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ABSTRACT

This paper studies the investment creation and diversion effects of the EU's Single Market programme (EU92). We first present empirical evidence which suggests that EU92 caused investment diversion in the European Free Trade Association (EFTA) nations and investment creation in the EU. The economic logic behind this is simple. Discriminatory liberalization shifts production of tradable goods from nonintegrating countries to the integrating region. Since tradable sectors are capital intensive relative to nontraded sectors, the production shifting raises the rental rate in the integrating regions, lowering it elsewhere. Investment creation and diversion is the result. To simulate what would have occurred if the EFTAns had never gained access to EU92 (via EU membership or the European Economic Area), we employ a computable general equilibrium model with endogenous capital stocks. The results show a modest drop in EFTA capital stocks when they are excluded from EU92, but an important rise (almost 5%) when they are included. In terms of real income, the difference between the included and excluded cases is quite large for the EFTAns (5.5% of GDP). In all cases, the EU experiences investment creation and income gains. The effects on the US and Japan are trivially small, but mostly negative in terms of capital stocks and real income.

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INVESTMENT CREATION AND INVESTMENT DIVERSION: SIMULATION ANALYSIS OF THE SINGLE MARKET PROGRAMME

1. Introduction

The European Union's Single Market programme altered commercial realities in Europe by making it easier for firms based in one EU market to compete in other EU markets. This had a generally positive effect on EU economies, yet because the programme initially applied only to EU nations, it unintentionally threatened firms based nonEU nations. The threat is easy to understand. By lowering the cost of doing business on an intraEU basis, without lowering costs for nonEU firms, the programme altered the relative competitiveness of EU and nonEU firms in EU markets. This loss of competitiveness constituted a severe problem for the nations of the European Free Trade Association (EFTA) since 60% of EFTA exports go to EU markets.

Many EFTA firms decided to adjust by becoming EU-based firms. The result was a well-documented outflow of direct investment from EFTA nations to EU nations.[1] Moreover after 1989, total investment in the EFTA countries slumped faster and farther than it did in EU nations and the Single Market programme may have had something to do with this. EFTAns also experienced a deeper and longer recession than the EU nations. In stark contrast, the two European economies that were rapidly integrating with the EU during the mid to late 1980s - Spain and Portugal - experienced exactly the opposite pattern. Net foreign direct investment flowed in at an increasing pace, and they experienced investment-led surges in their GDP growth.

Of course, many factors were responsible for these trends. One factor that is often mentioned, however, is the impact of the Single Market programme. That is, it is asserted that the closer integration of the EU economies diverted investment from European nations that did not participate and created investment in those that did.

This paper is an attempt to investigate the investment creation and diversion effects of the Single Market. The paper has 6 sections, beyond the introduction. Section 2 presents details of the Single Market programme, the European Economic Area (EEA) agreement and the prima facie case that investment creation and diversion did occur in Europe in the 1980s and early 1990s. Section 3 presents a simple, illustrative model that allows us to trace out the economic channels by which closer integration in the EU could trigger investment creation and diversion. While the illustrative model is useful, the assumptions that are necessary for tractability imply that it has very few points of contact with the real world. Section 4 discusses a slightly modified medium-sized simulation model, the Haaland-Norman model (Haaland and Norman 1992). This model is far too complex to study analytically, however it does bare a closer resemblance to the world economy than the illustrative model. Section 5 discusses the simulation results from the following scenarios. We simulate the effects of the 1992 Single Market Programme (EU92) on EFTA and EU economies - including the steady-state capital stocks - when EFTA is excluded from EU92 and when it is included. The final section presents some concluding

[1] See Oxelheim (1994) and Andersson and Fredriksson (1993).

remarks.

2. The Prima Facie Case for Investment Diversion

This section presents evidence that suggests that the Single Market programme might have led to investment creation and diversion. The evidence is far from conclusive and indeed no formal tests are performed The point of this section is to provide an empirical basis for the belief - widely-held in EFTA nations during the late 1980s and early 1990s - that the Single Market favoured investment in the EU at the expense of EFTA.

2.1 The Single Market Programme: Policies and Chronology

In 1985 Jacques Delors took office with the intention of rekindling European integration. His chosen vehicle was a massive microeconomic liberalization aimed at turning the common market into a single market. Vickerman (1992) and Emerson (1988) provide a detailed list of the policy measures, but in general terms the programme consisted of three elements. Goods trade liberalization, factor trade liberalization and general deregulation and promotion of competition. The main elements of the trade liberalization involve streamlining and/or elimination of border formalities, liberalization of government procurement, and mutual recognition of technical standards in production, packaging and marketing (with minimum harmonization). The principal element of factor trade liberalization consisted of increased capital market integration, liberalization of cross-border market-entry policies (rights of establishment, etc.), including mutual recognition of approval by national regulatory agencies. Lastly, although not formally part of the 1992 package, the European Commission engaged in a tighter enforcement of existing policies concerning anti-competitive practices and state aids to industry.

The lack of opposition to the single market measures stimulated the Commission to pursue liberalization of sectors excluded from the Single European Act. Although these are not strictly speaking part of the 1992 programme, they have affected or soon will affect the operation of the single market. These extra sectors include air transport, telecommunications, energy, and insurance.

As far as this paper is concerned, the main implication of the Single Market was that it made it easier for EU-based firms to compete in other EU markets. It did not, however, do the same for firms based in nonEU countries. In the late 1980s, this was especially difficult for firms based in EFTA nations since the EU market was very important to them.

The timing of events from the mid 1980s to the mid 1990s is critical to understanding the prima facie evidence we present below. The sequence, which is somewhat involved, concerns three types of policy changes: the adoption and implementation of EU92, the Iberian enlargement of the EU, and the EFTAns' evolving response to EU92.

Chronology of the European Integration since 1985 The first formal step towards the Single Market programme was a June 1985 White Paper by Lord Cockfield. This listed

282 measures necessary to complete the single market. The treaty that implemented these measures (along with many other changes) was the Single European Act. This was signed in February 1986 by EU heads of government. After being ratified by all member state parliaments, it came into force July 1987.

Adopting the Single European Act, however, was far from sufficient for the creation of a single market. Most of the measures had to be adopted individually by member states since they often involved detailed changes in existing member state legislation. This process is still going on, although most member states have adopted most of the measures. Additionally, the Single Market programme continues to develop. New measures and initiatives are being added continuously.

It is important to note that until the late 1980s, many analysts were very sceptical about the likelihood of the Single Market programme being implemented on time. Pointing to the many other major EU initiatives that had failed (eg several monetary arrangements), these observers suggested that widespread opposition from domestic special interest groups would delay or dilute EU92. Consequently, the credibility of the Single Market gradually grew as more measures were passed by member state parliaments.

Chronology of the Iberian Enlargement Accession talks with the countries from the Iberian peninsula, Spain and Portugal, began formally in 1980. These accession talks were quite difficult and lasted six years. Nonetheless, from as early as 1984, a successful conclusion was widely anticipated.

Chronology of the EEA and the EFTA Enlargement The Single Market's threat was recognized even before the White Paper was adopted and in the mid 1980s, EFTA governments had decided that they must react. The idea of countering the threat with a new plurilateral agreement was first suggested at a meeting of EFTA and EU ministers in Luxembourg in 1984. This produced the so-called Luxembourg Declaration, but the difficulties of such an initiative, and the EU's preoccupation with the Single European Act and the Maastricht Treaty led to long delays. Negotiations were at a standstill until January 1989 when Jacques Delors proposed the European Economic Area agreement (initially called the European Economic Space agreement). Talks on the EEA began informally in 1989, continuing more formally in 1990 and 1991.

The first version of the EEA was signed in 1991. It was, however, rejected by the European Court of Justice in December 1991. The Court ruled that this first version was inconsistent with the Treaty of Rome. The problem was the so-called EEA Court, which was supposed to have jurisdiction over Single Market cases involving EFTA and EU firms. This was found to violate the primacy of the European Court of Justice over all EU legal matters. To get around this, a new EEA was devised with an awkward 'two pillars' legal system.[2]

Negotiations were reconvened and the second version of the EEA was signed 2 May 1992 in Oporto. While acceptable to the European Court, it was rejected by Swiss voters in a

[2]See Baldwin (1994 pp 13-15) for details.

December 1992 referendum. Since this version of the Treaty presumed all EFTAns would join, the Swiss "no" required a technical rewriting of the agreement. More importantly, the EEA obliged the EFTAns to make financial transfers to poor EU regions, so withdrawal of Switzerland also forced a renegotiation of the size of these transfers.

The final version of the EEA was signed in 1993, with implementation starting in January 1994.

Two aspects of the EEA are truly extraordinary. First, the EEA is unbalanced as to the rights and obligations of EFTAns when it comes to future EU legislation. In essence, it forces the EFTAns to accept future EU legislation (the *Acquis Communautaire*) concerning the Single Market, without formal participation into the formation of these new laws.[3] Second, the EEA creates a good deal of supranationality among the EFTAns.[4] This supranationality is extraordinary for two reasons. First, it was the EU that imposed this supranationality on the EFTAns to simplify the task of keeping the Single Market homogeneous. Second, the EFTAns have resisted such supranational authority since the end of WWII, so it is astounding that they said they would accept it.

As it turns out, few of the EFTAns were willing to live with the EEA. Even before the final version was adopted, all the EFTAns (except Iceland and Liechtenstein) had applied for full EU membership. Applications were received from Austria (July 1989), Sweden (July 1991), Finland (March 1992), Switzerland (May 1992) and Norway (November 1992). For these countries, the EEA was viewed as a transitional arrangement, not a long term solution. Note that the EU froze the Swiss application in response to the negative outcome of their EEA referendum and Norwegian voters rejected membership in November 1994.

As of 1995, the EU side of the EEA consists of 15 countries (population 367.5 million) while the EFTA side consists of two micro-states Liechtenstein and Iceland (populations 0.03 and 0.3 million respectively) and Norway with its 4.3 million citizens.

2.2 The Prima Facia Case

Investment is difficult to explain empirically since expectations are notoriously difficult to account for empirically, yet they are at the very heart of the investment decision. The importance of this is that investment flows may respond before policy changes actually occur and may respond to changes in the private sector's opinion about the viability of policy changes. Keeping this in mind, we look at three types of evidence: Net foreign direct investment (FDI) flows, net FDI flows disaggregated by source and destination, and

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[3] See Baldwin (1994) for further analysis of the EEA Agreement. The *Acquis Communautaire* is the term for primary EU law. This includes the Treaty of Rome, subsequent treaties and secondary law adopted under the Treaty of Rome. This concerns regulations, directives and decisions as well as the relevant case law of the EU Court of Justice. Each year approximately 2,000 new legal acts, decisions and directives are added to the *Acquis*.

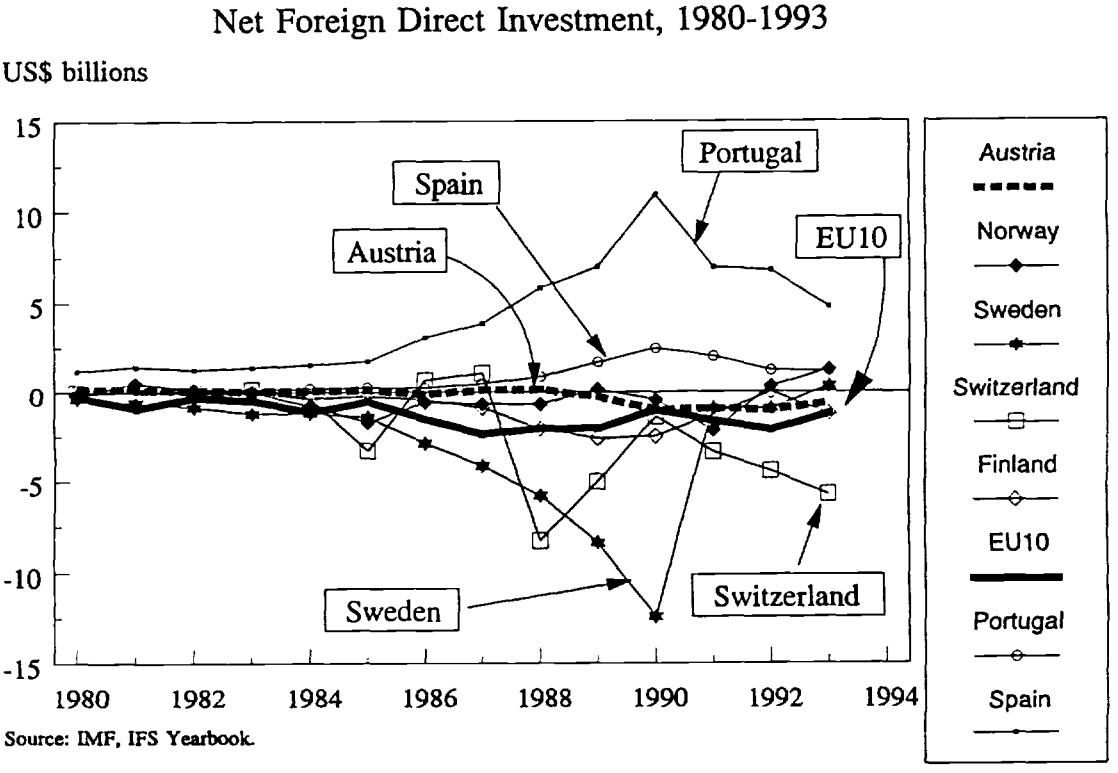
[4] See Baldwin (1994) Chapter 1 and CEPR (1992) for details.

total investment to GDP ratios. This evidence is not conclusive, but it does suggest that there is a phenomenon worth looking into.

2.2.1 Net Foreign Direct Investment Flows

The first piece of evidence that EU92 programme caused investment diversion in the EFTA nations is presented in figure 1. This shows net foreign direct investment flows (positive numbers indicate a net inflow) for the EFTA5 (Austria, Finland, Norway, Sweden and Switzerland), Spain and Portugal, and the average of the EU10 (France, Germany, Italy, Great Britain, Belgium, the Netherlands, Luxembourg, Denmark, Ireland and Greece). The EU10 (shown with a heavy solid line) includes the bulk of the output and purchasing power in European economy, so we can think of its behaviour as a sort of

Figure 1



control. That is, apart from issues of European integration and idiosyncratic national shocks, the Iberians and EFTAns should have roughly been subject to the same macroeconomic shocks as the EU10 and should therefore have experienced roughly the same FDI paths.

Given this, the widely differing behaviour of FDI flows is very suggestive. Roughly speaking, those nations that participated, or were expected to participate, in EU92 experienced rising net FDI inflows. Those that did not participate experienced deterioration of their FDI balances until their governments took actions that made it likely that they would participate. FDI flows continue to worsen for the only West European

nation, namely Switzerland, which has not arranged to participate in the Single Market. The break point seems to come in 1987, the year the Single European Act was ratified by all member state parliaments.

The behaviour of the Iberian aggregate provides the clearest evidence of FDI creation. These nations experienced above average FDI inflows throughout the 1980s and early 1990s. There also appears to be a rise in the rate between 1987 and 1990. A similar, but muted pattern occurs in the EU10 as a whole. Although they started from a negative position, they experienced a mild upward trend around in 1987

In contrast, the figures for most EFTAns turned sharply downwards in 1987 or 1988. While there may be other explanations, it is highly suggestive that the EFTAns' direct investment flows turned around in the year that the negotiations that eventually led up to the EEA agreement were announced in January 1989.

2.2.2 FDI Flows by Nation

Studying the individual EFTAns' FDI figures provides additional information since the EFTA economies did not all adjust in the same way to the Single Market's threat. However before turning to the country FDI data, it is important to understand that the EFTAns are far from homogeneous economically. Table 1 shows that Switzerland, Sweden and Austria are the largest EFTA economies, together accounting for 73% of all

Table 1 : Economic Indicators of the EFTA 6

	Austria	Finland	Iceland	Norway	Sweden	Switzer-land
Share of EFTA-6 total GDP	19%	14%	0.7%	12%	27%	27%
Population (millions)	7.8	5.0	0.3	4.3	8.6	6.9
Manufacturing GDP share	25%	24%	18%	14%	22%	25%
Exports to EU12 as % of GDP	17%	9.2%	16%	21%	13%	16%
Manufactures as % of total Exports	91%	85%	14%	40%	86%	95%

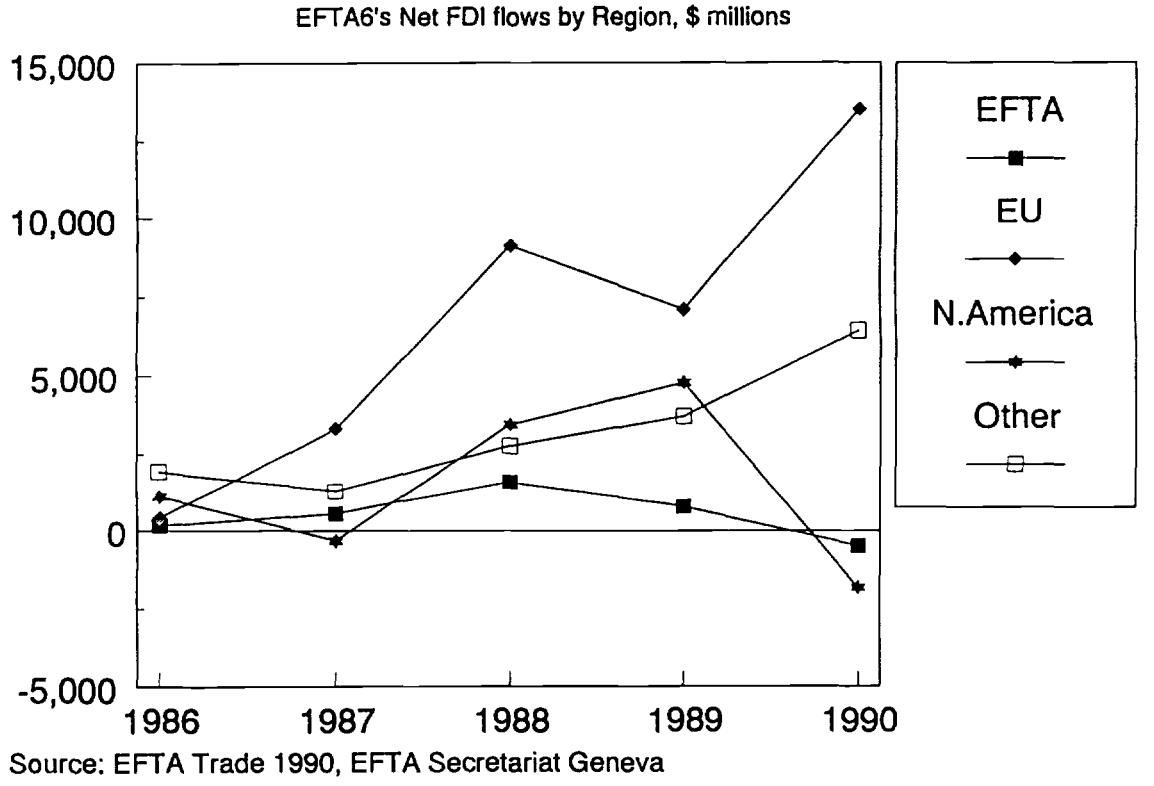
Sources: World Bank, World Tables 1993 and EFTA Trade 1991. Data for Liechtenstein (population 29,000) is included in Swiss data.

EFTAns' output. These three and Finland rely heavily on manufacturing, while Iceland and Norway depend more on natural resources. Since the EU92 programme affects the manufacturing sector more heavily than natural resource-based industries, the experiences of Switzerland, Sweden, Finland and Austria are particularly relevant. Finally, notice that the EU market is much less important for Finland than the other economies, reflecting Finnish trade with other Nordics and with Eastern Europe (figures are from 1991).

The EFTAns also differ in their policy response to the Single Market's threat. At one extreme, Austria applied for membership as early as 1989. Since there was a strong possibility that they would join the EU eventually, Austrian industry experienced much less uncertainty than that of other EFTAns over the solution to the Single Market's threat. At the other extreme, Switzerland's rejection of the EEA and the freezing of their application has created continuing uncertainty over their competitiveness in EU markets.

The Swedish data in figure 1 shows the clearest evidence of FDI diversion. Swedish flows were negative in the early 1980s, however the magnitude of the outflows increased sharply around the time that EU92 was adopted. The flows turned around quite clearly between 1990 and 1991. As usual, many factors were at work, but it is suggestive that the

Figure 2



Source: EFTA Trade 1990, EFTA Secretariat Geneva

Swedish membership application was handed in mid 1991. By 1993, Sweden had become a net importer of FDI. Finnish data show a similar pattern, although it the changes are somewhat muted. This may be partially because a lower fraction of Finnish exports consists of manufactured products, so they are less effected by EU92.

The Austrian case is more muted still, as might be expected given that their 1989 EU membership application received widespread popular support. Austrian FDI fluctuated around zero until 1988, at which time it turned negative and remains negative up to the end of the available data series. A slow improvement, however, is apparent from 1990 onwards.

The Swiss case is especially interesting. Switzerland is now the only West European country that does not have access to the Single Market. The Swiss government had put in an EU membership application before this, but the EU Commission ruled that rejection of the EEA amounted to a rejection of membership. The Swiss figures are also quite noisy, but there is some evidence of FDI diversion after 1990. Note that the referendum results were widely anticipated. Norway's investment figures, which are dominated by the idiosyncratic oil and shipping industries, are quite noisy.

2.2.3 Bilateral FDI Flows

The data on FDI flows by source and destination are quite sketchy. Data reaching back to the 1970s is available for some nations (Austria and Finland). It was collected in Switzerland only since 1986 so aggregate figures can be had only from 1986. Figure 2 shows the net bilateral flows from the EFTA6 to other EFTA countries, the EU, North America and the rest of the world. The fact that EFTA's flow to itself is not zero, gives us some idea of the imperfections in this data.

The evolution of the bilateral FDI balance with the EU is the most relevant feature of the figure. Starting from a position of approximate balance in the mid-1980s, EFTA turned into a net exporter of capital to the EU. EFTA's balance with the rest of the world also increased, however not as sharply. In contrast, EFTA's balance with North America became slightly negative.

2.2.4 Gross Fixed Investment Flows

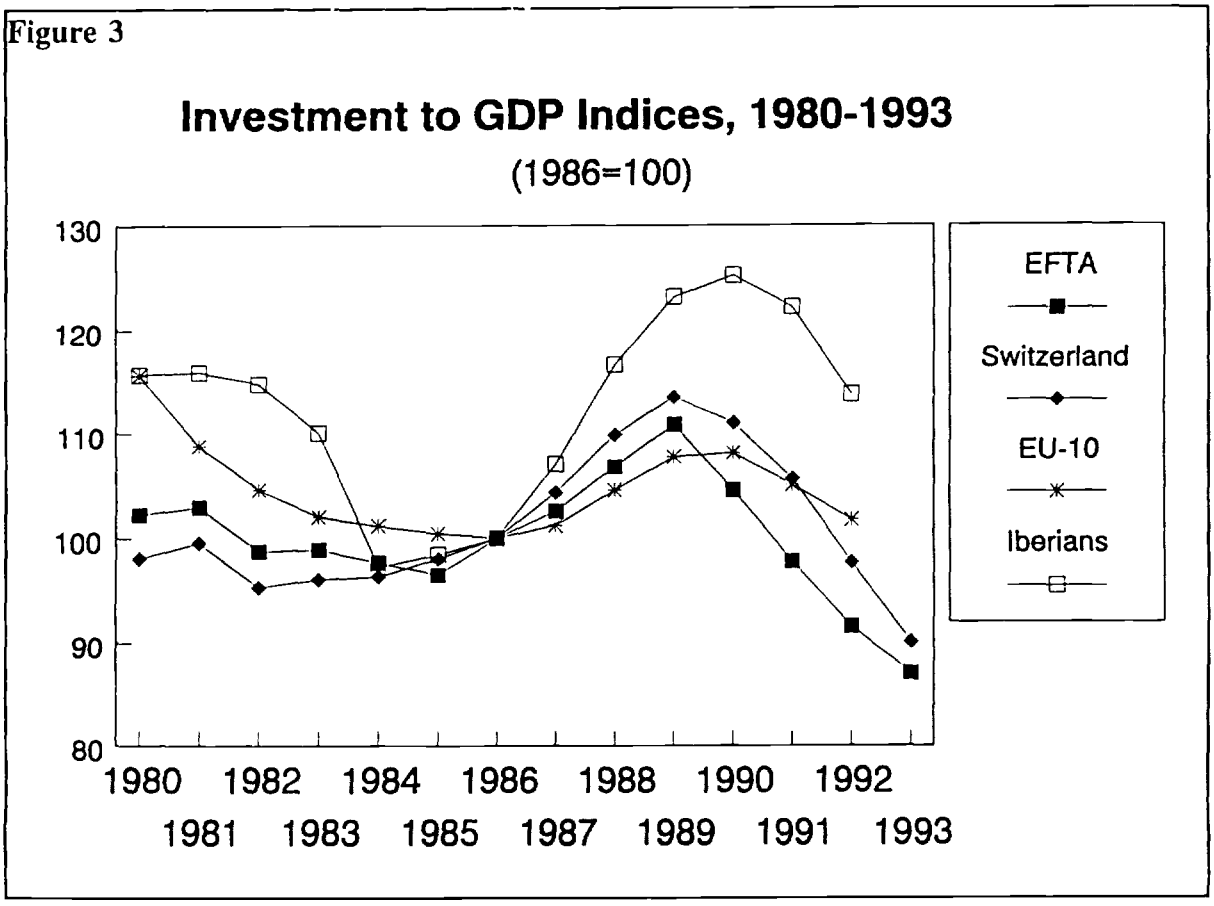
The data that we have reviewed so far has dealt only with a specific type of international capital flow. This seemed to indicate that the EU and especially Spain and Portugal had become relatively more attractive locations for investment. However, FDI is only a fraction of the total investment. For instance, at its maximum net FDI inflows amounted to 2% of the Iberian's GDP, while their gross fixed capital formation to GDP ratio was about 23% of GDP. Thus, if investment creation and diversion are to have large effects on a nation's medium term growth rate, then it must also affect domestic investment. This is what we turn to next. As we shall see, the evidence of investment diversion in the EFTA economies is much less clear, although evidence for investment creation in the Iberian economies is quite strong.

Figure 3 shows the time paths of total investment (gross fixed capital formation) as a ratio of GDP. To emphasis the changes in the levels, all ratios are rebased to 100 in 1986, which is the year that the Single Market programme was adopted and the Iberians acceded to the EU. First, reflecting the general macroeconomic upswing of the late 1980s, all investment ratios rose (investment is pro-cyclical). Notice that the Iberians experienced a rise that was well above that of other European economies. Although it has fallen since 1990, the cumulative rise is certainty still positive. The EFTAns' ratios also rose more than that of the EU10, during the late 1980s, however starting in 1990 their investment

ratios declined much more steeply than that of the EU10 or the Iberians.

Again this provides weak evidence that EU92 improved the investment climate in those countries that participated in it, and worsened the climate in the countries that did not participate. This evidence, however, is greatly clouded by macroeconomic events. Most EFTAns experienced a three-year recession starting in 1990 or 1991. It is hard to tell whether the output fall lowered investment or vice versa. Moreover, these EFTA recessions were longer and more severe in those in EU nations. While some of this may be related to EU92, most analysts cite purely domestic factors (eg domestic interest rate policies) as the main explanation of the EFTA recessions.

Figure 3



3. An Illustrative Theoretical Model

In this section, we present a simple model that helps us organize our thinking about the investment diversion and investment creation effects of closer integration in the EU. At the end of this section we discuss the logical links in our model that are essential for our main results. This will make it obvious that theoretical implications are more general than the model. Since the purpose of the theory in this paper is to boost understanding of real-world events rather than to explore the limits of an existing theoretical framework, we do not undertake the important task of formally characterizing the class of models in which our main results hold.

3.1 Basic Model

Consider a model with three symmetric countries (denoted as H, P and R for home, partner and rest of world), each with two factors and two sectors. One sector (the X sector) is marked by decreasing average costs, imperfect competition between differentiated products in segmented markets and free entry. The other sector (the Z sector) is a homogeneous product produced under constant returns by perfectly competitive firms. Trade in X is hindered by frictional trade barriers of the 'iceberg' type, with τ_i^j being the tariff-factor equivalent of the barrier hindering the sale of goods made in country i and sold in j (i.e., $\tau_i^j \geq 1$, $\tau_i^i = 1$, $\forall$ i, j). Trade in Z is unhindered by manmade or natural trade barriers. Countries' labour supplies are fixed, but investment and therefore the capital stocks are endogenous.

Preferences for the representative consumer in a typical country are given by a two-level utility function. The top level is the natural log of a consumption index C, where C is a Cobb-Douglas index of X and Z, X is a CES index of all industrial varieties and Z is the quantity of a homogeneous good. Namely,

$$U_j = \int_0^\infty e^{-\rho t} \ln C(t)\,dt \;, \quad C = C_X^{\alpha} C_Z^{1-\alpha} \;, \quad C_X = \left(\sum_{i=1}^{N} c_{Xi}^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}} \tag{1}$$

where N is the total number of varieties produced globally (the summation runs over all industrial goods since we assume that trade barriers are low enough to ensure all goods are sold in all countries), c_{Xi} and ρ are consumption of variety i and the subjective discount rate respectively. Where clarity permits, we drop the time argument to lighten the notation. For welfare calculations and various other purposes, it is convenient to express the instantaneous utility function in its indirect form. The indirect utility function for a typical country is V[E,P] = ln(E/P) where the E is national consumption expenditure and P is the perfect price index. We take consumables C as numeraire, so P=1.

The preferences permit two-stage utility maximization. The first stage determines the optimal time path of consumption expenditure, E. The second determines the optimal temporal allocation of E. With free entry, national income is rK+wL, where r and w are

the prices of capital K and labour L. Thus, the Hamiltonian for the first-stage is:

$$H[E,K,\lambda,t] = e^{-\rho t} \ln(E/P) + \lambda[rK + wL - E] \tag{2}$$

The standard necessary conditions that characterize the evolution of the state variables K and λ are:

$$\frac{\partial H}{\partial E} = 0 \quad <=> \quad e^{-\rho t}(P/E) = \lambda P$$

$$\dot{\lambda} = -\frac{\partial H}{\partial K} \quad <=> \quad \dot{\lambda} = -\lambda r \tag{3}$$

$$\textit{law of motion} \quad <=> \quad \dot{K} = Y - E$$

$$\textit{transversality condition} \quad <=> \quad \lim_{t \to \infty} \lambda(t)K(t) = 0$$

With some manipulation (involving total differentiation of the first necessary condition with respect to time and using the second condition to eliminate λ from the system), we transform these into a two-equation system with E and K as the state variables, namely:

$$\frac{\dot{E}}{E} = r - \rho \,, \quad \dot{K} = Y - E \tag{4}$$

These are the standard Euler equation and K's law of motion. In steady state, r equals ρ and income equals expenditure.[5]

The second stage of utility maximization defines the demand functions for a typical X variety and Z taking E as given.

Technology is defined by the Z and X sector cost functions:

$$(\phi + x)\, b_X[w,r] \qquad b_Z[w,r]\, Z \tag{5}$$

where b_X and b_Z are the marginal cost functions and w and r are the nominal prices of labour and capital services. The marginal cost functions are defined as:

$$\begin{pmatrix} b_X[w,r] \\ b_Z[w,r] \end{pmatrix} \equiv A \begin{pmatrix} w \\ r \end{pmatrix}, \quad A \equiv \begin{pmatrix} a_{xL} & a_{xk} \\ a_{zL} & a_{zk} \end{pmatrix} \tag{6}$$

where A is the matrix of constant unit input coefficients.

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[5]In a model with an exogenous force driving growth, the steady state growth rate and the evolution of the price index would enter the steady-state condition.

X sector firms choose a price in each market to maximize profits, ignoring the impact of their pricing decisions on aggregate variables (the price index and total expenditure). This implies that the perceived elasticity facing each X firm in each market is σ. With a fixed markup (equal to $\sigma/(\sigma-1)$), each firm needs to sell exactly:

$$\bar{x} = \phi(\sigma - 1) \tag{7}$$

units to cover its fixed cost. Notice that $\bar{x}$ is invariant to trade policy.

In the Z sector, perfect competition and constant returns renders firm size indeterminate. As usual, the indeterminacy is removed by treating the entire output of each nation's Z sector as being produced by a single price-taking firm.

Investment is quite literally assumed to be foregone consumption in this model. When we assume no international capital mobility, the national capital stock evolves as:

$$\dot{K} = Y - E \qquad s.t. \qquad Y = rK + wL + n\,\Pi \tag{8}$$

where Y and Π are national income and the profit of a typical industrial firm respectively. Note that free entry forces Π to zero in equilibrium. These relationships hold at all moments in time. We have dropped the time argument to lighten the notation.

3.2 Symmetric Steady-State Equilibrium

Focusing on the symmetric equilibrium, the equilibrium marginal costs in the X and Z sectors are given by (6). Given the competition assumptions, the producer prices of a typical X variety and Z are:

$$\begin{bmatrix} q_X \\ q_Z \end{bmatrix} = \begin{bmatrix} \dfrac{\sigma}{\sigma - 1} & 0 \\ 0 & 1 \end{bmatrix} \begin{bmatrix} b_X \\ b_Z \end{bmatrix} \tag{9}$$

Consumer prices are proportional to producer prices where the factor of proportionality is the trade cost that must be incurred. Note that this is zero for all Z sales and home market sales of X goods; for export sales of X varieties it is the trade cost τ.

With symmetric countries, all countries produce some of both Z and X. Notice that since Z is freely traded and r equals ρ in all nations, (6) implies that the w's are also equalized across nations. Consequently, all marginal costs and therefore all producer prices are equalized across nations.

Given that firm output is fixed by the zero profit condition, we can find the equilibrium number of varieties and Z production per country as a function of national labour and

capital stocks:

$$\begin{bmatrix} (\phi + \bar{x})n \\ Z \end{bmatrix} = (A^T)^{-1} \begin{bmatrix} L \\ K \end{bmatrix} \tag{10}$$

This expression turns out to be quite useful. Notice that if we know K and L in each nation, then we can uniquely determine that country's n and Z. Conversely, if we know what n must be and assume that L is fixed, then we can uniquely determine what K and Z must be. In particular, since we assumed that X is capital-intensive, if a nation's n rises (with no change in L) then its K will rise and its Z will fall.

The equilibrium number of firms is simple to derive. It is easy to show that a firm's operating profits (total profit gross of fixed costs) are simply $1/\sigma$ times consumer expenditure of its goods. Given the symmetry of countries and firms, it is obvious that consumer expenditure per variety is $\alpha E/n$ where E and n are the typical expenditure and the number of firms in each nation. Zero profits requires that n is such that $\alpha E/n$ equals fixed cost times σ.

3.3 Discriminatory Liberalization and Investment Diversion

Consider the impact of forming a perfect economic union between the H and P countries. This turns the three-symmetric country model into a two asymmetric-country model. In particular, one country - which we call the economic union (EU) - has twice the population of the R country.

3.3.1 The Simplest Case: Perfect International Capital Mobility and Repatriated Profits

It is easy to show that as long as factor price equalization holds, the global number of varieties of X goods implied is invariant to changes in τ.[6] Consideration of this result and the fixity of labour stocks implies that the world capital stock is invariant to changes in τ. The importance of this fact is the following. If we assume that capital is perfectly mobile internationally and that all payments to foreign capital are repatriated (i.e. spent in the capital's country of origin), then the changes in capital stocks do not alter expenditure patterns. The only impact of protection will be on the location of X-sector production.

Production Shifting With all this assumed, we now turn to the analysis. We start by looking at the production shifting effect, i.e. the fact that regional liberalization of the X sector tends to shift production of X into the liberalizing region. Denoting the equilibrium operating profit, n's and E's for a typical EU country as $O\Pi_{EU}$, n_{EU} and E_{EU}, and the corresponding variables for the ROW country as $O\Pi_{ROW}$, n_{ROW} and E_{ROW}, the post-

[6]Operating surplus is proportional to sales in this model and expenditure on each sector is fixed by the Cobb-Douglas preferences. Consequently total operating surplus - and therefore the number of fixed costs that can be paid for - is invariant to trade policy.

integration free entry conditions are:

$$\phi b_X = O\Pi_{EU} = \frac{1}{\sigma}\left(\frac{2\alpha E_{EU}}{2n_{EU} + \tau^{1-\sigma} n_{ROW}} + \frac{\tau^{1-\sigma}\alpha E_{ROW}}{n_{ROW} + 2\tau^{1-\sigma} n_{EU}}\right)$$
$$\phi b_X = O\Pi_{ROW} = \frac{1}{\sigma}\left(\frac{2\tau^{1-\sigma}\alpha E_{EU}}{2n_{EU} + \tau^{1-\sigma} n_{ROW}} + \frac{\alpha E_{ROW}}{n_{ROW} + 2\tau^{1-\sigma} n_{EU}}\right) \quad (11)$$

Recall that before integrating, $n_{EU}=n_{ROW}$. The first thing to do is to check whether this division is still an equilibrium in the postintegration steady state. To this end, we ask whether (11) holds when all E's and n's are equal to the preintegration levels. Keeping in mind the fact that $\tau^{1-\sigma}$ is less than unity, inspection of (11) reveals that if $n_{EU}=n_{ROW}$, then $O\Pi_{EU}$ would be greater than $O\Pi_{ROW}$. Since this would violate the equality between operating surplus and F in one or both regions, it cannot be that the EU has two-thirds of the X varieties.

Intuition for this result is as follows. The integration leads to an incipient change in a typical EU firm's sales. If the n's and E's are unaltered then there would be no change in its sales to the ROW market. The discriminatory liberalization would, however, lower its home market sales and expand its intra-EU export sales. The important point is that the rise in intra-EU export sales outweighs the loss of home market sales. This happens since the price of all EU-produced goods falls relative to that of nonEU goods. Thus, all EU firms gain in sales from the loss of relative competitiveness experienced by ROW firms. Obversely, ROW firms experience no change in home sales, but experience an unambiguous loss of export sales. Since operating profits are proportional to sales and were initially equal to F, this incipient change in sales would produce pure profits for EU-based firms and pure losses for nonEU firms. Clearly this would result in a rise in the number of EU firms and a drop in the number of ROW firms. The total number of varieties produced worldwide does not change. Another way to say this is that the discriminatory liberalization has induced production shifting in the X sector with n_{EU} rising and n_{ROW} falling.

Investment Creation and Diversion Finally we are ready to turn to investment creation and investment diversion. From (10) we see that the increase n_{EU} would cause the EU's capital stock to rise because X is capital intensive. This is investment creation. The decrease in n_{ROW} would lower ROW's capital stock. This is investment diversion. In fact in the simple model at hand, we could think of this as a pure diversion scenario, since the net result is nothing more than a reallocation of a constant global capital stock.

Notice that investment creation and diversion are accompanied by a change in the trade pattern. The EU becomes a net exporter of X and an importer of Z.

3.3.2 No International Capital Mobility

Now we switch to the other polar assumption of no international capital mobility. Here, similar changes in n's and K's will occur, but there are two important differences. First

since the induced capital formation in the EU must come from domestic savings, the EU's income as well as output would change. Second, since expenditure equals income in steady state, the investment creation and diversion will shift expenditure patterns. This is important since it will kick off a 'circular causality' of the type discussed in the economic geography literature (Krugman, 1991). The first half-circle is the expenditure shifting effect of the production shifting. The second half-circle concerns the way in which expenditure shifting tends to lead to more production shifting. The net result is that the total production shifting, and therefore the total investment creation and diversion, is amplified. Depending upon parameter values, this circular causality may lead all firms to leave ROW. This is the core-periphery outcome that has been heavily emphasised in the economy geography literature. As Krugman (1991) demonstrates, using a model not too unlike our model, this extreme result depends upon scale economies being strong enough and trade costs being low enough. Here we assume that parameters are such that both regions continue to produce some X and Z goods.

It is interesting to consider the impact of the integration, when capital stocks are fixed in the short run. From the full employment conditions, fixity of K and L implies fixity of n and Z. Thus, the integration cannot lead to production shifting immediately. The incipient production shifting appears as a shift up in the EU's derived demand for capital and a shift down the ROW's demand for capital. The result is a short run increase in r_{EU} and a short run fall in r_{ROW}. The nominal EU wage should fall and that of the ROW should rise, due to free trade in Z. The impact on the real wage in the EU is ambiguous, since the price of X goods tends to fall due to the reduction in intra-EU trade costs. Real wages in ROW should unambiguously rise in the short run, since there is no immediate change in goods prices.

3.4 Generality and Ambiguities

Our main result is that discriminatory trade liberalization will raise the steady-state capital stocks in the integrating countries and reduce it in excluded country. The economic logic of this is simple. Trade policy changes typically shift a nation's derived demand for capital and labour. If labour stocks are fixed, the result are factor price changes à la Stolper-Samuelson. If the capital stock is endogenous, then the result is induced capital accumulation or decumulation. In general the mapping between trade policy changes and the derived demand for capital is extremely complex. In the highly structured illustrative model, the map is easily characterized. While this was useful for fixing ideas, it is certainly too simplistic to provide a useful description of the real world.

There are three important sources of ambiguity. The first has to do with the existence of more than two factors. Once we allow for capital, skilled and unskilled labour then the mapping between trade liberalization and the demand for capital becomes ambiguous. Indeed, all we can really say is that when factor supplies are held constant at least one factor will experience a rise in its demand and at least one will experience a fall.

The second concerns the existence of more than two sectors. The discriminatory liberalization raised the relative price of ROW X-sector exports to the EU and so forces a change in the ROW trade and production pattern. In the simple model the Z sector was the only alternate use for ROW resources, so ROW labour shifted into the Z sector. This reduced the overall demand for ROW capital and thereby induced a reduction in ROW's

capital stock. However if we allow another export sectors, call it the Y sector, then ROW labour may shift from the X-sector to the Y-sector, expanding ROW's production and export of Y. If it is also true that the Y-sector is more capital-intensive than the X-sector, then this shift may raise the demand for ROW capital and thereby trigger an endogenous rise in the ROW capital stock.

This is particularly important in the case in Europe since Finland, Norway and Sweden export natural-resource based products, such as oil, paper pulp and minerals. As it turns out, these industries are even more capital intensive (in the sense that they have very high capital value-added shares) than most manufactured goods.

Third, allowing a more complete model of strategic interactions results in price-cost margins that depend endogenously on the market shares of firms. This introduces an additional influence on ROW and EU capital stocks stemming from changes in firm size. The point is that when market shares affect perceived elasticities, liberalization may change equilibrium firm size. Forming the free trade area (the EU) tends to defragment two-thirds of the world market in this three country model. This may reduce in the average price-marginal-cost markup charged by EU firms, forcing down the number of firms and raising the equilibrium firm size. Larger firms mean lower average cost and lower prices. This increases total X-sector output in the EU. Consequently, this procompetitive mechanism unambiguously raises the demand for EU capital. The impact on ROW capital, by contrast, is ambiguous.

The Need for Numerical Stimulation Introducing these sources of ambiguity are essential to bringing the model closer to the real-world situation. Unfortunately, they also render the interactions far too complex to solve analytically. We turn now to a simulation model that allows us to resolve the ambiguities.

4. The Simulation Model

The simulation model employed in this paper is a variant of the Haaland-Norman simulation model. Originally presented in Haaland and Norman (1992), the Haaland-Norman model is closely related to the Gasiorek, Smith and Venables (1992) model which was in turn inspired by the path-breaking paper by Smith and Venables (1988).

4.1 Description of the Model

The model contains four main regions: EU, EFTA, US and Japan. Production and consumption in the rest of the world are not modelled explicitly. Trade flows between our four main regions and the rest of the world are taken as fixed and invariant to policy changes. Since market integration and intra-regional trade costs play an important role, we divide the EU region into six identical markets and EFTA into 5 identical markets. Japan and the US are treated as individual countries.

The production structure in each country consists of 14 traded sectors and one nontradable sector. The nontraded good and one traded-good sector are modelled as perfectly competitive with constant returns. The other 13 traded-goods sectors consist of differentiated products produced under imperfect competition and increasing returns. There are three primary factors: capital, unskilled labour and skilled labour.

Final demand is quite similar to the theoretical model described above in that consumers are assumed to have a two-level utility function. The top level is a Cobb-Douglas function enforcing constant expenditure shares on nontraded goods, the perfect-competition traded goods and each of the 13 differentiated goods sectors. The principal difference is that we allow for home market biases in the 13 differentiated goods sectors. This is accomplished by including a multiplicative constant in the CES second-tier utility function.

Goods are produced using capital, skilled labour, unskilled labour and an intermediate-goods aggregate. Marginal costs in all sectors are given by nested CES functions. For the typical sector the top level is a CES combination of a factor price index and an intermediate goods price index. Both of these indices are themselves nested CES functions. In particular, the CES factor price indices reflect sector-specific factor intensities. The intermediate goods index (which is country specific) reflects the local price of intermediate goods.

More specifically, the total and marginal cost functions for a firm in an imperfect competition sector are given by:

$$TC_k^i = MC_k^i\,(x_k^i + F), \qquad MC_k^i = b_k^i \left(\omega_k^i (PV_k)^{1-\theta} + \phi_k^i (Q_k)^{1-\theta} \right)^{\frac{1}{1-\theta}} \tag{12}$$

where F is the fixed cost, x^i_k is the total quantity produced by a sector i firm in country k.

Also PV and Q are the price indices for factor prices and intermediate goods facing firms in country k, and b, ω and ϕ are country-specific, sector-specific parameters.

The price indices in country j for factors and intermediate goods are:

$$PV_j = \left(\beta_j^K (w_j^K)^{1-\lambda} + \beta_j^L (w_j^L)^{1-\lambda} + \beta_j^H (w_j^H)^{1-\lambda} \right)^{1/(1-\lambda)},$$

$$Q_j = \left(\Sigma_{i=1}^{13} \gamma_i \left[\left(\Sigma_{r=1}^{N} n_r \psi_r (p_{rj}^i)^{1-\xi} \right)^{1/(1-\xi)} \right]^{1-\mu} + \Sigma_{i=14}^{15} \gamma_i (p_j^i)^{1-\mu} \right)^{1/(1-\mu)} \quad (13)$$

where w^K, w^L and w^H are the factor prices for capital, unskilled labour and skilled labour respectively (the subscript j indicates producing country). Notice that Q is a nested-CES price index of goods prices p. For the differentiated goods sectors (i = 1 to 13) goods from different origins are combined to a first-level CES aggregate. These in turn are combined together with the two perfectly competitive sectors (i = 14 and 15) to the top-level CES aggregate. The parameters β, γ, ψ are country specific, while the elasticities l, ξ and μ are not country specific.

In the constant returns to scale sectors marginal cost equals average cost and prices are set at marginal cost.

The fragmentation of EU markets and the wide cross-country dispersion of prices for similar products are key aspects that EU92 was designed to address. More specifically, home firms typically have higher market shares than foreign firms. Unfortunately, the simple imperfect competition framework used in the illustrative model - viz. large-group monopolistic competition - cannot capture this market fragmentation unless one assumes unrealistically high trade costs (eg 50% to 100%). The basic problem is that pricing, even to segmented markets, does not depend upon market shares, so producer prices are equalized across all markets (assuming identical demand elasticities).

To incorporate market fragmentation we assume that firms in the differentiated goods sectors play Cournot. With segmented markets, this involves firms choosing submarket-specific sales taking as given their rivals' sales. The first order condition for the sales of a typical country j firm to a typical submarket k can be written as:

$$p_{jk}(1-t_{jk}) = \left(\frac{\varepsilon_{jk}}{1-\varepsilon_{jk}} \right) MC_j \quad (14)$$

where ε_{jk} is the firm's perceived elasticity, t_{jk} is the cost of selling country j goods in market k, and we drop the industry superscript to simplify the notation. With segmented markets these perceived elasticities depend on market-specific shares and elasticities of substitution. In particular, referring to the share of a country j firm in market k as ms_{jk}, the top-level elasticity (i.e. between different industries) in country k as s_k, and the elasticity of substitution between different varieties within a typical industry as σ_k, the

Nash-Cournot perceived elasticity is:

$$\varepsilon_{jk} = \frac{\sigma_k \, s_k}{s_k + m s_{jk}(\sigma_k - s_k)} \tag{15}$$

Firms sell their output as final goods and intermediate inputs. In this version of the model, we assume that firms do not distinguish these two sources of demand, so firms will choose a single level of sales to each submarket.[7] As a result, each variety will have a common price when sold as a final good and as an intermediate and the variables s_k and σ_k are weighted averages of the elasticities in the final demand and the intermediate markets. As we can safely assume that $\sigma_k > s_k$, firms charge higher prices where they have higher market shares. The result is reciprocal dumping.

Following Smith and Venables (1988), one of our policy experiments assumes that markets become fully integrated in the sense that firms are forced to treat all the integrating markets as a single market. In other words, firms cannot control the quantity sold in each submarket; they can only control total sales to the integrated market. As a result, producer prices are equalized in all such markets. Consumer prices may differ due to bilateral trade cost differences. The threat of arbitrage via unrestricted re-exports, an end to exclusive dealerships, the emergence of international trading houses, and so on are some justifications that are provided for this switch between segmented and integrated markets.

Playing Cournot in such an integrated market implies that each firm decides its total sales to the integrated market taking as given its competitors' total sales to the same market. However, the distribution of sales between the submarkets is given by an arbitrage condition that ensures that the consumer prices only differ by the trade costs. In the integrated market case, the perceived demand elasticities depend on average market shares - rather than the position in each submarket - but 'average' is defined in a rather complicated manner.[8] As we shall see, prices are typically lower and firms typically sell larger quantities in their home markets with integrated markets. This tends to reduce trade in the integrated market, since exports based on reciprocal dumping disappear. Given that trade involves real costs, this trade reduction tends to be welfare enhancing.

As an alternative, the model could also be solved under an assumption of small-group monopolistic competition with all firms playing Bertrand. In that case, the general first

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[7] In previous versions of the model, there has been a clear distinction between the markets for final demand and for intermediates, with Cournot competition in the final demand market and (large-group) monopolistic competition in the intermediate markets (see Haaland and Norman (1992)).

[8] See Haaland and Norman (1992) for a version of the model specification in this case, and Haaland and Wooton (1992) for a discussion of the market conditions with integrated markets.

order condition (14) still holds, but the perceived elasticity of demand is:

$$\varepsilon_{jk} = \sigma_k - ms_{jk}(\sigma_k - s_k) \tag{16}$$

Comparison of the Bertrand and Cournot perceived elasticities illuminates three important features. First, with much competition or no competition Bertrand and Cournot are equivalent. That is, as the number of firms rises and market shares approach zero, both elasticities approach σ_k. Thus at this extreme the two approaches are equivalent to the large-group monopolistic competition framework. Moreover when there is only a single active firm, ms = 1 and the two perceived elasticities are identical, this time equal to s_k. Second, for all intermediate market shares, the Bertrand elasticity exceeds the Cournot elasticity. Hence, Cournot prices will exceed Bertrand prices. Third, inspection of the formulas (using the fact that $\sigma_k > s_k$) reveals that Cournot elasticity is more sensitive to changes in the market share ms_{jk}, when no firm's market share is greater than one half (as is the case in our simulation model). Therefore, producer prices are also more responsive to trade cost changes under Cournot than under Bertrand. This is particularly important when it comes the policy experiment that assumes a switch from segmented to integrated markets, because this change directly equalizes all market shares (apart from trade cost considerations) in the integrating markets.

Previous model experiments, eg Smith and Venables (1988), indicate that the type of competition assumed has important implications for the results obtained. We have experimented with both Bertrand and Cournot assumptions and found that nearly all changes are much more pronounced with Cournot conjectures.

The capital stock in the model is endogenous. In particular, it is assumed to adjust to the level where the steady-state condition holds. From (9), the steady state is defined by $dE/dt=0$ and $r=\rho$. We do not investigate transitional dynamics.

4.2 Calibration

The model is calibrated to the data set used in Haaland (1993). The calibration procedure is complicated, but essentially it solves the model in reverse, treating the endogenous variables (trade flows, market share, concentration, etc.) as exogenous and treating the parameters as endogenous. Table 2 shows several key aspects of the data set that we shall refer to below.

Table 2

Base Case Parameters	Sectoral GDP shares				Herfindahl Index	
	JAPAN	EC	EFTA	US	EC	EFTA
NT Nontraded goods	0.621	0.619	0.678	0.579	n.a.	n.a.
N13,15 Mining, ores & minerals	0.044	0.040	0.052	0.031	n.a.	n.a.
N17 Chemical products	0.025	0.024	0.021	0.019	0.129	0.443
N19 Metal products	0.039	0.020	0.036	0.016	0.019	0.104
N21 Agric. & indus. machinery	0.023	0.023	0.026	0.016	0.019	0.217
N23 Office mach. & prec. instr.	0.012	0.008	0.012	0.016	0.308	0.270
N25 Electrical goods	0.044	0.023	0.018	0.019	0.094	0.302
N28 Transport equipment	0.029	0.025	0.015	0.028	0.359	0.199
N36 Food products	0.031	0.036	0.019	0.021	0.034	0.114
N42 Textiles, clothing and leather	0.023	0.020	0.016	0.010	0.010	0.109
N47 Paper and printing products	0.008	0.018	0.025	0.022	0.033	0.146
N48 Timber and other n.e.s.	0.015	0.011	0.019	0.010	0.011	0.102
N49 Rubber and plastic products	0.012	0.009	0.007	0.007	0.082	0.263
mN6X Transportation services	0.037	0.046	0.046	0.036	0.060	0.060
N69 Financial services	0.079	0.076	0.069	0.071	0.048	0.060

	Factor Cost shares				elasticity of substitution
	Skilled Labour	Unskilled Labour	Capital	Scale elasticity	
NT Nontrade goods	0.285	0.531	0.185	0	n.a.
N13+N15 Mining, ores & minerals	0.275	0.409	0.316	0	n.a.
N17 Chemical products	0.389	0.28	0.331	0.3	3.94
N19 Metal products	0.312	0.491	0.197	0.14	8.65
N21 Agric. & ind. machinery	0.376	0.458	0.166	0.14	8.41
N23 Office mach. & prec. instr.	0.536	0.301	0.163	0.3	5.83
N25 Electrical goods	0.413	0.431	0.156	0.2	7.3
N28 Transport equipment	0.303	0.463	0.234	0.24	8.97
N36 Food products	0.307	0.397	0.296	0.08	17.1
N42 Textiles, clothing and leather	0.299	0.507	0.194	0.06	18.84
N47 Paper and printing products	0.334	0.423	0.243	0.26	4.34
N48 Timber and other n.e.s.	0.322	0.51	0.168	0.1	11.42
N49 Rubber and plastic products	0.312	0.451	0.237	0.1	20.79
N6X Transportation services	0.11	0.538	0.352	0.1	23.3
N69 Financial services	0.824	0	0.176	0.1	19.61

5. Results

This section discusses the results from two standard policy experiments (see, for example, Smith and Venables (1988), Gasiorek, Smith and Venables (1992), Haaland and Norman (1992, 1995)). The first experiment assumes that real trade costs fall by 2.5% percent. The second experiment assumes that besides the trade cost reduction, firms treat the integrating markets as an integrated market rather than as segmented markets. We run two sets of simulations with these policy experiments. The first investigates discriminatory liberalization by assuming that the policy changes affect only intraEU trade and markets. In the second set of simulations, we suppose that these policy changes apply to all EU and EFTA markets. In both set we calculate changes with fixed and endogenously determined (i.e. steady state) capital stocks.

The mapping between these two sets of simulations and real-world policy is fairly straightforward. The intent of the 1992 European Economic Area (EEA) agreement was to grant Single Market status to firms based in EFTAn economies. Thus, one interpretation of our results is that the difference between the two scenarios represents the gains from the EEA. As events actually evolved, Swiss voters refused to accept the EEA and Austria, Finland and Sweden acceded to the EU. Thus, there is a slight problem in this interpretation, since in our second scenario, we assume that the Single Market covers Switzerland as well. We are not too concerned by this since we do not wish to view our results as a direct evaluation of any particular policy changes. The aim of this part of the paper is to use the simulation to learn about investment creation and diversion in a model that is too complicated to solve analytically.

5.1 Closer EU Integration with EFTA6 Excluded

We turn first to the scenario of discriminatory integration of the EU12, i.e. a lowering of real trade costs and a switch between segmented market pricing and integrated market pricing that affects only intra-EU12 trade. In keeping with the focus of this paper, the issue of investment creation and diversion is addressed first.

5.1.1 Investment Creation and Diversion

The second column of Table 3 presents the capital stock effects when European integration is presumed to alter firms' pricing strategies in the EU12. Investment diversion occurs in the EFTA6 and investment creation occurs in the EU12. The US and Japan are projected to experience tiny investment diversion effects. These findings are entirely in line with the predictions of the simple model. A discriminatory liberalization leads to production shifting that tends to lower the demand for capital in the nonintegrating region, raising it in the integrating region. In the short run, this should show up as a fall in the return to capital in the nonintegrating regions and a rise of that in the integration region. In the long run, capital stocks respond in order to restore the rate of return to its normal, steady-state level. The fact that the impacts on the US and Japan are negligible is also expected since only a tiny fraction these countries' capital stocks are dependent upon conditions in the European market. Also the fact that the magnitude of the impact on the EU12 capital stock is larger than the impact on EFTA6's capital is in line with the fact that EU firms depend more on the EU market than do EFTA firms

Comparing the column-two and column-one results reveals two striking difference. First, the investment creation effect in the EU12 is 540% larger with market integration. Second, the EFTA6 are projected to experience a moderately large loss of capital, namely about two-thirds of one percent of their initial capital stock. The impact on the US and Japan switch signs between the two columns, but the effects are vanishingly small (less than two percent of one percentage point).

Table 3: Changes in Steady-State Capital Stock:
EU12 Integration with EFTA6 Excluded (% change from base Case)

SCENARIO: ***EFTA Excluded***	Real Trade Cost Reduction	Integrated Market Pricing and Real Trade Cost Reduction
EFTA	**0.20%**	**-0.64%**
EU12	0.26%	1.66%
USA	0.02%	-0.01%
Japan	0.01%	-0.01%

The first column of the table shows the impact of the trade-cost-reduction-only scenario when the EFTAns are excluded. The most striking feature of the first column results in the lack of investment diversion. Steady-state capital stocks are projected to rise in all regions including the US and Japan. The investment creation, however, is not evenly distributed. It is fairly small in the EU12 and EFTA - about a fourth and a fifth of one percent for the EU12 and the EFTA6 (respectively) - but it is trivially small for the US and Japan - 2 and 1 basis points respectively.

The absence of investment diversion in the first column scenario is unexpected and we shall explore this results in more detail below. In contrast, the hugh differences in magnitudes between the column-one and column-two results are entirely expected and found in the other simulation models of this type. For example, Smith and Venables (1988), Gasiorek, Smith and Venables (1992), and Haaland and Norman (1992) have all found that market integration has a big impact on nearly all aspects of the equilibrium.

Accounting for Investment Creation and Diversion Changes in the steady-state capital stock can be thought of as driven by the demand for capital. If a policy change raises the demand for capital, in the sense that it raises capital's price, the steady-state supply of capital will rise. More specifically, trade policy shifts production patterns and this can alter the return to capital by the standard Stolper-Samuelson logic. Changes in the return to capital alter the return to foregone consumption and therefore leads to medium-term changes in the steady-state level. This line of reasoning directs us to investigate factor

price and production pattern changes when capital stocks are held constant. The factor prices are a dual measure of the changes in factor demands generated by the policy changes. The production patterns help us understand the source of the dual effects on factor prices. That is to say, using our knowledge of the capital intensity of the various sectors, alteration of the production patten will indicate what the incipient pressures are on the EU and EFTA capital stocks.

Table 4: Real factor price changes (relative to base case)

SCENARIO: EFTA excluded Fixed Capital Stocks	Factor	Trade Cost Reduction	Market Integration and Trade Cost Reduction
EU12	Skilled Labour	0.45%	1.47%
	Unskilled Labour	0.35%	1.51%
	Capital	0.30%	1.61%
EFTA6	**Skilled Labour**	**-0.34%**	**-0.06%**
	Unskilled Labour	**-0.13%**	**-0.43%**
	Capital	**0.16%**	**-0.55%**

Table 4 shows the impact on EU12 and EFTA6 factor prices. In the EU12, all three factor prices rise in both policy experiments, however the magnitudes of the changes are about five times larger with market integration. In the EFTA6, capital's rental rate rises when only trade costs are reduced, but the return of EFTA labour falls. When the cost reductions are accompanied by a switch to integrated market pricing, the rental rate on EFTA capital falls significantly.

The impact on labour is mixed. In the EU both types of labour gain in both scenarios with each group gaining approximately an equal amount. In EFTA, both types lose in both scenarios, however in the market integration scenario, the drop in the real wage of unskilled labour is seven times larger than that of skilled workers. Furthermore the drop in EFTA6 wage for unskilled workers is much greater with market integration than with trade cost reductions only. The opposite is true for EFTA6 skilled labourers' wages. These results are simply summary statistics for the changes in the derived demand for EFTA6 skilled and unskilled labour. As we shall see below, the pattern of factor price changes can be understood from shifts in the EFTA6 production pattern under the two policy experiments. In the first experiment (trade cost reductions only), the shrinking sectors - such as office machines and agricultural and industrial machinery - tend to be

heavy users of skilled labour. In the second policy experiment, the sectors that experience the largest decline in output - especially the transport equipment sector - are quite intensive in their use of unskilled labour.

Production Pattern Shifts The economics of discriminatory integration are highly complex and have not been thoroughly explored at a theoretical level. In particular, a great deal of intricacy arises from the interactions among free entry, declining average costs and the variable markups that come with small-group monopolistic competition. Allowing endogenous capital accumulation adds an additional factor, but most of the complexity stems from the allocation, rather than the accumulation, effects. Lastly, since we calibrate the base case to data, the degree of scale economies, the initial degree of competition and initial level and distribution of market shares differs across the 15 sectors. With this in mind, we turn to the projected production pattern shifts from discriminatory EU liberalization.

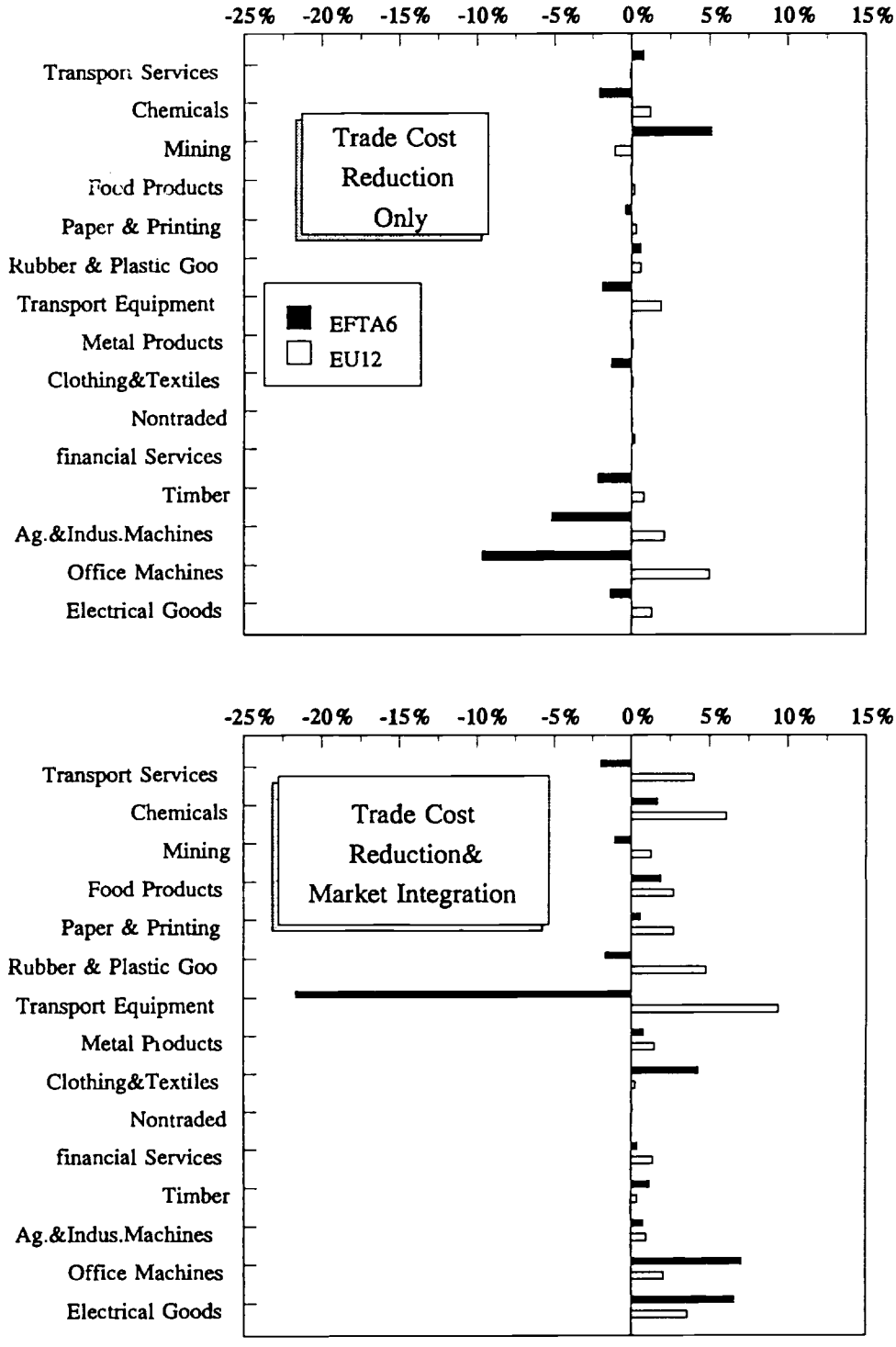
Figure 4 show the changes in the EU and EFTA production patterns (relative to the base case) stemming from discriminatory liberalization in the EU (trade cost reduction and market integration). The 15 sectors are arranged with the most capital intensive listed first. For instance capital's factor cost share is 0.331 in chemicals, 0.194 in textiles and apparel and only 0.16 in nontraded goods. The EFTA economy-wide average capital cost share (weighted by sectoral GDP shares) is about 20% and lies between transport equipment and metal products. The top panel shows changes for the EU12 and EFTA6 when only trade costs are reduced. The bottom panel shows the changes for the scenarios with integrated market pricing and trade cost reduction.

The figure helps us explain the presence of investment diversion in the market integration and its absence in the trade-cost-reduction-only case. In the latter case (top panel), EFTA generally experiences an expansion of the more capital intensive sectors and (especially) a contraction of the least capital intensive sectors. Generally speaking the opposite pattern appears when market integration accompanies the cost reductions. That is, EFTA's production pattern shifts towards the more capital intensive sectors. The projected impact on the EFTA transport equipment is spectacular, with a drop of over 20% indicated. Given the size of this drop, it is important to note that this sector's is more capital intense (as measured by capital's factor cost share) than the average sector.

Accounting for Production Shifting Theoretical analysis in Haaland and Wooton (1992) and Baldwin and Venables (1995) suggest two mechanisms by which discriminatory integration can reduce EFTA production in imperfectly competitive sectors. The first is quite simple and might be called the direct competitiveness effect. Holding constant the number of firms, discriminatory liberalization harms the competitiveness of EFTA-based firms in the EU and this reduces the optimal level of exports to the EU and output in the affected sectors. The second, which is more involved, can be called the procompetitive mechanism, or the market defragmentation mechanism.

To understand the second mechanism, consider the thought-experiment of switching from segmented to integrated market pricing in a two-symmetric-country world. Due to trade costs, a typical firm initially has a larger share in its local market than in its export market. An immediate effect of the switch to integrated market pricing is to even out the

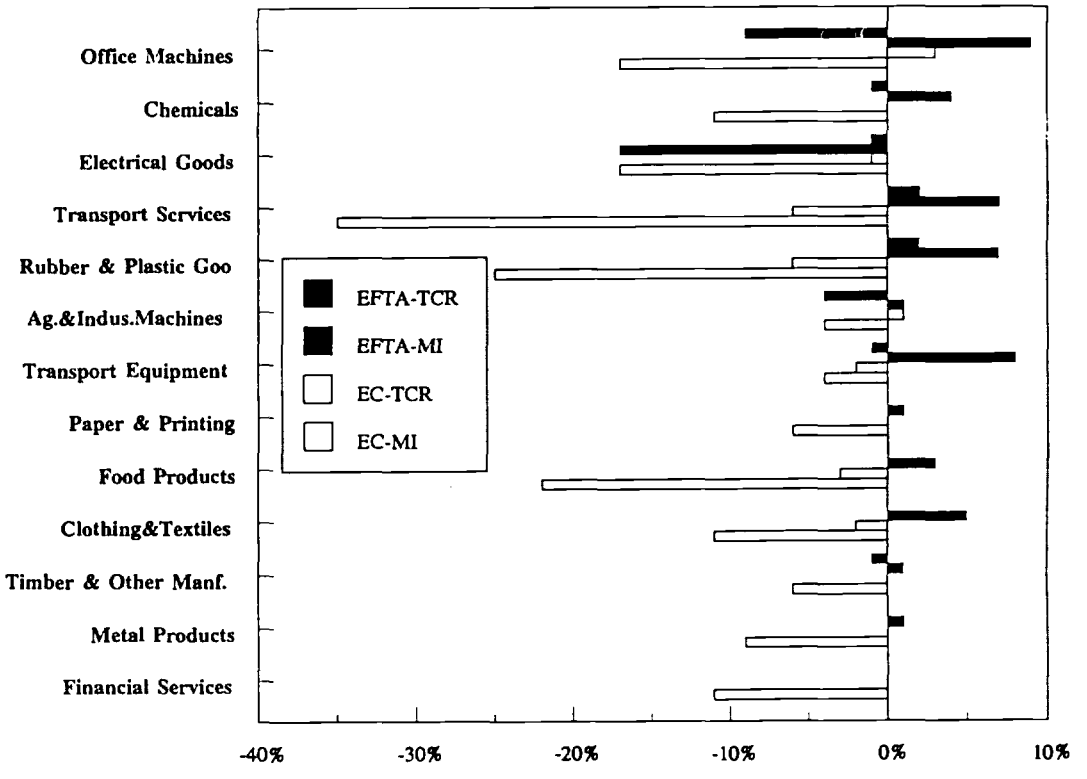
Figure 4: Production Changes with Fixed Capital Stocks and EFTA Excluded from EU Integration



distribution of a typical firm's market shares (as far as pricing is concerned). Because a firm's profit is convex in its shares in its various markets, the defragmentation of the two

markets harms profits in both countries. The resulting exit of firms produces an industry restructuring that ends up lowering average cost and prices. That is to say, although fewer firms operate in each country, the markets are more competitive and so firm operate at a higher scale of output. In a sense, the market integration has lessened the tradeoff between competition and scale economies by increasing the competitive pressures that home firms face from foreign firms.

Figure 5: Change in the number of firms with fixed capital stocks. (TCR=trade cost reduction experiment, MI=trade cost reduction plus switch to integrated market pricing)

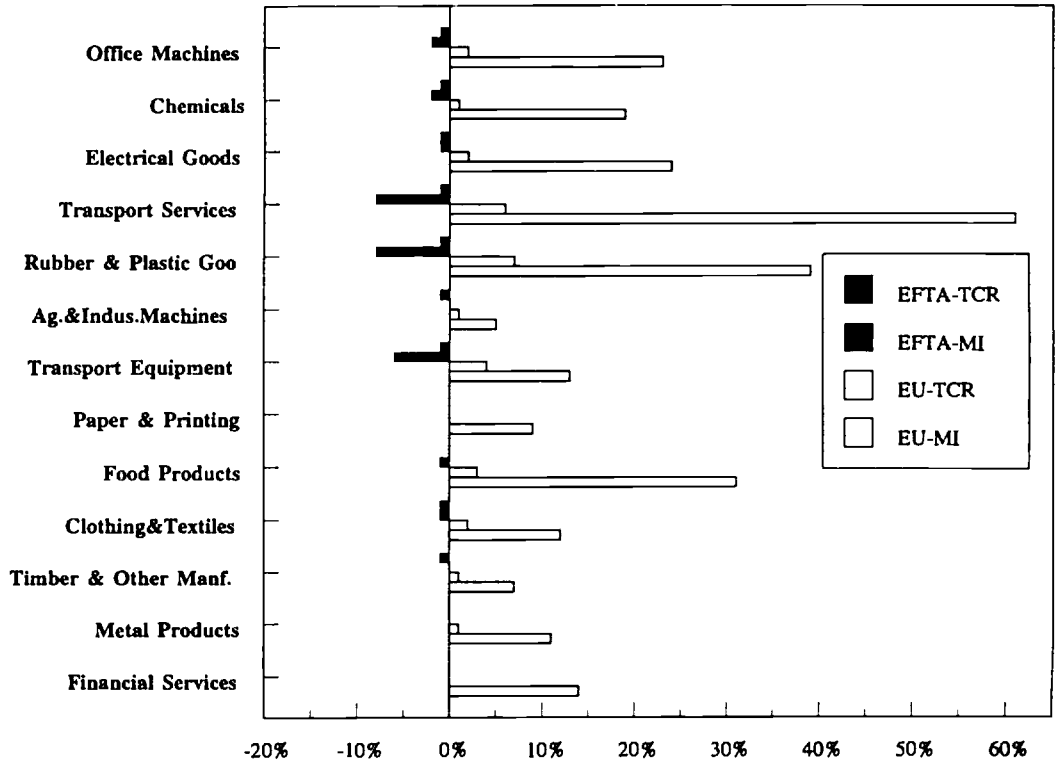


Things become more complicated when we expand this simple model to three, initially symmetric countries and consider a discriminatory market integration. As before, market integration tends to even out a typical firm's distribution of market shares in the integrating countries. In these countries, integration tends to lower profits, forcing exit and increasing the exploitation of scale economies, as in the two-country model. This mechanism affects the nonintegration country in a novel way. The reduction in the number of firms in the integrating countries lowers the degree of competition facing firms based in the nonintegating country. With fewer foreign competitors, the nonintegrating firms experience an increase in the dispersion of their local and export market shares. Convexity of profits implies that this increases their profitability and induces a rise in the number of firms in the nonintegrating countries. The result of all this is a decrease in firm size in the nonintegrating country, a negative scale effect, and therefore a rise in prices in the nonintegrating countries.

This change in the number of firms shows up very clearly in our simulation, as Figure 5

demonstrates. In the figure, four bars are shown for each industry. The top two show the change in the number of EFTA firms in the two policy experiments (trade cost reduction and market integration plus trade cost reduction). The bottom two bars show the same thing for EU firms. In all cases capital stocks are held constant (in fact the number of firms is little influenced by allowing the capital stocks to vary endogenously). The sectors are listed according to scale economy elasticities, with the industries marked by the greatest scale economies listed first

Figure 6: Changes in firm size when EFTA is excluded from EU integration and capital stocks are fixed.



In most sectors, the number of EU firms drops and the number of EFTA firms rises, with the electrical goods sector being an exception. Generally speaking, the biggest production shifting occurs in those sectors that are subject to the largest scale economies. Moreover, it is very apparent that the EFTA6 gain the most firms in exactly the sectors that the EU loses the most firms.

Figure 6 shows the change in equilibrium firm sizes in the EU12 and EFTA6. Again there are four bars for each sector, ordered as in the previous figure. As we can see, EU12 firms general enjoy increased scale in both policy experiments, while the opposite holds for EFTA6 firms. The changes in EU12 scale are remarkably large under market integration, with the average firm size in the rubber and plastic goods and transport services sectors rise more than 40%.

5.1.2 Real Income Gains and Loses

The aggregate real income effects for the discriminatory liberalization case are shown in Table 5. In the fixed capital stock cases, these numbers can be viewed as welfare effects. However, as Baldwin (1992) pointed out, allowing for capital accumulation clouds the link between real income and welfare. The point is that some consumption must be foregone in order to accumulate capital, so the present value of utility is not well-measured by the present value of real income.

Three aspects of the real income results stand out. First, the EU12 gain and the EFTA6 lose always. We could not say that this pattern of gains and losses was inevitable *a priori*. It is not unexpected, however, since the discriminatory liberalization in the EU boosts the competitiveness of EU-based firms at the expense of EFTA-based firms. The US and Japan also lose, but their losses are trivial because only a very small fractions of

Table 5: Changes Aggregate Real Income: EU12 Integration with EFTA6 Excluded (% change from base Case)

SCENARIO: EFTA Excluded	Policy Experiment: ***Trade Cost Reduction with Segmented Market Pricing***		Policy Experiment: ***Trade Cost Reduction with Integrated Market Pricing***	
	Fixed Capital Stock	Endogenous Capital Stock	Fixed Capital Stock	Endogenous Capital Stock
EU12	0.35	0.41	1.42	1.79
EFTA6	-0.13	-0.08	-0.12	-0.25
USA	-0.01	-0.00	-0.03	-0.03
Japan	-0.02	-0.02	-0.04	-0.04

US and Japanese economic activities depend upon the situation in the EU12. Second, allowing for the endogenous accumulation of capital amplifies the gain to the EU in both policy experiments. The ratio of the gains with and without endogenous capital - what Baldwin (1989) called the medium-run growth bonus - is about 1.2 for the EU in both policy experiments. In the trade cost reduction case, capital accumulation mitigates the EFTA welfare loss about 40%. In the market integration case, investment diversion doubles the EFTAns loss.

Third, the switch between segmented and integrated market pricing has an enormous impact on real income. For instance, the EU12's gain is typically four times larger when the switch from segmented to integrated market pricing accompanies the trade cost reduction.

5.2 Results for Nondiscriminatory European Integration

We turn now to the results of our simulations for the nondiscriminatory scenario, i.e. when EU92 is extended to the EFTA6. As usual there are two policy experiments: trade cost reduction with and without a switch from segmented to integrated market pricing. For both experiments, we consider the short run (fixed capital stocks) and medium-run (endogenous capital stocks) cases.

Table 6: Changes in Steady-State Capital Stock: EU12 Integration with EFTA6 Included (% change from base Case)

SCENARIO: *EFTA6 Included*	Real Trade Cost Reduction	Integrated Market Pricing and Real Trade Cost Reduction
EFTA6	**1.12%**	**4.65%**
EU12	0.28%	1.62%
USA	0.02%	-0.02%
Japan	0.01%	-0.01%

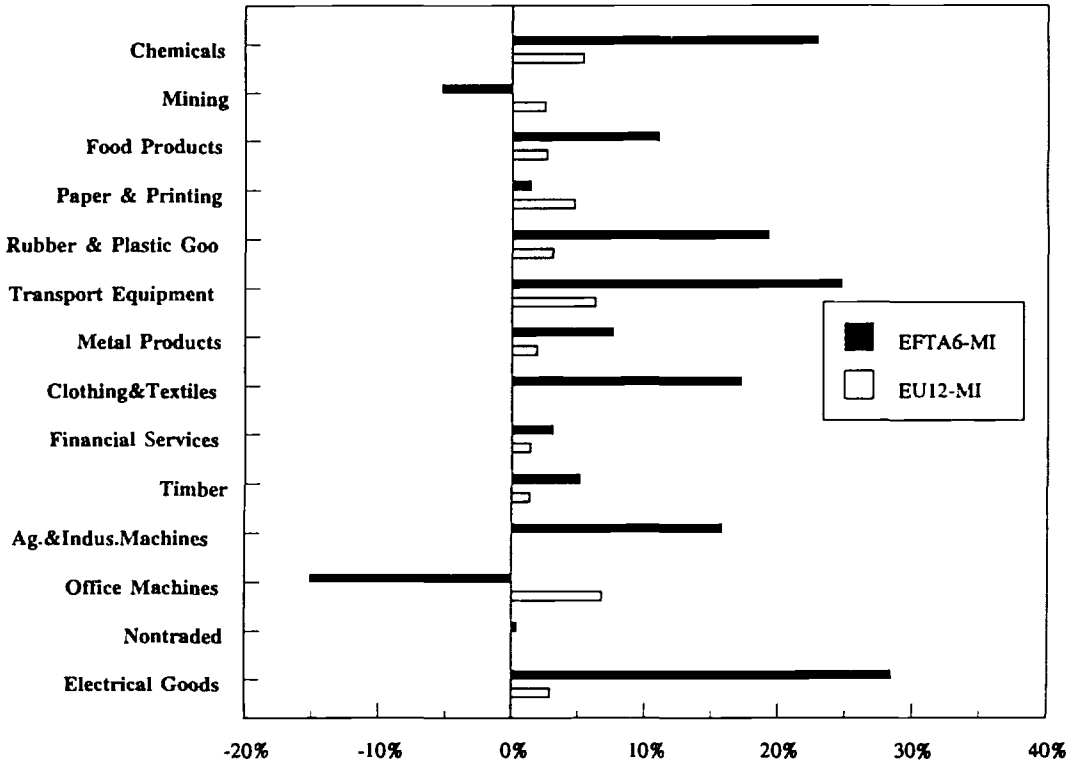
5.2.1 Investment Creation

Table 6 shows the percent changes in capital stocks under the two policy experiments. The table has three salient features. First, in contrast to the discriminatory liberalization case, the EFTA6 experience investment creation in both experiments. Second, the magnitude of EFTA's capital stock increase (almost 5% of their initial capital stock) is truly remarkable in the market integration experiment. In other words, decision to participation in the Single Market via the European Economic Area agreement (or membership) has very important economic consequence for the EFTAns. The difference between having and not having Single Market status (assuming this involves market integration as well as trade cost reductions), amounts to a change in EFTA6 capital stock of 5.3%. Third, the economic impact on the EU12 is almost identical in the discriminatory and nondiscriminatory cases. This latter fact results from smallness of the EFTA6 economies. As usual, the impacts on the US and Japan are negligible.

Figure 7 shows the impact of market integration on production patterns in EU12 and

EFTA6 economies. The EU12 experience an expansion in virtually every industry (this is possible with scale economies), but the expansion is biased towards capital intensive sectors. The EFTA6 experience expanded production in all but two sectors (mining, minerals and ores, and office machines). While mining is the second most capital intensive sector in the model, the production pattern changes do have a bias towards capital intensive sectors. Further evidence for this is found in the fact that the real return to EFTA6 capital jumps up almost 5% in the fixed capital stock case. Note that the corresponding figure for the EU12 is 1.6%. The figures (not shown) are quite similar for the trade-cost-reduction-only experiment, however the magnitudes of the changes are muted.

Figure 7: Production pattern change with European-wide trade cost reduction and market integration (fixed capital stocks).



5.2.2 Aggregate Real Income Results

Table 7 shows real income effects of including the EFTA6 in the EU integration. Comparing the first row of this table with that of Table 5, we see that including the EFTA6 in the EU's liberalization has very little impact on the EU12's real income in any of the four scenarios. The impact on the EFTA6, however, is dramatic. Looking at the scenario of market integration with endogenous capital stocks, we see that instead of losing a small amount of incomes (-0.25%), the EFTA6 gain 5.2%. The same comparison holds for the other three scenarios. The impacts on the US and Japan becomes slightly more negative when the EFTA6 are included, however, the change is never more than one or two basis points and the absolute size of the effects are tiny.

The importance of capital endogeneity can also be seen in the Table 7. In the trade-cost-reduction-only experiment, investment creation adds 15% to the EU's income gains and 43% to the EFTAns' income gain. For the market integration experiment, the figures are 27% and 25% respectively.

Table 7: Changes Aggregate Real Income: EU12 Integration with EFTA6 Included (% change from base Case)

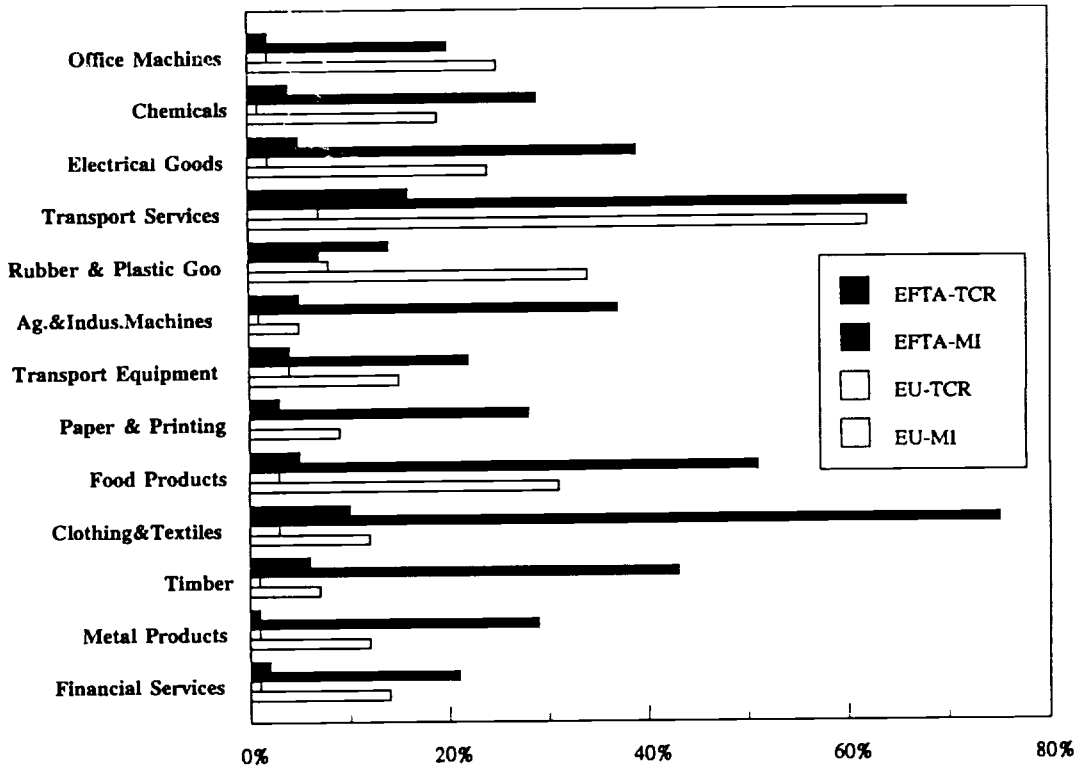
SCENARIO: ***EFTA Included***	Policy Experiment: ***Trade Cost Reduction with Segmented Market Pricing***		Policy Experiment: ***Trade Cost Reduction with Integrated Market Pricing***	
	Fixed Capital Stock	Endogenous Capital Stock	Fixed Capital Stock	Endogenous Capital Stock
EU12	0.39	0.45	1.38	1.75
EFTA6	0.60	0.86	4.13	5.16
USA	-0.01	-0.01	-0.03	-0.04
Japan	-0.03	-0.02	-0.05	-0.05

It is interesting that the switch from segmented to integrated market pricing has a much larger effect on EFTA than it does on the EU. For instance, when capital stocks are endogenous, switching to integrated market pricing raises the EFTA6 income gains by six times. The increase is even greater for the fixed capital stock case with EFTA6 gaining 6.9 times more under integrated market pricing than under segmented market pricing. The corresponding figures for the EU are 3.9 and 3.5. It is difficult to exactly trace the causes of such differences given the complexity of our simulation model, however it seems likely that differences in the initial degree of concentration plays an important role (see the Herfindahl indices in Table 2). Moreover in most sectors, a typical EFTA6-based firm faced a larger difference between its home market share and its shares in export markets. Consequently, the market integration had a more important impact on the distribution of these shares. As explained above, narrowing a firm's market shares distribution tends to drive down profits and induce exit. This industrial restructuring is typically associated with more efficient firm sizes and greater scale economies.

Evidence for this explanation is found in Figure 8, which shows the changes in

equilibrium firm size for EFTA6 and EU12 firms in the various sectors. The figure shows that in most sectors, the switch to integrated market pricing results in a greater expansion of the typical EFTA6 firm than the typical EU12 firm.

Figure 8: Firms size changes with panEuropean trade cost reduction and market integration (fixed capital stocks).



Bertrand Conjectures An earlier version of this paper simulated the eight scenarios (two EU policy experiments, with or without endogenous capital stocks and with the EFTA6 included or excluded) using Bertrand conjectures instead of Cournot conjecture in the 13 sectors marked by small-group monopolistic competition. As expected, the simulation results are quite different for the Bertrand case. In particular, we find that investment diversion never occurs and all of the real income effects are small. Capital stocks in the EU, EFTA, the US and Japan all rise as a result of closer integration among the EU12, although the rise in the EU's capital stock is much more pronounced.

6. Summary and Concluding Remarks

In this paper we looked at investment creation and investment diversion effects of the EU's Single Market programme in three ways. First we presented suggestive, but not conclusive, evidence indicating that EU's Single Market programme may have led to investment diversion in the EFTAns and investment creation in Spain and Portugal. Second we presented a simple model that allows us to illustrate the main channels through which discriminatory integration could lead to investment creation and diversion.

The model shows that if capital-intensive traded goods are subject to discriminatory liberalization, the resulting shift in production tends to increase the steady-state capital stock of the integrating region and decrease it in the rest of the world. This unambiguous result depends heavily on the specific structure of the model. In a more general model, many other effects arise and these may reverse the conclusion. A more detailed computable equilibrium model (which is closely related to the well-known Haaland-Norman model) is used to simulate the investment creation and diversion effects of European integration.

The simulations confirm the possibilities of investment diversion; however, the effects depend strongly both on the structure of the model and on the structural changes that takes place in the economies. Hence, the simulations emphasize the need for general equilibrium simulation studies. The results show that for the EFTA-countries the investment effects of EU92 vary from investment diversion when staying outside the single market to fairly strong investment creation when EFTA is part of the single market. In all cases, the EU experience investment creation, while the effects on the US and Japan are trivially small.

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