ISSN 0265-8003

MARKET INTEGRATION, COMPETITION AND WELFARE

Jan I Haaland and Ian Wooton

Discussion Paper No. 574
August 1991

Centre for Economic Policy Research
6 Duke of York Street
London SW1Y 6LA
Tel: (44 71) 930 2963

CEPR Discussion Paper No. 574

August 1991

ABSTRACT

Market Integration, Competition and Welfare*

The current debate on the likely impact of completion of the market in the European Community focuses crucially on the nature of the market structure. It has been suggested that 1992 will move an industry from a segmented-markets equilibrium to one in which the national markets are fully integrated. We examine the effects of this form of market completion on prices, consumer welfare and profits using a theoretical model augmented by numerical simulations. We find that the effects of market integration can change qualitatively, according to the assumptions made about demand, the barriers to trade and the degree of concentration in the market.

JEL classification: F12, F15, L13
Keywords: market integration, segmented markets, competition, welfare, trade biases

Jan I Haaland
Institute of Economics
Norwegian School of Economics and Business Administration
Helleveien 30
N-5035 Bergen-Sandviken
NORWAY
Tel: (47 5) 959 255

Ian Wooton
Department of Economics
University of Western Ontario
London
Ontario N6A 5C2
CANADA
Tel: (1 519) 661 3411

*This paper is produced as part of CEPR's research programme on 'The Consequences of "1992" for International Trade', supported by a grant from the Commission of the European Communities under its SPES Programme (no. E89300105/RES). The research for this paper was supported by a grant to the University of Western Ontario from the Alfred P Sloan Foundation and by the Norwegian Research Council for Science and the Humanities (NAVF). Wooton also acknowledges support from the British Council.

Submitted 5 July 1991

NON-TECHNICAL SUMMARY

The research for this paper was motivated by some of the results found in studies of the potential effects of the programme to complete the internal market of the European Community (EC) by the end of 1992. Analyses of the potential effects of 1992 for various industries in Europe have distinguished between two stages of market integration. The first of these consists of a continuation of efforts by the EC to reduce trade costs, broadly defined, between member countries. The second stage, full market integration, involves a change of market regime: from a situation where firms are able to treat different European countries or regions as separate markets, to one in which the national markets are so closely linked that it is impossible for a firm, say, to lower the price in one sub-market without having to do the same throughout the EC.

The first stage of integration is quite straightforward and most of the measures taken to prepare for 1992 are aimed at reducing remaining trade costs. Full integration is more difficult as it must induce a change in firms' perceptions of the nature of competition in EC markets. Of the substantial gains from 1992 predicted by applied studies, however, the lion's share are a consequence of full market integration.

The 'conventional wisdom' behind these anticipated gains from full market integration is that prior to 1992, many firms in most of the European countries have enjoyed quite large shares of their home markets and smaller shares of the other European markets. If markets are imperfectly competitive, this gives rise to exploitation of market power in the markets in which firms have high market shares. Hence they charge relatively high prices in their home markets while 'dumping' goods abroad at lower prices. When markets become fully integrated such price discrimination is no longer possible. Firms must choose their prices and quantities on the basis of some measure of their overall position in the integrated markets, rather than making a separate choice for each national or regional sub-market. Since the average market share must be lower than the share in the home market, firms are expected to lose market power and thus price lower than their former home-market prices. Hence, stronger competition is anticipated, with consumer gains and producer losses as the results.

Although such market integration plays a major role in many applied studies, very little theoretical work has been done to explain the results. In this paper we try to shed light on how market integration affects the competitive situation in markets. We do this by using a simple model of international trade based on imperfect competition to compare the equilibria for the economies under two different market regime assumptions: segmented markets, where price discrimination between markets is possible; and integrated markets, where producers receive the same price from all sub-markets.

We show that although the conventional wisdom may hold in some circumstances, there are also cases in which the reverse may happen and market integration will lower competition and induce losses for consumers. Indeed, there are even situations where all prices rise as a result of market integration. The reason for this possibility is that when 'dumping' is no longer possible, it becomes, in a sense, more expensive to retain market shares in foreign markets, since a firm cannot lower its price abroad without simultaneously lowering its home-market price. Hence, the competitive pressure from imports is reduced, and unless there is sufficient domestic competition, the markets may end up less competitive than they were in the segmented market regime with 'dumping'.

As regards welfare assessments, the conventional wisdom argues that consumers will gain and producers will lose from integration. This too is not always true: if all prices rise, obviously the reverse happens. Even in the more 'normal' case of a fall in the home-market price, however, we know that foreign prices will increase as there are no dumping possibilities. Hence, for consumers to gain there must be more than a marginal reduction in the home price in order to outweigh the rise in the import price.

A similar story applies for the profit-effects. The fact that a firm cannot price discriminate tends to lower its profits, while the fact that its competitors cannot price discriminate tends to increase its market power and hence profits. The balance of these effects may go either way, depending on the exact situation.

The heart of these results is that 1992 (modelled as market integration) does not bring about a single European market. As long as there are some remaining biases between national submarkets (due to transportation and transaction costs, remaining trade barriers or consumer preference biases) the equilibrium in integrated markets differs from that in a single European market. Hence, it is not sufficient to compare the market shares in the segmented markets with the average market share to determine how full market integration will affect competition.

We show that the most important factors determining the effects of market integration on prices and welfare are the trade costs (transaction costs and trade barriers) between the integrating countries, the degree of preference biases in favour of home-produced goods and the degree of concentration in the domestic market. The lower the remaining trade costs are and the more domestic competition there is, the more likely it is that market integration will lower home-market prices and yield gains for consumers.

There is an alternative way of explaining the results: with segmented markets and dumping we know that there is an element of wasteful trade in the sense that some of the trade occurs because of the imperfectly competitive structure

of the market, rather than as a first-best choice. Market integration eliminates this wasteful trade. Hence, if there are real trade costs there is an overall gain through a reduction of these costs. The distribution of the overall gain between producers and consumers depends on the competitive pressure in the markets. If there are few firms, the producers are able to keep the gains as increased profits. With many firms, all gains will be competed away to the benefit of consumers.

It should be emphasized that this study focuses solely on the effects of integration on the competitive situation in a market. For a more complete picture of the effects of integration a number of other effects must be considered; the most important of these are more efficient production with increasing returns to scale and the better exploitation of comparative advantages.

In summary, the main result of the analysis in this paper is that integrated markets differ from a single market. In terms of the 1992 programme this is interesting in several respects. First of all, in discussions of 1992 'integrated markets' and a 'single European market' are used as synonymous terms and our analysis shows that to be inaccurate.

More importantly, however, the analysis shows that for an integrated-market equilibrium to be more competitive than that for segmented markets, certain conditions must be satisfied. It is not sufficient to ensure (say, through encouraging arbitrage) that price discrimination is no longer possible. In certain cases that measure alone may reduce the competitive pressure in the markets. It is more important to ensure that the biases between markets are as low as possible, and that there is sufficient competition to avoid some firms from enjoying market power as the sole suppliers of some, particularly demanded, goods. If there is an especially strong demand for home-produced goods, domestic competition is required to ensure gains from integration.

Biases between countries consist of trade costs and preference biases. The former can to some extent be influenced by economic policies; indeed, that is what a large proportion of the 1992 programme is about. There will still be, however, some remaining trade costs, such as transportation costs. Preference biases may or may not remain unchanged as a consequence of 1992 but in any case they are probably not an appropriate target for economic policy; and whether closer economic links between countries tend to reduce or increase preference biases is not clear.

1. INTRODUCTION

A number of the applied studies of the potential effects of the 1992 programme for single industries focus on the effects of changing from segmented, national markets to a fully integrated European market [see, for example, Smith and Venables (1988) and Norman (1989)]. The present paper is motivated by these applied studies, and the purpose is to shed light on the various channels of price and welfare effects of such market integration.

For several results in the theory of international trade under imperfect competition it is crucial to make the distinction between segmented and integrated markets. In segmented markets firms consider each (national) market separately, and can charge different prices in each. With integrated markets such price discrimination is not possible (say, as a result of the potential for private arbitrage between markets). Market segmentation is the essential assumption of models of trade based on reciprocal dumping [see, for example, Brander (1981) and Brander and Krugman (1983)] since, in the simplest versions of such models, the possibility to price discriminate between markets is the only reason for international trade. More recent studies of the effects of trade policies in imperfectly competitive markets reveal that the distinction between segmented and integrated markets is crucial for many of the results [see Markusen and Venables (1989) for a summary].

International trade in the applied models that incorporate imperfect competition is partly motivated by reciprocal dumping, scale economies, and product differentiation (as well as comparative advantage and the effects of various kinds of trade policies). Thus the result of theoretical literature, that whether markets are segmented or integrated matters, must be central to their results. The applied analyses examine the market equilibria in both situations; and go farther, in reporting the price and welfare effects of changing regimes, from segmented to integrated markets. Smith and Venables (1988) initiated this line of research and their results show that for the internal market in the EC to yield substantial gains in single industries it is necessary to achieve more than simply reduced trade costs. The larger gains in their study appear when the market structure is altered from one with segmented,

national markets to a situation with full market integration, and no price discrimination between markets. Norman (1989) shows the same tendency in a similar model, but in which Norway and Sweden are included in addition to the EC. However, his study also shows that full market integration is not equally important in all industries and countries.

The story behind these results, which we shall call the "conventional wisdom", is as follows. For most industries in most of the European countries it is typically the case that the producers have high market shares in their home markets and lower shares in the other European countries. With imperfectly competitive markets, this gives the firms much more market power in their home markets than abroad; and we have a situation with reciprocal dumping in the sense that the firms export goods at a lower (producer) price than the one they charge at home. Market integration implies that such dumping is no longer possible; the firms do not compete in segmented national markets, but rather in one, integrated European market. Then it is not the market shares in individual markets that determine the market power of the firms; it is the overall position in the integrated market that matters, and all firms will typically lose market power at home compared to what they had in the segmented case. Hence, home market prices will go down, and the consumers gain. International trade flows are reduced because there is no longer a basis for the pure reciprocal dumping trade. With product differentiation there is of course still a basis for trade, but less so than in the segmented equilibrium. Hence, there is also a source of potential gains through the reduction of real trade costs.

In this paper we try to look into the mechanisms behind the effects of market integration in more detail. Although these effects are very important in many applied studies, they have not been thoroughly discussed; it is often taken for granted that market integration is similar to enlarging the market and thereby reducing the difference in market power between various submarkets. One important result of our analysis is that this is not true; as long as there are some kind of trade costs or biased preferences, an integrated equilibrium is not identical to equilibrium in one, larger market.

It is, for instance, often assumed that since price discrimination is no longer possible, producer surpluses must go down and consumer welfare up as a consequence of integration. We show, however, that this is not necessarily the case; the outcome depends on trade costs, preference biases, and the degree of competition (the number of firms) in each submarket. As the inability to price discriminate applies to your competitors as well as to your own firm, the whole situation is altered, and the outcome may well be that the integrated equilibrium in a certain sense is less competitive than the equilibrium in segmented markets with dumping. It may even be the case that all prices rise as a consequence of integration.

The plan of this paper is as follows. In the next section we present the structure of a simple model of international trade in a market with trade between symmetric countries. We stick to the dichotomy of segmented versus integrated markets, and we limit the analysis to one form of imperfect competition, Cournot competition.[1] Although such a change of regime has turned out to be central to the welfare effects in the applied studies, the mechanisms have not been thoroughly studied.[2] It is a standard model with no new features; nevertheless, we think it is useful to spell out the equilibrium conditions in some details. In particular, conditions for equilibrium with integrated markets have not been discussed in the literature. In section 3 we compare the price effects of market integration. These are quite complex and hence, for welfare assessments, in section 4 we switch to a discussion of results from a stylized numerical model that focuses on the dimensions discussed in the theoretical analysis: such as the degree of competition in the markets, the level of the trade costs between markets, and the degree of substitutability between products.

---

[1]A strand of theoretical work that looks more carefully into the game between firms competing simultaneously in multiple markets [see Ben-Zvi and Helpman (1988) and Venables (1990a)] suggests that the appropriate game is one in which firms realise that there are links between the markets, but not as close links as the integrated market hypothesis suggests. Hence Venables (1990a), for example, studies a two-stage game in which the segmented and the integrated solutions come out as special cases, but the "preferred" game is one that lies somewhere between these others.

[2]Venables (1990b) includes Cournot competition in segmented and integrated markets as special cases, and there are a few results regarding a regime change towards more integrated markets, however his main purpose is to illustrate other solution concepts, and his results regarding change of regime are not very general.

All of these turn out to be central to the effects of integration on prices, consumer welfare, and producer profits.

2. THE MODEL

We work with a very simple model of Cournot competition in a symmetric world. There is one representative consumer in each country and her demand is given from maximization of a standard, homothetic utility function. There are n firms in each country and $m + 1$ countries: thus there are m foreign countries.

2.1 Demand

The consumer chooses between consumption of an homogeneous good (which shall be the numeraire) and varieties of a differentiated product. Our focus is on the market for the latter set of goods; hence, we assume that each consumer spends a fixed proportion of her income on the homogeneous good. She then chooses among the varieties of the differentiated product through maximization of a CES sub-utility function. The utility function is then Cobb-Douglas:

$$U = X^{\alpha} Z^{\beta}, \tag{1}$$

where Z is the quantity consumed of the homogeneous good and X is a quantity index of consumption of varieties of the differentiated product.

In the sub-utility function all varieties of the good from a single country enter symmetrically; in fact, goods from all foreign countries enter symmetrically; hence, we only distinguish between home goods and foreign goods. The quantity index, or sub-utility function, is then:

$$X = \left[n\left(a_h x_h\right)^{\frac{1-\sigma}{\sigma}} + mn\left(a_f x_f\right)^{\frac{1-\sigma}{\sigma}} \right]^{\frac{\sigma}{1-\sigma}}. \tag{2}$$

where subscript h indicates home-produced goods and f foreign-produced (imported) goods. x_i is the consumed quantity of each variety of good of type i, a_i is the preference parameter

and σ is the elasticity of substitution. The price index (or the unit expenditure function) dual to (2) is:

$$P = \left\{ n\left(\frac{p_h}{a_h}\right)^{1-\sigma} + mn\left(\frac{p_f}{a_f}\right)^{1-\sigma} \right\}^{\frac{1}{1-\sigma}}. \tag{3}$$

where p_i is the consumer price for (each) good of type i. With Y as the total expenditure on differentiated products, the consumer maximizes X subject to the budget constraint:

$$PX = Y. \tag{4}$$

Demands for individual products are given by:

$$x_i = a_i^{\sigma-1} p_i^{-\sigma} P^{\sigma-1} Y, \qquad i = h,f. \tag{5}$$

Given the symmetry of the model, x_f refers both to the demand for imported goods in the home market and to the demand in each of the foreign markets for varieties produced in the home country. It is often convenient to work in terms of market shares. The market shares of each variety of home-produced and foreign (imported) goods, respectively, are defined to be:

$$\begin{aligned} s_h &\equiv \frac{p_h x_h}{Y} = n^{-1}\left\{1 + m\left(\frac{a_f}{a_h}\frac{p_h}{p_f}\right)^{\sigma-1}\right\}^{-1} \\ s_f &\equiv \frac{1 - ns_h}{mn}. \end{aligned} \tag{6}$$

The total share of the market given to domestic goods is ns_h, while the remainder, $(1 - ns_h)$, is the share of the market for foreign goods. The price index has the properties that:

$$\begin{aligned} \frac{\partial P}{\partial p_h}\frac{p_h}{P} &= s_h, \\ \frac{\partial P}{\partial p_f}\frac{p_f}{P} &= s_f. \end{aligned} \tag{7}$$

2.2 Producer behaviour

Producers maximize profits, with demand given from (5). We make the familiar Cournot assumption that all other producers hold their quantities constant. Thus, if we focus on the optimal choices for a representative firm, say firm 1, which we call the active firm, it assumes that:

$$\frac{dx_i}{dx_1} = 0, \qquad \text{for all } i \neq 1.$$

Technology is very simple: there is a constant marginal cost, b, and a fixed cost. In the firm's home market, the price that the producer receives, q_h, equals that paid by the consumers, p_h. For sales abroad, there is an ad valorem trade cost, t, (the same in all countries) and this drives a wedge between the consumer price of imported goods, p_f, and the price received by their producer, q_f, such that $q_f = (1 - t)p_f$.

Profit-maximising firms set their prices as a markup over marginal costs:

$$q_i = \frac{\varepsilon_i^*}{\varepsilon_i^* - 1} b, \tag{8}$$

where the perceived price elasticity in market i is defined as:

$$\varepsilon_i^* \equiv -\left(\frac{dx_{1i}}{dp_{1i}}\right)^* \frac{p_{1i}}{x_{1i}}. \tag{9}$$

The asterisk indicates that this is the perceived effect, given the Cournot assumption. With segmented markets, there is a separate perceived elasticity for each market: with integrated markets the firm only sets one price, so the perceived elasticity is defined by (9), with x_i being the firm's total sales. Using (5), this may be rewritten as:

$$\varepsilon_i^* = \sigma - (\sigma - 1)\left(\frac{dP}{dp_{1i}}\right)^* \frac{p_{1i}}{P}, \tag{10a}$$

for segmented markets, and

$$\varepsilon^* = \sigma - (\sigma - 1)\sum_{i=1}^{n+1} \theta_{1i}\left(\frac{dP_i}{dp_{1i}}\right)^* \frac{p_{1i}}{P_i}. \tag{10b}$$

for the integrated case, where θ_{ji} is the volume share of firm j's total sales in market i; that is:

$$\theta_{ji} \equiv \frac{x_{ji}}{\sum_{k=1}^{m+1} x_{jk}}.$$

To find the Cournot responses and the perceived elasticities, we must distinguish between home and foreign competitors. Let R_h and R_f be the expected relative market-price effects, equivalent to the Cournot assumption, for the home and foreign competitors, respectively, where:

$$R_h \equiv \left(\frac{dp_h}{dp_{1i}}\right)^* \frac{p_{1i}}{p_h}, \qquad R_f \equiv \left(\frac{dp_f}{dp_{1i}}\right)^* \frac{p_{1i}}{p_f}. \tag{11}$$

Using expressions similar to (10a) and (10b), the Cournot assumption for each competitor can be written:

$$\sigma R_k - (\sigma - 1)\left(\frac{dP}{dp_{1i}}\right)^* \frac{p_{1i}}{P} = 0, \qquad i,k = h,f, \tag{12a}$$

$$\sigma R_k - (\sigma - 1)\sum_{i=1}^{m+1} \theta_{ki}\left(\frac{dP_i}{dp_{1i}}\right)^* \frac{p_{1i}}{P_i} = 0, \qquad k = h,f, \tag{12b}$$

where (12a) is for the segmented, and (12b) is for the integrated, equilibrium.

Comparing (10b) and (12b), and remembering that $\theta_{1i} = \theta_{hi}$, we see that the elasticity can be rewritten as[3]

$$\varepsilon^* = \sigma(1 - R_h). \tag{13}$$

It is easy to see that this also holds for the segmented equilibria, where the R_h may differ between markets. It remains to find R_h. To do that, we use (12a) or (12b) together with:

[3]This is only valid for $n > 1$; that is, when there are domestic competitors. All of the results that follow are, however, correct for $n = 1$ as well.

$$\left(\frac{dP}{dp_{1i}}\right)^{*}\frac{p_{1i}}{P} = s_i + (n-1)s_iR_h + (1-ns_i)R_f. \qquad (14)$$

2.3 *Equilibrium in segmented markets*

From (12a), we see that $R_h = R_f = R$. (14) then becomes

$$\left(\frac{dP}{dp_{1i}}\right)^{*}\frac{p_{1i}}{P} = s_i + (1-s_i)R,$$

where R may differ between the markets. Together with (12a) and (13), this yields

$$\varepsilon_i^{*} = \frac{\sigma}{1 + (\sigma-1)s_i}. \qquad i = h,f, \qquad (15)$$

and, from (8), we find the familiar expression [see, for example, Norman (1989)] for prices in segmented markets

$$q_i = \frac{\sigma}{\sigma-1}\frac{1}{1-s_i}b, \qquad i = h,f. \qquad (16)$$

All market shares do, of course, depend on the relative prices; hence, these are not parameters, but determined by the overall equilibrium conditions. It is, nevertheless, convenient to think in terms of market shares, in particular when we are going to compare the segmented equilibria with the integrated one. The market share formulation also shows clearly how there is a basis for reciprocal dumping when market shares for home firms and foreign firms differ; for example, due to trade costs or a home good bias in the preferences.

If the number of firms grows and competition increases all market shares approach zero and the perceived elasticity goes towards σ for all firms in all markets. Hence, as one should expect, increased competition reduces the basis for dumping in the segmented equilibrium; this is important to remember when we compare segmented and integrated equilibria under various assumptions with regard to the number of firms.

2.4 Integrated equilibrium

With integrated markets price discrimination is not possible; hence, the producer price must be the same for sales in all markets, and the consumer prices can differ only with the trade costs. In a completely symmetric world, like the one we study here, this also fixes the relative prices between home and foreign goods in each market; hence the market shares are given. However, integration implies that all markets must be considered simultaneously; that is true for the profit maximization by each firm and also for the formulation of the Cournot assumption.

The overall elasticity is given by (13), but (12b) shows that R_h and R_f may now differ from each other, since they depend on weighted averages of the markets and the firms evaluate the relative importance of the markets differently. To find the perceived elasticity, we must thus solve for R_h and R_f, using (12b) and (14).

Due to the symmetry between the markets, it is sufficient to keep track of the effects in the active firm's home market and in a representative foreign market. Hence we use

$$\theta_i = \frac{x_i}{x_h + mx_f}. \qquad i = h,f.$$

Define the active firm's weighted-average market shares as follows:

$$\bar{s}_i \equiv \theta_i s_h + (1-\theta_i)s_f. \qquad i = h,f. \tag{17}$$

Using these and (14), the two equations in (12b) can be written

$$\begin{aligned} \sigma R_h - (\sigma-1)\left[\bar{s}_h + (n-1)\bar{s}_h R_h + (1-n\bar{s}_h)R_f\right] &= 0, \\ \sigma R_f - (\sigma-1)\left[\bar{s}_f + (n-1)\bar{s}_f R_h + (1-n\bar{s}_f)R_f\right] &= 0. \end{aligned} \tag{18}$$

From this we find R_h and, using (13), we then get

$$\varepsilon^* = \sigma \frac{\left(\frac{\sigma}{\sigma-1}\right) - n(\bar{s}_h - \bar{s}_f)}{\left(\frac{\sigma}{\sigma-1}\right) - (n-1)(\bar{s}_h - \bar{s}_f) + \sigma\bar{s}_i}. \tag{19}$$

This cannot be transformed into an easily interpretable price equation: it is, however, possible to write the integrated-equilibrium producer price in an expression analogous to that for segmented markets, equation (16). Thus:

$$q = \frac{\sigma}{\sigma - 1} \frac{1}{1 - s_{eq}} b, \tag{20}$$

where

$$s_{eq} \equiv \frac{1 + \delta}{n(m + 1 + \delta)}, \tag{21}$$

and

$$\delta \equiv \frac{\bar{s}_h - \bar{s}_f}{\sigma \bar{s}_f}.$$

From (21), we see that the one-market equivalent market share can be interpreted as a weighted average share in which each home firm counts as (1 + δ) foreign firms. It should, however, be remembered that the weight, δ, is endogenously determined. Hence, it is not straightforward to see how the price in the integrated equilibrium depends on the parameters of the model.

3. EFFECTS OF INTEGRATION

We will use this model to study effects of market integration for profits and consumer surplus. Overall welfare assessments are not explicitly included; they follow from the effects on profits and consumer surplus, plus any transfer payments if trade costs are tariffs rather than real costs [see, for example, Venables (1990c)]. Aggregate welfare may, however, depend on the exact parameter value in the utility and profit functions, and we do not want the results to depend on an arbitrarily chosen parameter. Hence, we stick to disaggregated welfare assessments, for which the qualitative results are robust to specific parameter values. In this section we try briefly to discuss the relevant dimensions, based on the model description above. The discussion shows that it is difficult to get firm results from theoretical considerations alone, and in the next sections we show numerical results to illustrate the processes going on. Even though we are going to focus primarily on welfare effects, it is

fairly obvious that the key issue in understanding the effects of integration is related to what happens to prices and competition. Indeed, the main motivation behind integration in the sense discussed here is that it will force firms to behave more competitively, and thus lead to consumer gains through lower prices and increased consumption; hence, a study of price effects is essential.

3.1 Prices

From (16), we see that with segmented markets there is an element of dumping, with $p_f(1 - t) < p_h$, as long as firms have larger market shares in their home markets than abroad. This will typically be the case if there are trade costs (real or artificial) or a bias for home-produced goods in the preferences. In our model there is a basis for such dumping as long as

$$T \equiv 1 - (1-t)\frac{a_f}{a_h} > 0 \tag{22}$$

holds. Following Smith and Venables (1988) we will call T the total tariff equivalent.[4] As dumping in this sense stems from the fact that firms exploit their market power in the home market, one would expect market integration to result in a reduction of home market prices. However, it is not easy to come to firm conclusions for the price effects of integration. From (16) and (20), we see that the integrated producer price is between the segmented producer prices if $s_f < s_{ei} < s_h$. It is fairly clear that the first of these holds, as we no longer have dumping in the integrated equilibrium. It is much less obvious that the second inequality holds. Hence, the discussion here will focus on that. In order to do so, it will be useful to introduce a new term, $\gamma \equiv s_h - s_{ei}$. This is the "share difference" between segmented-markets equilibrium and that of the solution for integrated markets. For $\gamma > 0$, the home market price falls through integration, and vice versa.

[4]In calibrated models, such as that of Smith and Venables (1988), the data are for market shares in the segmented equilibrium. These are functions of T, while the extent of trade barriers and relative preference biases are not independently observed.

Let $\rho \equiv q_h/q_f$, that is, the endogenously determined relative producer price in the segmented equilibrium. For $\rho = 1$, the producer prices in the two types of market are the same, as they must be (by definition) for integrated markets. In the segmented case, dumping implies that $\rho > 1$; and the higher is ρ, the more dumping there is. We can write $s_h = s(\rho,T,n,m)$, with $s_T > 0$ and the remaining partial effects negative. But ρ is endogenous and it is not too difficult to find that $\rho = \rho(T,n,m)$, with $\rho_T > 0$, $\rho_n < 0$, $\rho_m < 0$. That is, the indirect effects of the parameters T, n, and m work through ρ in such a way as to *dampen* their direct effects on s_h. Thus the presence of dumping increases the competitiveness of the segmented-markets equilibrium.

In the integrated equilibrium, firms have an equal share of the market, $1/n(m + 1)$. But, as we have seen, this is not the appropriate measure to use in determining producer prices: from (20), q is a function of s_{eq}, which is not the same as the simple measure of market share due to the influence of the δ term. The complexities stem from the fact that the integrated equilibrium is *not the same* as the equilibrium in a single, larger market. With differentiated products there are still different market segments, and the producers may care more about some segments than others, due both to differences in preferences and to trade policies. If there are high trade costs, firms perceive it to be very costly to retain market shares in the foreign markets when dumping is not possible. Hence the integrated equilibrium may be one in which all firms stick to their own home markets and care less about exports.

We can show that $\delta = \delta(T,t,m)$, where $\delta_T > 0$, $\delta_t > 0$, $\delta_m < 0$. Note that it is not only the total tariff equivalent that influences δ, but also its composition (unlike the case for the determination of ρ). Thus an increase in t raises δ both directly and through an increase in T. Even when the tariff equivalent is held constant, a shift in its composition towards increased trade costs (away from a preference bias for home-market goods) will still expand δ. Further, we can determine that $\delta > 0$ whenever there is a bias (due to preferences or impediments to trade) for home-market goods. Thus

$$s_{eq} \geq \frac{1}{n(m+1)},$$

that is, trade impediments make the integrated market less competitive than the equivalent single market.

In summary, dumping ($\rho > 1$) acts pro-competitively in the segmented-markets equilibrium and home-market biases ($\delta > 0$) reduce the competitiveness of the integrated-markets solution. We have yet to demonstrate that these influences can be sufficiently large to reverse the market-share inequality, such that $\gamma < 0$ and the home-market price rises as a result of market integration. What is immediately clear is that, for the polar cases of $T = 0$ and $T = 1$, $\gamma = 0$. Thus when either there are no impediments to trade or trade barriers are prohibitive, the integrated-markets equilibrium is indistinguishable to that of the segmented-markets case.

Share Difference, $\gamma \equiv s_h - s_{eq}$
($m = 1$, $n = 1$, $t = 0$)

Tariff Equivalent T	Elasticity of substitution, σ				
	2	4	6	10	20
0.0	0.00	0.00	0.00	0.00	0.00
0.2	0.02	0.03	0.02	-0.01	-0.18
0.4	0.05	0.02	-0.05	-0.24	-0.38
0.6	0.06	-0.07	-0.22	-0.30	-0.30
0.8	0.05	-0.17	-0.20	-0.19	-0.18

Table 1

In order to begin to understand what occurs between these extremes, consider the special case of a bilateral monopoly (that is, $n = 1$ and $m = 1$) in which $t = 0$. Hence, all home-market bias arises from preferences, not trade barriers. In this case γ is a function only of T and the elasticity of substitution, σ. Table 1 shows how γ varies with different values of the parameters. From the table, it is clear that we may well have $\gamma < 0$, implying that the

home-market price rises as a consequence of integration. Thus, in this special case, all consumer prices may rise from market integration.

Our next task is to loosen these restrictions and consider the sign of γ under more general assumptions. Instead of a bilateral monopoly, let n and m take any arbitrary fixed values (that is, there is still no entry or exit). Now, let t be non-zero and consider the effects of the composition of the tariff equivalent term, T.

PROPOSITION 1

For a given tariff equivalent, T, γ is smaller the higher is the trade cost element, t.

PROOF

For a given T, all individual market shares are given, both in the segmented and the integrated case. But s_{eq} is an increasing function of δ, itself an increasing function of t, for given T. □

Hence, the higher are the trade barriers, the less likely it is that the home-market price falls with integration.

Next, let us consider the importance the number of firms in each domestic market.

PROPOSITION 2

$$\frac{ds_{eq}}{dn}\frac{n}{s_{eq}} < \frac{ds_h}{dn}\frac{n}{s_h} < 0.$$

PROOF

From (21),

$$\frac{ds_{eq}}{dn}\frac{n}{s_{eq}} = -1,$$

since δ is independent of n. From (6) and the properties of ρ, we have

$$\frac{ds_h}{dn}\frac{n}{s_h} = -1 + \frac{ds_h}{d\rho}\frac{d\rho}{dn}\frac{n}{s_{eq}} > -1.$$

□

Hence, an exogenous increase in n reduces s_{eq} relatively more than it lowers s_h. So if $\gamma \leq 0$, the greater is n the more limited is the home-price rise from integration. If $\gamma > 0$, we cannot

rule out the possibility that γ falls with an increase in n. Of course, for large n, domestic markets are always highly competitive and, hence, the effects of integration are very limited.

In the numerical examples, below, we examine the relative importance of home versus foreign competition, through changing the allocation of firms between home and foreign competitors. With the same total number of firms, and for high trade barriers, these examples indicate that domestic competition yields a higher γ than competition from foreign firms. This effect is less when the level of the tariff equivalent is the result of home-market biases, rather than trade impediments.

3.2 *Welfare*

For welfare assessments both the home price and the foreign price matter; and this discussion shows that it is not unlikely that we end up with a moderate price fall for home goods and a sharp price rise for imports, such that the overall effects for consumers and producers are not obvious.

The removal of dumping possibilities reallocates sales between markets and reduces trade and thus lowers trade costs; hence there is an aggregate gain through reduced real trade costs; whether this appears as profits or consumer surpluses or as a combination of the two again depends on the exact conditions regarding competition and protection. If there are many domestic firms, competition ensures that the cost reduction benefits the consumers through lower prices; if there are few firms the gain may appear entirely as profits.

3.2.1 CONSUMER SURPLUS

Consumers' welfare will be measured by the sub-utility function in (2). With Y exogenously given (as consumption of the numeraire good is pre-determined), the consumer surplus is determined by prices alone; if integration lowers the average consumer price, as measured by the price index $P(\cdot)$ the consumers are better off, and vice versa. If P^s is the price level in segmented equilibrium and P^I the one in the integrated equilibrium, we have

$$\frac{X^I}{X^S} = \frac{P^S}{P^I}.$$

This may be rewritten as:

$$\frac{P^S}{P^I} = \left(\frac{1 + m(1-T)^{\sigma-1}}{1 + m\left[\rho(1-T)\right]^{\sigma-1}}\right)^{\frac{1}{\sigma-1}} \left(\frac{1-s_{eq}}{1-s_h}\right). \tag{23}$$

Above, we discussed whether the market share equivalent in the integrated solution is smaller than the home market share in the segmented case. Here we see that this is not sufficient to ensure consumer surplus gains of integration. With $\rho > 1$, the expression in the first parentheses is less than unity; hence, we need more than a marginal reduction in home market prices to make sure that the overall expression is positive. The reason is, of course, that import prices typically go up, and the fall in home market price must make up for that. As expected the price determination discussed above is essential for the consumer surplus effects of integration. It is not necessarily the case that consumers will gain, although this is often claimed.

3.2.2 PROFITS

It is commonly claimed that as the segmented case allows the firms to price discriminate, whereas that is not possible in the integrated case, profits must necessarily be higher in the segmented solution. This is, however, not correct. Since integration means that no firms are allowed to price discriminate, the whole competitive situation is altered, and profits may go up or down as a consequence of integration. In isolation the fact that a firm cannot price discriminate reduces profits and leads to a reallocation of sales from the former low-price markets (abroad) to the high price market (at home). But since this is true for all firms, the foreigners will reallocate their sales from our market to their own home markets, and this tends to increase our profits. The total effect depends on the exact competitive situation, as the discussion of price determination above clearly indicated. Indeed we have seen that all producer prices may go up, and then profits clearly increase. But even in the more normal case in which the home market price falls and the export price rises, profits may go up since

both markets matter, and since the reallocation of sales between markets saves trade costs for the firm. The numerical results below show that only when there are several firms in each country can we be sure that competition is strong enough to reduce profits and increase consumer surpluses when we go from segmented to integrated markets.

4. NUMERICAL EXAMPLES

In this section we will illustrate the effects of integration along the dimensions discussed above by presenting results from a stylized numerical model. The model is constructed in accordance with the model specification above; there are a number of identical economies trading with each other in markets that are segmented at the outset and then change to being integrated, in the sense that prices can only differ by trade costs. As the economies are identical we focus on prices and welfare effects in one country. Throughout the discussion we look at prices and welfare measured relative to the levels in the segmented equilibrium. Hence, the absolute levels of the variables are not important. Among the parameters that may be important for the results we will mention only two: first, the elasticity of substitution (σ) is set equal to 2 in the initial experiments, but alternatives are studied below. Secondly, the fixed costs of production are disregarded, so that there are constant returns to scale and the profits we report are defined as price less marginal costs. As long as we do not study free entry or exit the fixed costs are not important; they could be included without affecting the results and the profits we report would in that case be the contribution to the fixed costs from the production and sales. Other potentially important parameters are discussed in the experiments.

Table 2 shows the effects of integration between two countries with one firm in each country. Hence, we have the simplest possible textbook version of a model with reciprocal dumping between national "monopolies" at the outset, and we require that dumping is no longer permitted in the integrated solution. There are no biases in demand in this example; hence, the tariff rate is equal to the effective rate of protection, and dumping is related to this

tariff. All trade costs are summarized in the tariff rate; as we do not discuss tariff revenues it is not important whether this is a tariff or a trade cost; it is, however, assumed that the rate stays the same in the segmented and the integrated equilibria.

Effects of integration
Percentage change from segmented equilibrium
(Elasticity of substitution, $\sigma = 2$)

Tariff rate	Integrated relative to segmented			
	Home price	Foreign price	Consumer surplus	Profits
0.0	0.0	0.0	0.0	0.0
0.1	-2.4	2.9	-0.1	0.2
0.2	-4.4	6.9	-0.6	0.7
0.3	-6.0	12.4	-1.6	1.8
0.4	-6.9	20.2	-3.2	3.5
0.5	-6.8	31.8	-5.7	6.1

Table 2

The table shows results for various trade costs (as indicated in the first column). The second and third columns show percentage change in the consumer prices of home-produced good and imports in the integrated equilibrium relative to the segmented one. As expected, the home price goes down and the foreign price rises; the rise in the foreign price is, however, very strong, due to the fact that there is a substantial amount of dumping in the segmented equilibrium.

The next two columns show the welfare effects; the percentage change in consumer surplus and profits, respectively. This example clearly show that the welfare effects are not necessarily as the "conventional wisdom" suggests. In this case, producers gain and consumers lose from integration; and the reason is simply that the segmented case *with dumping* is, in a sense, more competitive than the integrated case; when price-discrimination is no longer possible, it becomes too costly to retain their shares in the foreign market.

From section 3.1, we know that these price results are affected by the composition of T, as well as by the degree of competition in the markets. The welfare consequences of this are illustrated in the next three sub-sections.

4.1 Tariff versus biased preferences

Figure 1 shows consumer surpluses and profits for the model discussed above; we do, however, allow the total tariff equivalent (see (22)) to come alternatively from tariffs or home market preferences or combinations of the two. The tariff equivalent is equal to 0.5 in all the cases; the left hand side of the diagram coincides with the last row in Table 2 with trade cost at 0.5 and no biases in preferences. As we go from left to right the proportion of the tariff equivalent coming from preferences increases, with the extreme right-hand side corresponding to free trade.

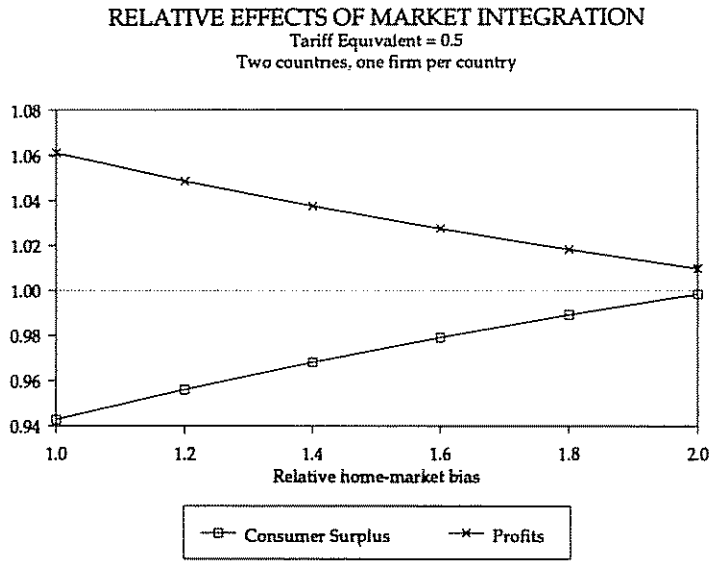

Figure 1

The diagram demonstrates the effects stated in Proposition 1. Going left to right in the diagram, the tariff rate is reduced. Hence, s_{eq} is reduced while s_h is unaltered.

4.2 The number of firms

In Figure 1 it is still the case that consumers lose and producers gain from integration. We know from Proposition 2 that increasing the number of firms will affect the integrated solution relatively more than the segmented one. Figure 2 shows the welfare effect with a larger number of firms ($n = 2$) in each country.

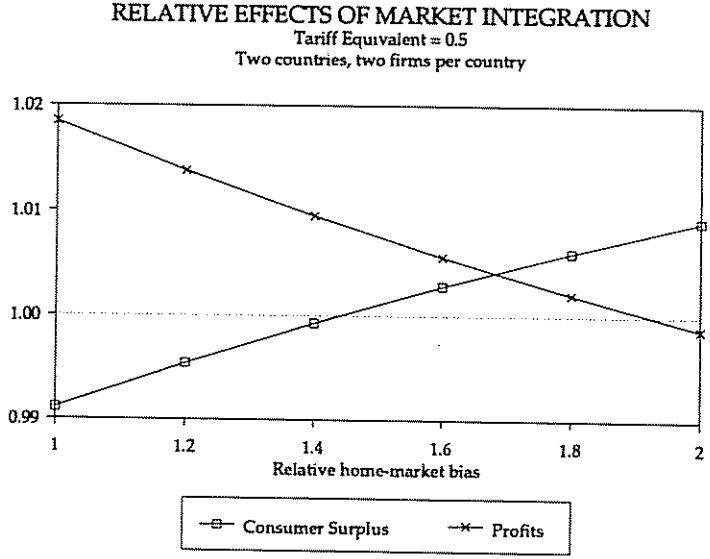

Figure 2

Two effects should be noticed, compared to the previous case. The overall effects in the no-bias case (left-hand side) are smaller than before, as predicted by Proposition 2. Hence, the difference between segmented and integrated equilibrium is smaller. Secondly, we now get situations where consumers gain and producers lose; which is the "conventional wisdom" case in applied analyses of integration. In fact, we also see that it is possible for

both producers and consumers to gain; this is because trade costs are saved when firms switch their sales towards more home market sales. Whether this is a gain for the country as a whole, depends on whether we talk about real trade costs or only income transfers through reduced tariff revenue.

4.3 *Home versus foreign competition*

Figures 1 and 2 and the description of the model in sections 2 and 3 above show that competition as measured by the number of firms in the market is important for the overall effects as well as for the distribution of the effects between consumers and producers: it is, however, also clear that it matters whether the competition comes from home firms or foreign firms. Since all foreign competitors face the trade costs, and hence will tend to lose market shares in our market when they are not allowed to dump, an increase in the number of foreign firms (or in the number of identical countries in the model) does not increase the competitive pressure to the same extent as an equivalent rise in the number of firms in each country would do. This is illustrated in Figure 3, in which two different situations are shown. In both cases the total number of firms in the world is equal to six; one set of lines show the welfare effects if there are three countries and two firms in each. The other lines show the similar effects for the case with two countries and three firms in each country. The results demonstrate how domestic competition is necessary to ensure consumer gains from integration. Again we see that with few domestic firms the integrated equilibrium may be less competitive than the segmented one with dumping, in the sense that profits rise and consumer surplus goes down with integration.

4.4 *The degree of product differentiation*

In the examples so far the elasticity of substitution between the varieties in the industry is two; implying a strong degree of product differentiation. Now examine further how the results depend on the σ. There are two opposing effects from increasing the elasticity of substitution. First, the competitive pressure increases, since there are closer substitutes, and

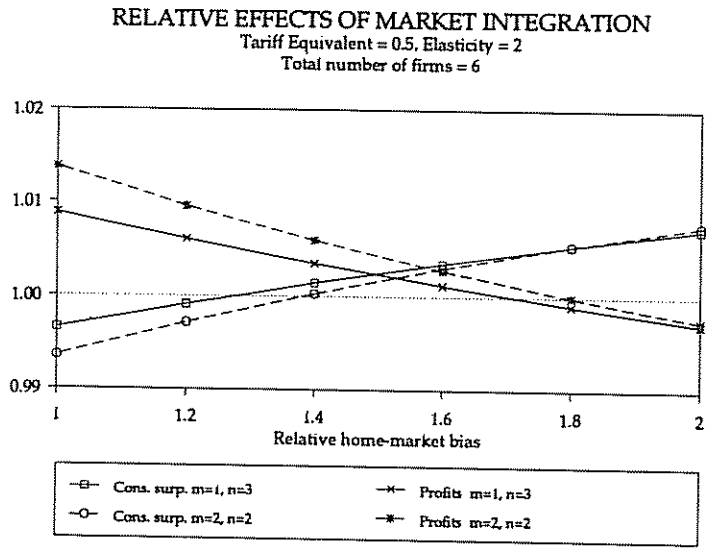

Figure 3

hence less room for price differences. On the other hand, the effects of trade costs and protection are stronger. Integration, with the same producer price in all markets, implies that the consumer prices are forced to differ by the trade costs, and the higher is the elasticity of substitution, the more will demand for foreign goods go down with integration. Hence, if there are only a few domestic firms their market power may increase substantially as a consequence of integration.

Table 3 shows the most extreme example of this. This table is identical to Table 2 except that we now have $\sigma = 5$, rather than 2. There is no bias in preferences in this case, and the results clearly illustrate how integration combined with remaining trade costs may give the domestic firm a market power that it did not have in the segmented equilibrium with dumping.

Effects of integration
Percentage change from segmented equilibrium
(Elasticity of substitution, σ = 5)

Tariff rate	Integrated relative to segmented			
	Home price	Foreign price	Consumer surplus	Profits
0.0	0.0	0.0	0.0	0.0
0.1	-3.1	5.4	-0.5	1.4
0.2	-4.0	14.8	-2.5	5.9
0.3	-0.9	31.9	-7.5	14.4
0.4	10.8	66.7	-18.1	27.3
0.5	43.7	150.1	-36.9	43.4

Table 3

For low trade costs, the development is similar to the one in Table 2; differing only in the magnitude of the changes. For higher trade costs, however, the situation is completely different. At some stage the tariff becomes almost prohibitive for the foreign producer, and the market equilibrium appears to shift from a duopoly to (almost) a domestic monopoly. In this example the change occurs from a trade cost around 0.3: from there on the prices rise dramatically and the changes in consumer and producer surpluses shift accordingly.

Finally, in Figure 4 it is shown that the importance of home firm competition is even stronger when the goods are closer substitutes. The figure is equivalent to Figure 3. The qualitative conclusions are not altered when we increase the elasticity of substitution; the magnitudes of the effects are, however, much stronger.

5. CONCLUSIONS

The effects of market integration, defined as a move from segmented, national markets to an integrated international one, have been central to a number of recent studies of potential gains from the 1992 programme. The expected gains from market integration come from the fact that, at the outset, firms enjoy large market shares and thereby substantial market power

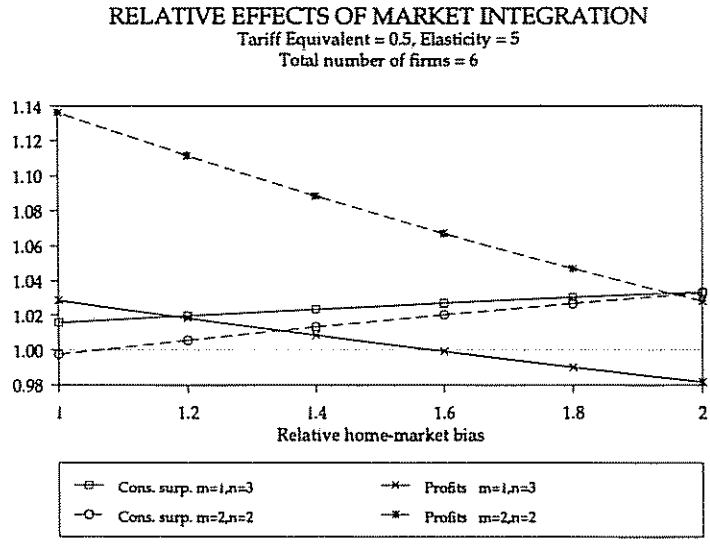

Figure 4

in their home markets, while their export-market shares are much smaller. With integrated markets, a firm's market power depends on its position in the overall market; hence the possibility to exploit its dominant position in its home market is expected to be reduced.

In this paper we show that, while this indeed may be the case, the opposite may also happen. The integrated equilibrium may be one in which the consumer prices of *all* products are higher than in the segmented case. If goods are differentiated and there are trade costs or national preference biases, then the equilibrium in integrated markets differs from that in a single market. Hence, even if the average market share in the overall market is smaller than that in the home market in the segmented case, this is not sufficient to ensure that the price of domestic goods will go down. The point is that, with integrated markets and no dumping possibilities, it becomes more expensive to serve the foreign market, and the competitive pressure from foreign firms (facing a cost or preference disadvantage) will go

down. Hence, even though an integrated equilibrium yields lower prices for home goods than in a segmented case without dumping (if such a case were possible), it does not necessarily yield lower prices than in a segmented equilibrium with dumping; and this should be the relevant basis of comparison. Our results show that the probability for all prices to rise from market integration is greater the higher are the trade costs, the bias in preferences towards home goods, and the degree of concentration in the market (that is, the fewer firms there are).

In applied models of this type, data limitations have meant that preference biases and trade barriers cannot be separately observed. Instead, all that can calibrated is the combined effect, as measured by the tariff equivalent [see, for example, Smith and Venables (1988) and the discussion in Norman (1989)]. This measure has then been allocated arbitrarily between its two components. We have shown that these two components have qualitatively different effects on the integrated-markets equilibrium. Hence, for applied work, it is important to attempt to distinguish between the two.

For welfare assessments, the "conventional wisdom" says that consumers will gain and producers will lose from integration. This is obviously not always true; if all price go up, the reverse is true. However, even in the more "normal" case of a fall in the home-market price, we know that the foreign price will increase, since there are no dumping possibilities. Hence, for consumers to gain we need more than a marginal reduction in the home price, since it must outweigh the rise in the import price.

A similar story applies for the effects on profits. Again, the degree of protection (or preference biases) and the degree of concentration in the markets are the central parameters. Another way to see this is as follows: we know that there is a certain quantity of "wasteful" trade in the segmented equilibrium, and that this disappears in the integrated case. Hence, if trade is costly, there are gains from integration, in the sense that the overall costs go down. The distribution of these gains and, indeed, whether the cost reduction represents a welfare gain at all in a second-best world, depends on how competitive the markets are. With few

firms in each countries, the firms manage to capture the benefits of the fall in costs, and even increase the prices, since the competitive pressure from foreign firms declines. With many firms in each country, any cost reductions are passed through to the consumers.

In this paper we have focused on how integration affects competition; in doing so we have worked with a model with a given number of firms, and in which the firms are symmetric in terms of production costs. There are at least two related topics that may be important. First, with increasing returns to scale, free entry and exit imply that the overall number of firms, and hence the overall production costs, may be affected by market integration. This tends to yield welfare gains through more efficient production. On the other hand, fewer firms implies that the exploitation of market power may go up, and the total welfare effects are not clear. Second, there may be asymmetric costs between firms, and thus elements of trade based on comparative advantage in addition to the intra-industry trade we have studied here. It is not obvious how the exploitation of comparative advantages is affected by market integration; this will have to be a topic for future research.

Of course, in applied models all of these effects are present. Hence, when such models yield large gains from market integration, this may be due to one or both of these alternative effects; even though the story usually told to explain the effects is the one related to market power and increased competition.

REFERENCES

Ben-Zvi, S. and Helpman, E. (1988). "Oligopoly in segmented markets." NBER Working paper no. 2665.

Brander, J.A. (1981). "Intra-industry trade in identical commodities." *Journal of International Economics*, 11, pp. 1-14.

Brander, J.A. and Krugman, P.R. (1983). "A reciprocal dumping model of international trade." *Journal of International Economics*, 15, pp. 313-321.

Markusen, J.R. and Venables, A.J. (1988). "Trade policy with increasing returns to scale and imperfect competition: contradictory results from competing assumptions." *Journal of International Economics*, 24, pp. 299-316.

Norman, V. (1989). "EFTA and the internal European market." *Economic Policy*, October, pp. 423-465.

Smith, A. and Venables, A.J. (1988). "Completing the internal market in the European Community: some industry simulations." *European Economic Review*, vol. 32, no. 7, pp. 1501-1525.

Venables, A.J. (1990a). "International capacity choice and international market games." *Journal of International Economics*, 29, pp. 23-42.

Venables, A.J. (1990b). "The economic integration of oligopolistic markets." *European Economic Review*, vol. 34, pp. 753-773.

Venables, A.J. (1990c). "Trade policy under imperfect competition: a numerical assessment." CEPR Discussion Paper no. 412.