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Globalisation is good for you: Distributional effects of mergers caused by globalisation

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March 2001

Abstract

Globalisation (in the sense of increased international trade) is usually associated with gains from trade but also distributional effects where e.g. capital owners gain and workers lose, both in real terms. In recent years, globalisation seems to be synonymous to international mergers of firms. This paper shows in a model with Cournot competition that international mergers due to globalisation also imply gains from trade. Under plausible assumptions for capital intensities and in contrast to the usual results, however, both capital owners and workers gain in real terms. This effect is due to the reduction in the consumption good price caused by an increase in competition.

1 Introduction

Mergers seem to be more common in times of globalisation. The European Commission (1999) reports that the number of mergers (that fell under the control of the Directorate–General for Competition of the European Commission) rose steadily from 50 in 1991 to approximately 250 in 1999. Mergers and their link to globalisation play a major role also in public discussions. Whenever one firm buys another and especially when a foreign company acquires a domestic one (think of Vodafone buying Mannesmann in 2000 or BMW buying Rover in 1994), the press is flooded with distributional statements by politicians and lobbyists: 'Mergers are good for stock markets' or 'mergers will be bad for workers' are just a few.

Surprisingly, international trade theory provides little guidance for understanding distributional effects of mergers caused by increased international trade. There is a huge literature on mergers and why firms merge in a closed economy context (e.g. Gowrisankaran, 1999; Jacquemin and Slade, 1992) but almost no mention of mergers due to international trade (this will be further discussed below). There has of course also been a considerable amount of research (also discussed below) on distributional aspects of international trade but, again, with no reference to mergers and the mechanism we have in mind.

We propose to fill this gap by presenting a model that links distributional effects of mergers due to globalisation to factor intensities in management and production technologies. Imagine an economy endowed with capital and labour that produces one homogeneous consumption good in a market with Cournot competition. The production technology is characterised by

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constant returns to scale. Production can only take place under managerial guidance, however, which is also characterised by constant returns to scale. As a fixed amount of management services is required for production, the entire production process of consumption goods exhibits increasing returns. Free entry pins down the endogenous number of firms in the economy by driving profits to zero.

Now let globalisation take place, i.e. let two countries with identical capital to labour ratios open up to trade.[1] As a firm faces more competitors in a now global market, the markup over marginal costs decreases and output of the representative firm has to expand in order to cover managerial costs. The number of firms under trade is therefore lower than the sum of the number of firms of both countries in autarky: Mergers have taken place due to intensified international trade.

This expansion of production activities of the representative firm implies that factors move from managerial to production activities. If production activities are more capital intensive than managerial activities, globalisation through mergers leads to an increase in the factor rewards for capital (i.e. an increase of stock prices) relative to the price of the consumption good and a decrease in wages relative to capital rewards.[2] If capital rewards increase relative to wages, capital rewards also increase in real terms (i.e. in terms of the consumption good), just as in the Stolper–Samuelson theorem under perfect competition. Due to our imperfect competition setup, wages losing relative to capital still increase in real terms if international trade sufficiently reduces the domestic distortion caused by oligopolistic firms. In a Cobb–Douglas world and for plausible parameter values, both factors of production gain in real terms.

The only author we are aware of who seems to consider international trade as a *cause* of mergers is Bliss (1986, sect. 7.6). He argues that firms are induced to merge under free trade (when compared to autarky) as this may require a reduction in the number of active firms.[3] Clearly, the mechanism behind Bliss' argument, which is also the mechanism we employ, is well–understood e.g. from the literature on optimal trade policy and welfare issues in models with Cournot competition (Dixit, 1984; Helpman and Krugman, 1985; Venables, 1985; Eaton and Grossman, 1986).[4] One of the contributions of the present paper therefore is to suggest the interpretation that mergers are behind this theoretical finding. Such an interpretation allows to analyse the important policy question of distributional effects of mergers in a very simple framework (á la Jones, 1965).

Distributional issues of international trade have a long tradition and recently received renewed attention in the discussion of the technology vs. trade explanation of increases in wage inequality.[5] The link between international trade and domestic inequality in almost all studies

[1] Studying international trade between countries with different capital to labour ratios would yield additional results besides the one we want to stress. These results are already well–known from other analyses, however.

[2] Lawrence and Spiller (1983) also allow for different capital intensities in their two–sector monopolistic–competition model. In their model, the total number of firms globally is the same under autarky as under free trade.

[3] There is a small literature on international mergers (e.g. Falvey, 1998; Head and Ries, 1997) or international merger *policies* (e.g. Horn and Levinsohn, 2001). Due to their partial equilibrium approach, both international trade as a cause of mergers or the general equilibrium distributional effects that we have in mind are not considered.

[4] This result can also be obtained in a Dixit–Stiglitz–type imperfect competition setup. See e.g. Flam and Helpman's (1987) analysis of industrial policy in a two–country world.

[5] See for example the Policy Forum in the September 1998 issue of the Economic Journal (Greenaway, 1998).

is provided by the Stolper–Samuelson theorem.[6] We present a mechanism where distributional effects occur without exogenous changes in international terms of trade and, our central result, where the Stolper–Samuelson results continues to hold in relative but not in real terms.

The next section presents the model. Section 3 shows how this model can be analysed using the approach of Jones (1965), despite our imperfect Cournot competition approach. Section 4 and 5 present the results and section 6 concludes.

2 The model

2.1 A closed economy

The economy is endowed with a fixed amount of capital K and labour L. Production of the homogeneous consumption good X requires a production process and management services. The production process itself takes place under constant returns to scale

$$x = x(k_x, l_x),$$

where $x(\cdot)$ has the standard neoclassical properties. The amount of capital and labour employed in a firm is denoted by k_x and l_x, respectively. Total output is given by the sum of output x of all n firms in the market, $X = nx$.[7] As firms behave as Cournot competitors, the price p_x of the consumption good is given by

$$p_x = \mu(a_{lx}w + a_{kx}r), \quad \text{with } \mu = \frac{n}{n-1} > 1. \tag{1}$$

As usual, a_{lx} and a_{kx} indicate the amount of labour and capital used to produce one unit of good x. Hence, the term in brackets gives unit costs as a function of factor rewards for capital (r) and labour (w). The parameter μ denotes the markup over the unit costs.

Production can take place only under managerial guidance. Management requires both capital and labour and is also provided under constant returns to scale,

$$\bar{m} = m(k_m, l_m),$$

with $m(\cdot)$ also having standard neoclassical properties. The amount of management services required for production in each firm is fixed at $\bar{m}$. Managerial services can be provided either in–house or bought on the market. In the former case, each firm minimises the costs associated with the provision of $\bar{m}$. Assuming perfect competition in the management sector for the latter case, both interpretations are formally equivalent. In what follows, we will present results taking the market perspective. Then, the price p_m equals unit costs,

$$p_m = a_{lm}w + a_{km}r. \tag{2}$$

We assume throughout that the capital intensity ρ_x is higher in the production sector than in the management sector,

$$\rho_x =: \frac{a_{kx}}{a_{lx}} > \frac{a_{km}}{a_{lm}} := \rho_m.$$

[6] An exception is e.g. Neary (2000, sect. 4) or Vandenbussche and Konings (1998).

[7] We anticipate the fact that all firms will have the same size as they all face identical marginal costs.

The existence of a fixed input requirement for management services is comparable to fixed costs.[8] With free entry, profits are driven to zero, so that $p_x x = (a_{lx}w + a_{kx}r)x + p_m\bar{m}$. Using the pricing equation (1), the zero profit condition requires the equality between operating profits (defined as the difference between revenues and variable production costs) and management costs,

$$\frac{p_x x}{n} = p_m\bar{m}. \tag{3}$$

A factor market equilibrium requires the equality of labour supply sL and labour demand in production, $a_{lx}nx$, and for management, $a_{lm}n\bar{m}$. With an identical equation for capital, we obtain

$$sL = a_{lx}nx + a_{lm}n\bar{m}, \tag{4}$$

$$sK = a_{kx}nx + a_{km}n\bar{m}, \tag{5}$$

where s is a scale parameter to be explained and applied later.

The system of equations (1)–(5) characterises the equilibrium of the economy. As numeraire, we normalise the price p_m for management services to unity. Equations (1)–(5) specify the values for the factor prices (w,r), the product price p_x, the number (n) of firms and the output (x) of an individual firm as a function of the exogenously given factor endowments (K,L) and the scale parameter s.

2.2 Analysing the effects of globalisation

Globalisation is defined the economy opening up for trade in goods and services, i.e. we assume management services to be internationally tradable.[9] Suppose, two or more countries structured as described in section 2.1 only differ with respect to their market size s. When they commence trading, they will experience factor price equalisation through trade in the consumption good and in management services unless one of these countries becomes completely specialised under trade. This follows directly from equations (1) and (2) where n is now the numbers of firms in the world as a whole.

The effects of integrating into a world with different relative factor endowments K/L than in the home country on the trade pattern and factor rewards have been widely studied and are well understood. Therefore, we focus on the integration process of two or more countries having identical relative factor endowments. Then, the integration process is identical to an equiproportional increase of any of these economies' resource base. In terms of the model described, integration is equivalent to increasing the parameter s.

3 Deriving the reduced form

We can analyse the model using the same approach as Jones (1965), despite the presence of imperfect competition features in our model. Similar to Jones, we study proportional changes

[8] The price for management services p_m and, therefore, the associated costs $p_m\bar{m}$ may respond to parameter changes. Fixed costs would not.

[9] Examples would include General Motors, where the US headquarter provides the new designs for Ford produced in Germany. Generally speaking, if management services were in–house activities, firms would locate their managers (plus equipment) where unit costs are lowest. Again, in–house management and management provided through the market are formally equivalent.

of endogenous variables as a function of proportional changes of exogenous ones. In our case, the following set of equations determines the proportional changes of x, n, w, r, p_x as functions of the proportional change in the market size s (cf. appendix):

$$\hat{p}_x - (\theta_{lx}\hat{a}_{lx} + \theta_{kx}\hat{a}_{kx}) = \theta_{lx}\hat{w} + \theta_{kx}\hat{r} + \hat{\mu}, \quad \hat{\mu} = -\frac{\hat{n}}{n-1} \tag{1'}$$

$$-(\theta_{lm}\hat{a}_{lm} + \theta_{km}\hat{a}_{km}) = \theta_{lm}\hat{w} + \theta_{km}\hat{r} \tag{2'}$$

$$\hat{p}_x = \hat{n} - \hat{x} \tag{3'}$$

$$\hat{s} - (\lambda_{lx}\hat{a}_{lx} + \lambda_{lm}\hat{a}_{lm}) = \lambda_{lx}\hat{x} + \hat{n} \tag{4'}$$

$$\hat{s} - (\lambda_{kx}\hat{a}_{kx} + \lambda_{km}\hat{a}_{km}) = \lambda_{kx}\hat{x} + \hat{n} \tag{5'}$$

The coefficient λ_{ij} stands for the fraction of the factor i used in the production of good j (cf. appendix, equation (15)). As factors are fully employed, fractions add to unity, i.e. $\lambda_{ix} + \lambda_{im} = 1$, $i = x, m$. The coefficient θ_{ij} denotes the share of value added (adjusted for markups) going to factor i in industry j (cf. appendix, equation (19)). Accordingly, the shares of both factors add to unity, i.e. $\theta_{li} + \theta_{ki} = 1$, $i = x, m$.

Equations (1') and (2') describe how prices and wages respond to parameter changes. A 'hat' denotes proportional changes, i.e. $\hat{z} = dz/z$. In the oligopolistic consumption good sector (1'), changes in factor rewards are accommodated by changes in the price p_x, in technologies (the term in brackets on the left–hand side) and by changes in the markup. The definition in (1) of the markup implies that its proportional change is given by $\hat{\mu} = -\hat{n}/(n-1)$. For the management sector, equation (2') illustrates that changes in the factor prices are balanced by adjustments in technologies only. The price p_m for management services cannot adjust, as it was chosen as numeraire.

Equation (3') stems from the zero profit condition (3). As the price for management services was set to unity and a fixed amount of management services is required, it simply says that zero profits prevail only if the operating profits from sales of the consumption good remain constant (in nominal terms).[10]

Equations (4') and (5') describe equilibrium changes on the factor market. An equiproportional increase $\hat{s}$ in the market size is accommodated by changes in the technology (the term in the brackets on the left–hand side) and changes in the supply (the right–hand side). As the demand of a single firm for management services is fixed, supply can only vary when either output x of the representative firm or the number n of firms change. Since the factor shares of both sectors add to one, $\hat{n}$ is not weighted.

Equations (1')–(5') can be simplified. As both oligopolistic consumption good firms and perfectly competitive management firms minimise production costs and are price takers on the factor markets, we obtain

$$\theta_{li}\hat{a}_{li} + \theta_{ki}\hat{a}_{ki} = 0, \quad i = x, m \tag{6}$$

for both types of firms (cf. appendix). Firms produce at minimum costs when the cost of an additional unit of labour is exactly offset by marginally reducing the amount of capital. This condition simplifies the pricing equations (1') and (2') as the brackets on the left–hand side disappear.

[10] We will see below that profits will need to change in terms of the consumption good.

The zero profit condition (3') can be used in equation (1'). Subtracting equation (2') from the resulting condition yields

$$\hat{x} - \mu\hat{n} + |\theta|\,(\hat{w} - \hat{r}) = 0, \tag{7}$$

where $|\theta|$ is the determinant of the factor share matrix θ (cf. appendix, equation (22)). Equation (21) in the appendix shows that the determinant $|\theta|$ is negative if the technology for producing the consumption good is capital intensive relative to the technology for management services (as we assume). This equation is the first one to be used in the reduced form.

With linear homogenous production functions and perfect competition on factor markets, the elasticity of substitution between the factors of production in sector i can be written as $\sigma_i = (\hat{a}_{ki} - \hat{a}_{li})/(\hat{w} - \hat{r})$. Together with the appropriate equation from (6), we obtain (cf. appendix)

$$\lambda_{lx}\hat{a}_{lx} + \lambda_{lm}\hat{a}_{lm} = \delta_l(\hat{w} - \hat{r}), \tag{8}$$

$$\lambda_{kx}\hat{a}_{kx} + \lambda_{km}\hat{a}_{km} = -\delta_k(\hat{w} - \hat{r}), \tag{9}$$

where $\delta_l \equiv (\lambda_{lx}\theta_{kx}\sigma_x + \lambda_{lm}\theta_{km}\sigma_m)$ and $\delta_k \equiv (\lambda_{kx}\theta_{lx}\sigma_x + \lambda_{km}\theta_{lm}\sigma_m)$. These equations can be used to replace changes in technology in factor market conditions (4') and (5') by changes in relative factor rewards. This yields

$$\lambda_{lx}\hat{x} + \hat{n} - \delta_l(\hat{w} - \hat{r}) = \hat{s} \tag{10}$$

$$\lambda_{kx}\hat{x} + \hat{n} + \delta_k(\hat{w} - \hat{r}) = \hat{s} \tag{11}$$

Together with equation (7), the modified factor market equilibrium conditions (10) and (11) constitute a system of equations which determines the effect of changes in the exogenous variable s, i.e. the effect of globalisation, on the endogenous variables $(n, x, w/r)$. For later purposes, we summarise these equations as

$$J\,b = d \quad \text{with} \tag{12}$$

$$J = \begin{bmatrix} \lambda_{lx} & 1 & -\delta_l \\ \lambda_{kx} & 1 & \delta_k \\ 1 & -\mu & |\theta| \end{bmatrix}, \quad b = \begin{bmatrix} \hat{x} \\ \hat{n} \\ \hat{w} - \hat{r} \end{bmatrix}, \quad d = \begin{bmatrix} \hat{s} \\ \hat{s} \\ 0 \end{bmatrix}$$

4 Aggregate effects of globalisation

The first question to be answered is whether the number of final goods firms grows proportionally or under–proportionally when countries integrate, i.e. when s increases. In the former case, no mergers would take place: The number of firms in the globalisation equilibrium is just the sum of the number of firms in the countries' autarky state. In the latter case the world–wide number of firms in a trading situation is lower than the sum of the number of firms in autarky — international trade implies mergers.

Answering this first question implies answers to further questions about firm and industry output, gains from trade and, our main focus, about changes in relative factor rewards. All results and proofs are valid for any number of countries which have an arbitrary size.

Proposition 1. *The number of sector x firms rises under–proportionally if the market sizes s increases, i.e.*

$$\hat{s} > 0 \quad \Rightarrow \quad 0 < \hat{n} < \hat{s}.$$

Proof. Define $j_1 \equiv |\theta|\,|\lambda|$, $j_2 \equiv \delta_l + \delta_k$ and $j_3 \equiv \mu(\delta_l\lambda_{kx} + \delta_k\lambda_{lx})$. This definition directly implies $j_2, j_3 > 0$. From (17) and (21) with $\rho_x > \rho_m$ we know $j_1 > 0$. Using (18), the determinant of the Jacobi matrix in (12) can be written as $|J| = j_1 + j_2 + j_3 > 0$ and the second element of adj Jd is $\hat{s}(j_1 + j_2) \equiv J_n\hat{s}$. Hence, $\hat{n} = \hat{s}(j_1 + j_2)/|J|$. As $j_1 + j_2 < |J|$, it follows that $0 < \hat{n} < \hat{s}$ if $\hat{s} > 0$. □

This proposition can be illustrated as follows: Giving a dynamic interpretation to a static model, there would be $\sum n_c^a$ firms in the market immediately after economies have removed prohibitive trade barriers, where n_c^a is the number of firms in autarky in country c. Proposition 1 indicates that this situation is not sustainable in the long run. The adjustment process is therefore characterised by an reduction of the number of firms, i.e. mergers take place.

As is generally argued, one of the main objectives for mergers are higher profits obtained by a reduction in costs. In fact, immediately after opening up to trade, firms make losses. As each firm requires a fixed amount of management services to run the business, two firms can always reduce their costs by merging (given the constant price of management services). Hence, mergers driven by a cost reduction motive indeed take place until the zero profit condition holds again.

Proposition 2. *The output x of a firm increases with the market sizes s, i.e.*

$$\hat{s} > 0 \quad \Rightarrow \quad \hat{x} > 0.$$

Proof. Let j_1, j_2, j_3 and $|J|$ be defined as above. The first element of adj Jd is $\hat{s}\mu\, j_2 \equiv J_x\hat{s}$ so that $\hat{x} = \hat{s}J_x/|J|$. As $|J| > 0$, it follows that $\hat{x} > 0$ if $\hat{s} > 0$. □

This is an intuitive outcome of the Cournot setup. As there are more firms in the market after opening up, the markup μ in (1) shrinks. With constant fixed costs, firms need to produce more in order earn the same amount of the operating profits that allow to cover these fixed costs.

The next proposition combines the previous two to obtain information on the output of the industry.

Proposition 3. *The output of the consumption good industry increases over–proportionally as the market size rises, i.e.*

$$\hat{s} > 0 \quad \Rightarrow \quad \hat{n} + \hat{x} > \hat{s}.$$

Proof. Let j_1, j_2, j_3, $|J|$, J_x and J_n be defined as above. Then, $\hat{n} + \hat{x} = \hat{s}(J_n + J_x)/|J|$. As $\lambda_{kx}, \lambda_{lx} < 1$, $\mu\, j_2 > j_3$ so that $J_n + J_x > |J|$ and $\hat{n} + \hat{x} > \hat{s}$. □

This effect can also be explained with increasing competition in sector x. As the world–wide number of oligopolistic firms reduces due to globalisation (with trade, there are fewer firms in the world as when all countries in autarky), there is less employment in the management sector after globalisation. Factors of production therefore move from the management to the production sector and total output increases. As this effect holds for each country individually (each country produces more but does not change its size), the increase in industry output $\hat{n} + \hat{x}$ must be larger than the increase $\hat{s}$ in the market size.

This proposition implies the following

Corollary 1. *There are gains from trade.*

Proof. For monotonous utility functions, social welfare u is an increasing function of output X of the consumption good normalised by country size s, $u = u(X/s)$, $u'(\cdot) > 0$. As $\hat{n} + \hat{x} - \hat{s} > 0$ by the last proposition, X/s increases as country size increases. Welfare u therefore rises when countries integrate. □

Propositions 1 and 3 provide a relationship between the change in output of the final goods sector, of the management sector and in the market size:

Proposition 4. *When the market size increases due to globalisation, output of the consumption good grows faster than market size which in turn grows faster than the overall supply of management services, i.e.*

$$\hat{s} > 0 \quad \Rightarrow \quad \hat{X} > \hat{s} > \hat{M}.$$

Proof. The industry supply of sector x and m have to satisfy $X = nx$ and $M = n\bar{m}$. As $\bar{m}$ is invariant, $\hat{X} = \hat{n} + \hat{x}$ and $\hat{M} = \hat{n}$. By propositions 1 and 3 we find that $\hat{X} = \hat{n} + \hat{x} > \hat{s} > \hat{n} = \hat{M}$. □

This proposition is similar to the Rybczynski theorem, only that we consider an equiproportional increase of the economy. This is the second 'classic' theorem in addition to factor price equalisation implied by (1) and (2) (no attention is paid to Heckscher–Ohlin issues as mentioned in footnote 1).

5 Distributional effects of globalisation

We now turn to our variant of the Stolper–Samuelson theorem which highlights the link between globalisation, mergers and relative factor rewards.

Proposition 5. *Capital rewards r rise relative to wages w following an increase in the market size s whenever the production of the consumption good is more capital intensive than production of management services, i.e.*

$$\hat{s} > 0 \quad \textit{and} \quad \rho_x \left\{ \begin{matrix} > \\ < \end{matrix} \right\} \rho_m \quad \Rightarrow \quad \hat{r} - \hat{w} \left\{ \begin{matrix} > \\ < \end{matrix} \right\} 0.$$

Proof. Let the determinant of the Jacobi matrix be defined as above. The third element of adj Jd is $\hat{s}\mu|\lambda|$ so that $\hat{r} - \hat{w} = -\hat{s}\mu|\lambda| / |J|$. Then, the proposition follows directly from equation (17). □

The intuition behind this proposition is similar to the intuition behind the Stolper–Samuelson theorem. Continue to assume that the consumption good is capital intensive relative to management services. When world–wide output of management services declines, the proportion of labour relative to capital that becomes available is, at given relative factor prices, higher than the proportion that firms in the production sector are willing to absorb. Full employment can therefore only be restored if firms (in both sectors) substitute labour for capital. The latter takes place only if factor rewards for labour decrease relatively to factor rewards for capital.

Surprisingly, a relative decline of wages does not necessarily (as in a perfect competition model) imply a decline of wages in terms of the consumption good:

Proposition 6. *The factor of production that gains relative to the other factor, also gains in real terms,*

$$\hat{r} - \hat{w} \left\{ \begin{matrix} > \\ < \end{matrix} \right\} 0 \Rightarrow \left\{ \begin{matrix} \hat{r} \\ \hat{w} \end{matrix} \right\} - \hat{p}_x > 0.$$

Proof. The proof holds for the case where capital owners gain relatively to labour, $\hat{r} - \hat{w} > 0$. Subtracting equation (1') from $\hat{r}$ and noting that the bracket term on the left–hand side vanishes gives $\hat{r} - \hat{p}_x = \theta_{lx}(\hat{r} - \hat{w}) + \hat{n}/(n-1)$. Both terms on the right–hand side are positive. The proof for the opposite case where $\hat{r} - \hat{w} < 0$ follows equivalent steps. □

Proposition 7. *The factor of production that loses relative to the other factor, loses in real terms only if competition was high already in autarky, i.e. if the number n^a of firms in autarky is above a certain threshold level n^*,*

$$\hat{r} - \hat{w} \left\{ \begin{matrix} > \\ < \end{matrix} \right\} 0 \quad \textit{and} \quad n^a > n^* \Rightarrow \left\{ \begin{matrix} \hat{w} \\ \hat{r} \end{matrix} \right\} - \hat{p}_x < 0.$$

Proof. This proof is also only for the case where capital owners gain relatively to labour, $\hat{r} - \hat{w} > 0$. Subtracting equation (1') from $\hat{w}$ gives

$$\hat{w} - \hat{p}_x = -\theta_{kx}(\hat{r} - \hat{w}) + \frac{1}{n-1}\hat{n}. \tag{13}$$

The first term on the right–hand side is negative, the second one is positive. Applying the expression for $\hat{r} - \hat{w}$ derived in the proof for proposition (5) and the one for $\hat{n}$ derived in the proof for proposition (1), the equation can be rewritten as (cf. appendix) $\hat{w} - \hat{p}_x = (\theta_{kx} n |\lambda| + |\theta| |\lambda| + \delta_l + \delta_k)\hat{s}/(|J|(n-1))$. Hence, wages fall in real terms,

$$\begin{aligned} \hat{w} - \hat{p}_x < 0, \quad \text{if } (\theta_{kx} n |\lambda| + |\theta| |\lambda| + \delta_l + \delta_k)\hat{s} < 0 \quad \Longleftrightarrow \\ n^a > n^* \equiv -\frac{|\theta| |\lambda| + \delta_l + \delta_k}{\theta_{kx} |\lambda|}. \end{aligned} \tag{14}$$

The threshold level n^* is positive if the consumption good is more capital intensive than management services. □

Equation (13) nicely reveals the intuition behind these two propositions. Changes in real factor rewards depend on changes in relative factor rewards (as in the Stolper–Samuelson theorem) caused by factor reallocation, as captured by the first term on the right–hand side, and on changes in the number of firms in the economy, the second term on the right–hand side of the equation. An increase of this second term represents an increase in competition and thereby a reduction in the distortion on the final good market. As international trade increases the number of competitors, this second term stands for the reduction of the markup which implies, ceteris paribus, higher real factor rewards. Real capital rewards therefore increase as both the relative change in factor rewards (i.e. the reallocation from management to production) and the increase in competition imply higher real capital rewards. Real labour rewards may also increase if the competition effect outweighs the loss implied by the reallocation to the production sector.

This discussion directly implies the following

Corollary 2. *(a) If a country characterized by a strong domestic inefficiency (few domestic firms) starts trading, there are gains from trade and both factors of production gain in real terms.*

(b) If a country with a large number of domestic firms starts trading, capital profits and labour loses in real terms.

These are clearly second–best world results. While these are usually employed to demonstrate that standard efficiency effects (e.g. gains from trade) do not necessarily hold in the presence of one additional or more distortions (for a short overview, cf. Bhagwati (1994)), here, second–best effects imply that standard distributional effects (losses in real factor rewards) may be invalidated.

More precise results are available for a Cobb–Douglas economy. The appendix proves the following

Corollary 3. *Let* α *and* β *denote the capital intensities in the production and management sectors, respectively. Real wages also rise due to globalisation (i.e. the difference between the threshold level* n^* *and the number* n^a *of firms in autarky is positive,* $n^a < n^*$ *in equation (14)), if* $(1+\beta)/2 > \alpha$.

For the extreme case where β almost zero, this holds if $\alpha < 0.5$ since then $1-\alpha > 0.5$ and $\alpha - \beta < 0.5$. The average share of capital in output is approximately $1/3$ in industrialised countries. Hence, with e.g. $\alpha = 0.4$ and $\beta = 0.2$ (to obtain roughly $1/3$ on average), this condition holds. For less extreme values of β, this condition holds for values of $\alpha > 0.5$ as well. We conclude that for reasonable parameter values, the threshold level n^* is always higher than the number n of firms in autarky. Factors of production that lose in relative terms therefore gain in real terms.

6 Conclusion

We have analysed a model with Cournot competition and free entry and exit where production requires a fixed amount of management services. As international trade increases, the number of firms active in a market and the markup of firms decreases in the number of competitors, international trade leads to an expansion of plant size. The number of firms producing under trade is therefore lower than the sum of the number of firms producing in autarkic economies. The interpretation given to this result is that international trade induces firms to merge. In this sense, globalisation leads to mergers.

Assuming that the production technology is more capital intensive than the management technology, international trade implies an increase of the production sector and a decrease of management services. These factor movements lead to a decline in capital intensity in all sectors and therefore an increase of factor rewards for capital relative to wages.

Measuring factor rewards in real terms, mergers caused by globalisation imply an increase in real capital rewards, real wages may fall or rise, depending on the degree of domestic distortions before opening up to trade.

If domestic distortions were weak (e.g. in a large country with many firms), globalisation through mergers implies a real decrease in wages. If domestic distortions were strong (in a country with few firms), globalisation leads to a considerable increase in the number of firms and therefore to a strong reduction of the distortion. This positive effect can outweigh the negative effect of losses of wages relative to capital caused by factor relocation from management

to production. In a Cobb–Douglas economy with plausible parameter values, real wages rise indeed. Both factors of production gain from trade.

Appendix

Available upon request.

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