital (K), marginal costs (λ) and output (Y). The exogenous variables are the growth rates of A, B, L, r, M_{eu} and M_{neu}. Parameters are α, β, θ, a, b, c, d, δ, ε and ϕ. Solving the system for the growth rate of wages yields:

$$\hat{w}^i = e_0 + e_2\hat{r} + e_{1a}\hat{M}^i_{eu} + e_{1b}\hat{M}^i_{neu} + e_3\hat{A}^i + e_4\hat{L}^i$$

with

$$e_0 = \frac{-\hat{B}}{\alpha(\phi+1)-1}, e_2 = \frac{\alpha(\phi+1)}{\alpha(\phi+1)-1} \leq 0,$$

$$e_{1a} = \frac{-\delta}{\alpha(\phi+1)-1} \leq 0, e_{1b} = \frac{-\varepsilon}{\alpha(\phi+1)-1} \leq 0,$$

$$e_3 = \frac{-(\phi+1)\theta}{\alpha(\phi+1)-1} \geq 0, e_4 = \frac{1-\alpha(\phi+1)-\beta(\phi+1)}{\alpha(\phi+1)-1} < 0$$

In this equation, compared to that of the perfect competition case, imports are the exogenous variable that replace prices. The exogenous shift variable B can go either way. If it is decreasing, competition is increased. Therefore, the demand function is shifted towards lower prices.

It follows from the second-order conditions of monopolistic profit maximization that e_4 has to be negative. The first-order condition was p $(\phi+1) - \lambda = 0$. To form the second-order condition, p can be replaced by the demand function and lambda by the marginal cost function from section 2. Deriving the LHS of the first-order condition again with respect to output Y and using information from the first-order condition to cancel output terms yields an expression that has to be negative. It coincides with the negative value of the numerator of e_4, thus requiring a positive numerator of e_4. However, if the numerator is positive, the denominator must be negative, implying that the coefficient is negative.

Once we have estimated e_{0-4}, we can successively infer values of $\alpha(\phi+1)$ from e_2. α must be positive [because the first-order conditions require $(\phi+1) > 0$] or zero. Thus, e_2 must be negative or zero. We get $\beta(\phi+1)$ from e_4. e_3 must be positive or zero. From e_3 we get $(\phi+1)\theta$. Only if theta is zero it is possible that $e_3 = 0$. If $\beta = 0$, however, we must have $e_4 = -1$. Furthermore, we can obtain the value of δ from e_{1a}, that of ε from e_{1b}, and the growth rate of B from e_0[4]. e_{1a} and e_{1b} both should be negative or zero.

[4] Theoretically, this is indeed possible. In practice, since we will be solving a system of six highly non-linear equations, there is no guarantee that either any or just one solution exists.

The CD function used in this section is, of course, a special case of a production function. In the next section we use a production function which contains the CD function as a special case. The cost of doing so is that the simple linear structure of the equation that can be estimated is lost.

3. Using Variable Elasticity of Substitution Production Functions (VES)

In this section we will illustrate the procedure for the case of Revankar's (1971) variable elasticity of substitution function. The function is either

$$Y = \gamma K^{\alpha(1-\delta\rho)} [A^{\theta} L + (\rho - 1)K]^{\alpha\delta\rho}$$

or

$$Y = A^{\theta} \gamma L^{\alpha(1-\delta\rho)} [K + (\rho - 1)L]^{\alpha\delta\rho}$$

with

$$\gamma > 0, \alpha > 0, 0 \leq \delta \leq 1, 0 \leq \delta\rho \leq 1.$$

The difference between the two functions is in the interchanged positions of capital and labour and the different ways how we add technical progress $A(t)$. Revankar did discuss the case without technical progress ($\theta = 0$). $\alpha >,=,< 1$ yields increasing, constant and decreasing returns to scale respectively. Under the assumption of constant returns to scale this function becomes Cobb-Douglas if $\rho = 1$, it is Harrod-Domar if $\rho = 0$ and it is a linear production function if $\rho = 1/\delta$.[5]

From cost minimization as in section 2, with the Lagrange multiplier λ (which has the economic interpretation of marginal costs) we get the demand for capital and labour and the marginal cost function all as a function of output Y and factor prices w and r. Using the labour demand function to eliminate the output variable from the marginal cost function we get:

[5] For more details of this function see Revankar (1971).

$$\lambda = (\alpha\delta\rho)^{-1} w[((\frac{r}{w}) - (\rho - 1) A^{-\theta})\delta\rho/(1 - \delta\rho)]^{\alpha(1-\delta\rho)}$$

$$A^{-\theta\alpha\delta\rho} L^{1-\alpha} \gamma^{-1} (\frac{r}{w} - (\rho - 1)/ A^{\theta} \delta\rho)^{\alpha-1}$$

or

$$\lambda = (\alpha\delta\rho)^{-1} r L^{1-\alpha} [(1 - \rho + w/r)\delta\rho/(1 - \delta\rho)]^{1-\alpha\delta\rho} A^{-\theta} \gamma^{-1}$$

The 'dot' in the first marginal cost formula indicates a multiplication. Using the marginal costs functions we can proceed under the assumptions of perfect or imperfect competition respectively.

If we use the *second* of the two production and marginal cost functions, make the assumption of *perfect competition*, $\alpha \leq 1$, and equate $p = \lambda$ and solve for wages w, we get

$$w = (\rho - 1)r + p^a b A^c L^d r^f$$

with

$$a = -1/(\alpha\delta\rho - 1) > 0,$$

$$b = (\alpha\gamma)^{-1/(\alpha\delta\rho-1)} (1 - \delta\rho)(\delta\rho)^{\frac{-\alpha\delta\rho}{\alpha\delta\rho-1}} \geq 0,$$

$$c = -\theta/(\alpha\delta\rho - 1) \geq 0,$$

$$d = (1 - \alpha)/(\alpha\delta\rho - 1) \leq 0,$$

$$f = \alpha\delta\rho/(\alpha\delta\rho - 1) < 0.$$

Note that f + a = 1, which is a constraint in an estimation. Given the constraints on the parameters of the production function the expected signs are *as indicated above*. The logic of identifying parameters is as follows: ρ follows from the linear part, the coefficient of r. Using ρ, an estimate of *a* then delivers $\alpha\delta$, which in turn delivers α from *d*; having α and ρ, δ follows from *a*. *b* then delivers γ, and from *c* we find θ. Note that the coefficients coincide with those of section 2 in the CD-case when ρ = 1. Note that we use the same interpretation as in section 2: labour L is assumed to be sector specific, *r and p* are given from the world market at each point in time and *A(t)* is exogenous technical progress.

If wages deviate from full employment wages, labour may be the endogenous variable and wages may be exogenous. The equation to be estimated for this case of *reversed causality* then will be:

$$L = [w - (\rho - 1)r]^{1/d} p^{-a/d} b^{-1/d} A^{-c/d} r^{-f/d}$$

using the same abbreviations for the coefficients as above. The procedure to identify parameters is to get ρ from the coefficient of the first *r*, α from the exponent of *p* which is $-a/d = 1/(1-\alpha)$, δ from $1/d$ and θ from the exponent of A and γ from *b*. Note that there are two identical exponents (up to the sign) forming a first constraint and $-f/a + 1/d = a/d$, which is a second constraint.

Continuing with the *second* version of the production and marginal cost function but now for the case of *imperfect competition* we use the demand function from section 2 (with slightly different notation):

$$p = BY^{\phi} M_{EU}^{\varphi} M_{NEU}^{\varepsilon}$$

Marginal revenue now will be $(\phi+1)p$. Equating this to marginal costs and eliminating Y using the firms labour demand function L(r,w,Y) and solving for wages yields:

$$w = (\rho - 1)r + \frac{1-\delta\rho}{\delta\rho} \cdot$$

$$[((\phi + 1)\alpha\delta\rho)^{-1} r^{\alpha\delta\rho} B^{-1} L^{1-\alpha(\phi+1)} A^{-\theta(\phi+1)} \gamma^{-1-\phi} M_{EU}^{-\varphi} M_{NEU}^{-\varepsilon}]^{\frac{1}{\alpha\delta\rho(\phi+1)-1}}$$

Except for the new import variables the coefficients for $\phi = 0$ are the same as those of perfect competition. For the case of reversed causality we get:

$$L = [\frac{r}{(\phi + 1)\alpha\delta\rho} B^{-1} [(\frac{w}{r} - \rho + 1)\frac{\delta\rho}{1-\delta\rho}]^{1-\alpha\delta\rho(\phi+1)}$$
$$A^{-\theta(\phi+1)} \gamma^{-\phi-1} M_{EU}^{-\varphi} M_{NEU}^{-\varepsilon}]^{\frac{1}{\alpha(\phi+1)-1}}$$

The second-order condition from profit maximization of the monopolist can be shown to require $\alpha(\phi+1) - 1 < 0$. Identification will run as follows. From the exponent of *r* we obtain $\alpha(\phi+1)$, from the exponents of the import terms we get ε and φ, from the exponent of *A* we get θ and from the exponent of the brackets containing the wage-rental ration we get $\delta\rho$. Identification therefore will be somewhat difficult for some variables can only be solved for together.

Using the first version of the production and marginal cost functions we have the problem that the marginal cost formula cannot be solved for wages. In case of *perfect competition* using, $p = \lambda$, we can solve for employment:

$$L = a\, p^b w^c [\frac{r}{w} - (\rho - 1)/A^{\theta}]^d A^e [\frac{r}{w} - (\rho - 1)/(A^{\theta}\delta\rho)]^f$$

with

$$a = [\alpha\delta\rho(\frac{\delta\rho}{1-\delta\rho})^{-\alpha(1-\delta\rho)}\gamma]^{\frac{1}{1-\alpha}} > 0,$$

$$b = \frac{1}{1-\alpha} > 0, c = \frac{-1}{1-\alpha} < 0, b + c = 0,$$

$$d = \frac{-1+\alpha\delta\rho}{1-\alpha} \leq 0, e = \frac{\theta\alpha\delta\rho}{1-\alpha} \geq 0, f = 1.$$

b or c will give values for α; θ can be found either from exponents of A or from ε; ρ and δ can be found from the terms to which Aexpθ is multiplied or by using d; γ follows from a.

Inserting the *first version* of marginal cost functions and the demand function for the case of *monopoly* into $p\,(\phi+1) = \lambda$ we can solve for employment:

$$L = (\frac{r}{w} - \frac{\rho-1}{A^{\theta}\delta\rho})^a(\frac{r}{w} - \frac{\rho-1}{A^{\theta}})^c w^b A^d M_{EU}^e M_{NEU}^f$$

with

$$a = (\frac{\delta\rho}{1-\delta\rho})^{\frac{\alpha(1-\delta\rho)(\phi+1)}{\alpha(\phi+1)-1}} \gamma^{\frac{-(\phi+1)}{\alpha(\phi+1)-1}} (\frac{1}{-\alpha\delta\rho(\phi+1)B})^{\frac{1}{\alpha(\phi+1)-1}},$$

$$b = \frac{1}{\alpha(\phi+1)-1} < 0, c = \frac{-\alpha\delta\rho(\phi+1)}{\alpha(\phi+1)-1} > 0, d = \frac{-\theta\delta\alpha\rho(\phi+1)}{\alpha(\phi+1)-1} \geq 0,$$

$$e = -\frac{\varphi}{\alpha(\phi+1)-1} \leq 0, f = \frac{-\varepsilon}{\alpha(\phi+1)-1} \leq 0$$

In determining signs we have again made use of the fact that the denominator of the last five coefficients must be negative because of the second-order condition from profit maximization. Our specific-factors model with Revankar VES functions delivers 6 equations that can be estimated: the second version delivers wage equations and employment equations for reversed causality for perfect and imperfect competition. The first version delivers only employment equations for perfect and imperfect competition, because it was not possible to solve the marginal cost equation for wages.

4. Policy Conclusions, Limitations and Suggestions for Further Research

Protectionism or compensation mechanisms are probably the first policy instruments firms and sectoral institutions point to when trying to counterbalance the wage effects from losses from trade. From a model point of view, the effects of such measures are difficult to determine, for under perfect competition and the small country assumption protectionism is damaging.

One policy action has been the Trade Adjustment Assistance Program in the US. Sachs and Shatz (1994) show that the sectoral distribution of compensations from that program are strongly correlated with the underlying sectoral distribution of sectoral employment losses (so that the relevant sectors are compensated drop – which might make losing more attractive).

One could ask the crucial question whether income policies for the short run or tax reductions and R&D subsidies for the long run would be a better means to help sectors coping with negative trade effects than protectionism.

It should be clear that behind the given interest rate there is a critical issue of interest rate determination and behind the given sectoral labour supply and wages there are labour market imperfections, both of which are, of course, not captured by our model .

The major drawback of a trade-theoretic approach is that international trade models are not related to models explaining unemployment and vice versa. The state of the art in the literature thus seems to be somewhat unsatisfactory. This is the reason why economists currently have to choose between a closed economy labour market imperfections approach and a trade approach. The integration of the two must be researched further (provided that major intertemporal changes in the labour market situation occur). Moreover, due to the simplifying assumption of constant price elasticities of demand and therefore of mark-ups over marginal costs, we cannot include their change across the business cycle without considerably complicating the model.

An incentive for further research is given by the possibility that all the models developed above, which are innovative because they fulfill the requirements stated in section 1, can be estimated.

References

Baldwin, R.E. and Cain, G.G, 'Shifts in U.S. Relative Wages: The Role of Trade, Technology and Factor Endowments', *NBER WP* 5934 (1997).

Freeman, R. B., 'Are your Wages set in Beijing?', *Journal of Economic Perspectives* 9 (1995), pp. 15-32.

Francois, J.F. , 'Trade, Labour Force Growth and Wages', *The Economic Journal* 106 (1996), pp. 1586-1609.

Helpman, E. and P.R. Krugman, Trade Policy and Market Structure, *MIT Press* 1989.

Jones, R.W., 'The Role of Technology in The Theory of International Trade'. In: Vernon, R. (ed.), *The Technology Factor in International Trade*, NBER, New York, 1970.

Krugman, P.R., 'Competitiveness: A Dangerous Obsession', *Foreign Affairs*, March/April 1994.

Krugman, P.R. and Obstfeld, M., *International Economics*, 4th edition, Addison-Wesley Publishing Company, Reading, 1997.

Lawrence, R.Z. and Slaughter, M.J., 'International Trade and American Wages in the 1980s: Giant Sucking Sound or Small Hiccup', *Brookings Papers on Economic Activity*, 2 (1993), pp. 161-226.

Leamer, E.E., 'Wage Inequality from International Competition and Technological Change: Theory and Country Experience', *American Economic Review*, AEA Papers and Proceedings, May 1996.

Leamer, E.E., 'Trade, Wages and Revolving Door Ideas', *NBER WP 4716* (1994).

Leamer, E.E., 'Wage Effects of a U.S. Mexican Free Trade Agreement'. In: Garber, P.M. (ed.), *The Mexico-U.S. Free Trade Agreement*, MIT Press, Cambridge, 1993.

Lücke, M. (1999), Sectoral Value Added Prices, TFP Growth, and the Low-skilled Wage in High-income Countries, Kiel WP No. 929.

Locke, M., 'European Trade with Lower-Income Countries and the Relative Wages of the Unskilled: An Exploratory Analysis for West-Germany and the UK', *Kiel University WP* 819 (1997).

Oliveira Martins, J., 'Market Structure, Trade and Industry Wages', *OECD Economic Studies No. 22*, Spring 1994, pp. 131-154.

Oscarsson, E., 'Trade and Relative Wages in Sweden 1968-91', Department of Economics, *Stockholm University Research Memorandum*, January 1997.

Revankar, N.S., 'A Class of Variable Elasticity of Substitution Production Functions', *Econometrica*, Vol.39, No.1, January 1971, 61-71.

Richardson, J.D., 'Income Inequality and Trade: How to Think, What to Conclude', *Journal of Economic Perspectives* 9 (1995), pp. 33-55.

Sachs, J.D. and Shatz, H.J., 'Trade and Jobs in U.S. Manufacturing', *Brookings Papers on Economic Activity* 1 (1994), pp. 1-84.

Wood, A., *North-South Trade, Employment and Inequality*, Clarendon Press, Oxford, 1994.

________, 'How Trade Hurt Unskilled Workers', *Journal of Economic Perspectives* 9 (1995), pp. 57-80.