PRICE-COST MARGINS AND ECONOMIC INTEGRATION: HOW IMPORTANT IS THE PRO-COMPETITIVE EFFECT?

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1. Introduction

The so-called "pro-competitive" effect, i.e., the disciplinary effect of an increased foreign competition on domestic markups, stands as one of the main potential outcomes of a process of economic integration, according to models of international trade with imperfect competition (Baldwin and Venables, 1995). In fact, the higher levels of efficiency and welfare due to this reduction in market power, have been mentioned as one of the most important benefits to be reached following the implementation of the Single Market Programme in the European Union (EU); see, among others, Flam (1992), Allen, Gasiorek and Smith (1998), or Bottasso and Sembenelli (2001).

The rationale behind this conclusion would be as follows. The removal of trade barriers associated with a process of economic integration would mean that the size of the relevant market for domestic firms is now greater, so that their market shares would decrease. As a consequence, domestic firms would reduce their price-cost margins, and then their ability of charging higher prices at home than abroad. In addition, the increased competition would entail some industrial restructuring, through the entry of new firms into the enlarged market and the exit of the less efficient producers, as well as a greater exploitation of economies of scale. All this would result in less distortions, lower prices, and a higher level of welfare (Allen, Gasiorek and Smith, 1998).

This "conventional wisdom", however, has been challenged by some authors. So, for instance, Haaland and Wooton (1992) notice that a process of integration does not necessarily amount to enlarging the market and hence reducing market power in the previously domestic markets. In particular, they conclude, the probability that prices would rise, instead of fall, after integration would be greater the higher were trade costs, the bias in preferences towards domestic goods, and the degree of concentration in the market (i.e., the lower the number of firms).

The purpose of this paper is to examine to what extent the conventional result of a higher degree of integration leading to lower price-cost margins, and hence falling prices, would hold, when two countries integrate by forming a common market. To that end, we develop a simple model of pricing behaviour in an imperfectly competitive industry, with three types of firms: home, partner or associated, and foreign, where the common market formed by the home and partner countries is assumed to be "large", so that foreign variables are taken to be endogenous. By solving the model, the price-cost margin of domestic firms would depend on a set of variables in addition to trade costs *versus* the partner country (namely, the elasticity of substitution among varieties, the bias in preferences towards domestic and partner goods, the number of firms operating in the domestic market, trade costs *versus* the foreign country, and the marginal costs of firms). In this way, we would be able to establish whether the expected decrease in the price-cost margin of domestic firms following a process of integration, could be offset by eventual changes in these other variables.

The paper is structured as follows. In section 2, we present a simple model of price setting in a competitive industry, where the relationship between the price-cost margin of domestic firms and its potential explanatory factors should be highlighted. Some concluding remarks are presented in section 3.

2. The model

We will develop in this section a simple, partial equilibrium model of an industry where firms compete *à la* Cournot. The model incorporates three types of firms: home (i.e., those from the domestic country), partner or associated (i.e., those from the country forming a common market with the domestic country) and foreign (i.e., those from the rest of the world), denoted by subscripts h, a and f, respectively. Each firm produces a variety of a differentiated good, and, for simplicity, all firms are assumed to be of equal size; there are n_h, n_a and n_f home, partner and foreign firms, respectively.

Product differentiation is modelled according to the approach of Dixit and Stiglitz (1977). The representative consumer in each country maximizes her utility, given by the quantity index:

$$Q = \left[\alpha_h^{\frac{1}{\sigma}} n_h q_h^{\frac{\sigma-1}{\sigma}} + \alpha_a^{\frac{1}{\sigma}} n_a q_a^{\frac{\sigma-1}{\sigma}} + \alpha_f^{\frac{1}{\sigma}} n_f q_f^{\frac{\sigma-1}{\sigma}} \right]^{\frac{\sigma}{\sigma-1}} \tag{1}$$

where q is the quantity consumed of each type of variety, $\sigma>1$ is the elasticity of substitution among varieties, and α is a parameter indicating the extent of idiosyncratic tastes [extending Warnock's (1999) specification to the case of three types of varieties]. The α's are normalized to add one, so that no bias in preferences would appear when α_h

$= \alpha_a = \alpha_f = \frac{1}{3}$; we will assume a bias in preferences towards home over partner goods, and towards partner over foreign goods, which would occur when $\alpha_h > \frac{1}{3}$, and $\alpha_h > \alpha_a > \alpha_f$. The price index dual to (1) is:

$$P = \left[\alpha_h n_h p_h^{1-\sigma} + \alpha_a n_a p_a^{1-\sigma} + \alpha_f n_f p_f^{1-\sigma}\right]^{\frac{1}{1-\sigma}} \tag{2}$$

where p is the price of each type of variety.

Given the budget constraint:

$$Y = PQ = n_h p_h q_h + n_a p_a q_a + n_f p_f q_f \tag{3}$$

where Y is the (fixed) total expenditure on differentiated products, maximization of (1) subject to (3) leads to the following demand function for every type of variety:

$$q_i = \alpha_i p_i^{-\sigma} P^{\sigma} Q \qquad i = h, a, f \tag{4}$$

whose inverse function is:

$$p_i = \alpha_i^{\frac{1}{\sigma}} q_i^{-\frac{1}{\sigma}} Q^{\frac{1-\sigma}{\sigma}} Y \qquad i = h, a, f \tag{5}$$

Now, we can find from (5) the (absolute value of the) perceived elasticity of demand, η, for every type of variety, by first computing its inverse:

$$\frac{1}{\eta_i} = -\frac{\partial p_i}{\partial q_i}\frac{q_i}{p_i} = \frac{1}{\sigma} + \left(\frac{\sigma - 1}{\sigma}\right) s_i \qquad i = h, a, f$$

so that:

$$\eta_i = \frac{\sigma}{1 + (\sigma - 1) s_i} \qquad i = h, a, f \tag{6}$$

where $s_i = \frac{p_i q_i}{Y}$ is the market share for each type of firm (i = h, a, f), and $n_h s_h + n_a s_a + n_f s_f = 1$.

Profit-maximizing firms set prices as a markup over marginal costs. Denoting by c_i ($i = h, a, f$) the firm's marginal cost, this can be shown in the case of home firms as:

$$p_h = \left(\frac{\eta_h}{\eta_h - 1}\right) c_h$$

which, after replacing η_h from (6), becomes:

$$p_h = \left(\frac{\sigma}{(\sigma - 1)(1 - s_h)} \right) c_h \tag{7}$$

Following a similar reasoning, the pricing behaviour of partner firms can be expressed as:

$$p_a = \left(\frac{\sigma}{(\sigma - 1)(1 - s_a)} \right) c_a t_a \tag{8}$$

where $t_a = (1 + \tau_a)$ is the trade cost faced by partner firms, being τ_a the *ad valorem* cost. Finally, regarding foreign firms, we can assume [in analogy with the case of a monetary union in open economy macroeconomics; see Bajo-Rubio and Díaz-Roldán (2001)] either that the common market formed by the home and partner countries is "small", so that p_f would be exogenous; or that the common market is "large", in which case:

$$p_f = \left(\frac{\sigma}{(\sigma - 1)(1 - s_f)} \right) c_f t_f \tag{9}$$

where $t_f = (1 + \tau_f)$ is the trade cost faced by foreign firms, being τ_f the *ad valorem* cost.

Notice, on the other hand, that market shares can be expressed from (4) and (5) as [see equation (2.4) in Baldwin and Venables (1995, p. 1607)]:

$$s_i = \alpha_i \left(\frac{p_i}{P} \right)^{1-\sigma} \qquad i = h, a, f$$

and, replacing P from (2):

$$s_i = \frac{\alpha_i p_i^{1-\sigma}}{\alpha_h n_h p_h^{1-\sigma} + \alpha_a n_a p_a^{1-\sigma} + \alpha_f n_f p_f^{1-\sigma}} \qquad i = h, a, f \tag{10}$$

Assuming the perhaps more realistic case of a "large" common market (think, e.g., of the Single Market in the EU), (7) to (10) would form a system of six equations with six endogenous variables, namely, the prices and market shares of the three types of firms. Solving the system for p_h, defining the price-cost margin of domestic firms, PCM_h, as:

$$PCM_h = \frac{p_h}{c_h} \tag{11}$$

and replacing the solution for p_h in (11), we would get an equation for PCM_h as a function μ of the elasticity of substitution, the bias in preferences towards domestic and partner varieties (remember that $\alpha_f = 1 - \alpha_h - \alpha_a$), the number of firms, trade costs, and marginal costs:

$$S \quad . \quad a \quad . \tag{12}$$

In this equation, a regional integration agreement, such as the formation of a common market, would be reflected in a decrease in (and the eventual elimination of) t_a.

Since p_i enters in an exponential way in (10), the solution to the system formed by (7) to (10) has been found by fully differentiating the model, so that the multipliers associated to each explanatory variable would be elasticities of the price-cost margin with respect to it. This solution is given by:

$$\frac{dMPC_h}{MPC_h} = \frac{1}{D}\left(N_1 \frac{d\sigma}{\sigma} + N_2 \frac{d\alpha_h}{\alpha_h} + N_3 \frac{d\alpha_a}{\alpha_a} + N_4 \frac{dn_h}{n_h} + N_5 \frac{dn_a}{n_a} + N_6 \frac{dn_f}{n_f} + \right.$$
$$\left. + N_7 \frac{dt_a}{t_a} + N_8 \frac{dt_f}{t_f} + N_9 \frac{dc_h}{c_h} + N_{10} \frac{dc_a}{c_a} + N_{11} \frac{dc_f}{c_f} \right) \tag{13}$$

where:

$D > 0, N_1 \quad 0, N_2 \quad 0, N_3 \quad 0, N_4 < 0, N_5 < 0, N_6 < 0, N_7 = N_{10} > 0, N_8 = N_{11} > 0, N_9 > 0$

and the exact definition of D and the N's is provided in the Appendix.

Therefore, according to (13), the price-cost margin of domestic firms would depend on:

- the elasticity of substitution among varieties (σ), with an ambiguous sign;
- the parameters indicating the bias in preferences towards domestic and partner varieties (α_h, and α_a), with an ambiguous sign;
- the number of (home, partner, and foreign) firms operating in the domestic market (n_h, n_a, and n_f), negatively;
- the trade costs faced by partner and foreign firms (t_a, and t_f), positively; and
- the marginal costs of (home, partner, and foreign) producers (c_h, c_a, and c_f), positively.

As can be seen from above, a regional integration agreement, shown by a decrease in (and the eventual elimination of) the trade barriers borne by the partner country's firms, would lead, *ceteris paribus*, to a unambiguous fall in the price-cost margin of home firms (i.e., the so-called "pro-competitive" effect). However, it is possible that this result could be offset by changes in other variables. Leaving aside changes in both the elasticity of substitution and preferences regarding domestic and partner goods, which show an ambiguous effect on the price-cost margin, and should rather occur in the long term, the possibility of a reversion of the “pro-competitive” effect would be higher if:

- higher integration with the partner country is accompanied by an increase in the trade barriers borne by firms from the rest of the world;
- the number of (home, partner, and foreign) firms operating in the domestic market decreases; or
- the marginal costs of (home, partner, and foreign) producers increases.

Regarding marginal costs, it does not seem too clear their relationship with integration; and even a reduction in marginal costs, rather than an increase, might be expected following an increase in productive efficiency after integration. More relevant would seem the role of trade barriers against the rest of the world: if a process of integration is to be accompanied with a higher degree of protection towards third countries' firms, by decreasing the market share of these firms and increasing that of home firms, this would lead to an increase in the price-cost margin of home firms. And the same would happen if the increased competition associated with a process of integration leads to a net exit of firms into the enlarged market. This point would be of a crucial importance, since a process of integration can generate a number of sometimes conflicting effects that might lead to the number of both home and foreign firms to either increase or decrease; see, e.g., the discussion in Markusen and Venables (1999). Therefore, the effect of integration on the price-cost margin of home firms (i.e., the extent of the “pro-competitive” effect) would be ambiguous on theoretical grounds, once the possibility of changes in other variables following a process of integration is recognised, and would turn to be an empirical question.

3. Concluding remarks

We have examined in this paper to what extent the conventional result claiming that a higher degree of integration would lead to lower price-cost margins, and hence falling prices, actually holds, when two countries integrate by forming a common market. To that end, we have developed a simple model of pricing behaviour in an imperfectly competitive industry, with three types of firms: home, partner or associated, and foreign, where the common market formed by the home and partner countries is assumed to be "large", so that foreign variables are taken to be endogenous. By solving the model, the price-cost margin of domestic firms would depend, in addition to trade costs *versus* the partner country, on several other variables, such as the elasticity of substitution among varieties, the bias in preferences towards domestic and partner goods, the number of firms operating in the domestic market, trade costs *versus* the foreign country, and the marginal costs of firms. In particular, price-cost margins might increase following a process of integration if the latter is accompanied with a higher degree of protection towards third countries' firms, or if the increased competition leads to a net exit of firms into the enlarged market.

Appendix

$$N_1 = -\left(\log p_h - \log p_f\right)\frac{s_h}{1-s_h}\left\{\left(1-n_h s_h\right)+\left(\sigma-1\right)\left[\frac{s_a}{1-s_a}\left(1-n_h s_h - n_a s_a\right)+\frac{s_f}{1-s_f}n_a s_a\right]\right\}+$$

$$+\left(\log p_a - \log p_f\right)\frac{s_h}{1-s_h}n_a s_a\left\{1+\left(\sigma-1\right)\frac{s_f}{1-s_f}\right\}-\frac{1}{\sigma\left(\sigma-1\right)}D$$

$$N_2 = \frac{s_h}{1-s_h}\left\{\left[\frac{\left(1-\alpha_a\right)}{1-\alpha_h-\alpha_a}\left(1-n_h s_h\right)-\frac{\alpha_h}{1-\alpha_h-\alpha_a}n_a s_a\right]+\right.$$

$$\left.+\left(\sigma-1\right)\left[\frac{\left(1-\alpha_a\right)}{1-\alpha_h-\alpha_a}\frac{s_a}{1-s_a}\left(1-n_h s_h - n_a s_a\right)+\frac{s_f}{1-s_f}n_a s_a\right]\right\}$$

$$N_3 = \frac{s_h}{1-s_h}\left\{\left[\frac{\alpha_a}{1-\alpha_h-\alpha_a}\left(1-n_h s_h\right)-\frac{\left(1-\alpha_h\right)}{1-\alpha_h-\alpha_a}n_a s_a\right]+\right.$$

$$\left.+\left(\sigma-1\right)\left[\frac{\alpha_a}{1-\alpha_h-\alpha_a}\frac{s_a}{1-s_a}\left(1-n_h s_h - n_a s_a\right)-\frac{s_f}{1-s_f}n_a s_a\right]\right\}$$

$$N_4 = -\frac{s_h}{1-s_h}n_h s_h\left[1+\left(\sigma-1\right)\left(\frac{s_a}{1-s_a}+\frac{s_f}{1-s_f}\right)+\left(\sigma-1\right)^2\frac{s_a}{1-s_a}\frac{s_f}{1-s_f}\right]$$

$$N_5 = -\frac{s_h}{1-s_h}n_a s_a\left[1+\left(\sigma-1\right)\left(\frac{s_a}{1-s_a}+\frac{s_f}{1-s_f}\right)+\left(\sigma-1\right)^2\frac{s_a}{1-s_a}\frac{s_f}{1-s_f}\right]$$

$$N_6 = -\frac{s_h}{1-s_h}\left(1-n_h s_h - n_h s_h\right)\left[1+\left(\sigma-1\right)\left(\frac{s_a}{1-s_a}+\frac{s_f}{1-s_f}\right)+\left(\sigma-1\right)^2\frac{s_a}{1-s_a}\frac{s_f}{1-s_f}\right]$$

$$N_7 = N_{10} = \left(\sigma-1\right)\frac{s_h}{1-s_h}n_a s_a + \left(\sigma-1\right)^2\frac{s_h}{1-s_h}\frac{s_f}{1-s_f}n_a s_a$$

$$N_8 = N_{11} = \left(\sigma-1\right)\frac{s_h}{1-s_h}\left(1-n_h s_h - n_a s_a\right)+\left(\sigma-1\right)^2\frac{s_h}{1-s_h}\frac{s_a}{1-s_a}\left(1-n_h s_h - n_a s_a\right)$$

$$N_9 = (\sigma - 1)\left[\frac{s_a}{1-s_a}(1-n_a s_a) + \frac{s_f}{1-s_f}(n_h s_h + n_a s_a)\right] + (\sigma-1)^2 \frac{s_a}{1-s_a}\frac{s_f}{1-s_f} n_h s_h$$

$$D = 1 + (\sigma-1)\left[\frac{s_h}{1-s_h}(1-n_h s_h) + \frac{s_a}{1-s_a}(1-n_a s_a) + \frac{s_f}{1-s_f}(n_h s_h + n_a s_a)\right] +$$
$$+ (\sigma-1)^2\left[\frac{s_h}{1-s_h}\frac{s_a}{1-s_a}(1-n_h s_h - n_a s_a) + \frac{s_h}{1-s_h}\frac{s_f}{1-s_f} n_a s_a + \frac{s_a}{1-s_a}\frac{s_f}{1-s_f} n_h s_h\right]$$

References

Allen, Chris, Gasiorek, Michael and Smith, Alasdair (1998): "The competition effects of the Single Market in Europe", *Economic Policy* 27, 441-486.

Bajo-Rubio, Oscar and Díaz-Roldán, Carmen (2001): "A general framework for the macroeconomic analysis of monetary unions", Documento de Economía y Finanzas Internacionales 01-06, AEEFI and FEDEA (available online at ftp://ftp.fedea.es/pub/defi/2001/defi01-06.pdf).

Baldwin, Robert E. and Venables, Anthony J. (1995): "Regional economic integration", in Grossman, Gene M. and Rogoff, Kenneth (eds.): *Handbook of International Economics* (Volume III), North-Holland, Amsterdam, 1597-1644.

Bottasso, Anna and Sembenelli, Alessandro (2001): "Market power, productivity and the EU Single Market Program: Evidence from a panel of Italian firms", *European Economic Review* 45, 167-186.

Dixit, Avinash K. and Stiglitz, Joseph E. (1977): "Monopolistic competition and optimum product diversity", *American Economic Review* 67, 297-308.

Flam, Harry (1992): "Product markets and 1992: Full integration, large gains?", *Journal of Economic Perspectives* 6, 7-30.

Haaland, Jan I. and Wooton, Ian (1992): "Market integration, competition, and welfare", in Winters, L. Alan (ed.): *Trade flows and trade policy after '1992'*, Cambridge University Press, Cambridge, 125-147.

Markusen, James R. and Venables, Anthony J. (1999): "Foreign direct investment as a catalyst for industrial development", *European Economic Review* 43, 335-356.

Warnock, Francis E. (1999): "Idiosyncratic tastes in a two-country optimizing model: Implications of a standard presumption", International Finance Discussion Paper 631, Board of Governors of the Federal Reserve System, Washington, DC.