RESEARCH SEMINAR IN INTERNATIONAL ECONOMICS

School of Public Policy
The University of Michigan
Ann Arbor, Michigan 48109-1220

Discussion Paper No. 487

EU Expansion and EU Growth

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October 29, 2002

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Presented at
International Economic Association,
13th World Congress
September 9-13, 2002

Revised
October 29, 2002

ABSTRACT

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Almost from its inception as the European Economic Community, the European Union has excited the hope if not the expectation that it would generate dynamic gains from trade, including perhaps a permanent increase in the rates of growth of participating countries. This paper examines the empirical evidence relating to this issue and then interprets the economic performance of the EU countries in terms of a simple theoretical model of economic integration with increasing returns to scale. The paper concludes that evidence for increased long-run growth rates of the EU countries is weak, and that what may have happened instead is that countries have benefited asymmetrically from the formation and the later expansion of the EU. Benefits of economic integration appear to accrue – in the form of temporarily higher growth rates leading to higher levels of per capita income – first to large countries and then to some smaller countries that entered the arrangement relatively early.

Keywords: European integration
Trade and growth

JEL Subject Code: F13 Commercial Policy

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I. Introduction

The exercise in economic integration that today is called the European Union (EU) began in the 1950s amid high hopes for the benefits that it would provide, both economically and politically. The political benefits, by eliminating the historic military conflict among the participating countries, have been unambiguous and very large. The economic benefits (in addition to avoidance of economic destruction caused by war) have also been fairly clear, but not so obviously large. The static welfare gains from economic integration have always been estimated to be comparatively small, while the "dynamic gains" that many have hoped for have been both less well understood and difficult to identify in the data.

Meanwhile, a distinctive characteristic of the EU[1] has gone largely unremarked in discussions of its effects on the participating countries: the EU has expanded its list of member countries several times throughout its history, periodically adding new members

[*] We have benefited from guidance to the literature on European integration provided by David Greenaway and Alan Winters, as well as from comments by participants in seminars at Stockholm School of Economics, Stockholm University, and University of Copenhagen. Alan Deardorff is grateful to Tore Browaldh's Research Foundation for financial support while working on this paper at the Institute for International Economic Studies, Stockholm University.

[1] For convenience we will call it the EU even for the years when it was called, first, the European Economic Community and then, from 1967 to 1992, the European Communities. We will however use

and promising to continue to do so into the future. This raises the question of whether EU expansion has had an effect on the participating countries distinct from their participation *per se*. That is, can the effects of the EU on, say, the original six members be fully understood from just their participation in a customs union among themselves or even with a larger group of countries, or does a full understanding of these effects require that we take account of the fact that the EU was repeatedly expanding? This seems particularly relevant for the issue of the effects of the EU on the growth of participating countries, which is our primary focus here. Whatever may be the evidence and rationale for countries within a larger integrated trading bloc to grow permanently faster than nonmembers, one might expect an additional effect on GDP over time, and thus on growth in the intermediate run, if the trading bloc itself is expanding over time.

In this paper we do two things. First, we review the empirical evidence on the long-term growth effects of the EU. As we will see, this evidence is not very strong, even though it has inevitably been collected from an era in which the EU was periodically expanding. We then turn to the theory of how such expansion might affect the rates of growth that are observed to accompany the expansion. Even a simple static model has implications for this, which we review. But we find more interesting implications from models with increasing returns to scale, in which the dynamic path of EU expansion plays a role in determining which countries are able to attract increasing-returns industries, and therefore in producing the resulting effects on per capita GDP. We spell this out in the simplest possible model of trade with increasing returns, and then

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EC-6 to denote the six countries that originally formed the EEC, EC-9 for the membership after the first expansion in 1973, and so forth.

sketch how the same results might arise in a more sophisticated model of economic geography.

The conclusion that we, as the authors of this paper, have derived from our investigation is to seriously question the existence of the "dynamic effects" of EU integration as they have commonly been understood. That is, we see little evidence for the belief that countries of the EU have realized a boost to their long-term rates of economic growth. This is partly because of the likelihood of a different kind of dynamic effect, one that increases some members' rates of growth, but only temporarily, during the process of expansion. Thus, whatever evidence exists for a growth effect of the EU may include an effect of expansion that cannot, by definition, continue indefinitely. Since the evidence itself is minimal, this further weakens the case for the EU as a long-run stimulus to growth.

If this sounds like a negative message, we do not mean it to be. We already noted the overwhelming success of the EU in securing political stability in a historically turbulent part of the world, and that by itself would be enough to justify its existence. We also see the economic benefits as being clearly positive and important, even though we doubt that they extend to the point of increasing long-run rates of economic growth. If countries want to secure permanently higher rates of growth, the means are more likely to be found in conventional tools of increased investment, especially investment in research and development and human capital accumulation, than in the quick fix of economic integration.

II. Evidence

We first look directly at the available data on income and growth in the EU member countries. Then we review the empirical literature on how trade and integration in Europe may have affected these countries, especially in terms of growth.

The Data

Figures 1a-1o show the ratio of real GDP per capita to the average of all OECD countries for each EU member country over the period 1951-1997.[2] For each country, a vertical line shows the year in which it joined the EU, while a horizontal dashed line shows the ratio during the year before entry.[3] Relative to these two lines, benefits from joining are clearest if the graph passes from the lower left to the upper right quadrant. This is the case for Belgium, France, Germany, Ireland, and Italy. It is also roughly true of Finland, Portugal, and Spain, although each of these three countries also enjoyed a few years of relative prosperity just before entry. In contrast, the graphs pass into the lower right quadrant for Austria, Denmark, Greece, and the United Kingdom, each of which therefore only fell, relative to the OECD average, after entering. The remaining three countries – Luxembourg, Netherlands, and Sweden – show diverse behaviors, each of which is rather unlike the other countries. Of course, for more than half of these countries the data include only a few years either before or after entry, so that these patterns are hardly conclusive.

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[2] Data are from the Penn World Tables, version 6.0, real per capita GDP, chain method, 1996 prices, except for Germany prior to 1991, for which the per capita GDP of West Germany is adapted from version 5.6. The OECD figure is the real-GDP-weighted average of the 22 countries included in the OECD Development Assistance Committee: the OECD members as of 1990, but excluding Iceland and Turkey.

[3] For those countries that were members of the European Free Trade Association (EFTA) before their entry into the EU, we also include a vertical dashed line when they joined EFTA.

Based solely on inspection of these graphs, one certainly cannot say with any confidence that all countries have benefited economically from joining the EU. On the other hand, it does appear that the majority of the members, especially those who joined it initially and have been in the longest, are enjoying higher per capita GDP, relative to the OECD average, than they did before joining.

That, however, is not the same as a higher long-run rate of growth. With the exception of Ireland, all of the countries that most clearly gained after joining also reached a peak some years later and then declined relative to the OECD average, indicating that at best their levels of GDP increased, but not their rates of growth. Only three countries – Finland, Ireland, and Luxembourg – show distinct increases in the final years that could be the beginning of steeper growth paths, while two others – Portugal and Spain – reach higher levels a few years earlier that may augur well for their futures. But for the remaining countries, if EU membership has led to permanently higher growth rates, that fact is well disguised in these data.

What does seem plausible from these graphs, however, is that the larger of the original six countries of the EU, may have gained substantially in the levels of GDP. France, Germany, and Italy all advanced steadily in per capita GDP relative to the OECD average during the two decades after the EU began as the European Economic Communities. After that they leveled off and declined a bit, but the improvement during those two decades was substantial and lasting, something like 10, 20, or even 30 percentage points. Of course, these countries started this process while still recovering from World War II, and it may be that much of this improvement would have happened even without the EU. Other countries' performance during the same period was mixed,

with Austria showing similar improvement without membership in the EU, while the U.K. shows no such improvement at all, even after joining.

Of the smaller original members, Belgium performed similarly to its larger neighbors, but its gain was smaller and somewhat delayed. The Netherlands also gained a little, but then lost it completely. Meanwhile, the smallest, Luxembourg, showed no sign at all of gaining from membership, and it might even have lost, until more than three decades after integration when it finally took off.

Studies of the Growth Effects of European Integration

There has been no shortage of studies of European integration. Initially, and of necessity, such studies were prospective, using either extrapolation from the past or simple economic models to calculate what the effects of integration might be.[4] As time went on, the prospective studies became increasingly sophisticated in their use first of general equilibrium models and then their incorporation of imperfect competition,[5] and they also were supplemented by retrospective empirical analyses of the actual economic performance of the countries involved. However, until the 1990s, almost all of the attention of these studies was on the effects of integration on trade, not on income or economic growth. Perhaps influenced by the theoretical attention directed by Viner (1950) at trade creation and trade diversion, and perhaps simply looking at what was easiest to observe, the few retrospective studies sought to determine whether the EU (or its predecessors) had increased trade, and if so with whom.

[4] See Balassa (1975).
[5] See Smith and Venables (1988).

Srinivasan et al. (1993) surveyed the empirical literature on the effects of regionalism (not just the EU) up to that time, and they identified only three retrospective empirical studies, all of which dealt only with effects on trade. Although these trade effects are not our main interest in this paper, these studies show clearly and unsurprisingly that European integration caused a large expansion of the countries' trade, especially with each other. Viner (1950) had shown that not all such trade within a trading bloc is welfare improving, so this does not itself assure that the EU had increased incomes. But the sense of this literature was also that trade creation had sufficiently exceeded trade diversion so that European integration had been beneficial, and most would agree that it had raised real incomes even if the increase had not been measured.

Throughout this period, however, the effects that integration might have on incomes through expansion of trade, when viewed through the lens of simple and therefore static economic models, was presumed to be rather small. Even when trade liberalization is nondiscriminatory and thus not trade-diverting, the gains from trade consist of the removal of the dead-weight losses due to distortion of producer and consumer behavior, and these tend to be relatively small. For a large country that does not rely very heavily on trade, typical estimates of the gains from trade based on these models tend to be just a few percent of GDP. It was customary, therefore, to speak of unspecified "dynamic effects" that trade liberalization would also have, even though these were based more on hope than on analysis.

Possibly the first effort to measure such dynamic effects was by Brada and Mendez (1988), who reported panel regression estimates for two equations with investment shares and growth rates as dependent variables and with dummy variables for

participation in six regional integration arrangements including the EU. They found a significant positive effect on investment due to membership in the EU, but no such effect separately on the growth rate.[6] This study predated the theoretical literature on the dynamics of integration and growth, as well as the huge empirical literature of cross-country growth regressions and the criticisms of that literature, many of which would undoubtedly apply to it.

In the 1990s, both the theory and the empirics of dynamic effects took off. This started with the theoretical contributions of Grossman and Helpman (1991), who built on the closed-economy, endogenous-growth models of Romer (1986) and Lucas (1988) to show several ways in which international trade could increase long-run rates of economic growth. Also noteworthy is the work by Baldwin (1992), who sought to quantify the dynamic effects and to show that the prospective gains from the EU's single market program ("Europe 1992") would be a multiple of, and perhaps even an order of magnitude larger than, the static gains estimated in the Cecchini Report (1988).

Empirical studies followed and are summarized in Table 1. In addition to the country coverage and time span of the data, which may help to place the results in the context of the country behavior displayed in Figures 1a-1o, we also record how integration was captured: by dummy variables for membership in the EU or other trading arrangement; or by a variable based on amounts of trade. For each study, we state what we see as the major conclusion as related to our issue of the effects of European economic integration on growth. For those studies that found a significant effect and

[6] The growth rate equation had capital accumulation as an explanatory variable, so this is consistent with EU membership stimulating the growth rate, but only through investment, not through improved technology. Since the data for the study ended in 1977, this corresponds to the period of steady improvement in per capita GDP that we saw in Figures 1a-1o for the larger EU countries.

reported its size, we report the effect either on the rate of growth or on accumulated GDP over the time span of the data. The details are as follows:

- Coe and Moghadam (1993) applied cointegration analysis to quarterly data on French output, 1971:1-1991:4, so as to identify long-run relationships between capital accumulation, growth, and trade integration measured by intra-EC trade as a percent of total EC output. They found a clear beneficial effect of European integration on French growth. However, they stressed that the relationship was between the level of integration and the level of output, and it did not imply that integration had a long-run impact on the rate of growth.
- Italianer (1994) regressed GDP growth on capital, labor, and trade-based proxies for integration among EC-6 and EC-12 countries for 1961-92. He found significant positive effects of integration on growth, suggesting that growing trade had contributed to growing GDP. During the period of estimation, integration contributed on average 0.3 percentage points to economic growth, which accumulates to an additional output of 10 percent by the end of the period.
- Landau (1995) took a slightly different approach to a larger sample of OECD country growth rates over the longer period, 1950-1990. He used dummies for membership in the EU and added controls for time, initial per capita GDP, and others. With one exception, the EU membership dummies were insignificant, the exception being a regression with no controls in which the dummy by itself had a significant positive coefficient and the dummy interacted with time had a significant negative coefficient. This suggested a positive effect that may have existed in the early years but disappeared in the 1970s.

- Baldwin and Seghezza (1996) also used dummies for EU membership, adding these both to the technology-spillover analysis of Coe and Helpman (1995), which we will discuss further below, and to their own previous analysis of determinants of investment. They found a positive effect on technology spillovers, but nothing significant for investment.
- Henrekson et al. (1997) performed a variety of regressions on growth rates during 1976-85 across a large sample of both developed and developing countries, and included a dummy for membership in the EU or EFTA. They found a significant, positive effect that became smaller, but retained its significance, when the sample was restricted to developed OECD countries. The effect was as valid for membership in EFTA as in the EU, and it seemed to arise from technology, not investment.
- Vamvakidis (1999) sought to avoid the pitfalls of cross-country growth regressions by using fixed effects in a time series of five-year average growth rates for all available countries over 1950-92. In these he included dummies to indicate whether the countries participated in broad liberalization or in regional trade agreements. Only the former appeared to have a significant positive effect on growth. In Table 1 we therefore record as "not significant" the effect of the EU on growth, although of course the study did not look at EU integration separately from the many other regional trade agreements.
- Vanhoudt (1999) also used a time series, but tailored it specifically to the issue of EU membership by defining his time periods between EU expansions. Within

that context, and in several specifications using various controls, the coefficient on EU membership was consistently insignificant.

- Johansson (2001) narrowed attention to just four large EU countries and examined growth in total factor productivity (TFP) in 22 manufacturing industries in each country. Using imports from within the EU and imports from outside as explanatory variables, she found the former to be significant, while the latter was not, suggesting a positive effect of intra-EU trade on growth of TFP.

One's first impression from Table 1 may be that the results are very mixed, some studies finding effects of integration on growth while others look for such effects but fail to find them. There is however one suggestion of a pattern in the results that might be worth noting: All of the studies that fail to find an effect of integration on growth use dummy variables to measure integration, while most (but not all) of the studies that do find an effect use a trade-based measure of integration. This could mean that the former studies simply use too crude a measure of integration, and we should believe the latter studies instead. Or it could mean that the trade-based measures are subject to the criticisms that Levine and Renelt (1992) levied against growth regressions more generally.[7]

We are not prepared to sort out these issues definitively here. We can only say that we remain unconvinced, based on the evidence we have seen, that European integration has increased the long-run growth rates of the countries involved. We do not doubt the static benefits of European integration. And we are prepared to believe that at least some of the EU member countries enjoyed increased rates of growth following

integration that lasted for a number of years, perhaps benefiting from the "medium term" growth effects that Baldwin (1992) extolled. But if the EU has caused its member countries to advance to permanently higher rates of economic growth, we have a hard time seeing it.

Other Evidence

In addition to the studies mentioned in Table 1, there has been other empirical work that bears on the issue of how the EU may have affected growth in its member countries, even though these other studies did not address the question directly. This includes, for example, the work of Ben-David (1993, 1996), who has shown a tendency for per capita incomes to "converge" as a result of economic integration and trade. This means a fall over time in the dispersion of per capita incomes across countries, particularly those that trade a lot such as the original six members of the EU. This result does not, of course, say anything about whether this convergence is achieved by the initially poorer countries growing faster or *vice versa*, and it therefore has no direct implications for the effects of integration on rates of growth.[8]

Another body of evidence that certainly deserves mention is the work on technology spillovers initiated by Coe and Helpman (1995). They regressed changes in TFP on import-weighted averages of other countries' expenditures on research and development (R&D) and found a significant positive effect. They concluded that the fruits of R&D spill over to other countries through trade, suggesting therefore that a

[7] The main message of Levine and Renelt (1992) was that effects found in growth regressions were seldom robust to the inclusion of other control variables. See also Frankel and Romer (1999), who stressed that causation may be expected to go both directions between trade and growth.

country's growth can be stimulated by increasing its trade with other countries that are doing a lot of R&D. Of course, this assumes that such trade does not adversely affect the country's own level of R&D, which continues to be important, but it certainly provides a plausible case for integration among, and with, high-R&D countries in order to stimulate growth. This, indeed, is one of the mechanisms developed theoretically by Grossman and Helpman (1991), and the Coe and Helpman results provide empirical support for it. This is so compelling, in fact, that one has to wonder why the more direct search for growth effects of European integration, reviewed above, has not been more successful.[9]

Which brings us to the broader literature on the effects of trade on growth. This extends back at least to the work of Michaely (1977) and includes contributions during the 1990s that are too numerous to list here. The point for us is that, if indeed trade contributes to growth, as many believe in spite of the many criticisms of this literature, then doesn't the fact that the EU has increased trade mean that it must also have increased growth? Unfortunately, no. In addition to the concerns that causation may run from growth to trade rather than the reverse, there is also the question of which, among the many causes of trade, may lead to trade that is beneficial for growth.

The point can be made quite simply in terms of Frankel and Romer's (1999) very clever demonstration that at least one sort of trade does indeed cause growth. By using economic geography variables as instruments for trade, they avoid the endogeneity

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[8] Nor does it imply that per capita incomes converge *within* countries, across internal regions and/or across other economic groups.

[9] The answer may be implicit in the paradoxical observation of Keller (1998), who showed that the Coe-Helpman results did not require that the R&D levels be weighted by trade. What Keller called random weights, as well as simple arithmetic averages, would work as well. Coe and Hoffmaister (1999) argued that Keller's weights were not really random, but were centered on arithmetic averages. That is apparently true, but it leaves open the question of why these arithmetic averages work as well as import-weights. Until this is sorted out – and Keller does not provide an explanation, only the observation – it seems that there is still a mystery here.

problem of most trade and growth regressions and show conclusively that such trade as is caused by geographic factors, such as proximity and size, does indeed contribute to growth. But does it follow that such trade as may be stimulated by economic integration will cause growth? We don't know. For the trade that is caused by integration is inherently *not* the same trade that Frankel and Romer capture with their instruments. Until we know why the geography-based trade plays the role that it does in promoting growth, we have little basis for assuming that the same causation applies to trade that arises for other reasons, such as integration. Indeed, we know from the theory of trade creation and diversion that not all trade is the same in its effects, so we should not assume that here.

In short, we have a long way to go before empirical work will tell us all that we want to know about this issue.

III. Theory

In this section we use economic theory to address the question of EU expansion. Our concern is not just with the effects of economic integration, especially regional or preferential integration, although that is certainly part of the story. We are also concerned with the phenomenon of a growing trading bloc, one that, once formed among a few countries, repeatedly adds additional countries as the EU has done. The question is whether this process of expansion has implications that differ at all from the original formation of the trading bloc.

Traditional trade theory has not usually addressed this question, perhaps because it was not viewed as interesting. In a static model of trade creation and diversion, each

new country added to a preferential arrangement causes the same kinds of things to happen, with new opportunities for trade creation and new ones also (unless the added country is that last outsider remaining) for trade diversion. Of course, some trade diversion that had occurred in an earlier expansion may be reversed by a later one, so the likelihood of expansion being beneficial may improve. But otherwise, further expansion of a trading bloc is just more of the same. If trade creation dominates trade diversion when a bloc is first formed, then it is likely to continue to do so as the bloc is expanded, and the welfare of participating countries as a group ought to expand fairly smoothly as the bloc gets larger. The gains may not be shared uniformly among them, however, as new members causes changes in relative prices within the bloc that benefit some members and harm others.[10] A new member that exports the same goods as an existing member will turn the terms of trade against that existing member.

The issue of expanding trading blocs was addressed a few years ago in a paper by Krugman (1991b), and also a bit later by us, in Deardorff and Stern (1994).[11] The focus of these papers was not so much on the expansion of a single trading bloc, but rather the effect on the world as countries group together into preferential arrangements that in turn combine to become larger and, therefore, fewer. Krugman used a monopolistic competition model of intra-industry trade in which the world is divided into some number, n, of trading blocs. He simulated the effects of expanding the blocs and thus reducing n. What he found was that world welfare first declines as blocs expand, reaching a minimum when there are just three blocs each comprising one third of the world. Beyond that, as the number of blocs falls to two and then one (free trade), welfare

[10] We are grateful to Helene McCarren for pointing this out.
[11] See also Baldwin (1996), Levy (1997), and Krishna (1998).

increases. Deardorff and Stern (1994) used a model based on comparative advantage, in which larger trading blocs are more likely to include, and thus to take advantage of, countries with diverse abilities. In their model, although a fall in welfare as blocs expand is possible, a lower bound on welfare rises monotonically with bloc size from autarky to free trade. This suggests a likelihood, though not a certainty, that bloc expansion will be beneficial.

All of these models treat countries symmetrically, so that whatever happens to the welfare of the group of countries in a trading bloc also is presumed to happen to each member. Yet one of the messages of the data displayed in Figures 1a-1o is that the countries of the EU seem to have performed quite differently from one another, both comparing large and small members of the original EC-6 (such as France vs. Netherlands) and comparing the original members with countries of comparable size that entered later (such as France vs. U.K.). To allow for such asymmetric performance across countries, either or both in terms of exogenous country characteristics or in terms of their positions in the resulting equilibrium, it seems useful to examine a model in which increasing returns plays a larger role.[12] Indeed, we have been motivated to do that by reading Puga and Venables (1997), in whose model increasing returns and related forces lead to agglomeration of industry in particular locations within a trading bloc, so that the benefits of integration are shared unequally. We will return to their model a bit later, but first we explore the role that increasing returns can play in a much simpler model.

[12] The model of Krugman (1991b), though it assumes increasing returns at the level of the firm in order to generate monopolistic competition, does not permit that feature to play much of a role in the resulting equilibrium. As is common (but not universal) in such models, assumptions about preferences, technology,

Increasing Returns

The model we use is a variation of Ethier (1982), which also appears in various forms in textbooks on international trade. There are two sectors, both of which employ only labor. One sector – call it wheat – has constant returns to scale; the other – call it manufactures – has increasing returns to scale that are external to firms but internal to the country.[13] Both sectors, therefore, can be perfectly competitive, even though for a given wage, average cost in the manufactures sector will decline with output.

This model is routinely used to illustrate the effects of increasing returns on patterns of trade and the gains from trade, looking at a world of two countries that move from autarky to free trade. For our purpose of examining expansion of a trading bloc, we will abstract from the realistic complications of trade subject to non-prohibitive barriers (and thus also from the possibility of trade diversion) and ask, in a world of many countries initially in autarky, identical except perhaps for size, what happens first when a group of them trade freely, and then when that group expands to include more countries.

In Ethier's (1982) model, costs of manufactures decline from infinite to zero as output expands from zero to infinite, giving rise to a greater multiplicity of equilibria than we care to confront here. We therefore depart from his model slightly by assuming that average cost in manufactures is finite and declines with rising output less rapidly than does the price that consumers are willing to pay. Multiple equilibria will still exist,

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and number of firms lead to a constant output per firm, with industries expanding and contracting only through entry and exit of firms, not through changes in firm size.

[13] Ethier (1979) also explores the implications of internationally increasing returns, but these would not have anything like the implications that we are interested in here unless their effect declines with distance, as is true, in effect, in Puga and Venables (1997).

involving different patterns of specialization across countries, but the model with trade will be somewhat better behaved and more tractable.

Consider first, then, the standard problem of two (out of many) countries opening from autarky to free trade. Figure 2 shows the autarky equilibria. The larger country, A, (with a larger labor force) has production possibilities given by the curve T_AT_A'. The smaller country, B, because it has the same technologies, has a transformation curve T_BT_B' that is the same as T_AT_A' but shifted vertically downward. In each country, autarky equilibrium requires that the price of manufactures equal its average cost and thus that, wherever production takes place along the interior of TT', the price line must extend from the wheat intercept of TT' to the production point. That price line is then the budget line for aggregated consumers, who must in equilibrium choose to consume also at that same point.

Thus the autarky equilibrium in country B is at E_B with price line p_B (its slope is minus the relative price of manufactures) tangent to the indifference curve u_B. The autarky equilibrium in the larger country, A, is at a point like E_A, with autarky price p_A.

The main purpose of putting both countries in the same figure is to show that $p_A<p_B$; that is, the increasing-returns good, manufactures, is cheaper in autarky in the larger country. This is shown by noting that, since T_AT_A' is identical to T_BT_B' but vertically above it, it must cross a price line parallel to p_B at point c, vertically above E_B. But with homothetic preferences that are identical in the two countries, at that price consumption would be at point d, where the ratio of wheat and manufactures is the same as in country B. The indifference curve through d also indicates that the market-clearing price at point c would be higher than p_B, providing the incentive for output of

manufactures to increase. Thus autarky equilibrium is found at a higher output of manufactures, and thus a lower average cost and price, as at E_A.

Now suppose that these two countries were to open to free international trade in goods but not labor.[14] Although several equilibria may actually exist, this price difference will under normal circumstances tell us where we go. If initially outputs remain at their autarky levels, those outputs will be demanded at a single free-trade price that is somewhere between the autarky prices. Higher than p_A, it will provide the incentive for manufactures output to expand in the larger country, A; lower than p_B, it will cause manufactures in the smaller country B to contract.

Either or both countries may then completely specialize, though of course in different goods. Which of several possibilities occurs depends on the relative demands for manufactures and wheat, each with rather different implications for the well being of the citizens of the two countries. The role of demand is shown in Figure 3, in which one should first look at the supply curve, *S*, that exists within these two markets now that they are integrated. Of necessity, this curve does not have the usual interpretation of describing quantity supplied at given prices. Rather, it should be read vertically as the supply price corresponding to each quantity. As such, it starts at point *a*, the price p^0 at which the smallest quantity of *M* would be produced in either country, which is equal to the slope of the transformation curves in Figure 2 at their vertical intercepts. As output rises from zero in the larger country *A* (since that is the country that we know, from the autarky prices, will increase its production of *M*), the average cost falls due to increasing

[14] It is true of course that the EU came to include the free movement of labor, not just goods. However, even today, it is our understanding that labor is far less mobile even within European countries than would be needed for a unified labor market. We therefore view the assumption of immobile labor – which is essential to our results – as more appropriate than perfect mobility.

returns and the supply price declines. This only continues, however, until country A reaches its maximum output of M, M_A^{max}. At this point the price must rise again to p^0 in order to induce any output of M in country B. From there the supply price again declines, this time reflecting average cost in country B, until it too reaches its maximum. The supply curve therefore follows the crooked path, *abcdeS*.

This supply curve can then be combined with whatever demand curve characterizes incomes and preferences in this trade-integrated market, three different examples of which appear in Figure 3.[15] If demand for M is not too large, such as the curve D_1, then the whole market for M is served by the larger country, which also produces some wheat. The smaller country specializes in wheat in this case, and the price of manufactures is determined by average cost in the large country. For small shifts in the demand curve around D_1, note that an increase in demand for M will lower its price. If demand is larger, however, such as curve D_2, then the large country produces only M while the small country produces only W. The price now rises above average cost in country A, in order to clear the market, but fails to increase output since country A is already producing all it can. And price is still too low, below p^0, to permit production of M to begin in country B. Finally, for even larger demand, such as curve D_3, the smaller country does produce some M, along with W, and price becomes the average cost of M in country B.

[15] The demand curve is well defined, given first the incomes that consumers in both countries derive from the patterns of production reflected in the supply curve. It is then the relative price of manufactures that will induce these aggregated consumers, given those incomes, to demand the indicated quantity of M and the corresponding quantity of W that the remaining labor will produce. With identical homothetic preferences, there is no problem assuring that the demand curve is downward sloping. It is likely, however, to have a slight kink at M_A^{max}, although we do not attempt to show that.

Now suppose that another country, *C*, is added to this trading bloc. What will happen depends on the autarky price in country *C* compared, not to the autarky prices of *A* and *B*, but rather to the price that prevailed with free trade between them. In spite of the large size of their combined market, as we've seen, that price could be quite high, if demand was such that the smaller country was producing *M* and not too much of it, as at E_3. If so, the small country's manufactures industry may be replaced by producers from country *C*. Alternatively, it is just as possible that country *C* will have a higher autarky price than that in the trading bloc, and that it will be the one to reduce manufactures production.

In this simple model, it is therefore difficult to say in what order the countries will enter the manufactures market, since the market price is so very sensitive to demand as shown in Figure 3. Let us assume, however, that new entrants to the trading bloc typically have slightly higher costs of manufactures than do member countries, perhaps for reasons that are currently outside this model.[16] Then we can describe the process of bloc expansion in terms of a series of average cost curves, like Figure 3, but for multiple countries arranged in the order of their entry to the trading bloc. This is shown in Figure 4, where each average cost curve also has a short horizontal line crossing it at the level of its respective autarky price.

Here the complete supply curve is composed of the average cost curves of six countries, *A*, *B*, …, *F*. Demand curves are drawn for bloc sizes of 2 to 6: *A* and *B* together yielding D_2, *A*, *B*, and *C* together yielding D_3, etc. Thus as the trading bloc

[16] For example, the increasing returns, which so far we have simply taken as given, may be the result of an externality among producers in close proximity or in the same market. Then contrary to the model, that externality might spill across borders to some extent, reducing costs in other bloc members by a portion of

expands through the addition of more countries, the demand for manufactures within the bloc expands as well. As drawn, the first expansion, adding the rather small country *C*, leaves patterns of specialization within the bloc unchanged and country *A* just increases output of *M* by a small amount, also reducing its price as cost falls. The next expansion, to include the rather large country *D*, shifts demand to D_4, causing country *A* to increase output of *M* to its maximum so that price rises. Yet another expansion, adding country *E*, brings country *B* into production of manufactures as well as *A* and, as drawn, causes the price to fall again. Finally, expansion of the bloc to include the last country, *F*, increases demand so much that even the smallest country *C* begins to produce manufactures.[17]

This, then, is part of the story that this simple model is able to tell about expansion of a trading bloc. With an increasing-returns-to-scale sector, that sector will be pulled by integration into a single country until that country's capacity for its production is exhausted. With global free trade among many countries, one might expect that sector to expand in the largest country, whatever that may be. But by forming a trading bloc, a group of countries may be able to direct that production instead into one of their own. Then by expanding the bloc to include more countries and thus increasing the size of the internal market, they can induce that sector to grow beyond just one member country and into others.

Does this do them any good? The answer can be seen in Figures 5a and 5b, where the production possibilities for countries *A* and *B* are reproduced from Figure 2. In each,

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what it reduces costs at home. This, in effect, is what happens in the economic geography model of Puga and Venables (1997) that we discuss below.

[17] Reaching this equilibrium, with *C* producing *M* and the much larger countries *D* and *F* not producing *M*, may be problematic, since autarky prices, shown for each country in Figure 4 by short horizontal lines, are likely to be lower than *C*'s. It is here that we may need the sorts of cross-border externalities mentioned in the preceding footnote. However, the situation with *C* producing *M* certainly *is* an equilibrium, since the price is below the cost, p^0, at which the other countries could begin production.

the equilibrium prices for each stage of bloc expansion from Figure 4 are drawn, anchored by the patterns of production in the two countries that are also indicated in Figure 4. In the top panel, for example, price p_2 reflects equilibrium in the two-country bloc of just *A* and *B*, and at this price country *A* produces both goods and exports *M*, reaching utility level u_2. When a third country, *C*, is added to the bloc, Figure 4 shows that price falls, to a level shown as p_3 in Figure 5. Country *A* expands its output of *M* and reaches a slightly higher utility, u_3. However, when the fourth country, *D*, is added to the bloc, then country *A* specializes in *M* and is also able to sell it for a higher price, p_4. This is where the country gets the biggest boost to its welfare, utility rising to u_4. From here on, further expansion of the bloc causes the price to rise and fall, changing country *A*'s utility in proportion to that price.

Figure 5b shows the situation in country *B*, though omitting all indifference curves except u_2 to reduce clutter. Following the same prices as appeared in Figure 5a but recognizing the different specialization of country *B*, one observes that it gains slightly from the first expansion from 2 to 3, loses considerably from the second, from 3 to 4, recovers somewhat with the addition of the fifth country, and then gains massively when expansion finally enables it to specialize completely in increasing-returns manufactures, at price p_6. Of course, it is not just the price that makes this possible, but the expansion of demand that occurred with the larger market, and the fact that country *B* was able to enter the manufacturing sector before other countries, *D* and *F*, that might have captured the market instead had they been part of the bloc from the start.

Figure 6 plots the levels of welfare reached by each country as a function of the number of countries in the trading bloc. Assuming that countries join the bloc at regular

intervals, the horizontal axes of these graphs represents time, and these are therefore roughly comparable to the graphs of per capita income over time that we saw in Figure 1. Notice that, like France, Germany, and Italy, the larger of our two initial countries, A, gains steadily for some time after the bloc is formed, leveling off after it includes several additional countries. In contrast, the smaller of our countries, B, actually loses relative to autarky at one point after the bloc is formed, and only takes off to higher levels of welfare when the bloc is large, roughly like the performance of the smaller countries of the EC-6.

This, of course, is just an example of what might happen. Even with these same countries, other equilibria exist that might be reached if industries follow different paths of expansion and contraction. And with other configurations of country sizes and orders of admission to the trading bloc, it is difficult to imagine any robust predictions that could be sustained. But the example does draw attention to a few patterns that seem plausible and that resonate well with the data that we looked at earlier in the paper.

1. Large countries gain more than small countries from the initial formation of a trading bloc.
2. Small countries may gain more from the subsequent expansion of the trading bloc than they gained from its initial formation.
3. Other countries that enter a trading bloc late may find it difficult to exploit a comparative advantage in increasing-returns industries, and they may therefore gain less from membership than earlier entrants.
4. Growth of real income in a trading bloc, even that of the original members, may depend on the expansion of the bloc to include new members, thus expanding the

market size and allowing them to further exploit the scale economies in the industries where their early participation secured a foothold.

Looking back at the data of Figures 1a-1o, it seems plausible to interpret the performance of France, Germany, and Italy as consistent with that of country *A* in our model. The somewhat delayed success of Belgium might be an example of country *B*, while Luxembourg and Ireland may be examples of country *C*. Meanwhile the U.K., in spite of its size, seems never to have gained much if at all from the EU. In the context of the model, the U.K. may be like countries *D* or *F* that, in spite of their size, are put at a disadvantage by their late entry into the bloc.

Obviously, all of this is making far more of a simple model than is justified, and we are only suggesting this model as a possible and very partial explanation of what the experiences of countries in the EU have been. One lesson of this sort of model, in contrast to more traditional models with which we, at least, are more familiar and comfortable, is that the experiences of different countries may well be very diverse and complex, with effects that vary across countries in both their magnitude and their timing. It may therefore be expected that empirical efforts to relate performance to membership in a trading bloc will be fraught with difficulty.

Geography Models

Our use of the simple increasing-returns model above was motivated by what we have learned from the literature on New Economic Geography. Starting with several papers by Krugman that built on his earlier work,[18] this literature stresses the forces that encourage and deter "agglomeration," that is, the concentration of economic activity at a

single location, due to benefits that derive from being close to other economic activity. The application of such models to regional integration was done most elegantly by Puga and Venables (1997), who noted that regional trading blocs are likely to attract concentrations of increasing-returns industries into their member countries, attracted by their enlarged markets.[19]

Puga and Venables addressed primarily the differences between simple regional blocs and "hub and spoke" arrangements in which a single country makes separate free trade agreements with two or more other countries. The former tends to center agglomeration within the larger member country, while the latter tends to attract it to the country at the hub. Clearly, market size is all-important in these models.

The geography models are far more complex than the simple increasing-returns model that we have used here, but they share several common characteristics, including this importance of market size. Indeed, the Puga and Venables model produces very much the same patterns of specialization that we saw above as depending on the share in demand of the increasing-returns sector. That is, when two countries integrate, in their model as well as ours, if demand for manufactures is relatively small, then the larger country will produce it along with the other good; if demand is somewhat larger, both countries will specialize; and if demand for manufactures is large, then the smaller country will produce both goods.

The geography model goes beyond our simple model in at least two important ways. First, it provides explicit underpinnings for the increasing returns that we simply

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[18] See Krugman (1991a, 1992).

[19] These models also incorporate imperfect competition, a feature that is required by their assumption of increasing returns to scale that are internal to the firm. But imperfect competition does not seem to be otherwise important in generating their agglomeration effects.

assumed. In geography models, increasing returns arises from a combination of fixed costs in producing individual varieties of manufactures, and from the cost reductions that arise when more varieties of manufactures become available. The latter constitute an externality that produces a decreasing-cost industry within a country, but it also spills over, to some extent, across borders in a way that our simple model does not capture.

A second difference is that geography models include an essential role for transportation costs. If these are too high, then the forces of agglomeration are swamped by the need to produce close to geographically dispersed consumers. On the other hand, since the increasing returns arise primarily through access to varieties, if transportation costs are too low then the forces of agglomeration are also diminished, since the relevant market becomes the world. Only if transportation costs are of intermediate size does the model display its distinctive geographical properties.

These differences are of course important, and they provide a much richer understanding of the geographic patterns of production and specialization than is possible with our simpler model. However, although we have not succeeded in solving the Puga-Venables model ourselves to verify this, we feel confident that it would yield much the same conclusions as our simple model if it were applied to the problem of trading bloc expansion.

IV. Conclusion

In this paper we have asked whether, and in what sense, European integration has contributed to the economic growth of the participating countries. That is, have the traditional static gains from trade (assuming these even exist for this potentially trade-

diverting preferential arrangement) been augmented by "dynamic gains" that extended over time and produced larger benefits? And in particular, since many have argued that this could happen, has the EU permitted its members to enjoy increases in their long-run rates of economic growth? Finally, with or without such an increase, what is the pattern of these dynamic effects, both across countries (who gets them?) and across time (and when?)?

We looked first at the data, then at the empirical literature that has attempted to answer the question of whether European integration has increased growth. We then examined a simple theoretical model of increasing returns to see what it could tell us about which countries are likely to gain from integration, and when, during a process in which an economic bloc expands over time by adding more members. Our main conclusions are as follows:

1. Based on the evidence, we are doubtful that European integration has produced increases in long-run growth rates.
2. What appears to have happened instead is that
    a. the large countries among the original membership grew faster than other OECD countries for a period of years and then settled into new higher levels of per capita income;
    b. the smaller original members gained little at first, but enjoyed similar movement to relatively higher levels of income some years later as the EU expanded to more countries;
    c. countries that were added later to the EU trading bloc have had diverse experiences, some gaining (though also with a delay), others not.

3. These patterns can be understood in the context of a model in which increasing returns to scale at the country level causes greater specialization and gains from trade in large members of a trading bloc than in small ones, and in early entrants than in late ones.

If these conclusions are correct, then they have implications not only for the countries that are already members of the EU, but also for the countries that may join in the future. To the extent that some current members have not yet been able to take advantage of the larger market by expanding into increasing-returns sectors, further expansion of the EU may provide that opportunity. On the other hand, new entrants – especially small ones – may find that their gains from participation will be limited, at least at first, as they specialize instead in sectors that do not have the potential for such economies of scale.

References

Balassa, Bela, eds. 1975 *European Economic Integration*, Amsterdam: North Holland.

Baldwin, Richard 1989 "The Growth Effects of 1992," *Economic Policy*, October, pp. 247-281.

Baldwin, Richard 1996 "A Domino Theory of Regionalism," in Richard Baldwin, P. Haaparanta, and J. Kiander, eds., *Expanding Membership of the EU*, Cambridge, U.K.: Cambridge University Press, pp. 25-48.

Baldwin, Richard E. and Elena Seghezza 1996 "Growth and European Integration: Towards an Empirical Assessment," CEPR Discussion paper No. 1393, May.

Ben-David, Dan 1993 "Equalizing Exchange: Trade Liberalization and Income Convergence," *Quarterly Journal of Economics*, August, pp. 653-79.

Ben-David, Dan 1996 "Trade and Convergence among Countries," *Journal of International Economics* 40, pp. 279-298.

Brada, Josef C. and Jose A. Mendez 1988 "An Estimate of the Dynamic Effects of Economic Integration," *Review of Economics and Statistics* 70, February, pp. 163-168.

Cecchini Report 1988 *The European Challenge 1992*, Gower.

Coe, David T. and Elhanan Helpman 1995 "International R&D Spillovers," *European Economic Review* 39, (May), pp. 859-87.

Coe, David T. and Alexander W. Hoffmaister 1999 "Are There International R&D Spillovers Among Randomly Matched Trade Partners? A Response to Keller," IMF Working Paper WP/99/18, February.

Coe, David T. and Reza Moghadam 1993 "Capital and Trade as Engines of Growth in France," *IMF Staff Papers* 40, September, pp. 542-66.

Deardorff, Alan V. and Robert M. Stern 1994 "Multilateral Trade Negotiations and Preferential Trading Arrangements," in Alan V. Deardorff and Robert M. Stern, eds., *Analytical and Negotiating Issues in the Global Trading System*, Ann Arbor: University of Michigan Press, pp. 27-94.

Ethier, Wilfred J. 1979 "Internationally Decreasing Costs and World Trade," *Journal of International Economics* 9, pp. 1-24.

Ethier, Wilfred J. 1982 "Decreasing Costs in International Trade and Frank Graham's Argument for Protection," *Econometrica* 50, September, pp. 1243-68.

Frankel, Jeffrey A. and David Romer 1999 "Does Trade Cause Growth?" *American Economic Review* 89, June, pp. 379-99.

Grossman, Gene M. and Elhanan Helpman 1991 *Innovation and Growth in the Global Economy*, Cambridge, MA: MIT Press.

Henrekson, Magnus, Johan Torstensson, and Rasha Torstensson 1997 "Growth Effects of European Integration," *European Economic Review* 41 1997, pp. 1537-57.

Italianer, Alexander 1994 "Whither the Gains from European Economic Integration?" *Revue Économique* 45 (3), May, pp. 689-702.

Johansson, Helena 2001 "Regional Integration and Productivity Growth: The Case of EU," *Journal of Economic Integration* 16, March, pp. 1-20.

Keller, Wolfgang 1998 "Are International R&D Spillovers Trade-Related? Analyzing Spillovers among Randomly Matched Trade Partners," *European Economic Review* 42, pp. 1469-81.

Krishna, Pravin 1998 "Regionalism and Multilateralism: A Political Economy Approach," *Quarterly Journal of Economics* 113, (February), pp. 227-251.

Krugman, Paul R. 1991a "Increasing Returns and Economic Geography," *Journal of Political Economy* 99, pp. 183-199.

Krugman, Paul R. 1991b "Is Bilateralism Bad?" in Elhanan Helpman and Assaf Razin, eds., *International Trade and Trade Policy*, Cambridge, MA: MIT Press.

Krugman, Paul R. 1992 *Geography and Trade (Gaston Eyskens Lecture)*, Cambridge, MA: MIT Press.

Landau, Daniel 1995 "The Contribution of the European Common Market to the Growth of Its Member Countries: An Empirical Test," *Weltwirtschaftliches Archiv* 13(4), pp. 774-782.

Levine, Ross and David Renelt 1992 "A Sensitivity Analysis of Cross-Country Growth Regressions," *American Economic Review* 82, (September), pp. 942-963.

Levy, Philip I. 1997 "A Political-Economic Analysis of Free-Trade Agreements," *American Economic Review* 87 (September), pp. 506-519.

Lucas, Robert E., Jr. 1988 "On the Mechanics of Economic Development," *Journal of Monetary Economics* 22, pp. 3-42.

Puga, Diego and Anthony J. Venables 1997 "Preferential Trading Arrangements and Industrial Location," *Journal of International Economics* 43, pp. 347-368.

Romer, Paul M. 1986 "Increasing Returns and Long-Run Growth," *Journal of Political Economy* 94, pp. 1002-1037.

Smith, Alasdair and Anthony J. Venables 1988 "Completing the Internal Market in the European Community," *European Economic Review* 32, pp. 1501-1525.

Srinivasan, T. N., John Whalley, and Ian Wooton 1993 "Measuring the Effects of Regionalism on Trade and Welfare," in Kym Anderson and Richard Blackhurst, eds., *Regional Integration and the Global Trading System*, New York: Harvester Wheatsheaf, pp. 52-79..

Vamvakidis, Athanasios 1999 "Regional Trade Agreements or Broad Liberalization: Which Path Leads to Faster Growth?" *IMF Staff Papers* 46, March, pp. 42-68.

Vanhoudt, Patrick 1999 "Did the European Unification Induce Economic Growth? In Search of Scale Effects and Persistent Changes," *Weltwirtschaftliches Archiv* 135(2), pp. 193-220.

Viner, Jacob 1950 *The Customs Union Issue*, New York: Carnegie Endowment for International Peace.

Figure 1: Per Capita GDP Relative to OECD

Figure 1a: AUSTRIA

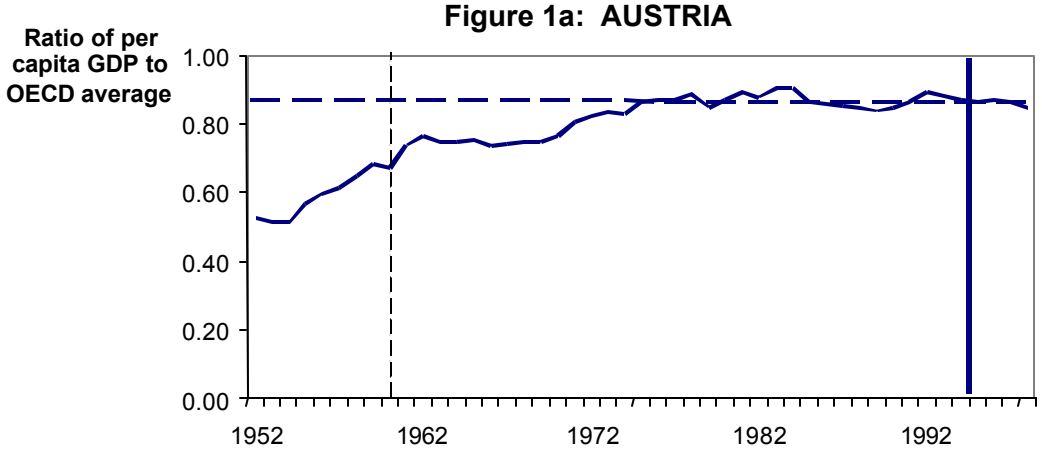


Figure 1b: BELGIUM

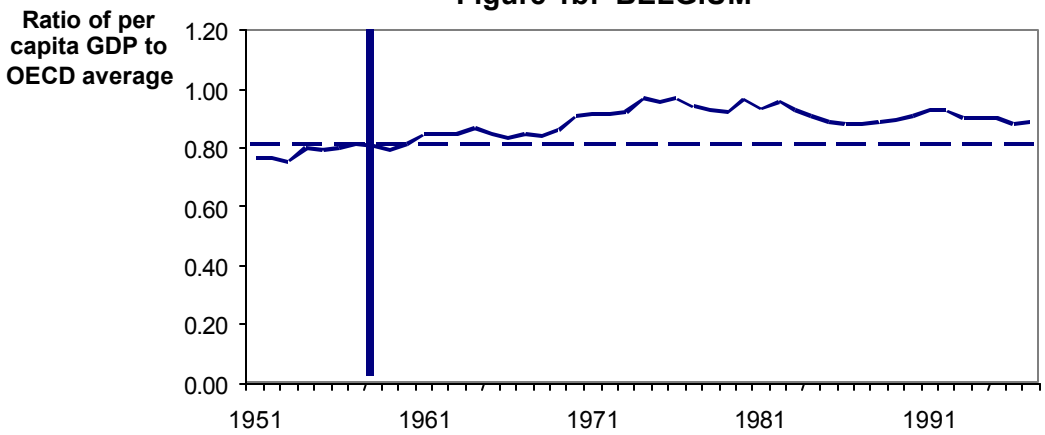


Figure 1c: DENMARK

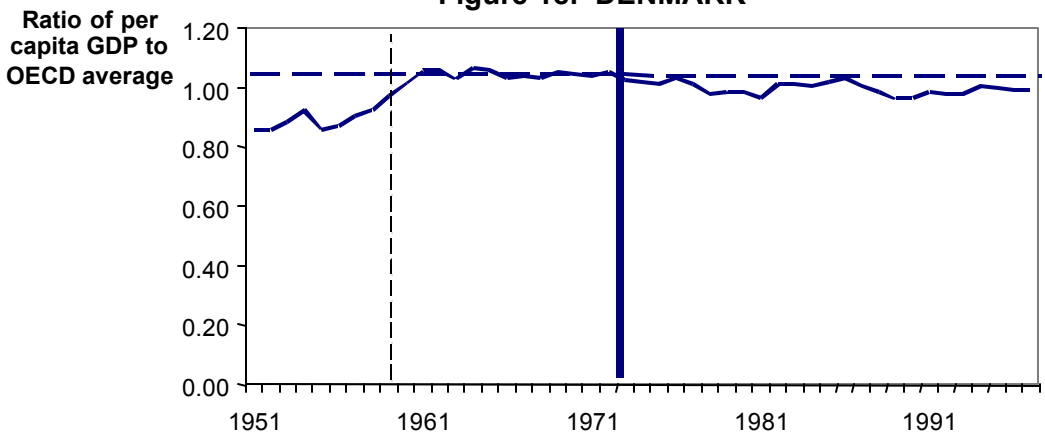


Figure 1d: FINLAND

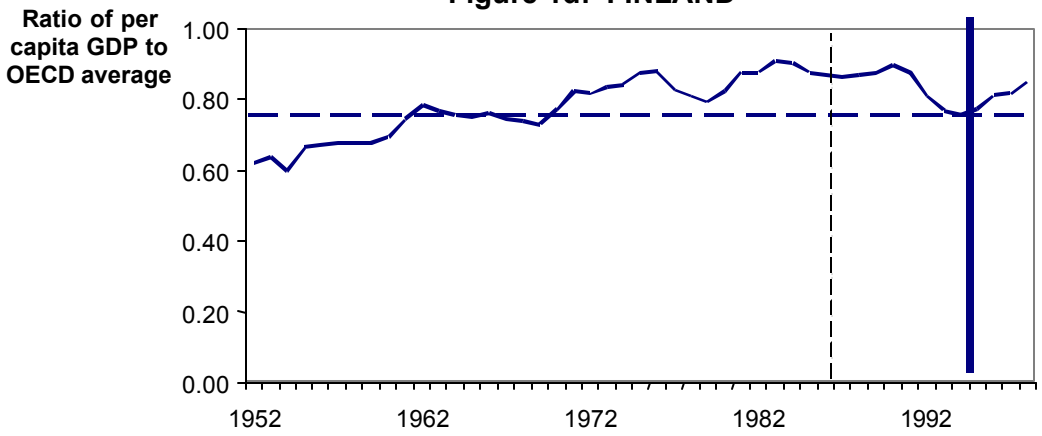


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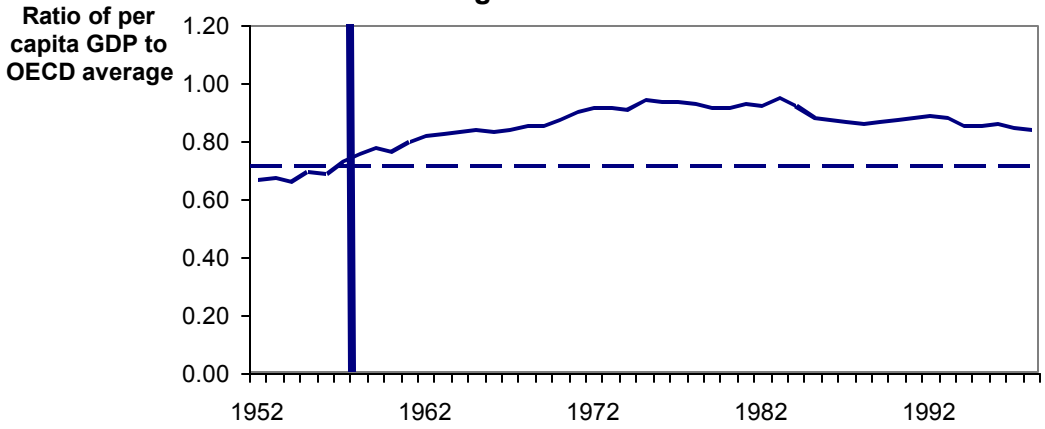


Figure 1f: GERMANY*

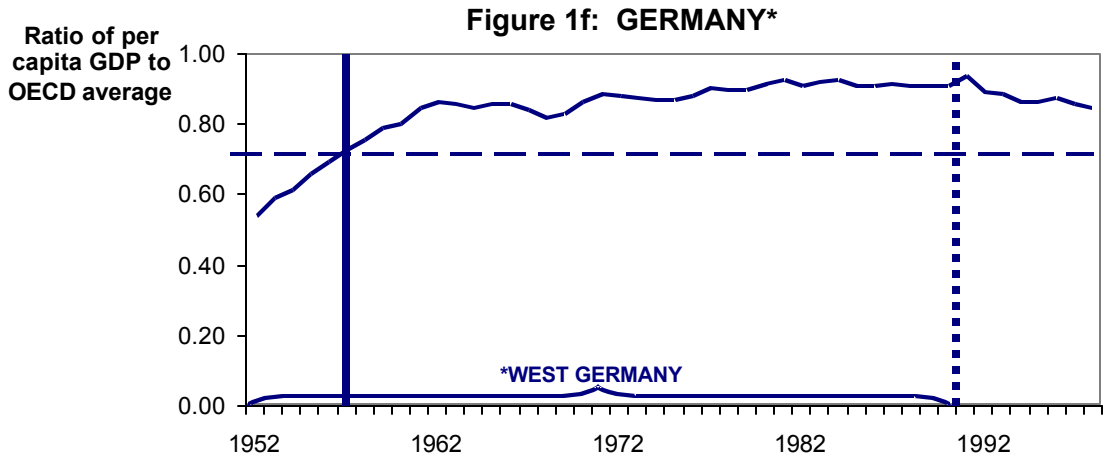


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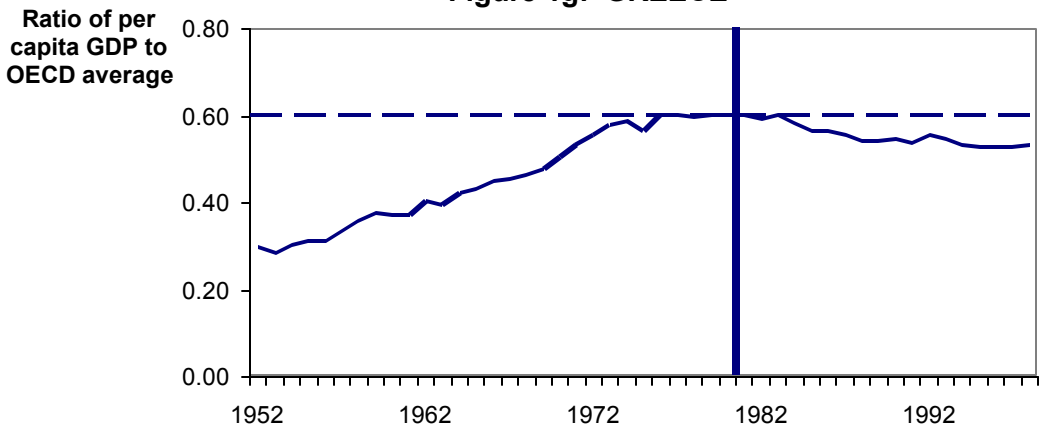


Figure 1h: IRELAND

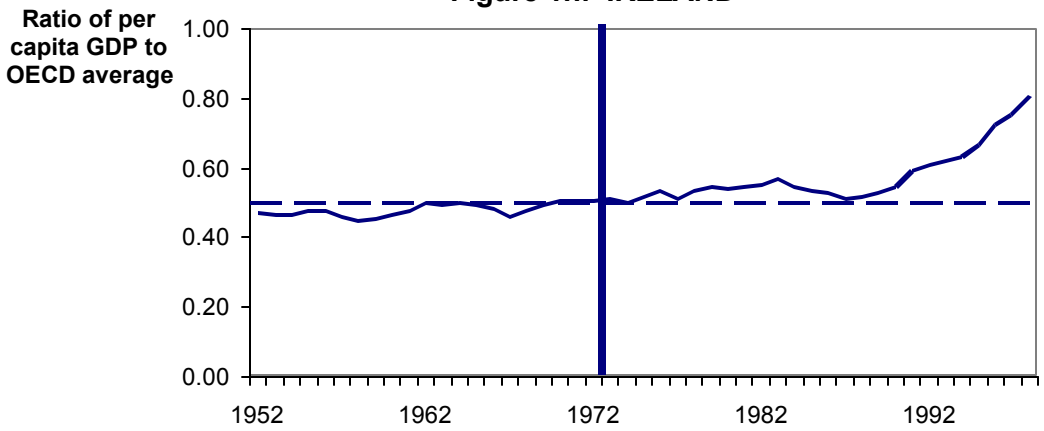


Figure 1i: ITALY

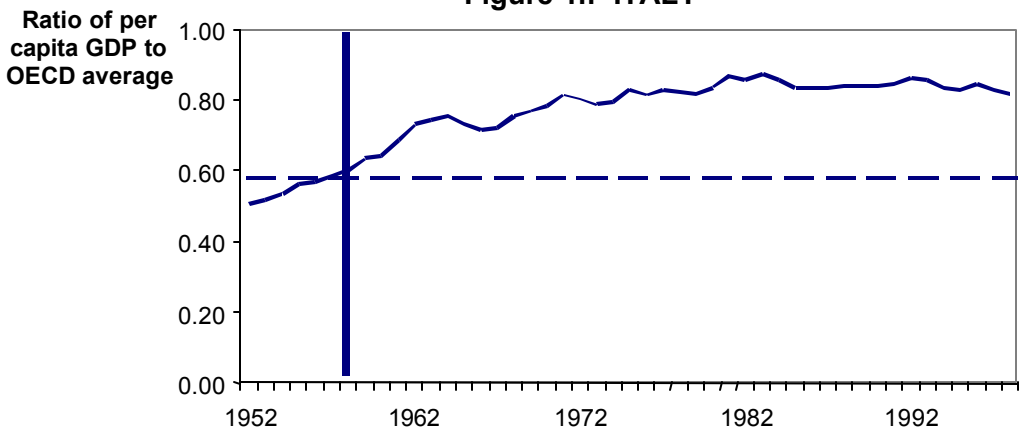


Figure 1j: LUXEMBOURG

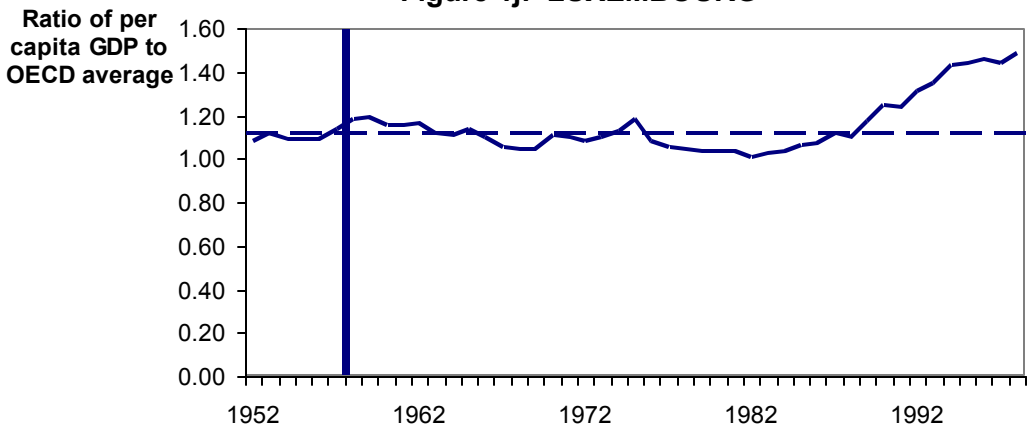


Figure 1k: NETHERLANDS

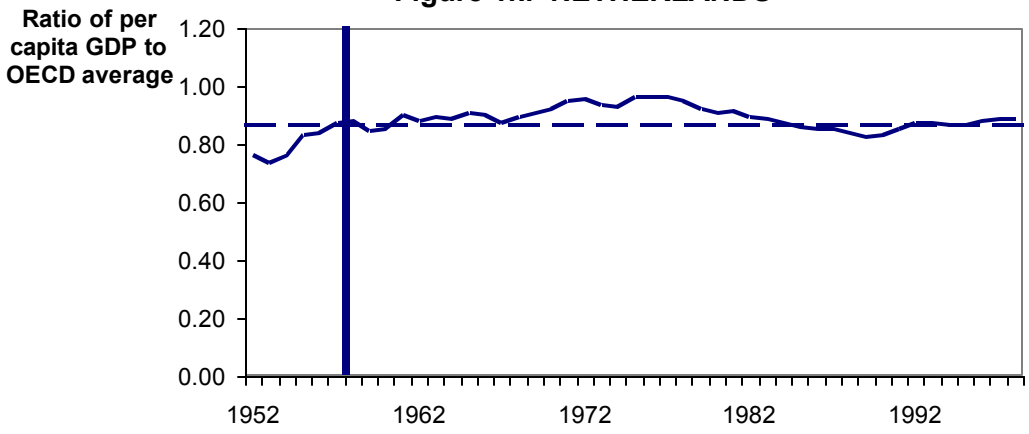


Figure 1l: PORTUGAL

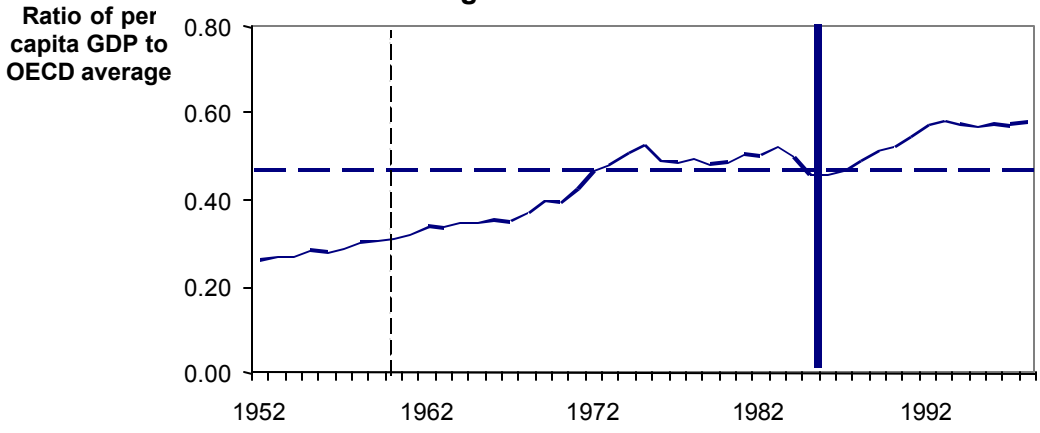


Figure 1m: SPAIN

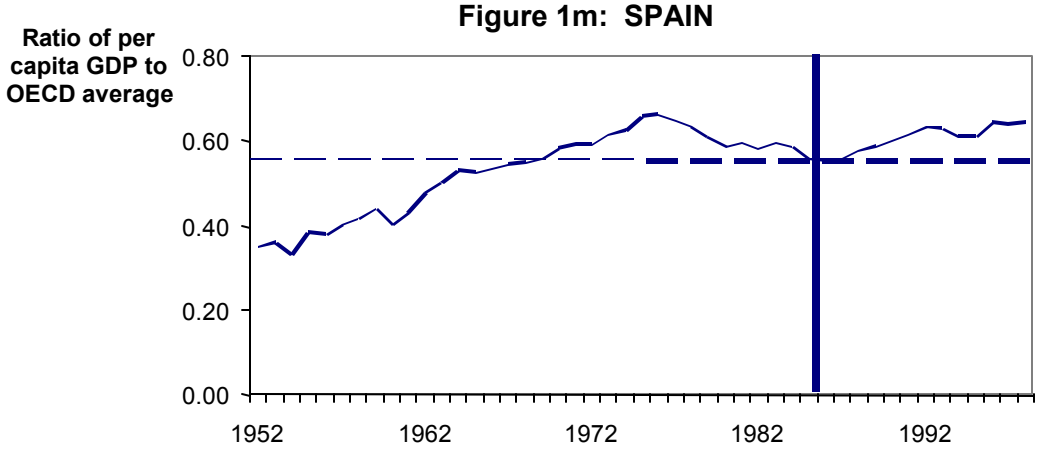


Figure 1n: SWEDEN

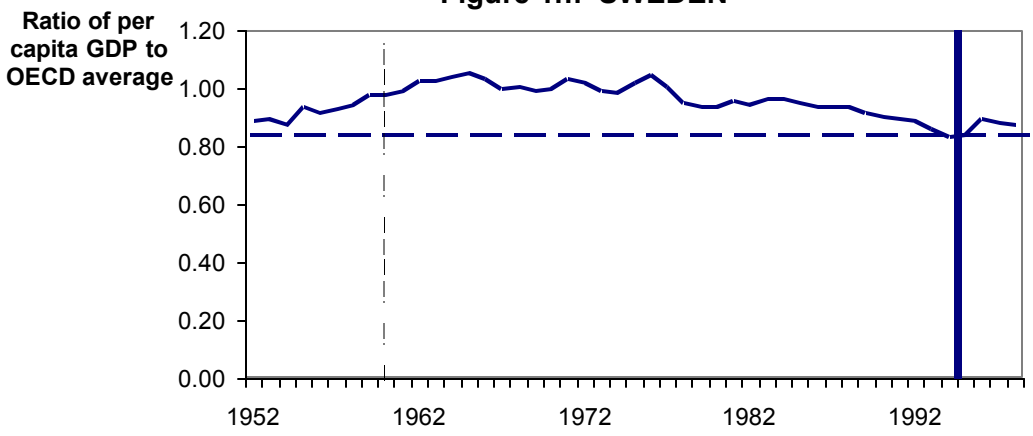
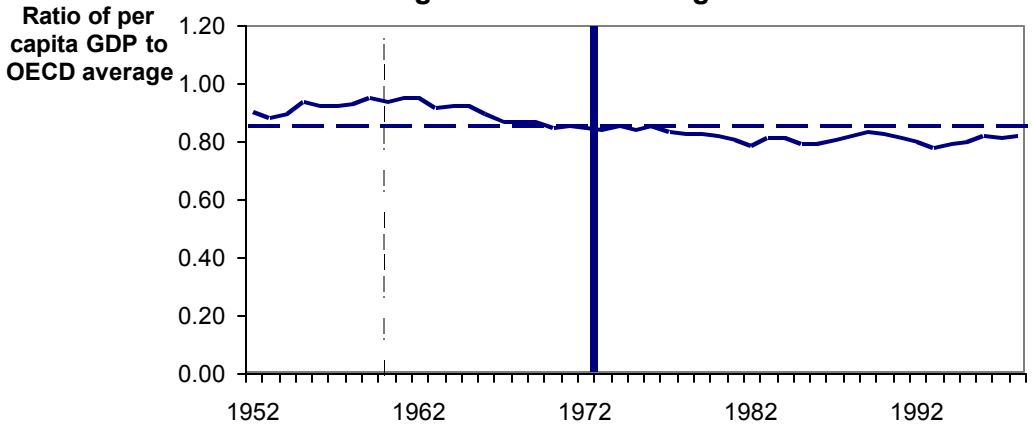


Figure 1o: United Kingdom



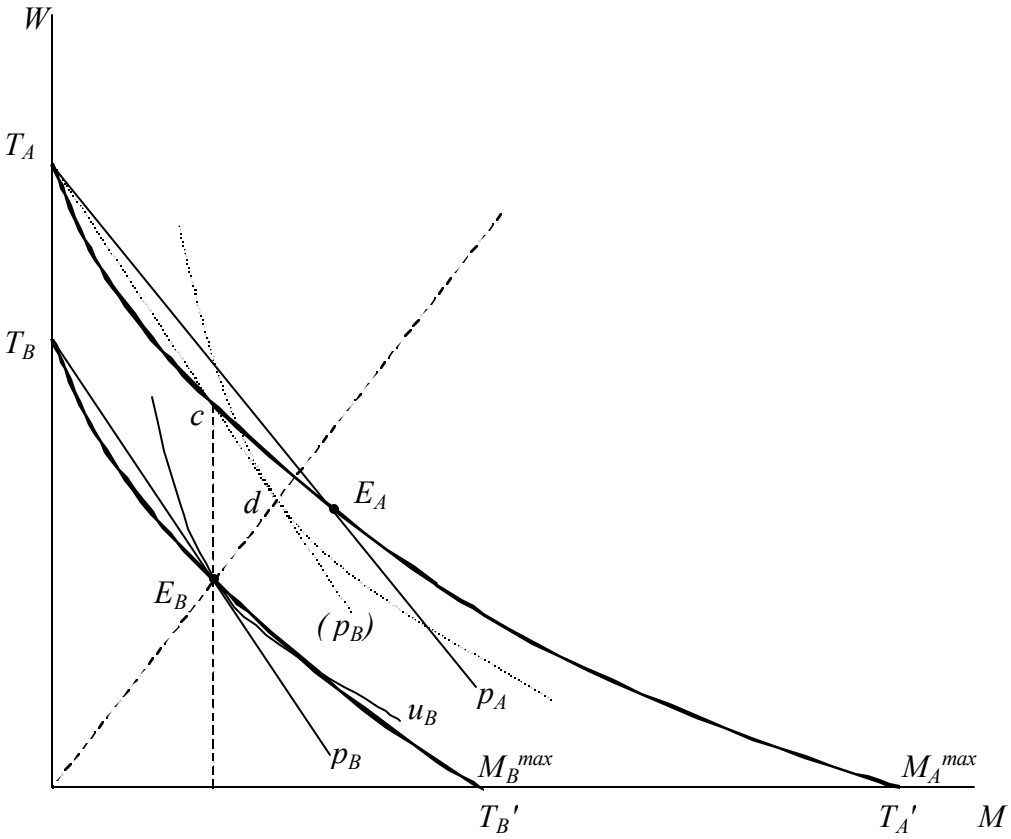


Figure 2

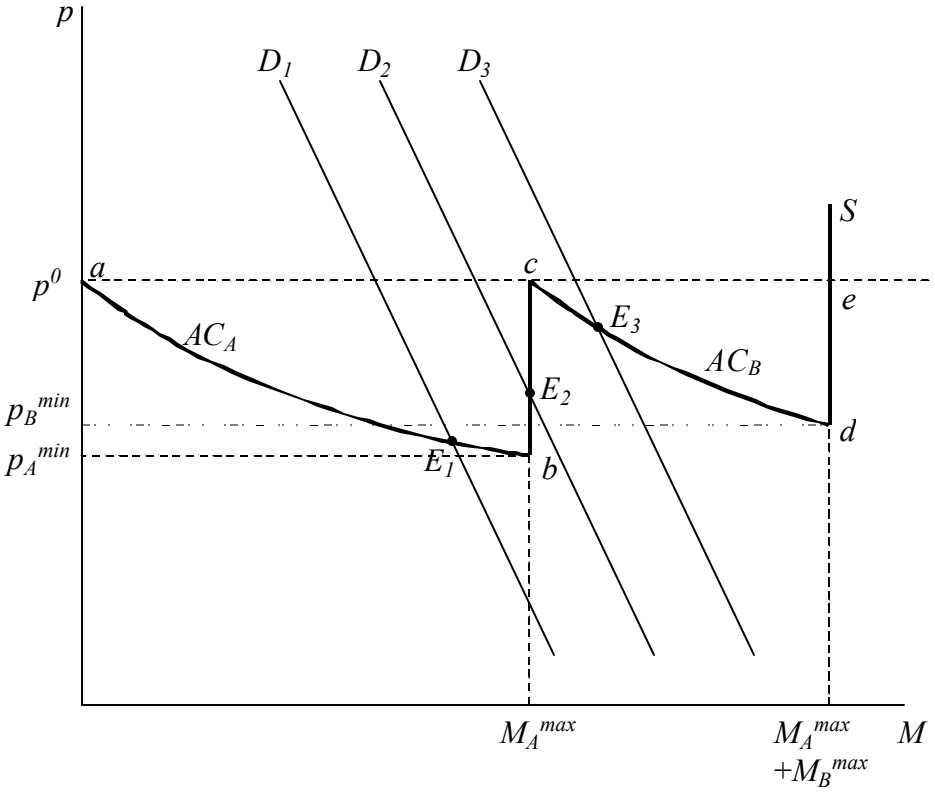

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Figure 3

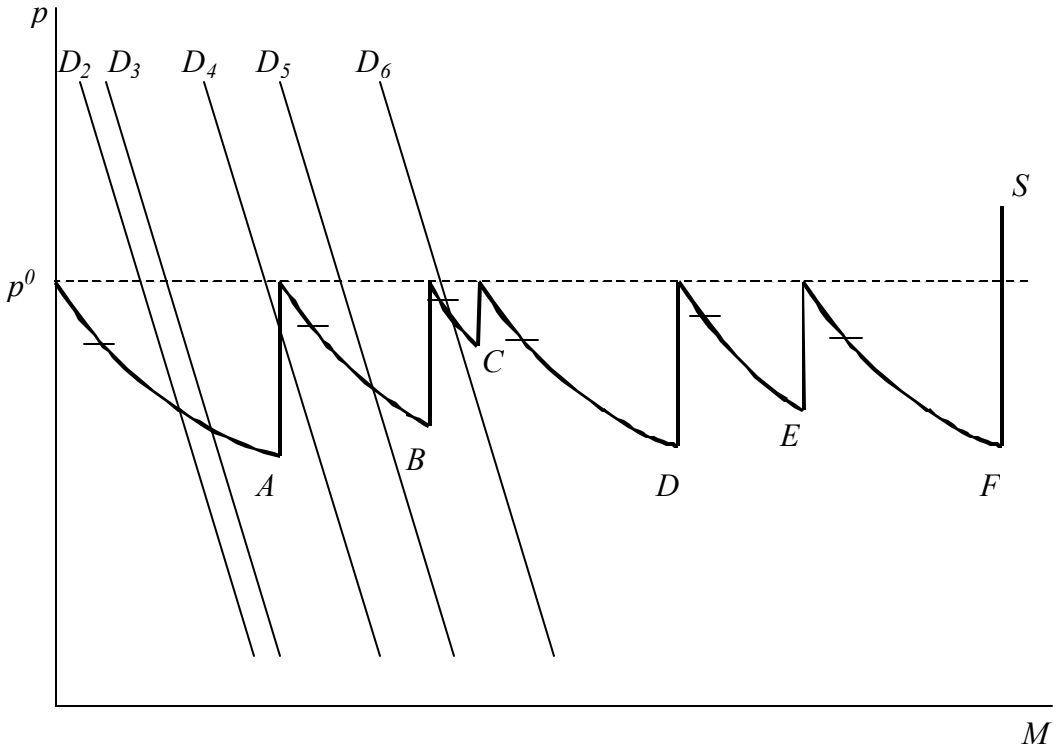


Figure 4

Country A

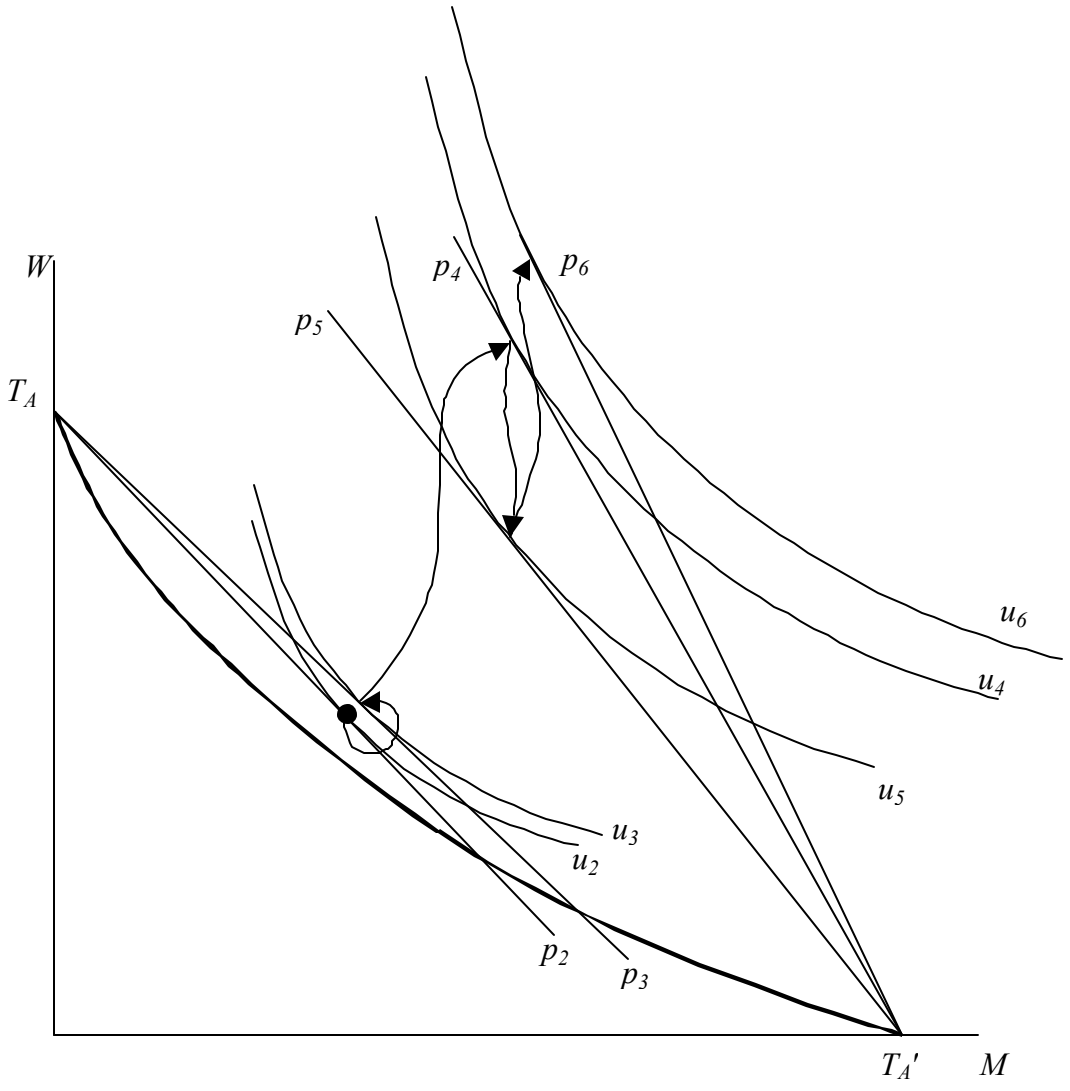


Figure 5a

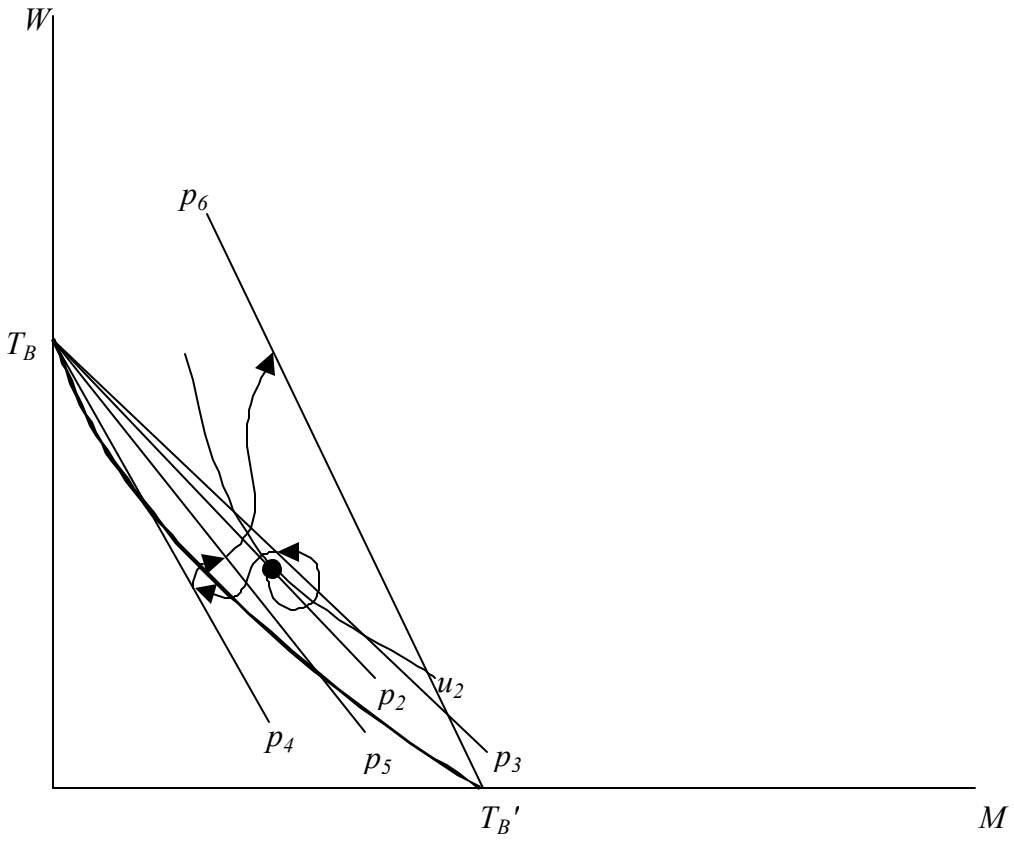


Figure 5b

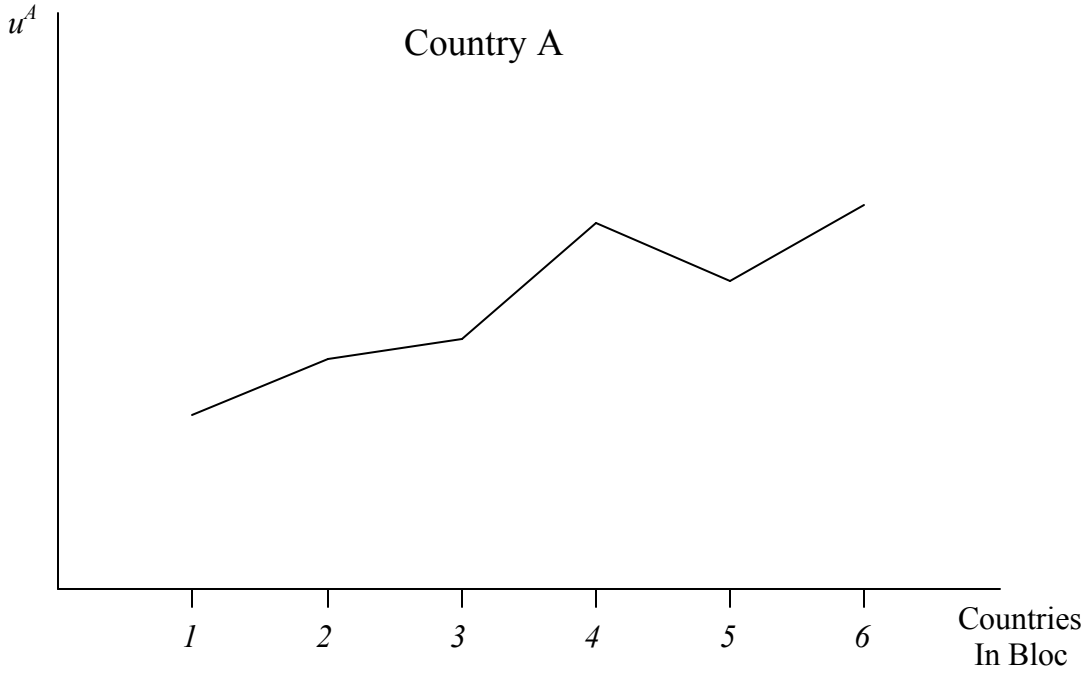


Figure 6a

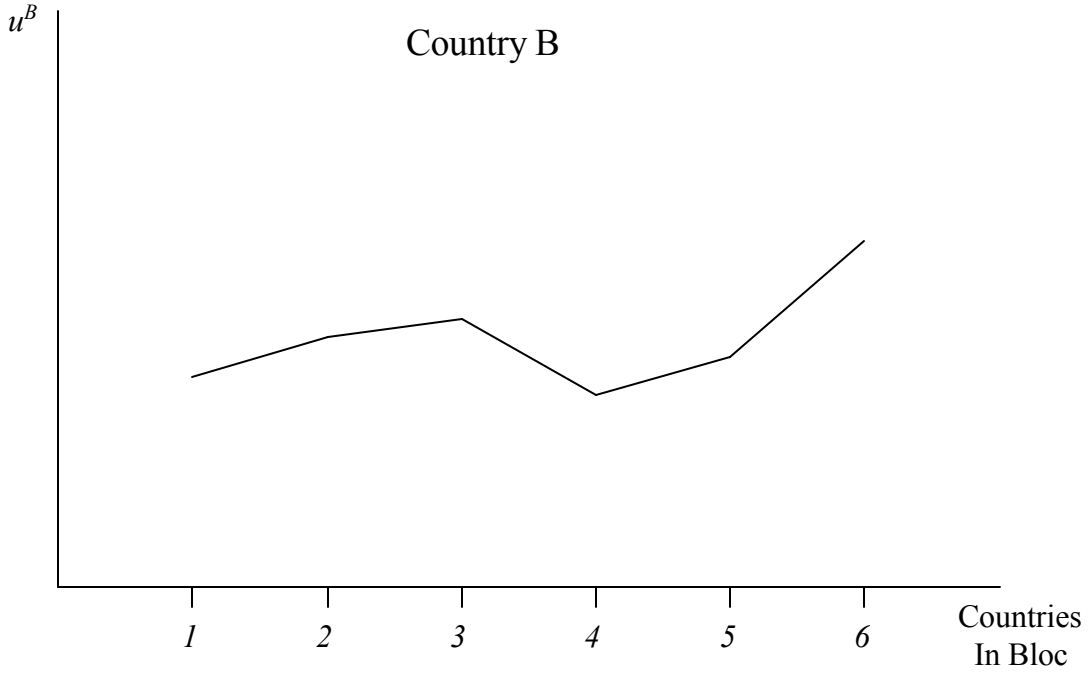


Figure 6b

Table 1
Empirical Studies of the Effects of Economic Integration on Growth

Study	Countries	Years	Integration Variable	Conclusions for Europe	Estimated Effect of European Integration on	
					Level of GDP (%)	Growth Rate of GDP (%pts)
Brada and Mendez (1988)	Members of six integration schemes, including EEC	1951-77	Dummies for membership	Membership in EEC positively related to investment but not separately to growth.	+0.48	
Coe and Moghadam (1993)	France	1971-91	Intra-EC trade / output	Level of European integration positively related to French output.		+0.7
Italianer (1994)	EC-6	1961-92	Trade-based proxies	Proxies for integration and openness have significant impact on growth.	+10	+0.3
Landau (1995)	17 OECD countries	1950-90	Dummies for EU membership	No significant effect of integration on growth		Not significant
Baldwin & Seghezza (1996)	n.a.	n.a.	Dummy for EU membership	EU membership has a positive effect on technology spillovers but not on investment.		n.a.
Henrekson et al. (1997)	All countries, also narrowed to OECD	1976-85	Dummy for EC/EFTA	EC and/or EFTA membership increase growth.		+0.6-0.8
Vamvakidis (1999)	All countries	1950-92	Dummies for type of liberalization	Dummies for broad liberalization are positive and significant, but not for regional liberalization.		Not significant
Vanhoudt (1999)	23 OECD countries	1950-90	Dummies for EU membership	EU membership did not have a significant effect on members' growth.		Not significant
Johansson (2001)	France, Germany, Italy, UK	1973-90	Imports from EU vs. non-EU	Industry TFP is positively related to intra-EU imports, not to imports from outside.		+