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The Internal Market and the Dutch Economy

Implications for trade and economic growth

Bas Straathof, Gert-Jan Linders, Arjan Lejour, Jan Möhlmann

CPB Netherlands Bureau for Economic Policy Analysis
Van Stolkweg 14
P.O. Box 80510
2508 GM The Hague, the Netherlands

Telephone +31 70 338 33 80
Telefax +31 70 338 33 50
Internet www.cpb.nl

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Abstract in English

This paper estimates the effects of the formation and development of the Internal Market (IM) in the European Union on income per capita for the EU and specifically for the Netherlands, since its appearance in 1958. It does so in two stages. First, gravity equations are estimated to identify the impact of the IM on bilateral trade in goods and services and Foreign Direct Investment (FDI). The results of the first stage show that 8 percent of the exports and imports of goods by the EU members can be attributed to the IM. For services trade, the IM effects are somewhat smaller: about 5 percent of EU members' services trade. The IM has a bigger impact on FDI stocks. For the Netherlands, the IM has about twice as large an effect on trade in goods compared to the results for the EU. For services trade and FDI, the effects are in line with the results for the EU. Second, the trade-enhancing effect of IM on GDP is estimated. For 2005, IM integration of goods markets has yielded 2 to 3 percent higher per capita income in the EU, and about 4 to 6 percent higher income per capita in the Netherlands. If the current level of integration effects with respect to the IM for goods and services persists, GDP per capita in the long run will increase by about 10 percent in the EU and about 17 percent in the Netherlands.

Key words: European Union, Internal Market, gravity equation, openness and income
JEL code: F15, F4

Abstract in Dutch

Dit document presenteert de effecten van de Interne Markt (IM) in de Europese Unie (EU) op inkomen in twee stappen. In de eerste stap worden panel-schattingstechnieken toegepast op graviteitsvergelijkingen om het IM-effect van de handel in goederen en diensten en buitenlandse directe investeringen (DBI) te bepalen. Acht procent van de totale handel in goederen door de EU-landen kan worden toegeschreven aan de IM en 5 procent van de handel in diensten. De IM heeft een grotere bijdrage aan de DBI-voorraad geleverd. Voor Nederland zijn de IM-effecten van de goederenhandel ongeveer twee keer zo groot. De resultaten voor dienstenhandel en DBI zijn in lijn met het EU-gemiddelde. De tweede stap identificeert het effect van de extra handel op het inkomen. Met betrekking tot goederen heeft de IM ongeveer voor 2 tot 3 procent bijgedragen aan het BBP in de EU en voor 4 tot 6 procent in Nederland. Op de lange termijn kan het huidige niveau van IM integratie voor goederen en diensten voor bijna 10 procent aan het BBP in de EU-bijdragen en voor ongeveer 17 procent in Nederland.

Steekwoorden: Europese Unie, interne markt, graviteitsvergelijking, openheid en inkomen

Een uitgebreide Nederlandse samenvatting is beschikbaar via www.cpb.nl.

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Preface

The Treaty of Rome went into force in 1958: Belgium, France, Germany, Italy, Luxembourg and the Netherlands had established European Economic Community. One important aim was and still is the free movement of goods, services, capital and labour. In the European Outlook 5 of 2007 SCP and CPB described the fifty-year history of integrating goods, services, capital and labour markets in Europe. They concluded that market integration is one of the biggest successes of the European Union and has contributed to prosperity. This document contributes into more depth to that conclusion by first estimating the effects of market integration in the EU on goods trade services trade, foreign direct investment. In addition, it examines the effects of previous enlargements on the internal market for goods. Second, it estimates the effect of fifty years of market integration on income for the EU and separately for the Netherlands.

The document gives a thorough overview on the effects of the Internal Market. The authors apply up-to-date empirical methodologies to estimate the economic impact of a very important policy domain in Europe. The conclusions support the relevance of IM policy. At the moment, about 4 to 6 percent of GDP in the Netherlands can be ascribed to the current stage of IM integration. For the EU overall the income effect is about 2 to 3 percent. These incomes gains will probably increase because less than half of the long-run income gains have been realized yet due to the long transition period between increased market openness and productivity changes.

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Coen Teulings
Director CPB

Summary

For more than half a century, members of the European Union (EU) have pursued policies stimulating the free movement of goods, services and capital. Most of these policies aim to reduce the cost of cross-border transactions, thus fostering what is known as the Internal Market (IM). This paper estimates that 8 percent of the exports and imports of goods by EU members can be attributed to the IM. This number includes the effect of the IM on trade between members and non-members. The Netherlands has experienced a greater impact on trade: in 2005 the IM contributed 18 percent to Dutch exports and 12 percent to Dutch imports of goods.

Apart from affecting trade in goods, the IM is also associated with more trade in services and more Foreign Direct Investment (FDI). About 5 percent of trade in services by the EU15 can be attributed to the IM and the IM contributed 11 percent to outward FDI and 17 percent to inward FDI stocks of the EU15. For the Netherlands the IM effects on services trade and FDI are in line with the results for the EU.

The IM effect for goods is estimated to have increased GDP by about 3 percent for the EU and about 6 percent for the Netherlands. In a more conservative scenario in which openness has less effect on income, the GDP effects are estimated at 2 percent and 4 percent, respectively. The integration of capital markets could add slightly to the income effect of trade in goods and services. According to our estimations less than half of the long-run income gains have been realized yet due to the long transition period between increased market openness and productivity changes. The next decades the income effects of the current stage of IM integration will accumulate.

History of the Internal Market

The development of the IM is closely related to the history of the EU. It has expanded by covering more countries and has deepened by more intense cooperation. In 1958, Belgium, France, Germany, Italy, Luxembourg and the Netherlands established the European Economic Community (EEC). The treaty envisioned the free movement of persons, goods, capital and services between member states. In 1968 a customs union is put in place between the six EEC countries, eliminating import duties on imported goods from other member states. Other barriers, including quality and safety requirements, remained.

The Single European Act of 1986 paved the way for harmonisation of regulation, which led to completion of the IM for goods (also known as the Single Market). At that time the EU already consists of twelve Member States. Denmark, Ireland and the UK joined in 1973, Greece in 1981 and Spain and Portugal in 1986. Austria, Finland and Sweden joined the EU in 1995, while in 2004 the internal market expanded from 15 to 25 countries by the accession of the countries in Central and East Europe (CEE). Three years later the EU welcomed Bulgaria and Romania as members.

Methodology

We employ a two-step procedure. First, we estimate a gravity equation for bilateral trade to identify the contribution of the Internal Market to trade. We want to examine the IM effects on bilateral trade in goods and services and on bilateral FDI. The second step estimates the contribution of trade openness and foreign investment on income.

When measuring the effect of EU membership on trade, two difficulties arise. First, trade between two countries is affected by many other factors, such as physical distance, adjacency, differences in culture and language. This problem has been countered by using panel data estimation techniques in order to explain trade in goods and services and FDI.

Second, by making trade between its members more attractive, the IM could have had a negative impact on the trade between members and non-members. This phenomenon is known as trade diversion. Anderson and Van Wincoop (2003) have proposed a method to take account of this difficulty. Based on recent refinements of their approach, we find that Internal Market policies have stimulated trade in goods and services between EU members, while diversion of trade with non-members has been limited. This solution is only applicable for trade in goods and services. We are not able to correct for possible "investment diversion" due to the Internal Market, that is the possibility that firms which invest more in the EU because of the free movement of capital invest less in other countries.

The Internal Market for goods

The impact of the IM on trade in goods has varied over time, but EU membership has consistently been associated with a trade bonus since the 1960s. The first stage of the IM was characterised by a rapid expansion of intra-EU trade, culminating in a peak contribution to EU trade of about 12 percent of actual trade in 1970. After this first peak, the contribution of the IM to trade dropped.

A second peak was reached in the first half of the 1990s. At this time the share of trade attributable to the IM was about 18 percent for EU-members on average. The second peak occurred at the time the Single Market was formally completed. During the last decade of our data sample, the impact of the IM declined to 8 percent in 2005 for the EU and 18 and 12 percent for Dutch exports and imports, respectively. In contrast with the EU average, the recent decline in the contribution of the IM seems to stabilise for the Netherlands.

All expansions of the EU have had a positive impact on trade with new members. The accession of Denmark, Ireland and the United Kingdom has had the most profound impact (8 percent on average), followed by the accession of Spain and Portugal (3 percent). The impact of the 2004 expansion has been small until now, but this is not surprising because the time period is too short to identify a significant effect. Overall, the expansion of the EU has more impact on trade than the deepening of the IM. For Dutch trade expansion and deepening are equally important.

The Internal Market for services

Services trade amounts to about 20% of total trade. Services were often considered to be non-tradable, and attracted less attention from policy makers. Discriminatory rules based on nationality are forbidden in the EU, but services trade is often hampered by national regulation. The Services Directive which has to be implemented in 2009 is a recent policy initiative to stimulate services trade.

For bilateral trade in services data are only available since 1999, which makes it impossible to estimate the effects of extensions of the EU before that year. The only enlargement within the available time series occurred in 2004. Although the length of our data sample is limited, the Internal Market has a small, but statistically significant effect on trade in services after controlling for other factors using panel data estimation. After accounting for trade diversion, we conclude that for the EU15 and the Netherlands about 5 percent of all services trade can be ascribed to the Internal Market. The IM effects for services trade are thus smaller than for goods trade, which could be explained by the focus on the free movement of goods in IM policy making.

The Internal Market and Foreign Direct Investment

Before the 1980s international capital movements and in particular FDI was limited. Capital controls and other barriers were serious impediments. Also within the EU nearly no policies were implemented to improve the free movement of capital. This changed in the 1980s and 1990s, in particular the formation of the Economic and Monetary Union has been important. The free movement of capital is important to allocate capital to those countries where it is most productive. In addition, it could increase competition and productivity.

Using a panel approach, we have estimated the effect of the internal market on bilateral FDI stocks. Because we were not able to capture possible substitution effects of domestic and investment and FDI in non-EU counties towards FDI in EU countries, the numbers have to be considered as an upper bound. For the EU15 17 percent of inward FDI stocks can be ascribed to IM and 11% for outward FDI stocks in 2005. For the Netherlands the effects are slightly larger.

The IM effect on inward stocks is bigger because it includes also inward investment from non-EU investors motivated by the attractiveness of IM. Due to the Internal Market, products that are produced in one EU country can more easily be sold in other EU countries, which benefits horizontal motivated FDI by increasing the market size. The effect of the IM on FDI has increased over time. The accession of Austria, Finland and Sweden to the Internal Market in 1995 had a sizeable effect on FDI stocks.

Effects of the Internal Market on income

International trade increases productivity and economic growth through various channels. Openness to trade increases the scale of the market. This increases exposure to foreign competition as well as increases the variety of products available both for intermediate use and for final consumption. A larger market might thus lead to more specialization and to higher productivity. Over time, openness to foreign products may induce spillovers of technological knowledge, as embodied in new products. The larger market scale provides incentives for investment in research and development, leading to more innovation and technological progress. However, the literature on openness and income shows that it can take decades before all the benefits of more openness are reaped.

The trade-enhancing effects of the IM for goods and services is estimated to have increased GDP by about 3 percent of GDP for the EU and 6 percent for the Netherlands. In a more conservative scenario in which openness has less effect on income, the income effects are 2 percent and 4 percent, respectively. For the Netherlands we have excluded re-exports from trade for compiling openness changes due to the Internal Market because re-exports generate much less value added per euro exported.

According to our estimations about half of the potential income gains of the current stage of IM integration have been realized until now. The other part will be realized the coming decades due to reallocation, productivity improvements and innovation. These movements are already triggered by IM integration but take a long time before they are materialized. Then the GDP effect for the EU could add up to nearly 10% and of the Netherlands to 17%.

These long-term income effects are mainly the IM effect of integration goods markets. The IM effect of services market integration adds much less to GDP for two reasons. First of all, the trade-enhancing effect of services is about half of the size of that of goods in the EU15. Second, services trade contributes only a third to trade openness compared to goods. As a result the integration of services markets could add about 1 percent of GDP to the income effect of goods market integration for the EU in the long run. For the Netherlands it is nearly 3% because the tradability of services is higher.

1 Introduction

For more than half a century, members of the European Union (EU) have pursued policies aimed at reducing the cost of cross-border transactions. In 1958 the foundation of the European Internal Market (IM) was laid with the establishment of a customs union. Since then EU policies have spread to a wide range of policy areas. Agricultural policies have been centralised, common product standards related to health and safety have been agreed upon, and many EU members have adopted a single currency, the euro.

The IM has not only grown in terms of depth, but also in terms of width. Fifty years ago it comprised just six countries, while currently the number of member states is 27. In addition, the EU has inspired other groups of countries to establish free trade areas (fta's). Examples are the North American Free Trade Agreement (NAFTA), and the Association of Southeast Asian Nations (ASEAN).

Although in many cases the economic reasoning behind the EU's trade-related policies is sound, empirical evidence on the contribution of the IM to its members' GDP is rather coarse and inconclusive. Economic theory prescribes that reductions in trade costs promote the efficient allocation of resources and therefore generally improve welfare.[1] A detailed empirical confirmation of this intuition, however, has proved to be difficult to obtain.
The diversity of EU policies, their gradual implementation, and noise caused by a multitude of other trade-related events cause cross-section regressions to yield results that wildly vary over time. As a consequence, recent studies typically focus on averages over time. Baier and Bergstrand (2007b), for example, report that between 1960 and 2000 fta membership is associated with an increase in intra-fta trade of thirty to sixty percent.

This study aims to provide insight in how IM policies have affected trade and production *over time*.[2] In addition, we track how the accession of new member states has altered trade since the first expansion of the EU in 1973. Particular attention is given to the contribution of the IM for the Netherlands, a small open economy relying heavily on trade.

Similar to Frankel and Rose (2002) who estimate the effects of currency unions on trade and income, we proceed in two steps. First, we estimate the effect of EU-membership on bilateral trade flows using a gravity equation. Second, we perform a panel regression of GDP on openness to trade. Combining the results from these two regressions yields an estimate of the EU's contribution to the GDP of its members.

The first step uses data on bilateral trade in goods from 1961 to 2005 in order to estimate a time-varying effect of EU membership. A possibly substantial problem is that a reduction of

[1] Adjustment costs can be substantial and unevenly distributed.

[2] The analysis does not include all effects of EU membership on production, but only those that affect production through a reduction of intra-EU trade costs. EU policies like competition policy, cohesion policy, and the Lisbon policies on economic reform might have had an impact on production that does not run through this channel. The effects of the EU's external trade policy are also ignored.

trade cost within the EU might not only stimulate trade between members, but that it might also lead to a reduction of trade between members and non-members. Lower trade costs within the EU simultaneously create trade and divert trade from non-members towards members. For this reason, the difference between intra-EU trade and other trade flows overestimates the contribution of the EU to trade – even after controlling for country-pair specific characteristics.

In order to separate trade creation from trade diversion, we follow the theoretical framework suggested by Anderson and van Wincoop (2003). This allows us to compute time series for all trade flows describing the counterfactual situation in which the IM would not have existed, but other trends like globalisation would still have taken place. The difference between the counterfactual flows and the actual flows then constitutes the effect of the IM on trade.

The IM is not only relevant for trade in goods, but might also have stimulated trade in services and Foreign Direct Investment (FDI).[3] We analyse trade in services, similarly as trade in goods, noting that data on bilateral trade in services are only available for a short period and a modest number of countries. For bilateral FDI stocks a slightly modified gravity equation is estimated. Because an appropriate theoretical framework is lacking for FDI, no distinction can be made between FDI-creation and -diversion.

The second step of the analysis quantifies the effect of openness on GDP. A panel regression is performed in which GDP is regressed on a number of variables including lagged GDP and openness to trade (openness measured as imports plus exports divided by GDP). The panel is a set of middle and high-income countries followed over five-year periods since 1960. The analysis of the first step can be used to compute the contribution of the IM to a country's openness. With the second-step results we calculate both the transitory and steady-state (i.e. short term) effects of the IM on GDP.

We find that the IM effect has varied substantially over time. Initially the share of the actual trade in goods due to the IM grew rapidly, culminating in a peak in 1970. The next three years saw a major setback, but the IM contribution gradually improved again until a second peak in the early 1990s. At this time the share of trade attributable to the IM was about 18 percent for the EU15 and about 30 percent for the Netherlands. A gradual decline set in afterwards, such that the IM-effect is 8 percent of all goods trade for the EU and 18 percent for the Netherlands in 2005. We find that trade diversion has been limited to one or two percent of actual trade.

With regard to the accession of new member states, we conclude that the accession of Denmark, Ireland, and the United Kingdom has had the largest impact (5 percent of actual trade). The expansion from 15 to 25 members in 2004 is found to have only had a small impact, but this is probably because our dataset has no observations beyond 2005.

For services and FDI only an IM effect averaged over time has been computed. About 5 percent of EU15 trade in services is estimated to be attributable to the IM. For the Netherlands

[3] We ignore the international movement of labour. The main reason is that until recently (temporary) migration between member states has been limited (Dekker *et al.* (2007)).

the effect is slightly larger. The IM-effect for FDI ranges between 11 and 17 percent of outwards and inwards FDI stocks respectively for the EU15 and between 15 and 18 percent for the Netherlands.

In 2005, the effect of the IM on GDP is estimated to be about 3 percent of actual GDP for the EU15 and about 6 percent for the Netherlands. Based on the effect of the IM on trade in 2005, the long-term IM-effect would be 10 percent of GDP for the EU15 and 17 percent of GDP for the Netherlands.

This study contributes to the existing literature in four respects. First, it is one of the first studies that present clear results on how the IM has affected trade over time. Frankel (1997) notes that the effect of EU-membership fluctuates from one year to another and suggests pooled regression as a solution. Baldwin and Rieder (2007) track the IM-effect in a panel data regression with year-specific EU membership dummies, yielding highly fluctuating coefficients. In addition, our study identifies specifically the IM effects of previous enlargements.

Second, this paper is the first to employ an Anderson and van Wincoop (2003)-type adjustment for trade diversion. In particular, we use an exact solution for Anderson and Van Wincoop's non-linear system of multilateral resistance terms (Straathof (2008)). (We report results for linear approximations proposed by Baier and Bergstrand (2007a) in the appendix).

Third, we present new results on the relation between openness and economic growth. We follow Bond *et al.* (2001) by applying GMM in order to avoid bias caused by the endogeneity of GDP and openness. The contribution of the IM to both the steady state and transitory growth of GDP utilizes the time-varying estimates of the IM-effect on trade in goods.
Fourth, we extend the analysis of the Internal Market for trade in goods to trade in services and also to FDI. Most papers focus on trade in goods which is until now the most important part of IM, but does not give a complete analysis. This paper broadens the analysis of IM.

This report is structured as follows. Chapter 2 presents a brief history of the Internal Market, some descriptive statistics and an overview of the literature on the effects of IM. Chapters 3 to 5 subsequently investigate the IM effects over time on goods trade, on services trade and on FDI, respectively. Chapter 6 reports estimates of the contribution of trade openness to production. Chapter 7 summarizes and gives an overall assessment of the main results.

2 The Internal Market: history and trends[4]

2.1 IM history in a nutshell

Following the Second World War far-reaching cooperation between European countries was upheld as an ideal for the future. The creation of the European Coal and Steel Community (ECSC) in 1952 was an important step in stabilising the relation between Germany and France. The Benelux countries and Italy also joined. In 1957 the six ECSC countries signed the Treaty of Rome, which established the European Economic Community (EEC). Improving prosperity and closer cooperation between member states are its main aims, and a common market and harmonisation of policies of the Member States its main means. The idea of the common market is to encompass the free movement of persons, goods, capital and services.

From 1967 onwards, the free movement of goods was simplified by the gradual reduction of differences in systems of indirect taxation. In 1968 a customs union is put in place between the six EEC countries, eliminating import duties on imported goods from other member states. In addition, a common import tariff applies for imports from third countries. Now that the customs union is in place, a lack of policy harmonisation proves to be an impediment to further integration. Although the Treaty of Rome enshrines the free movement of goods, the member states developed few new initiatives. For some time, the main progress came from the European Court of Justice, enforcing mutual recognition of product standards in a number of landmark cases .

Europe endeavoured to revitalise European integration by the Single European Act of 1986. It aimed to remove all barriers to trade in goods between the member states by 1992. At that time the EU already consists of twelve Member States. Denmark, Ireland and the UK joined in 1973, Greece in 1981 and Spain and Portugal in 1986. Six years later, the Treaty of Maastricht (1992) provides for the creation of an Economic and Monetary Union, the foundation for the euro. The simplification of payment transactions in the euro-zone forms a major stimulus to all four freedoms in the first years of this century.

In 1994, the European Economic Area (EEA) is created, when the member states of the European Free Trade Association (EFTA) take part in the internal market.[5] The EFTA was established in 1960 by Austria, Denmark, Norway, Portugal, Sweden, Switzerland and the UK. Later Iceland (1970) and Finland (1986) joined. Denmark, UK and Portugal had to leave the EFTA when these countries joined the EU. This was also the case for Austria, Finland and Sweden when these countries joined the EU in 1995. Before the creation of the EEA, the EFTA

[4] In particular section 2.1 and 2.2 are based on Dekker *et al.* (2007) which describes the history of the internal market more extensively.

[5] With the exception of Switzerland because the referendum turned out to be negative. In the meantime, Switzerland adopted many directives on the internal market. As a result, it has privileged access to the internal market of the EU.

and EEC already abolished tariffs on industrial goods in 1977 and established a broader cooperation in 1984 (Luxembourg declaration).[6]

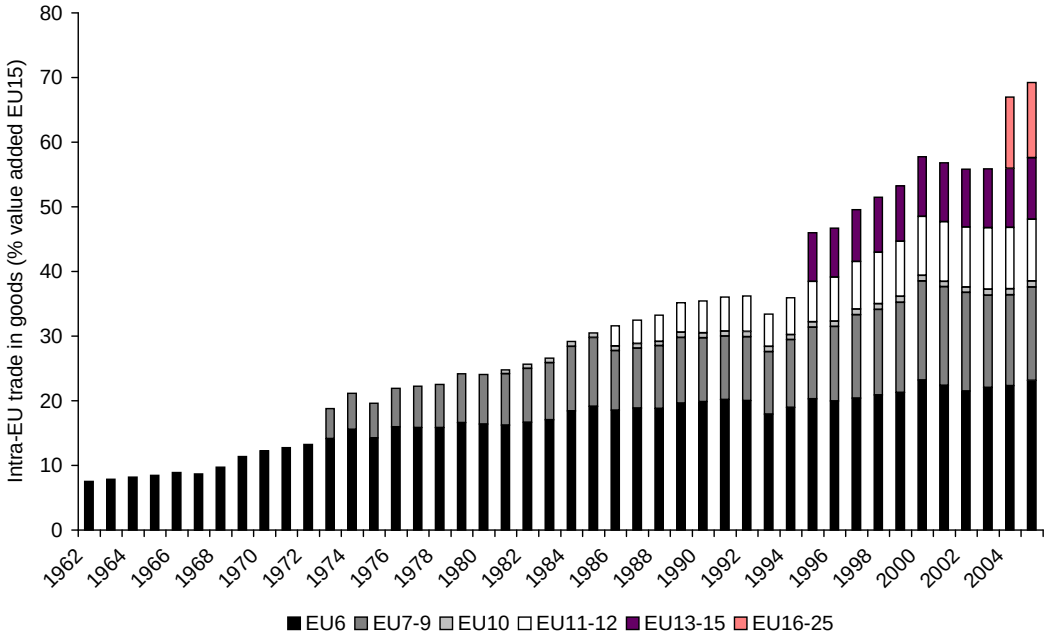
In 2004 and 2007 the internal market expanded from 15 to 27 countries by the accession of the countries in Central and East Europe (CEE), Cyprus and Malta. Currently, the internal market comprises of about 500 million people.

2.2 Trade and foreign direct investment developments in the EU[7]

2.2.1 Goods trade

Figure 2.1 presents the development of intra EU15 trade in goods as a share of value added between 1962 and 2004. It increases from 8% in 1962 to about 70% in 2005. The figure decomposes also trade developments between existing members of the EU at a certain point in time and new members.[8] It shows that EU trade increased because of trade deepening (between existing members) and widening (new members).

Figure 2.1 Intra-EU trade is driven by accession



Trade developments with new members have two causes. The first is the trivial effect that some non-EU or extra-EU trade flows becomes intra-EU trade flows after enlargement. The second is an increase in the volume of trade in the first years after accession. This result is illustrated in

[6] For more information: EFTA (2007), Dekker *et al.* (2007).

[7] All data material in this section is derived from Dekker *et al.* (2007), Straathof (2007).

[8] The series "EU6" shows the trade in goods between the six founding members of the EU. The series "EU7-9", shows the increase in intra EU trade following the accession of the United Kingdom, Ireland and Denmark. and consists of all trade between the EU7-9 countries as well as the exports to and imports to these countries by the EU6. The series for "EU10", "EU11-12", etc. are constructed in the same way as the "EU7-9" series.

Table 2.1. The third column reports the yearly growth rates[9] for the ten years following the accession of three groups of countries. The first number, for example, is the average yearly growth rate over the period 1973 to 1982 of intra-EU trade flows with either Denmark, Ireland or the United Kingdom as one of the trading partners. The fourth column reports the growth rate of the trade between existing members of the EU: the first growth rate in this column refers to intra-EU6 trade, the second to intra-EU10 trade, and the third to intra-EU12 trade.

The growth in trade with new member states is markedly higher than the growth in trade between the rest of the member states. For the enlargement to nine members the difference in growth rates exceeds four percentage points, for the enlargement to twelve members the difference is almost six percentage points. An exception is the accession of Austria, Sweden and Finland. Here, there is no difference in the growth rates of trade. This is not surprising, as these countries were already strongly integrated within the EU (e.g. by the EU-EFTA agreements, see Section 2.1).

Table 2.1 Growth in trade with accession countries higher than for old member states

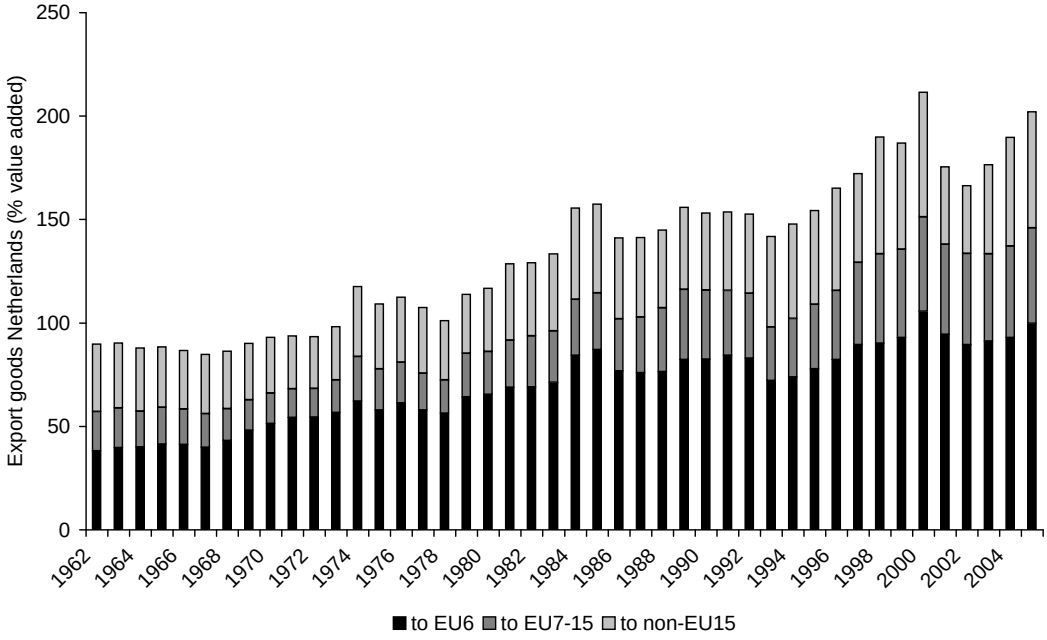
Accession	Period	Growth ratio intra-EU trade to value added EU15 (% per year)	
		Acceding members	Old members
EU6 to EU9	1973-1982	6.2	1.6
EU10 to EU12	1986-1995	6.7	0.8
EU12 to EU15	1995-2004	2.3	2.4

The Netherlands is more open to goods and services trade and FDI than the average EU country (Dekker *et al.* (2007)) because it is a relatively small country and the Rotterdam harbour acts as a gateway to Europe. Figure 2.2 shows that the ratio of exports of value added is much higher than for the EU as a whole (compare to Figure 2.1). This is already the case in 1962 and still continues. The bars also show that in the 1960s the non-EU countries were relatively more important export destinations than they currently are.[10]

[9] Average growth rates have been computed by regressing the log of a series on a time variable indicating the year and a constant. Coefficients on the time variable are reported as growth rates.

[10] The first section of the bars marked “to EU6” refers to the Dutch exports to the other five founding members of the EEC. The section marked “to EU7-15” are exports to the other EU15 countries. The section “to non-EU15” shows exports to non-EU15 countries.

Figure 2.2 Export of goods from the Netherlands



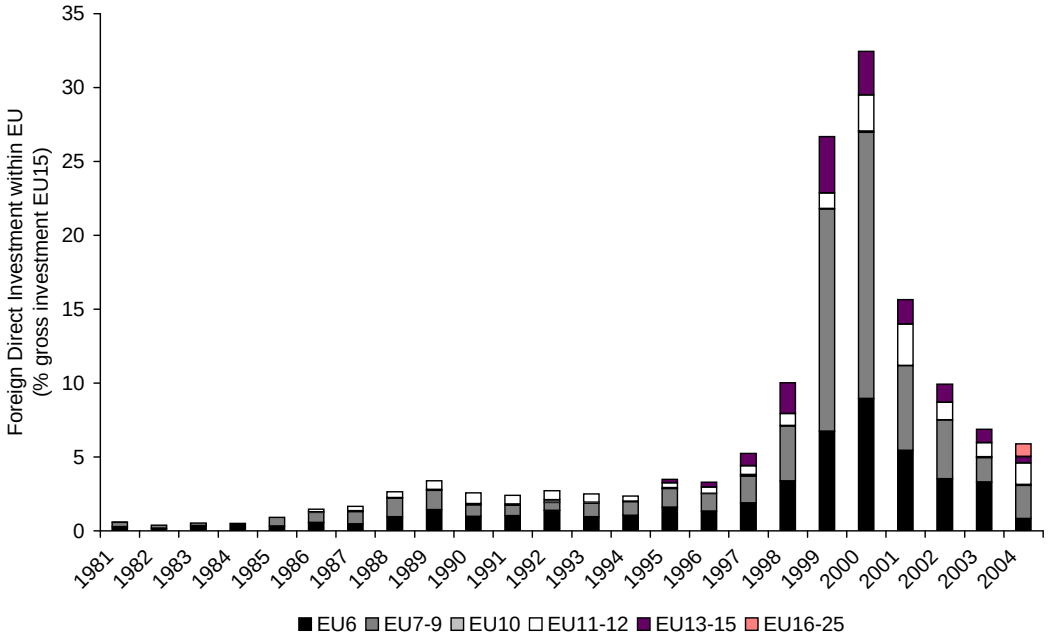
2.2.2 Services trade

International trade in services amounts about 12% of the value added in services (including government services). This is considerably lower than for goods and the openness of services grows also much less rapidly. Most of the EU services exports are destined to other EU countries (56%) in 2004. The EU6 is the main destination with 29%, second is EU7-9 due to the importance of financial services in the UK (16%), and the other EU countries (EU10-25) account for at most 10%.

2.2.3 Foreign Direct Investment

In 1980, FDI as a share of gross investment was negligible in the EU. Lifting capital controls and capital market integration stimulated FDI. It swallowed until its peak in 2000. This peak was largely the result of a surge in mergers and acquisitions – especially in the telecom sector. Since then, the size of FDI seems to have crumbled but it remained in 2004 at a higher level than in the 1990s. In recent years the level of FDI flows picked up again. In the years 1999 and 2000, a couple of very large acquisitions took place involving UK companies like Vodafone AirTouch (USD 203 and 14 billion), ZENECA group (USD 35 billion) and Orange (USD 33 and 46 billion). These acquisitions are reflected in the large share of EU7-9 in Figure 2.3.

Figure 2.3 United Kingdom dominates intra-EU FDI



2.3 The economic effects of the Internal Market

The economic literature has not yet delivered a clear-cut answer to the benefits of the Internal Market. The quantitative studies fall roughly into two categories. The first category covers studies using simulations to derive the gains of the economic integration. Typically, the gains are static and relatively modest (often do not exceed 2% of GDP).[11] They tend to overlook the effects of better integrated capital markets, larger FDI flows and the dynamic effects of integrated product markets, such as increased competition, and the effects on productivity through the exit of inefficient firms and innovation. Also, the transfer of ideas and technologies facilitated by international trade are not considered.[12]

The second category consists of studies using regression analysis to directly estimate the effects of EU membership on income growth. This does not confine the gains from membership to improvements in allocative efficiency, but considers the overall effect on production. Van Houdt (1998) uses panel data for 23 OECD countries and 5 time periods between 1970 and 1990 to establish the effect of EU and EFTA membership on economic growth per capita. He derives that EU membership raises economic growth for a long time by about 0.6% to 0.8% per year. The results are not always robust to alternative specifications and with a similar data set Henrekson M. *et al.* (1997) and Van Houdt (1998) did not find a permanent growth effect of EU membership.

[11] See Lejour *et al.* (2006) for an overview.

[12] See for example Coe and Helpman (1995) and Griffith *et al.* (2000).

Crespo-Cuaresma *et al.* (2002) conclude that the duration of EU membership has a positive effect on GDP growth per capita. Crafts and Kaiser (2004) stress the importance of the rule of law for the CEE countries and their economic performance. They conclude that economic growth per capita in the CEE countries can be about 4% in the medium term, if they move to EU standards of good governance.

Eichengreen and Boltho (2008) question the validity of the quantitative results presented above, mainly because the benchmark, the counterfactual situation in which there is no internal market, is not well designed. The Del Gatto *et al.* (2006) paper is a clear example of this. Their benchmark is the absence of intra-EU trade. With this benchmark the benefits of IM are clearly overstated. Badinger (2005) considers all trade integration for the European countries, including global integration, in his estimations, but the outcomes can not be solely interpreted as IM effects. He concludes that global market integration increased income in Europe by about 20 percent.

Badinger (2005), Eichengreen and Boltho (2008) warn that the development of the IM is not an exogenous event. From a political economy point of view this decision is motivated. Even if the underlying reasons would not have culminated in an IM policy, other decisions would have been taken (probably also supporting trade within the EU). Examples could be a free trade agreement of the Mediterranean countries, an internal market for the Benelux countries etc. It is not hard to come up with alternatives for IM but which one is the right benchmark?

Eichengreen and Boltho (2008) survey several key events related to European economic integration and investigate for each event the economic impact using existing quantitative estimates. They examine the European Payment Union, the European Coal and Steel Community, the Common market (market integration until 1980), the 1992 Single Market Programme, and European Monetary Union (EMU) and try to be as sceptical as possible on the benefits of European integration. They conclude that only the Common Market and Single Market programme had a sizable effect on trade and GDP, and that it is too early to draw definitive conclusions on the EMU. Mainly based on the estimations of Owen (1983) for the Common Market and the European Commission (2002) for the Single Market, Eichengreen and Boltho (2008) conclude that economic integration within Europe has increased incomes by about 5%. Given their perspective this number has to be considered as a lower estimate.

The quantification of this income effect is based on expert opinions, which are hard to reproduce. In this paper we consider a quantitative method that can be reproduced. We are careful in designing a benchmark which does not overstate the effect of economic integration. We want to identify the effects of economic integration in Europe on top of the overall trend of increasing trade openness since the 1960s and increasing foreign direct investment since the 1980s. Our benchmark is increased openness for trade and FDI in the world. Therefore we include many non-EU countries in our data set which could serve as a good benchmark.

3 Trade in goods

3.1 Introduction

Has the Internal Market reduced trade cost for its members? Since 1958, the EU has adopted various policies with the intention of reducing the cost of trade between member states. Apart from lowering tariff barriers these policies also comprise harmonisation of regulation in areas related more to domestic policy. The approach of this study is not to investigate the effects of each individual policy measure, but to estimate the overall effect of the Internal Market on trade and GDP.

We estimate the effect of IM-membership on trade separately from the effect of trade on GDP. Similar to Frankel and Rose (2002), we first estimate a gravity equation in order to isolate the effect on trade and then perform a growth regression to determine the impact of trade-openness on GDP. Regarding the gravity equation our analysis differs in three respects. First, whereas Frankel and Rose focussed on the effect of the Euro, we consider the effect of EU-membership. Second, we follow Anderson and van Wincoop (2003) by taking into account trade diversion. Third, we trace the effect of EU-membership over time, taking general globalisation trends as a "baseline".

Tinbergen (1962) already used a gravity equation to study the effect of free trade agreements (fta's) on trade. He concluded that fta's had an economically insignificant effect, while some later studies produced different outcomes. Abrams (1980), Aitken (1973) and Brada and Mendez (1985), for example, found an economically significant positive impact of fta's. However, their conclusions are not supported by Bergstrand (1985), Frankel *et al.* (1995) and Frankel (1997). According to Baier and Bergstrand (2007b) these mixed results stem from a failure to account for the endogeneity of fta's: countries that trade intensively are also likely to form fta's. Without correcting for fta-endogeneity, they report that fta's boost trade by just 14 percent. After correcting for endogeneity, they find that an fta almost doubles the trade between members.

Closely related to this literature are studies focussing on the EU as an fta. Frankel (1997) notes that the effect of EU-membership fluctuates over time and that pooling data from 1970 to 1992 yields an EU effect of 16 percent. Fidrmuc and Fidrmuc (2003) find effects of the EU12 ranging between 34 and 60 percent depending on sample and year. In a recent study, Lejour *et al.* (2006) conclude that, controlling for various country characteristics, trade between two EU-members is 34 percent higher than trade between non-members. The baseline gravity equation of Baldwin and Rieder (2007) implicitly yields an EU-effect of 51 percent.[13]

The introduction of the Euro also received much attention. After Frankel and Rose (2002) claimed that common currencies triple trade between members, a number of studies followed.

[13] Chen (2006) and Nitsch (2000) compared intra-EU trade flows with intra-national trade instead. Both authors found that national borders in the EU still have a large impact on trade.

Rose and Stanley (2005) provide a meta-analysis of these studies. More recent papers are due to Baldwin (2006), Barro and Tenreyro (2007), and Serlenga and Shin (2007). Bun and Klaassen (2007) argue that panel estimates of the Euro-effect are generally too large because they fail to account for trends in bilateral trade. They show that little Euro effect remains after allowing for pair wise trends.

This chapter proceeds with estimating by how much and when the IM has affected trade in goods. After the theoretical framework is introduced in Section 3.2, estimation results are presented in Section 3.3. Next, the impact of the Internal Market on European and Dutch trade flows is analysed in Sections 3.4 and 3.5, respectively. The latter two sections take into account both trade creation and trade diversion.

3.2 Theoretical framework

A simple way of testing the hypothesis that membership of the EU leads to lower cost for trade with other members, is to compare the trade between EU-members with trade flows for which at least one of the trading partners is not a member of the EU.

There are two reasons why such a straightforward approach can lead to false conclusions about the effect of the IM on trade. First, the precision of such an approach hinges on the proper inclusion of control variables. The second has to do with trade diversion: the creation of the IM is likely to have influenced trade outside the IM as well. We will return to trade diversion later on and continue with a discussion on control variables.

Besides EU membership, there are other factors determining the intensity of trade between two countries. Naturally, countries are likely to trade more when their economies are larger, or when the distance between the two countries is smaller. Similarly, other factors such as a common language and a common border may influence the level of trade between two countries.

If not all factors influencing trade can be controlled for, the estimate of the IM-effect can be biased. For two reasons, this bias is likely to persist even when controlling for size of the economies, distance, common borders, language, colonial relationships, etc.

First, trade between two countries depends not only on the characteristics of those two countries, but also on the characteristics of other countries (Anderson (1979)). Australia and New Zealand, for example, will trade more with each other than can be judged from the distance between the two nations. The geographic isolation of New Zealand with regard to the large economies elsewhere in the world, enhances the attractiveness of Australia as a trading partner.

Second, countries do not join free trade agreements (fta's) randomly. Instead, the decision to form an fta depends on factors like geographical proximity and cultural similarities. Some of these factors can be approximately controlled for using easily accessible data, but Baier and Bergstrand (2007b) argue that this is not the whole story. For an fta to make sense there need to

be policy-related barriers to trade – otherwise signing an fta would be a purely ceremonial affair. For this reason, trade between fta-members is not necessarily larger than trade between countries that do not need to form an fta because the latter may already have few policy-related trade barriers. Comparing the trade between fta-members with other trade flows thus leads to underestimation of the benefits of the fta, unless all policy-related trade barriers are adequately controlled for.

It is possible to avoid problems caused by unobserved control variables by means of panel data estimation techniques. Baier and Bergstrand (2007b) show that bias due to omitted time-invariant controls can be prevented by adding fixed effects for each pair of trade partners. Drawback of this approach is that all time-invariant factors are lumped together, such that the effect of, say, distance on trade can no longer be isolated.[14]

The second problem why comparing trade between IM-members with other trade flows leads to a biased estimate of the effect of the IM has to do with trade diversion. When two countries establish an fta this will not only intensify the trade between them, but will also change other flows. By making trade with non-members less attractive fta's not only lead to trade creation, but also cause trade to be diverted from non-members towards members. Going one step further, the consequences of an fta extend even to trade between non-members as trade between a member and a non-member is partly substituted by trade between non-members.

Measuring the extent to which the IM has lowered trade costs is complicated because the consequences of the IM are not limited to its members. If, after controlling for other factors, trade flows between members are larger than other trade flows, this indicates a positive IM-effect. However, the average difference between intra-IM trade and other flows is not a correct estimate of the amount of trade created by the IM. This would only be correct if all trade flows outside of the IM would not have been affected by the IM.

Anderson and van Wincoop (2003) have devised a method for estimating the effect of the border between the United States and Canada on trade between US states and Canadian provinces. Building on the framework of Anderson (1979) and others, they derive trade flows for the counterfactual situation in which the border between the United States and Canada would not induce trade costs of any kind. As the method proposed by Anderson and Van Wincoop (A-vW) can be used for all types of (variable) trade cost, it can also be applied to the IM.

The framework of A-vW rests on two main assumptions. The first is that a country's production is fixed for a given year. A country's total export quantity can therefore only change

[14] The relation between time-invariant variables and trade may itself have changed over time (Leamer (2007)). For example, Evans and Harrigan (2005) show that even though transport costs have declined, the opportunity cost of transportation time have become higher. However, Disdier and Head (2008) find evidence that the impact of distance on trade hardly changed in the second half of the last century. In view of this evidence, we conclude that pair wise fixed effects to control for distance and other time-invariant factors is reasonable.

if the consumption of domestically produced goods moves in the opposite direction. The effect of trade on a country's level of production is estimated in Chapter 6.

The second main assumption is that each country produces a single type of final good, which is unique to that country. The purpose of this assumption is that exports from one country are imperfect substitutes for the exports from another country.

Let c_{ij} be the consumption of goods from country *i* in country *j*. A-vW assume that consumers in country *j* maximize utility *u* as defined by a CES utility function

$$u_j = \left(\sum_i \left(c_{ij} / \beta_{ij} \right)^{(\sigma-1)/\sigma} \right)^{\sigma/(\sigma-1)} \tag{3.1}$$

subject to the budget constraint

$$\sum_i p_{ij} c_{ij} \leq y_j \, . \tag{3.2}$$

The parameter β_i allows for differences in preferences and the quality of goods across countries, σ is the elasticity of substitution between goods, y_i is a country's nominal income, and p_{ij} is the price of goods produced in *i* for consumers in *j*.

The price of a good is different for consumers in different countries because of trade costs. If p_i is the domestic price of goods produced in *i*, then p_{ij} is the domestic price multiplied by a trade cost factor τ_{ij} .

$$p_{ij} = p_i \tau_{ij} \tag{3.3}$$

Assuming $\tau_{ij} = \tau_{ji}$, A-vW show that this framework leads to a 'gravity equation' explaining bilateral trade from the size of the trading economies relative to the size of the world economy (y_W), the trade cost factor specific to the pair of countries, and two multilateral resistance terms (P_i and P_j).

$$x_{ij} = \frac{y_i y_j}{y_W} \left(\frac{\tau_{ij}}{P_i P_j} \right)^{1-\sigma} \tag{3.4}$$

The larger the multilateral resistance terms are, the less attractive it is for countries *i* and *j* to trade with third countries. High multilateral resistance terms relative to the costs of trade between *i* and *j* therefore imply more trade between these two countries.

Each multilateral resistance term is a non-linear function of the multilateral resistance terms of the other countries, their share of the world economy and the trade cost factors:

$$P_j^{1-\sigma} = \sum_i P_i^{\sigma-1} \frac{y_i}{y_W} \tau_{ij}^{1-\sigma} \tag{3.5}$$

If the IM has reduced the cost of trade between members of the EU, then – controlling for other factors – trade costs are lower for all country pairs for which both trading partner is a member.

$$\tau_{ijt} = b^{1-EU_{ijt}} \varepsilon_{ij} \tag{3.6}$$

Here, EU_{ijt} is a dummy variable that equals one if both country *i* and country *j* are members of the EU at time *t* and zero otherwise. $b-1$ is the tariff equivalent for trade flows that (partly) fall outside of the IM and ε_{ij} captures the effects of all time invariant factors influencing the trade cost for the pair *ij*.

We use the last three equations to estimate the effect of the IM on trade. The analysis proceeds in two steps. In the first step, the parameter *b* is estimated and in the second step, trade flows are computed for the counterfactual situation that the IM would not have existed.

There exist four methods for estimating *b* in a way consistent with theory. The simplest method is to estimate the gravity equation with the multilateral resistance terms replaced by dummies for each country-year combination. This "dummy method" yields unbiased estimates, but is not the most efficient approach.

The other three methods involve solving the non-linear system of resistance terms. A-vW use non-linear programming to get a solution for the system. Baier and Bergstrand (2007a) proceed by taking a first-order Taylor expansion of the system and substitute the resulting linear approximations of the resistance terms into the gravity equation. They labelled their method *Bonus Vetus ("good old") OLS* because it avoids the non-linear programming used by A-vW and allows for estimation with standard econometric procedures. Last, Straathof (2008) shows that the system of resistance terms actually is log-linear. Solving the log-linear system yields expressions for the resistance terms that can be used in the gravity equation (which can subsequently be estimated with OLS).

3.3 Estimation results

To estimate the effect of the IM on trade, we use panel data on bilateral trade for 38 countries and subcontinents starting in 1961 and ending in 2005.[15] The use of panel data has two advantages. First, it allows us to follow the IM-effect over time. Second, using fixed-effects for

[15] Before 1990, observations were missing for some countries. A description of the data can be found in Appendix 1.

each pair of trading partners reduces bias due to the endogeneity of IM-membership by taking into account time-invariant omitted variables.[16]

The empirical equivalent of the gravity equation using the dummy method is given by

$$\ln x_{ijt} = a_0 + a_1(\ln y_{it} + \ln y_{jt}) + a_2(1 - EU_{ijt}) + d_{it}D_{it} + d_{jt}D_{jt} + \eta_{ij} + \phi_{ijt} \qquad (3.7)$$

In the expression above $a_2 = (1-\sigma)\ln b$ captures the effect of EU membership. The *D*'s are dummies for each country-year combination and have parameters *d* (in the expression above dummies equal to zero have been omitted). These dummies ensure that the estimated parameters are not biased because of multilateral resistance. In addition, the dummies absorb variation caused by y_W that is not absorbed by the constant a_0.

The unobserved time-invariant characteristics of trade between *i* and *j* is captured by the pair wise fixed effects η_{ij}, which is a transformation of ε_{ij}.[17]

3.3.1 Average effect of the Internal Market

Equation (3.7) can be estimated using least squares with pair wise fixed effects. However, the residuals ϕ_{ijt} are likely to be heteroskedastic, clustered and autocorrelated. By estimating the covariance matrix as suggested by Driscoll and Kraay (1998) it is possible to avoid biased and inconsistent standard errors for the coefficients. Because adding dummies for each combination of country and year in addition to the pair wise fixed effects leads to a large loss in the degrees of freedom and is computationally taxing, country dummies have been constructed on a bi-annual basis.

Estimation results for the average effect of EU membership are presented in Table 3.1. The first model regresses the log of trade on "GDP", which is the log of the exporter's GDP plus the log of the importer's GDP. Pair wise fixed effects and bi-annual country dummies are included, but are not reported. Because of bi-annual country dummies it does not make much sense to include the GDP for the importer and the GDP for the exporter separately.

Column (2) refers to equation (3.7) exactly. Besides GDP a dummy is included which equals one if both countries are a member of the EU and zero otherwise. The coefficient for the EU dummy of 0.31 reveals a positive and statistically significant effect of EU membership on trade between members of the EU.[18]

[16] The use of pair wise fixed effects has the disadvantage that it filters out the consequences of IM policies effectuated before 1961 on the original six members of the EU.

[17] The derivation of the relation between ε_{ij} and η_{ij} can be found in Linders and Straathof (2008).

[18] The conventional interpretation, that is without taking into account trade diversion, would be that the IM raised intra-EU trade by (exp(0.31) - 1) * 100% = 36%. This number is in line with the literature discussed on page 23.

Table 3.1	**Average IM-effect: Regression of log bilateral trade on bilateral EU membership**				
	(1)	(2)	(3)	(4)[a]	(5)
GDP	0.53 ***	0.52 ***	0.52 ***	0.52 ***	0.52 ***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
EU		0.31 ***			0.32 ***
		(0.04)			(0.04)
EU (excl. NL)			0.30 ***	0.30 ***	
			(0.04)	(0.04)	
NL			0.40 ***	0.39 ***	
			(0.03)	(0.03)	
EFTA					0.14
					(0.09)
CEEC					0.01
					(0.06)
EURO					– 0.02
					(0.04)
N	51586	51586	51586	51586	51586
# parameters	793	794	795	795	797
R^2-adj.	0.82	0.82	0.82	0.82	0.82

[a] Data corrected for Dutch re-exports and re-imports.

Driscoll-Kraay standard errors with lag one between brackets; stars indicate statistical significance levels: *5% **1% and ***0.1%.
Country-pair fixed effects and bi-annual country dummies included, but not reported.

Model (3) has two EU dummies: one for all trade flows for which the Netherlands is either the importer or the exporter (NL), and one EU dummy capturing all other intra-IM trade (EU excluding NL). The sum of both dummies reproduces the dummy of model (1), such that EU excl. NL + NL = EU. The EU coefficient for the Netherlands is 0.40, which is higher than the average.[19] Model (4) is identical to (3) but uses data that have been corrected for re-exports and re-imports by the Netherlands. The corrected data do not yield very different coefficients.

Model (5) adds various other indicators to the basic specification: a dummy on EFTA membership, a dummy for all trade between Central and Eastern European countries (CEEC) and non-CEEC countries that occurred before 1990, and a Euro dummy.[20]

Inclusion of these dummies hardly changes the coefficient for EU membership. The coefficient on EFTA has the expected sign, but is not statistically significant. In regression results not reported here, the EFTA dummy has been split up for different cohorts. Also these dummies were not significant. This outcome is somewhat unexpected as EFTA countries can be considered to be participants in the IM – at least partly. The story of the EFTA, however, is different than that of the EU as the EFTA has lost members to the EU on several occasions. EFTA members for which the potential gains of EU membership are large are likely to have left

[19] The corresponding "conventional" IM-effect on trade between the Netherlands and other EU members would be 48%.

[20] 1999 has been taken as the starting year of the Euro.

EFTA earlier than countries for which these gains are smaller. This selection process could have had a downward effect on the EFTA dummy.

The CEEC dummy is approximately zero,[21] as is the effect of using the Euro as a common currency.[22]

Including a single dummy for EU captures the effect of IM averaged over time and countries. In the next two subsections we will loosen both restrictions. Below, we will first allow the EU effect to vary over time. After that, we turn to the effects of new member states entering the IM.

3.3.2 The effect of the Internal Market over time

IM policies, as well as global trading conditions, have changed over time. Therefore, the trade cost advantage of the IM relative to the rest of the world might also have changed. The relative depth of the IM can be estimated by replacing the EU dummy of the previous empirical models with a flexible time trend (or "linear spline") which allows a change in slope at several fixed points in time. Table 3.2 contains the estimates for such an EU spline. We have divided the period 1961-2005 into six intervals. A separate coefficient is estimated for each interval, indicating the slope for that period. Note that a negative slope does not necessarily mean that the IM-effect is negative, but only that the IM-effect is declining. Intervals are chosen after visual inspection of results from rolling pooled regressions (this is explained in Appendix 2).

Model (1) reveals that the impact of the IM has varied substantially over the years. The largest coefficient is found for the early stages of the IM, indicating a positive slope of the EU trend. The lowering of tariffs between the six founding members of the EU seems to have stimulated trade between them markedly. The advantage of EU membership suffered a backlash in the first beginning of the 1970s, as the slope of the EU trend is strongly negative for the period between 1970 and 1972. (We will see in the next section that this steep decline did not last long enough to let the IM effect become negative.)

Between 1973 and 1983, the Internal Market got back on track with a slope of 0.84. Between 1984 and 1991 the effect of the IM remained roughly constant as coefficients are small and not significantly different from zero. The lead of the IM over the rest of the world declined after 1992, first slowly, later more rapidly. A possible explanation for this finding is the increase in globalisation, which makes intra-EU market regulation less exceptional. In

[21] In regressions without bi-annual country dummies, the CEEC dummy has a large negative coefficient. The effect of the Iron Curtain on trade appears to be captured by the country dummies.

[22] The absence of a Euro effect is in line with the findings of Bun and Klaassen (2007), who show that after allowing for pair wise trends, the adoption of the Euro only has a small impact on trade. They do not explicitly control for the IM.

particular, global agreements made under the Uruguay Round of the GATT[23] came into force on January first 1995.[24] This has led to a world-wide reduction in tariffs and non-tariff barriers.

Table 3.2 The IM-effect over time: Regression of log bilateral trade on EU spline

		(1)		(2)		(3)[a]	
GDP		0.52	***	0.52	***	0.52	***
		(0.01)		(0.01)		(0.01)	
EU	1961-1969	2.24	***	2.05	***	2.05	***
		(0.23)		(0.26)		(0.25)	
	1970-1972	– 4.18	***	– 3.87	***	– 3.88	***
		(0.98)		(0.97)		(0.98)	
	1973-1983	0.84	**	0.86	**	0.86	**
		(0.29)		(0.26)		(0.28)	
	1984-1991	0.17		0.14		0.14	
		(0.23)		(0.24)		(0.21)	
	1992-1997	– 0.42		-0.30		– 0.30	
		(0.37)		(0.34)		(0.35)	
	1998-2005	– 0.96	***	– 1.06	***	– 1.06	***
		(0.27)		(0.26)		(0.27)	
NL	1961-1969			2.87	***	2.76	***
				(0.22)		(0.21)	
	1970-1972			– 4.71	***	– 4.54	***
				(1.14)		(1.11)	
	1973-1983			0.80	*	0.79	*
				(0.96)		(0.33)	
	1984-1991			0.33		0.34	
				(0.37)		(0.35)	
	1992-1997			– 1.08		– 1.07	*
				(0.58)		(0.53)	
	1998-2005			– 0.24		– 0.38	
				(0.33)		(0.35)	
N		51586		51586		51586	
# parameters		799		805		805	
R^2-adj.		0.83		0.83		0.82	

[a] Data corrected for Dutch re-exports and re-imports.

Trends are normalized to have a minimum of zero and a maximum of one.

Driscoll-Kraay standard errors with lag one between brackets; stars indicate statistical significance levels: *5% **1% and ***0.1%.

Country-pair fixed effects and bi-annual country dummies included, but not reported.

[23] General Agreement on Tariffs and Trade: the predecessor of the World Trade Organization (WTO), which was established at the end of the Uruguay Round in 1995.

[24] Another explanation could be due to the Intrastat method for collection intra-EU data on trade (see Appendix 1). Including a dummy for Intrastat trade flows, however, did not change results.

Models (2) and (3) in Table 3.2 decompose the EU spline into a spline for Dutch trade within the IM ("NL") and a spline for other intra-IM trade ("EU"). Model (3) differs from model (2) in that it uses data corrected for re-exports and re-imports by the Netherlands. Models (2) and (3) are comparable to models (3) and (4) of Table 3.1, respectively.

The impact of the Internal Market on the Netherlands has been more pronounced than its impact on the EU on average. The exception to this regularity is the period after 1998, where the reduction of the IM effect has been smaller for the Netherlands than for other member states. Correcting for Dutch re-exports and re-imports causes only slight changes in coefficients.

3.3.3 Expansion of the Internal Market

During the period 1961 to 2005 the EU has expanded five times.[25] The first expansion occurred in 1973 with the entry of the United Kingdom, Ireland and Denmark. The fifth expansion took place in 2004 and included ten countries from Central Europe.

The consequences of entry can be identified by adding a dummy for each of the five cohorts of entering countries. Each dummy is equal to one for all trade flows that are new to the IM and zero otherwise. For example, the dummy EU7-9 equals zero for all trade flows before 1973 and one for all intra-IM trade where United Kingdom, Ireland or Denmark are either importer or exporter. Thus, after 1973 not only exports from Ireland to Denmark get a one, but also the imports by the United Kingdom from France.

Table 3.3 displays the regression results with indicators for each cohort of entrants. In model (1) all coefficients have the expected sign and, except for the expansion to EU25, all coefficients are statistically significant. This means that almost every expansion of the EU has raised the level of intra-IM trade with the new members. The small coefficient (0.07) for the expansion to 25 members is not unexpected because it is based on data from only two years, 2004 and 2005. Typically, it takes about five to ten years before a country is fully adjusted to the IM (Dekker *et al.* (2007), Ch. B3).

The second and third model have cohort indicators specific to the Netherlands as well as cohort indicators capturing the rest of the intra-IM trade. The coefficients for the Netherlands are comparable with those for the EU on average, except that the entry of Greece has hardly had any influence on its trade with the Netherlands. Another difference is that Dutch trade with the EU16-25 countries has had a positive impulse from the fifth expansion – even though just two years of data are available during which these trade flows fall inside the IM.

[25] A brief history of the EU can be found in Chapter 2.

Table 3.3	Expansion of the IM: Regression of log bilateral trade on EU cohort indicators			
		(1)	(2)	(3)[a]
GDP		0.52 ***	0.52 ***	0.52 ***
		(0.01)	(0.01)	(0.01)
EU	EU7-9	0.55 ***	0.54 ***	0.54 ***
		(0.03)	(0.03)	(0.03)
	EU10	0.18 ***	0.19 ***	0.19 ***
		(0.04)	(0.03)	(0.03)
	EU11-12	0.48 ***	0.47 ***	0.47 ***
		(0.05)	(0.05)	(0.05)
	EU13-15	0.21 ***	0.20 ***	0.20 ***
		(0.04)	(0.04)	(0.04)
	EU16-25	0.07	0.06	0.06
		(0.05)	(0.05)	(0.05)
NL	EU7-9		0.61 ***	0.59 ***
			(0.05)	(0.04)
	EU10		0.10	0.09
			(0.06)	(0.06)
	EU11-12		0.53 ***	0.52 ***
			(0.04)	(0.04)
	EU13-15		0.31 ***	0.30 ***
			(0.05)	(0.05)
	EU16-25		0.14 **	0.11 *
			(0.05)	(0.05)
N		51586	51586	51586
# parameters		798	803	803
R^2-adj.		0.83	0.83	0.82

[a] Data corrected for Dutch re-exports and re-imports.

Driscoll-Kraay standard errors with lag one between brackets; stars indicate statistical significance levels: *5% **1% and ***0.1%.
Country-pair fixed effects and bi-annual country dummies included, but not reported.

3.4 Europe with and without the Internal Market

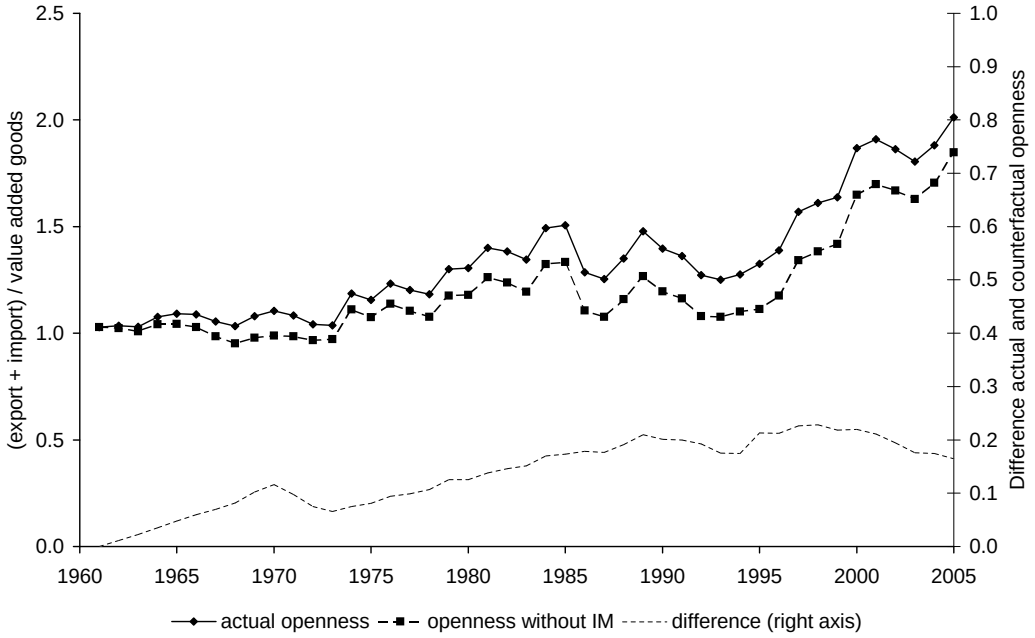
How would the exports and imports of EU members be affected if there would never have been a common market? Although the regression results presented above give an idea of the role played by the IM, additional analysis is required to make a distinction between trade created by the IM and trade diverted by it. We have used the framework developed by Anderson and van Wincoop (2003) to compute the counterfactual trade flows that would have taken place if the IM would not have existed.[26]

[26] To be precise, the method we have used for deriving counterfactual trade is a variant of Anderson and Van Wincoop's method proposed by Straathof (2008). Another variant due to Baier and Bergstrand (2007a) is reported in Appendix 3.

A first question which needs to be answered is whether the IM actually has created trade or whether it has merely diverted trade with non-members to trade within the IM. Figure 3.1 shows how the openness of the EU15 has changed over time.[27] The figure is based on the spline estimated in model (1) of Table 3.1. The top line is the actual openness, while the second line refers to the counterfactual situation without the IM. The bottom line is the difference in openness with and without the IM (right hand axis).

Without the IM, the openness of the EU15 would not have grown as fast as it has. Our method implies that at the beginning of our dataset the IM-effect is zero. Over the years the IM has contributed increasingly to openness, but in the last decade the difference has become smaller.

Figure 3.1 Openness of EU15, with and without the Internal Market



The first peak in the contribution of the IM occurred around 1970. In this year twelve percent of trade can be attributed to the IM.[28] A sharp drop immediately afterwards stabilised in 1974 at seven percent. A second increase occurs in the second half of the 1980s, while the last interval running from 1998 to 2005 is characterised by a decline in the IM effect. The second peak was reached in the early 1990s. At that time the IM was responsible for approximately 18 percent of trade. After 1995 the IM-effect started to decline gradually eventually arriving at eight percent in 2005. This pattern occurs with both exports and imports.

[27] Openness is defined here as the sum of a country's total exports and imports of goods divided by value added in non-service sectors.

[28] The percentages mentioned here are percentage points of actual exports or imports. The trends in Figure 3.1 refer to the sum of exports and imports relative to GDP.

Another issue is how the IM has created trade: by reducing trade cost between existing members (deepening) or by giving more countries access to the IM (expansion). Although it is not possible to estimate both the consequences of deepening and expansion simultaneously,[29] we use the estimates of Table 3.3 to calculate the counterfactual trade flows without expansion of the IM. Deepening can then be approximated by the difference of the overall effect and the expansion effect.

The top panel of Table 3.4 displays the share of the EU15 exports that can be attributed to the IM. The first row reports that in 2005 eight percent of all exports by the EU15 were attributable to the IM. The second row shows that for the entire period from 1961 to 2005 the IM has on average been responsible for twelve percent. The other rows refer to sub-intervals. The bottom panel of the table displays the outcomes for imports. The first column containing the total effect shows a sharp increase in the IM-effect in the early stages.

The second and third column contain the effects for deepening and expansion of the IM, respectively. Here, "deepening" is defined as the difference between the total effect and the expansion effect. The impact of EU expansion proved to be more durable than the impact of deepening. This makes that for exports in 2005 expansion has been responsible for the entire effect of the IM.[30] Deepening has been a substantial factor in the second half of the 1980s, but its contribution has weakened in the years thereafter.[31] For imports expansion has been equally influential.

The last three columns consider three important expansions in isolation. Just as it is possible to study what would have happened without the IM, it is also possible to compute counterfactual trade flows assuming that only a specific expansion would not have occurred, while the other expansions remain unaltered. The first column shows that the expansion to nine members is responsible for four percent of EU15 trade in 2005. The accession of Spain and Portugal has had an effect of three percent; the expansion to fifteen member states contributed one percent.

[29] In principle, a spline can be included in the regression for each cohort of trade flows. The problem of this approach is that the coefficients obtained in this way are strongly influenced by intra-EU trade diversion. The A-vW method, however requires that only variables are included that directly affect trade cost; the effects of trade diversion should be captured by the bi-annual country dummies.

[30] The expansion effect might be overestimated in 2005, because coefficients for expansion are not allowed to vary over time. The resulting deepening effect might therefore be underestimated.

[31] It is possible that the coefficients capturing expansion also include some deepening effects.

Table 3.4 Share of EU15 exports and imports due to the IM: effects of deepening and expansion

Year	Total effect[a]	Deepening[b]	Expansion[c]			
			All cohorts	EU7-9	EU11-12	EU13-15
Exports						
2005	0.08	0.00	0.09	0.04	0.03	0.01
1961-2005	0.12	0.04	0.08	0.05	0.02	0.01
1961-1969	0.06	0.06				
1970-1972	0.09	0.09				
1973-1983	0.10	0.05	0.05	0.05		
1984-1991	0.14	0.07	0.07	0.05	0.02	
1992-1997	0.15	0.06	0.09	0.05	0.03	0.01
1998-2005	0.11	0.02	0.09	0.05	0.03	0.01
Imports						
2005	0.08	0.00	0.08	0.04	0.03	0.01
1961-2005	0.12	0.04	0.08	0.05	0.02	0.01
1961-1969	0.05	0.05				
1970-1972	0.09	0.09				
1973-1983	0.09	0.04	0.05	0.05		
1984-1991	0.14	0.07	0.07	0.05	0.02	
1992-1997	0.15	0.06	0.09	0.05	0.03	0.01
1998-2005	0.11	0.02	0.09	0.05	0.03	0.01

[a] Total effect is based on the EU spline of model (1) in Table 3.2.

[b] Deepening is approximated as the total effect minus the expansion effect for all cohorts jointly.

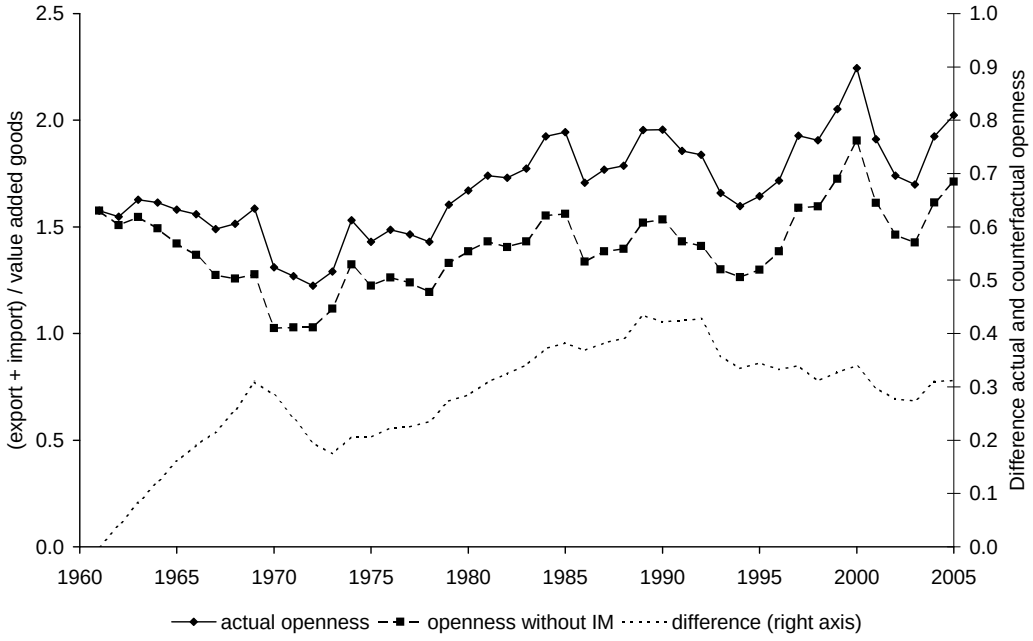
[c] The expansion effect is reported for all expansions since 1973 jointly ("All cohorts"); for expansion from EU6 to EU9 ("EU7-9"); for expansion from EU10 to EU12 ("EU11-12"); for expansion from EU12 to EU15 ("EU13-15"). The last three columns assume that all earlier and later expansions did take place. The expansion effects are based on model (1) in Table 3.3.

3.5 The Netherlands with and without the Internal Market

How would the Dutch exports and imports be affected if there would never have been a common market? Figure 3.2 displays the evolution of the openness of the Netherlands with and without the IM. The IM has had a substantial impact on the openness of the Netherlands, even when compared to the EU15 as a whole (Figure 3.1).

Table 3.5 displays the share of Dutch exports and imports that is due to the IM. Three different sets of results are presented: total effect, deepening and expansion. The first, "total effect" corresponds to the effects of the IM over time (Table 3.2) and "expansion" to the consequences of new member states for the Netherlands (Table 3.3). Each set of results is shown with and without a correction for Dutch re-exports and re-imports.

Figure 3.2 Openness of the Netherlands, with and without the Internal Market



Dutch exports seem to have benefited most from EU membership: about eighteen percent of the Dutch exports in 2005 can be attributed to the IM. The benefits for Dutch imports are smaller about twelve percent are due to the IM. These numbers vary according to whether data have been corrected for re-exports or not, but the difference between the minimum value and the maximum is not larger than two percentage points.

Like the EU average also the Netherlands has experienced two peaks in the IM effect. The first peak occurred in 1970 with an IM contribution of 28 percent (average of imports and exports). The subsequent sharp decline ended in 1974 at 16 percent. The Netherlands reached its second peak of thirty percent already in 1991 – earlier than the EU on average.
The Dutch trade has thus been affected more by the IM than the EU15 on average and this has been a result of deepening exclusively. The effect of deepening has been substantially larger for the Netherlands than the expansion effect, this in contrast to the EU15 for which expansion was more important than deepening.

That the impact of the IM on the Netherlands has been larger than the EU average can also be seen from Figure 3.3 which compares the share of Dutch exports attributable to the IM with the share for the rest of the EU6. Over the entire period from 1961 to 2005 Dutch exports have been stimulated more than exports by the other founding members. The last decade of the series displays even a divergence in the IM-effects as the share of exports attributable to the IM started to grow again for the Netherlands.

Table 3.5 Share of Dutch exports and imports due to the IM

	Total effect[a]		Deepening		Expansion[b]	
Exports						
Re-exports corrected	no	yes	no	yes	no	yes
2005	0.17	0.18	0.10	0.11	0.07	0.08
1961-2005	0.19	0.21	0.13	0.15	0.06	0.06
1961-1969	0.12	0.12	0.12	0.12	0.00	0.00
1970-1972	0.19	0.20	0.19	0.20	0.00	0.00
1973-1983	0.19	0.19	0.14	0.15	0.05	0.05
1984-1991	0.23	0.24	0.17	0.18	0.06	0.06
1992-1997	0.21	0.23	0.16	0.17	0.06	0.06
1998-2005	0.17	0.18	0.10	0.11	0.07	0.07
Imports						
2005	0.10	0.12	0.07	0.09	0.03	0.03
1961-2005	0.14	0.16	0.10	0.12	0.03	0.04
1961-1969	0.11	0.11	0.11	0.11	0.00	0.00
1970-1972	0.17	0.17	0.17	0.17	0.00	0.00
1973-1983	0.13	0.14	0.10	0.11	0.03	0.03
1984-1991	0.18	0.19	0.14	0.15	0.03	0.04
1992-1997	0.16	0.18	0.12	0.14	0.04	0.04
1998-2005	0.11	0.13	0.08	0.09	0.04	0.04

[a] Refers to models (2) and (3) of Table 3.2.
[b] Refers to models (2) and (3) of Table 3.3.

Figure 3.4 shows the IM's contribution to imports of the Netherlands and the other EU6 countries. Compared to exports, two things stand out. First, the Netherlands moves closely together with the rest of the EU6. Although the IM-effect is still larger for the Netherlands, the difference with the other countries is modest and does not increase over time. Second, the share of Dutch imports attributable to the IM does not seem to stabilise in the last decade, but continue to decline.

The rise of trade with other EU countries hardly has led to trade diversion. Table 3.6 displays how intra-IM and extra-IM exports would have changed for the Netherlands. The positive effect of the IM of intra-IM trade is substantially larger than the negative effect on extra-IM trade. Although trade diversion does occur, it is much smaller than the trade creation effect.

An alternative scenario could be that the Netherlands would never have joined the IM and would also not have signed special trade agreements with the EU, like Norway and Switzerland did. In this scenario, the consequences for the Netherlands could have been more severe because other countries could have diverted their trade away from the Netherlands and towards other members of the EU. The difference in impact of the two scenarios, however, turns out to be small, both for exports and imports. Our results show that the total, re-exports corrected,

effect of Dutch membership on exports is 0.19 in 2005, while the number for imports is 0.13.[32] The estimates for deepening and expansion also do not vary substantially across scenarios.

Figure 3.3 **Dutch exports compared to exports by the rest of the EU6**

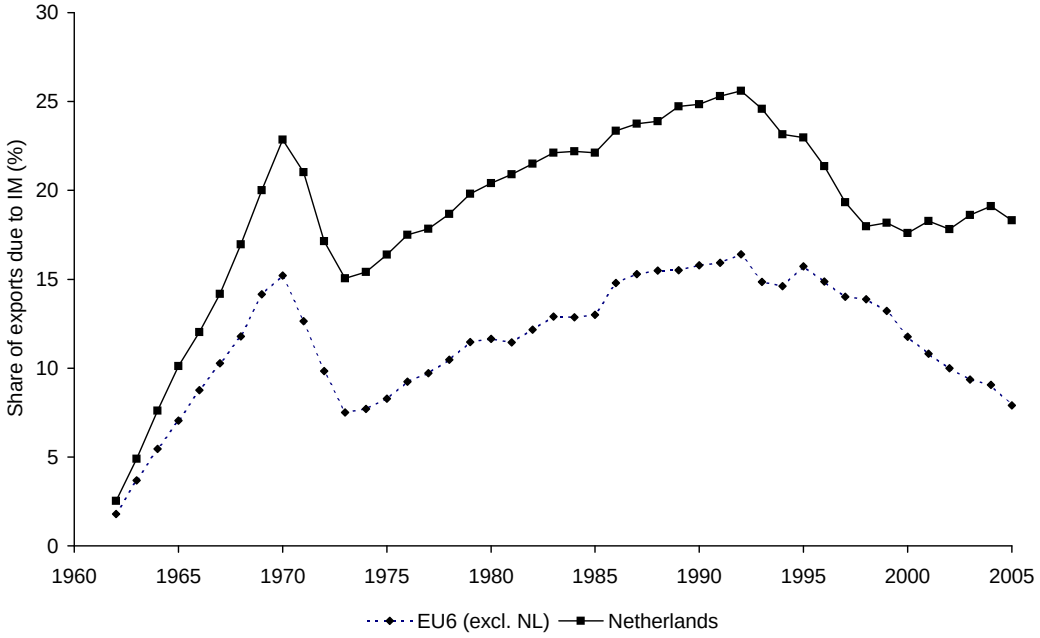
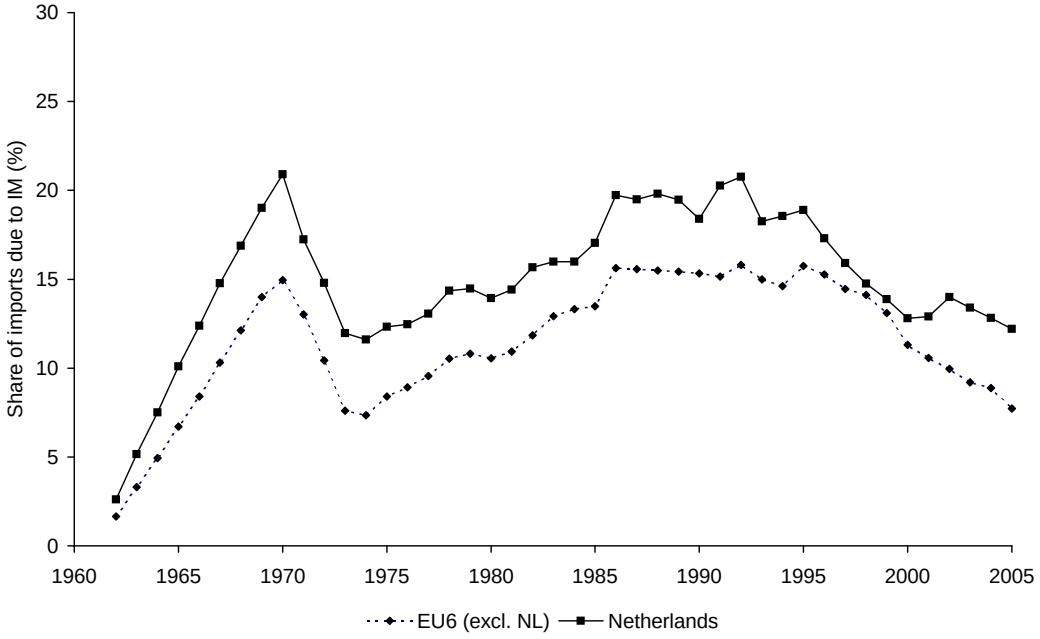


Figure 3.4 **Dutch imports compared to imports by the rest of the EU6**



[32] Detailed results are available from the authors upon request.

Table 3.6	Trade creation and trade diversion: share of Dutch intra-IM and extra-IM trade due to IM[a]			
Year	Exports		Imports	
	Intra-IM	Extra-IM	Intra-IM	Extra-IM
2005	0.19	– 0.01	0.14	– 0.01
1961-2005	0.22	– 0.01	0.17	– 0.02
1961-1969	0.13	– 0.01	0.13	– 0.01
1970-1972	0.21	– 0.01	0.19	– 0.02
1973-1983	0.20	– 0.01	0.15	– 0.01
1984-1991	0.25	– 0.01	0.21	– 0.02
1992-1997	0.24	– 0.01	0.20	– 0.02
1998-2005	0.19	– 0.01	0.15	– 0.02

[a] Based on estimates of the total expansion effect of model (3) in Table 3.3; data corrected for Dutch re-exports and re-imports; intra-IM and extra-IM add up to total effect (except for rounding errors)

3.6 Conclusions

The Internal Market appears to have stimulated trade between members substantially, while trade diversion has been small. The impact of the IM on the imports and exports of European countries has varied over time. The first stage of the IM was characterised by a rapid expansion of its effectiveness, culminating in a peak contribution to EU trade of about twelve percent of actual trade in 1970. The peak contribution for the Netherlands was 28 percent. After this first peak, the contribution of the IM to trade dropped sharply to seven percent in 1973 for the EU and 16 percent for the Netherlands.

A second peak of was reached first half of the 1990s. At this time the share of trade attributable to the IM was about 18 percent for EU-members on average and about 30 percent for the Netherlands. The second peak occurred at the time the Single Market was formally completed. During the last decade of our data sample, the impact of the IM declined again to 8 percent in 2005 for the EU and 18 percent for the Netherlands. In contrast with the EU average, the decline in the contribution of the IM seems to stabilise for the Netherlands.

All expansions of the EU have had a positive impact on trade with new members. The accession of the Denmark, Ireland and the United Kingdom has had the most profound impact (five percent of EU15 trade), while the impact of the 2004 expansion has been small. This latter effect is not surprising as the EU25 only existed in the data sample for two years. Overall, expansion of the EU is estimated to be responsible for 9 percent of EU15 exports and imports. The contribution of all enlargements to Dutch exports is 7 percent. The effect on Dutch imports is smaller and amounts to 3 percent of imports in 2005.

4 Trade in services

4.1 Introduction

Trade in services covers about 20% of total trade globally. This share is rather stable since the 1980s. Only one tenth of world services output enters international trade, compared to over half of the production of goods (UNCTAD (2004)). In spite of the increasing importance of services in value added and employment in most industrialized countries, the share of services in total trade has not significantly increased. Trade in business services has increased, partly due to outsourcing, but the impact of total trade in services is mitigated by relatively less trade in transport services and travel.[33]

Our question is whether IM policies have contributed to intra-EU trade in services? Overall trade in services has not grown faster than trade in goods since the 1980s, but the growth rates of intra-EU trade in services and extra-EU trade in services could have developed differently due to IM policies.

Before answering this question we have to define trade in services because the concept is much more complex than trade in goods. Trade in goods is considered to be cross-border trade. Firms could also deliver the foreign market by establishing a foreign affiliate, but this is not classified as international goods trade. For services this is different. Four modes of international transactions are distinguished. Mode 1 is cross-border trade (as in goods). Mode 2 represents foreign sales if the consumer moves to the country of the producer (for business travel or tourism). Mode 3 reflects foreign sales by producers which established an establishment in the country of the consumer. Mode 4 covers temporary international movements of independent service providers.[34]

In this chapter we concentrate on the impact of IM policies to stimulate the free movement of services on international services trade covering cross-border trade (mode 1) and tourism and travel (mode 2). These two categories together are classified as total trade in services of which tourism and travel forms on average about a quarter of the value of total services trade (Kox *et al.* (2004)). Mode 3 is more important for services trade than mode 1 and 2 and will be investigated in chapter 5. Data on foreign sales are highly inaccurate and incomplete; therefore FDI stocks are often used to represents foreign sales. The development of FDI stocks is closely related to the free movement of capital which the main focus in chapter 5. Thereby chapter 4 and 5 together cover the broad concept of trade in services.

In principle cross border trade in services could be treated empirically similarly as trade in goods. Theoretically it can be argued that trade in services is different because services differ from goods because of the intangibility of services and lack of standardization. This discussion

[33] See the annual reports of the WTO and Kox *et al.* (2004) among others.

[34] According to the meagre and rough statistics mode 4 covers only about 1% of the value of all international transactions in services and is neglected in this study.

is neglected here.[35] We follow the same methodology as for trade in goods. The same theoretical framework (as in section 3.2) is applicable and the same empirical equivalent of the gravity equation (equation 3.7)).

The main reasons not to explore the possible methodological differences in explaining cross-border trade in goods and services is the notoriously lack of data on bilateral trade in services. 1999 is the first year for which bilateral data on total trade in services are published by the OECD (2002). Since then researchers have started to analyse bilateral trade in total services using a gravity model and also have included dummies for regional free trade agreements (fta's). This dummy does not only include the EU but also NAFTA and other fta's. Kimura and Lee (2006) identify a positive effect of fta's on bilateral trade in 1999 and 2000, but warn that Japan is the only country in the sample without fta's. It is not clear whether this effect identifies relatively limited services trade to and from Japan or a positive impact of fta's. For the same data set Mirza and Nicoletti (2004) also identify a positive effect of fta's on services trade. For the 1999 data Grünfeld and Moxnes (2003) do not find a positive effect of fta's on services trade. They suggest that most fta's do not include services trade and that the lack of services trade is caused by national regulation. Walsh (2006) introduces a dummy for the internal market in the EU, but does also not find a significant result for the years 1999-2001 in his preferred estimation method. In some regressions he finds a significant positive effect. Ceglowski (2006) concludes that the EU has stimulated trade in services but suggests that this is induced by the complementarity with bilateral trade in goods.

In the meantime, the data base on bilateral trade in services has expanded and covers the years 1999 to 2005. Therefore we are able to exploit some of the time variation in the data which previous studies could not do. In addition, it includes the enlargement of the EU in 2004.

Because of the lack of data prevents us to replicate the complete analysis for trade in goods we first discuss the availability of trade in services data in section 4.2. Section 4.3 estimates the IM effect of trade in services using the same methodology as for trade in goods. Section 4.4 presents the outcomes of IM policies on total trade in services for the EU15 and the Netherlands. Section 4.5 concludes.

4.2 Trade data in services

The analysis of trade in services is based on a database containing reports of service flows from OECD countries, Hong Kong and the Russian Federation to their trading partners from 1999 to 2005. We use trade data on total services, because these data are most complete. There are two problems related to this data base. First, there are often two reporting OECD countries for the same trade flow because trade involves an exporter and an importer. Second, the database is not

[35] See for example the special issue on trade in services in the Journal of Industry, Competition and Trade (2008, forthcoming).

complete. We miss data and the quality of some of the data is disappointing. Third, the number of observations is increasing over time. We discuss these issues below.

First, double reporting of the OECD exporter and importer is a problem because the reported values for the same trade flow can deviate relatively much. We use a method that has been proposed by Gehlhar (1996) for merchandise trade and is followed by Leeuwen *et al.* (2007) for trade in services. The Gehlhar method uses reliability indices for each country.[36] When two values are reported for the same flow we use the value of the reporting country with the highest reliability index.

Second, many data are missing. In principle the database contains export and import flows of service trade that occur between the reporting OECD countries and over 200 partner countries and regions. Bilateral trade data to and from most partner (non-OECD) countries are missing and the quality of the remaining data is poor. For this reason we only include bilateral trade data between reporting OECD countries. In addition, for six OECD countries[37] the data are relatively incomplete, therefore they have been excluded as well.

This leaves us with 26 countries (24 OECD, Hong Kong, Russian Federation). There are potentially 650 (n(n - 1)) annual observations. This is however not the case, but the data availability is increasing over time (in particular until 2002). The smallest number of positive observations is 523 in 1999 and the largest number is 650 in 2004. The first years of the sample miss reported bilateral data for Belgium and Luxembourg. As a consequence, we have only 156 bilateral flows between EU15 countries instead of 210 per year. This is a serious reduction of data points to identify an IM effect. For this reason we include these available data points for later years in our sample and construct thereby an unbalanced sample. We perform sensitivity analyses with balanced samples.

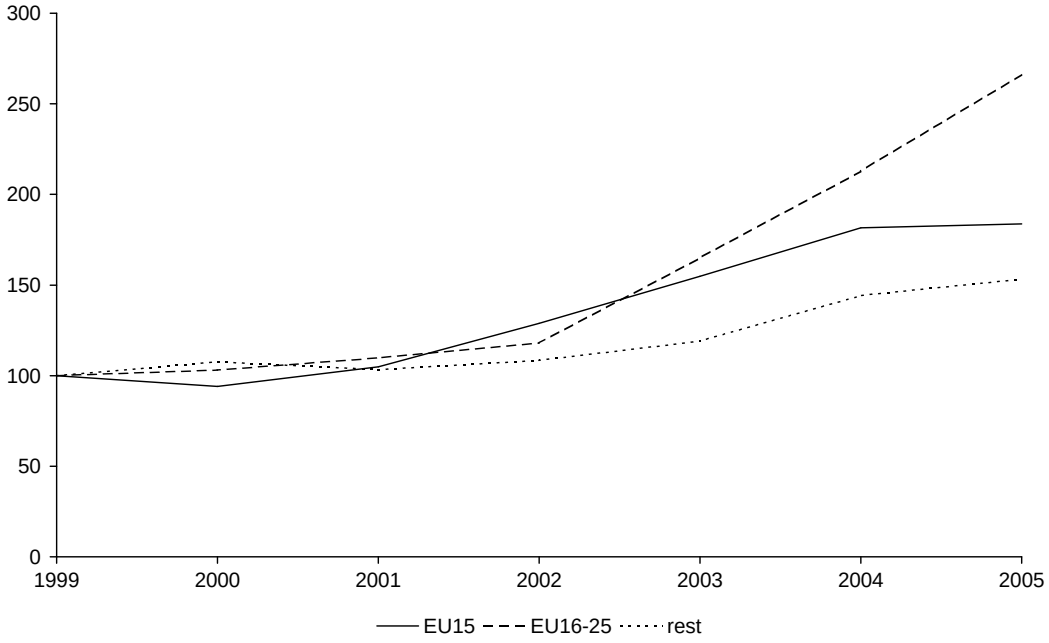
The amount of (reported) trade in services between the countries in the sample has increased 730 billion dollars in 1999 to 1230 billion dollars in 2005. This implies an average annual increase of about 9%. Intra EU15 trade accounted for 290 billion dollars in 1999 and for 530 billion dollars in 2005. Trade in services thus nearly doubles between 1999 and 2005 for EU 15 measured in US dollars, as can be seen in Figure 4.1 by the EU line rising from 100 (normalisation) in 1999 to 185 in 2005. The steep rise in services trade of the EU15 with and between the EU16-25 countries in 2004 and 2005 compared to intra-EU15 trade is due to the EU-accession of these ten countries. Trade with and between these countries increased from 20 billion dollars in 1999 to 52 billion in 2005. Services trade of other OECD countries and between EU and non-EU countries accounted for 420 billion dollars in 1999 and for 650 billion dollars in 2005: a 50% increase. This suggests that services trade between EU members has

[36] A value is considered reliable when it deviates less than some fraction (20%) from the value reported by the partner country. The sum of the reliable flows is then divided by the sum of the reported flows in order to determine the reliability index of the country. This index always lies between 0 and 1. When calculating the reliability indices, flows that are not reported by the partner country are considered unreliable.

[37] Korea, Iceland, Mexico, New Zealand, Switzerland and Turkey.

developed faster than between other countries in this period. This result could be biased due to better reporting over time but Kox *et al.* (2004) conclude that intra-EU services trade has grown faster than EU- extra services trade for the period 1985 to 2001.

Figure 4.1 Growth of services trade of reporting OECD countries, 1999- 2005 (1999 = 100)



4.3 Method

4.3.1 Model specification

For estimating the effect of the IM on services trade, we use panel data on bilateral trade for 26 countries starting in 1999 and ending in 2005 as described above. The use of panel data allows us to follow the IM-effect over (a limited period of) time and the using fixed-effects for each pair of trading partners reduces bias due to the endogeneity of IM-membership by taking into account time-invariant omitted variables.[38] The empirical equivalent of the gravity equation (see equation 3.7) is given by

$$\ln x_{ijt} = a_0 + a_1(\ln y_{it} + \ln y_{jt}) + a_2(1 - EU_{ijt}) + d_{it}D_{it} + d_{jt}D_{jt} + \eta_{ij} + \phi_{ijt} \qquad (4.1)$$

$a_2 = (1-\sigma)\ln b$ captures the IM effect. The *D*'s are dummies for each country-year combination and have parameters *d*. These dummies ensure that the estimated parameters are not biased because of multilateral resistance. In addition, the dummies absorb variation caused by y_W that is not absorbed by the constant a_0. The unobserved time-invariant characteristics of trade between *i* and *j* are captured by the pair-wise fixed effects η_{ij}, which is a

[38] The use of pair-wise fixed effects has the disadvantage that it filters out the consequences of IM policies effectuated before 1999.

transformation of ε_{ij}. The covariance matrix is estimated it is possible to avoid biased and inconsistent standard errors for the coefficients as suggested by Driscoll and Kraay (1998). Adding dummies for each combination of country and year in addition to the pair-wise fixed effects leads to a large loss in the degrees of freedom and is computationally taxing. Therefore, country dummies have been constructed on a bi-annual basis.

In addition, we also estimate the model using a dummy for EU_NL and for EU_other. This allows us to estimate different effects for the EU15 as a whole and for the Netherlands. The EU_NL dummy is 1 when both trading countries are a member of the EU and one of the countries is the Netherlands, and 0 otherwise. The EU_other dummy is 1 when both trading partners are in the EU and the Netherlands is not involved, and 0 otherwise. The sum of these two dummies is always equal to the regular EU dummy.

4.3.2 Estimation results

The results for the fixed effect estimator are shown in Table 4.1 for three samples. In all samples there as two regressions: one with a total EU dummy and one with a separate EU dummy for the Netherlands and a remaining EU dummy. In all regressions the coefficients on GDP are significantly lower than 1 which is usually the case in cross-section analysis. The reason is that we included by-annual country dummies in the regression which identify also large share of the GDP effect on bilateral trade. For the 1999-2005 (column (1) to (2)) the EU dummy is positively significant. This is also the case for the Dutch EU dummy. In a non-reported regression for a balanced sample between 1999 and 2005 the EU dummy is not positive any longer. The reason is that we have excluded the bilateral data for Belgium and Luxembourg in later years which are in particular relevant to identify an IM effect as discussed in section 4.2. For this reason we do not trust the results of the balanced sample from 1999 onwards.

Because since 2002 data are nearly complete, 2002 to 2005 is our preferred sample (column (5) and (6)). The regression results for the balanced and non-reported unbalanced sample are nearly identical. Services trade between EU countries has increased by about 11% ($=e^{0.11} - 1$) during the sample period due to IM. For the Netherlands the IM effect on intra EU services trade is positive, but not statistically significant. The reason is that the number of observations for bilateral service trade relations with the Netherlands is too limited to identify a separate IM effect. The standards errors are quite high compared to the balanced sample between 2001 and 2005 (column (3) and (4)) which indicates to limited data to identify efficiently an IM effect. Because this is a statistical outcome not pointing to the negligibility of an IM effect, we assume for the Netherlands the same effects as for the EU15 as a whole (results column (5)). In the next section we will calculate the effect on total trade for the EU15 and for the Netherlands.

Table 4.1 Regression results for fixed effect panel estimator for IM

Sample period	Unbalanced, 1999-2005		Balanced, 2001-2005		Balanced, 2002-2005	
Column	1	2	3	4	5	6
Ln($GDP_i^t GDP_j^t$)	0.36***	0.36***	0.37***	0.37***	0.37***	0.36***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
EU_{ij}^t	0.09***		0.10***		0.11***	
	(0.02)		(0.01)		(0.03)	
$EU\_NL_{ij}^t$		0.20**		0.19**		0.07
		(0.08)		(0.09)		(0.09)
EU_{ij}^t [a]		0.08***		0.10***		0.11***
		(0.02)		(0.02)		(0.03)
Observations	4201	4201	2820	2820	2524	2524
Within R^2	0.51	0.51	0.48	0.48	0.47	0.47

Driscoll-Kraay standard errors between brackets; stars indicate statistical significance levels: *10% **5% ***1%; country dummies included for 26 countries and 7 years, but not reported. Dependent variable is bilateral services trade estimated with fixed effect panel estimator.

[a] EU dummy is without the Netherlands. What is specified as $EU\_other_{ij}^t$ below equation (4.1).

4.3.3 Alternative specification

Because the time series is rather short we also present cross section estimates. We specify the following equation:

$$\ln(x_{ij}^t) = \beta_0 + \beta_1 \ln(GDP_i^t GDP_j^t) + \beta_2 \ln(distance_{ij}^t) + \beta_3 contig_{ij}^t + \beta_4 comlang_{ij}^t + \beta_5 colony_{ij}^t + \beta_6 EU_{ij}^t + \sum_{x=1}^{x=2n} \alpha_x c_x + \mu \quad (4.1)$$

x_{ij}^t represents the service trade flow between country i and j in US dollars and $GDP_i^t GDP_j^t$ the product of importer and exporter GDP in US dollars. $distance_{ij}^t$ is measured in kilometres. The other variables represent dummies: $contig_{ij}^t$ is 1 if countries share a border (otherwise 0), $comlang_{ij}^t$ is 1 if countries share a language, $colony_{ij}^t$ is one if the country has been a colony of the other in the past, EU_{ij}^t is 1 if both countries are a EU15 member, and c_x is 1 if the importer or exporter is a specific country in a specific year. The latter dummies[39] are included to solve problems with omitted variables. There could also be omitted bilateral variables that correlate with included variables. It is not possible to solve this by adding country-pair dummies because that would make it impossible to identify the EU15 effect.

4.3.4 Estimation results

We present the regression results with OLS for each year. A disadvantage of the OLS estimator is that it can not include zero trade flows because the logarithm of zero is undefined. As a consequence all observations with a zero trade flow are ignored. However, the observations are

[39] A dummy is included for the exporting country as well as for the importing country. The amount of country-year specific dummies is equal to 2*ny*, where *n* is the number of countries and *y* is the number of years. This approach allows for differences in country-specific trade costs of exporting and importing.

missing because of no reporting and do not reflect zero trade flows between the (OECD) countries involved.[40]

The results in Table 4.2 show that the GDP and distance variables are always statistically significant at the 1% level and have values consistent with those in the literature. The coefficients for contiguity and colony are significant and positive. The coefficient for a common language is always positive, but only significant for 2001. The variable for the EU dummy is only significant in 2002, at a 5% confidence level. Its coefficient varies between - 0.02 (2000) and 0.34 (2002) with a mean of 0.13. This is comparable to the outcome of the panel estimation, but the standard error is much larger. The coefficient for the EU dummy is not very stable over time. Non-reported regressions with the same number of observations over the years show a similar pattern of the EU dummy over time. This lack of stability is not caused by changes in the data coverage over time.

Table 4.2 OLS cross-section regression results between 1999 and 2005 for IM

	1999	2000	2001	2002	2003	2004	2005
$\ln(GDP_i^t\ GDP_j^t)$	1.01***	0.85***	0.91***	0.91***	0.85***	0.84***	0.79***
	(0.04)	(0.06)	(0.05)	(0.04)	(0.05)	(0.04)	(0.05)
$\ln(distance_{ij}^t)$	– 0.91***	– 0.92***	– 0.87***	– 0.89***	– 0.83***	– 0.84***	– 0.88***
	(0.09)	(0.10)	(0.09)	(0.09)	(0.08)	(0.09)	(0.09)
$contig_{ij}^t$	0.48**	0.45**	0.48***	0.50***	0.51***	0.61***	0.46**
	(0.21)	(0.22)	(0.18)	(0.17)	(0.17)	(0.19)	(0.20)
$comlang_{ij}^t$	0.22	0.19	0.25*	0.11	0.11	0.04	0.11
	(0.16)	(0.17)	(0.14)	(0.14)	(0.15)	(0.15)	(0.15)
$colony_{ij}^t$	0.56***	0.46**	0.51***	0.50***	0.44**	0.46**	0.44**
	(0.17)	(0.19)	(0.16)	(0.15)	(0.18)	(0.20)	(0.20)
EU_{ij}^t	0.13	– 0.02	0.16	0.34**	0.21	0.11	0.01
	(0.18)	(0.17)	(0.15)	(0.15)	(0.14)	(0.15)	(0.15)
Observations	523	535	571	635	640	650	647
R^2-adjusted	0.86	0.86	0.85	0.85	0.86	0.84	0.82

Robust standard errors between brackets; stars indicate statistical significance levels: *10% **5% ***1%; country dummies included for 26 countries, but not reported. Dependent variable is bilateral services trade.

4.4 The EU15 and the Netherlands with and without the Internal Market

The IM effect on total services trade is expected to be smaller than indicated by the results above because these estimations do not take account of trade diversion. As discussed in chapter 3 we apply the model of Anderson and van Wincoop (2003) to correct for this omission. We use

[40] Santos Silva and Tenreyro (2006) suggest using the Poisson estimator to get consistent results, because OLS is likely to be inconsistent in estimations of gravity equations due to heteroskedasticity. However, Martinez-Zarzoso *et al.* (2007) show that the heteroskedasticity assumed by PPML is not always present in international trade data and that OLS outperforms PPML in out-of-sample forecast.

GDP as a proxy for intra-national trade in services.[41] Based on the transformed EU15 variable and the coefficients for the EU15, it is possible to estimate the IM effect on each bilateral trade flow for each year. We use the estimates reported in Table 4.1. Because we have used a sample of about 30 countries we miss about 30% of total services trade in the bilateral data.[42] Also the size of these trade flows will be corrected in estimating the net amount of services trade for the Netherlands and the EU due to the internal market.

The final effects of EU on the services exports and imports of the EU15 are presented in Table 4.3.[43] This table shows the share of trade that can be attributed to the EU. The first (third) column in the table shows the effect of the EU on the exports (imports) of the EU15 using the traditional approach in which trade diversion is ignored. The effects vary slightly by year because the share of the services are traded with EU countries varies over time. Without trade diversion, the average increase of total exports and imports between 1999 and 2005 is about 5.3%. This is about half of the increase in bilateral EU15 trade (11%), reflecting that about 50% to EU15 services exports is destined for non EU15 countries.

Table 4.3 EU15 services trade due to the Internal Market as share of total services trade

	Exports Traditional	Exports AvW	Imports Traditional	Imports AvW
	in %			
1999	5.1	4.8	5.1	4.8
2000	4.8	4.5	4.8	4.5
2001	5.0	4.7	5.1	4.7
2002	5.4	5.1	5.7	5.3
2003	5.4	5.0	5.7	5.3
2004	5.5	5.1	6.0	5.5
2005	5.2	4.8	5.7	5.3
Average	5.2	4.9	5.4	5.1

Source: Own calculations.

The traditional approach overestimates the effect on total services exports mildly. The difference is only 0.3% points with the traditional model because most of the trade substitution occurs with domestic trade according to our estimations.

The results for the Netherlands are calculated using the same EU coefficient (0.11) This is why the IM effects for the Netherlands (see Table 4.4) are about 0.5% points higher than for the EU15. This difference reflects the higher intra-EU services trade intensity of Dutch trade. The

[41] Service activities form the major part of GDP. However, trade is usually a lot higher than value added due to the fact that services are sold at production value to which not necessarily much value added is created. Therefore GDP is a reasonable proxy for the amount of trade in services.

[42] These numbers can be derived from the total services exports and imports of the reporting country without knowing the bilateral flows.

[43] Due to data limitations it is not possible to determine the trade effect for the EU25.

average effect of the IM of total services trade is about 5.5% for the Netherlands with the AvW model. Also for the Netherlands the trade diversion effects is not very large (comparing the "traditional" and "AvW" columns), but compared to the EU15 slightly more important.

Between 2000 and 2001 Table 4.4 shows an increase in the IM-effect. This is caused by a substantial shift in the Dutch trade pattern from external EU trade to intra-EU trade in services in these years. After 2002 this shift is partly reversed and the IM-effect as share of total services trade decreases.

Table 4.4 Dutch services trade due to the Internal Market as share of total services trade

	Exports Traditional	Exports AvW	Imports Traditional	Imports AvW
	in %			
1999	5.0	4.6	5.2	4.8
2000	5.2	4.7	5.1	4.7
2001	6.6	6.1	6.5	6.0
2002	6.7	6.1	6.6	6.0
2003	5.8	5.3	6.1	5.6
2004	5.9	5.4	6.3	5.8
2005	5.6	5.0	6.2	5.7
Average	5.8	5.3	6.0	5.5

Source: Own calculations.

4.5 Conclusions

Intra EU-services trade seems to have increased slightly faster than services trade between other OECD countries. The internal market could be an explanation for this. Our empirical research suggests that the EU countries traded 11% more with each other than with other countries between 1999 and 2005. Of the total amount of EU15 services trade about 5% can be explained by the internal market in services. For the Dutch trade in services the IM effect is slightly larger. These effects are calculated while taking trade diversion into account but the model suggests that the effects of trade diversion on total trade are limited. Most of the increase of intra-EU trade in services did not come at the expense of trade with other countries. If this pattern is persistent the recently adopted Services Directive (European Commission (2006)) will also create net trade (Kox and Lejour (2006); De Bruijn *et al.* (2008)).

The estimated effect is identified using data from 1999 due to data limitations. This implies that we can not measure the effect of the EU before that time. It could be that IM also had a positive effect on services trade in the years before 1999, although policy efforts towards IM were always much more focussed on trade in goods than on trade in services, take for example the Single Market Programme. From that perspective it is reasonable that the net trade increase in services is much smaller than for goods.

5 Foreign Direct Investment

5.1 Theory and literature

5.1.1 Introduction

Foreign Direct Investments (FDI) are investments with the objective of obtaining a lasting interest by a resident entity in one economy in an entity resident in another economy (OECD (1996). FDI has grown particularly fast, at a much higher rate than trade transactions since the 1980s: FDI flows have increased by about 25% per year on average and trade flows by about 10% on average per year (Markusen (2002) ,UNCTAD (2004)).

The rise of FDI is global. Our interest is the role of the Internal Market for the development of FDI. Did IM policies aimed to ease the free movement of capital contribute to intensified foreign direct investment within Europe? We use gravity equations to explain the development of FDI and estimate the contribution of IM to FDI in Europe.

The rise of FDI attracted also the attention of researchers to the behaviour of multinational enterprises (MNE). One methodology is partial equilibrium analyses to determine the effect of exogenous macroeconomic factors (such as exchange rate movements, taxes and tariffs) on FDI decisions of firms. This literature is primarily focussed on short-run effects and ignores long-run general-equilibrium factors that influence FDI decisions (Blonigen (2004)). This is clearly a problem when cross-section data are used.

A gravity model with time series on FDI could solve this problem. The gravity model has worked particularly well in empirical studies on trade (see chapters 3 and 4) as well as on FDI. Several researchers have tried to underpin the gravity model for FDI with a theoretical model. Helpman (1984) and Markusen (1984) suggested that FDI can be motivated by trade barriers and by access to low wages. The former form is called horizontal FDI and the latter is called vertical FDI. More recently, authors have suggested other forms of FDI, like export platform FDI (Ekholm *et al.* (2003); Bergstrand and Egger (2004)). This type of FDI is used to serve the neighbouring markets of the host country.

Because there are multiple types of FDI with different motives and due to the complexity of the theoretical models it is difficult to translate these models into an empirical specification. Brainard (1997) derives an equation that shows that the share of total foreign sales that are exported depends negatively on export frictions like transport costs and tariffs. Based on US data she found evidence for this relationship. Markusen *et al.* (1996) developed the knowledge-capital model, which is more complex than that of Brainard (1993), Brainard (1997) and has more flexible assumptions. The implications of the model were that FDI is influenced by the traditional gravity variables like market size and trade frictions, as well as by factor endowments.

Carr *et al.* (2001) empirically tested the hypotheses of the knowledge-capital model for the US. In their empirical specification the amount of affiliate sales depended on the GDP of both

countries, the trade costs, the FDI costs, and differences in factor endowments labelled as skill differences. They found evidence for horizontal motivated FDI as well as for vertical motivated FDI. However, the evidence for vertical motivated FDI was criticised because of the specification of the skill differences variable Blonigen *et al.* (2003).

The two-country models implicitly assume that FDI decisions between two countries are independent on FDI decisions between the parent country and any other host countries. For export platform motivated FDI this is a particularly bad assumption. Firms that are considering FDI in order to serve a specific region will generally choose to invest in the most attractive country in that region. This could imply that countries nearby an attractive host country for FDI will attract a relatively low amount of FDI. Blonigen *et al.* (2004) indeed find that the amount of FDI received by European countries is negatively affected by the amount of FDI received by their neighbours and positively by the GDP of their neighbours. Coughlin and Segev (2000) find an opposite result for China: the amount of FDI received by Chinese provinces increases with the FDI received by their neighbouring provinces. They explain this by the existence of agglomeration externalities.

This literature predicts that FDI is affected by three main factors: market size, trade costs and factor endowments. Although there is no unambiguous model that leads to the functional form of the gravity specification, many empirical studies have successfully used the gravity model to estimate FDI flows, using various variables for market size, trade costs and factor endowments.

5.1.2 The gravity model for FDI and the effect of the EU

Various studies have focussed on the effect of European economic integration on FDI using a gravity model. Brenton *et al.* (1999) use a specification where the stock of FDI is explained by the GDP and population size of the host country, the distance between both countries and dummy variables for preferential relationships between both countries. The expected sign of the EU dummy is ambiguous. If the investing country is also a member of the EU, FDI can increase due to the liberalisation of the financial flows and the reduced transaction costs. FDI can also decrease, because trade costs are reduced as well, which decreases the need for horizontal FDI. When the investing country is not a member of the EU the effect is also ambiguous. On the one hand, Neary (2002) concludes that the economic integration of Europe could lead to 'fortress Europe' for outside countries, reducing FDI inflows. On the other hand, firms might find it more attractive to invest in Europe because it offers free access to the whole EU.

Brenton *et al.* (1999) perform separate regressions for each investing country. For most investing countries they find that the EU coefficient is insignificant. They do warn that this result might be caused by a correlation of the EU dummy variable with other explanatory variables.

Panel data techniques are a solution for the problems that occur when the EU dummy correlates with other explanatory variables. Egger and Pfaffermayr (2004) use this technique to

explain the stock of FDI by the real GDP per capita and the population size of both the investing as the receiving country. They include bilateral dummies to account for all observed and unobserved time-invariant bilateral effects like distance and common language and time dummies to account for cycle effects that are the same for all countries. Finally, they include a variable that measures the integration phase effects. They distinguish between three integration phases: the period 1986 - 1992, the period 1993 - 1994 and the period starting in 1995 and conclude that the effect of additional economic integration seems to occur in the years before the event. For example, they conclude that the effect of the Single Market Programme (SMP) has already materialised between 1987 and 1992. The effect of the enlargement in 1995 can be found in the period between 1993 and 1995. At that time the amount of FDI between the three new members and the EU12 increased 26% faster than that of intra EU12 FDI.

Since this study focuses on the effects of the internal market on FDI and not in the other determinants of FDI we use the same method as Egger and Pfaffermayr (2004): a fixed effect estimator to compensate for all bilateral time-invariant effects. Bi-annual country dummies are able to capture country-specific trend effects, see also the empirical analysis of goods trade in chapter 3.

5.2 Estimation results

To estimate the effect of IM on FDI we use panel data on bilateral FDI stocks. The main reason for using FDI stocks instead of FDI flows is that the former are a better proxy for the sales activities of foreign affiliates as a measure of the capital stock than FDI flows. Ideally one would try to explain activities of foreign affiliates by statistics of their sales but these are hardly available, except for a few countries like the US.

Our database contains bilateral FDI stocks between 30 reporting OECD countries and over 300 partner countries and regions from 1981 until 2005. The non-OECD partner countries have been removed from the database because many data any missing. In principle there are 870 (n(n - 1)) observations for each year, but the data are not complete for all country-pairs. This is often the case in the first years of the time period. When a country did not report a bilateral FDI stock we will use the reported value by the partner country. When both countries reported a value we will use the value reported by the host country, because these values are considered to be more reliable.

The empirical gravity equation is given by

$$\ln FDI_{ijt} = a_0 + a_1\left(\ln y_{it} + \ln y_{jt}\right) + a_2\left(EU_{ijt}\right) + d_{it}D_{it} + d_{jt}D_{jt} + \eta_{ij} + \phi_{ijt} \qquad (5.1)$$

In the expression above a_2 captures the effect of EU membership, but is not related to an elasticity of substitution as is the case for goods and cross-border services trade. The reason is that equation (5.1) is not directly derived from a theoretical model. The *D*'s are dummies for

each country-year combination and have parameters *d* (in the expression above dummies equal to zero have been omitted). These dummies ensure that the estimated parameters are not biased because of multilateral resistance. The unobserved time-invariant characteristics of trade between *i* and *j* is captured by the pair wise fixed effects η_{ij}, which is a transformation of ε_{ij}.

An time-varying EU dummy is included to determine if the EU enlargements have led to higher FDI stocks between EU-members.[44] In an alternative specification a second dummy (toEU) is included to determine the effect of the EU on inwards FDI stocks of countries that are no EU member. This dummy is 1 if the investing country is not a member and the host country an EU member. A third dummy (fromEU) is included to determine the EU-effect on FDI stocks of EU-members in other countries. This dummy returns 1 if the investing country is an EU-member and the host country not. The time period covers the 1986, 1995 and 2004 enlargement of the EU. Due to the bad data coverage we can not identify separate accession effects as is done in chapter 3.

Table 5.1 presents the results of the fixed effects estimator for two specifications and for two (unbalanced) samples. First we discuss the results for the most extended sample between 1981 and 2005. In the first column the FDI stocks between EU members are compared to all other FDI stocks. The coefficient for the EU dummy is positive and statistically significant at the 1% level. In the second column, the variables EU, toEU and fromEU show the difference of FDI stocks compared to the case in which both countries are no member of the EU. At the 1% confidence level, FDI stocks between two EU-members are significantly higher compared to FDI stocks between countries that are both not a member of the EU. This is also the case for the FDI stocks of other countries in the EU (toEU). The EU dummy has a higher coefficient (0.25) than the toEU dummy (0.13). This is consistent with our expectations. The creation of the IM makes EU countries more attractive for FDI, because products that are produced in the EU can be transported relatively cheap to all other EU countries due to reduced trade restrictions. This argument applies for the EU dummy and the toEU dummy.

These results indicate that bilateral FDI stocks between EU members is on average 28% ($=e^{0.25} - 1$) higher than FDI stocks between two countries that are both not a member of the EU. For bilateral FDI stocks of other countries in EU countries this percentage is 14%.

The sample is highly unbalanced. In particular in the 1980s many OECD countries did not report bilateral FDI stocks. We present the estimation results for an other sample 1994 and 2004 for which the data coverage is much better. The results are similar as for the extended sample except for the higher EU coefficient in the first regression. In this sample the EU coefficients in

[44] In this sample, Belgium, Luxembourg, Germany, France, Italy, the Netherlands, UK, Ireland, Denmark and Greece are EU member from 1981 (beginning sample). Spain and Portugal enter in 1986, Austria, Finland and Sweden in 1995, and Czech Republic, Hungary, Poland and Slovak Republic in 2004.

both samples are of the same magnitude. The lack of data between 1981 and 1993 does not seem to affect the regression coefficients substantially.[45]

Table 5.1 Regression results of fixed effects estimator for IM effect on bilateral FDI stocks

Period	1981-2005		1994 - 2004	
Ln($GDP_i^t GDP_j^t$)	0.78***	0.76***	0.75***	0.74***
	(0.09)	(0.09)	(0.15)	(0.15)
EU_{ij}^t	0.14***	0.25***	0.22***	0.25***
	(0.05)	(0.05)	(0.08)	(0.09)
$toEU_{ij}^t$		0.13***		0.11**
		(0.04)		(0.05)
$fromEU_{ij}^t$		– 0.00		– 0.06
		(0.04)		(0.09)
Observations	10933	10933	6713	6713
Within R^2	0.65	0.65	0.44	0.44

Driscoll-Kraay standard errors between brackets; stars indicate statistical significance levels: *10% **5% ***1%; country-pair fixed effects and bi-annual country dummies for 30 countries and 25 years (11 years) included, but not reported. The dependent variable is the bilateral FDI stock.

5.3 The EU15 and the Netherlands with and without the Internal Market

Using the outcomes in Table 5.1 for the extended sample period, this section determines the bilateral FDI stocks in the counterfactual case without an Internal Market. This means, for example, that the FDI stock of Germany in the Netherlands is 28% higher with IM than without IM and the FDI stock of the US in the Netherlands is 14% higher with IM. Applying this to all bilateral FDI stocks yields the graphs in Figure 5.1. We are not able to correct for possible substitution from FDI stocks to others countries and from (domestic) capital stocks in the own country resulting from IM as we did for goods and services trade. These trade diversion effects can only be estimated in the framework of AvW for goods and services. For FDI we miss such a concise theoretical framework.

[45] Ideally we would present the results for a balanced sample. This would reduce the number of observations with a third for the sample 1994 - 2004 and the efficiency of the estimations. Then the EU coefficient is still positive but standard errors are substantially larger.

Figure 5.1 **Total outward (left panel) and inward (right panel) FDI stocks of the Netherlands with and without IM (in billions US$)**

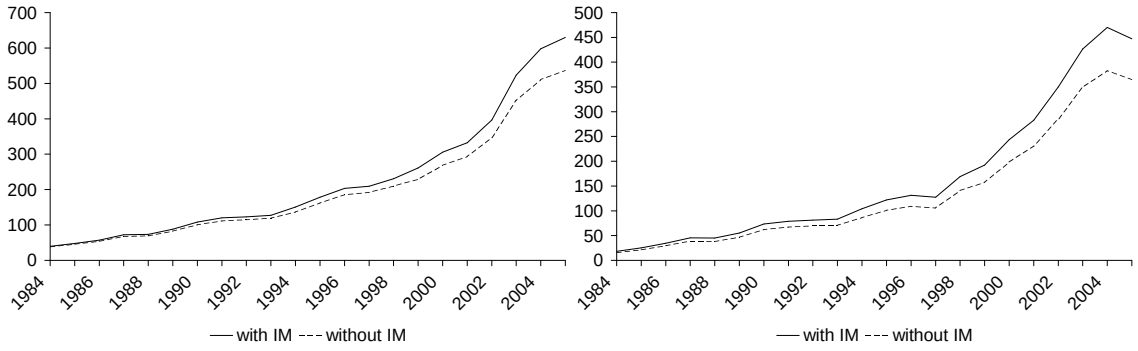
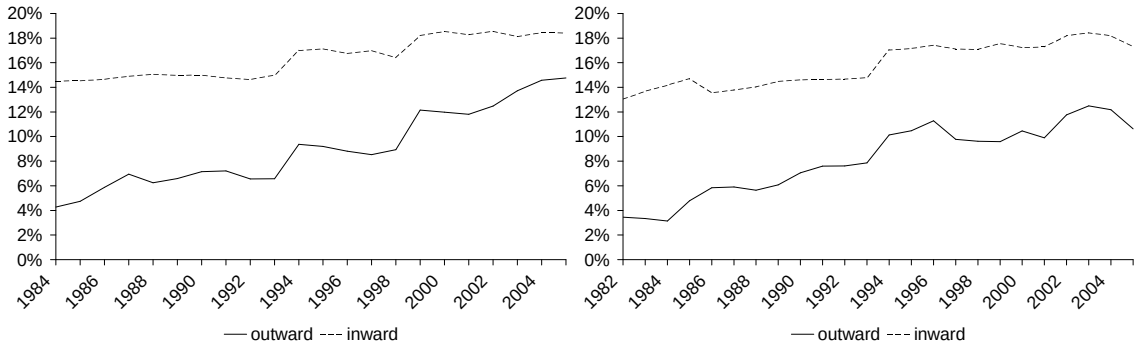


Figure 5.1 shows the share of the Dutch outward (left panel) and inward (right panel) FDI stocks that can be attributed to IM. For the Netherlands, the IM share for outward FDI is on average 9% of the outward FDI stock and the share for inward FDI is on average 16.5% of the inward FDI stock. The main reason for this difference is the impact of IM on inward FDI stocks from non-EU countries. The EU became more attractive to invest in for countries outside the EU because of access to the Internal Market.

Figure 5.2 **Share of outward and inward FDI stocks for the Netherlands (left panel) and the EU15 (right panel) due to the EU**



The right panel of Figure 5.2 shows the share of FDI for the EU15 that can be explained by the IM over time. For the EU15 the share of the outward and inward FDI due to the EU is on average about 8.5% and 16%, respectively. These shares are slightly lower than for the Netherlands, but the difference is small. For the EU15 the IM effect seems to decline in 2004 and 2005. This is not the case for the Netherlands which is caused by a lower share of FDI with EU countries in the total FDI stock. The IM effect for the EU15 also declined somewhat temporarily between 1997 and 1998.

The increases in FDI stocks attributable to IM in Figure 5.2 between 1994 and 1995 is caused by the expansion of the internal market of the EU with Austria, Finland and Sweden in 1995. Because of this expansion, a larger part of the outward and inward FDI of the Netherlands could be attributed to the EU. The sudden increase in Dutch outward FDI stocks in 1999 seems

to be specific for the Netherlands. The expansion of the EU in 2004 can not be identified for the EU15 in the graph, although we still see a small increase in the IM effect on the Dutch outward and inward FDI stock. Anticipating EU-membership, many European multinationals have already invested in the new Member States since the 1990s, which could be an explanation for the rather stable shares from the mid 1990s onwards.

5.4 Conclusions

Our analysis suggests a significant effect of the Internal Market on FDI stocks. FDI stocks between EU members have accumulated 28% faster than FDI stocks between two countries outside the EU. This increase in FDI stocks between EU countries can be explained by a higher level of economic integration and lower transaction costs within the EU. Inward FDI stocks to EU countries from non-EU OECD countries are 14% higher compared to FDI stocks between two OECD countries outside the EU.

For the Netherlands, the share of the total amount of inward (outward) FDI stocks that can be explained by the IM is 18.5% (15%) in 2005. For the EU15 as a whole the shares of inward and outward FDI stocks due to the IM are slightly lower. The reason is that the share of the FDI stocks from other and to EU countries is larger for the Netherlands than for the EU15 as a whole. The effects presented above do not take account of possible substitution effects with other investments and could therefore be upward biased.

6 Trade and growth

6.1 Introduction

A higher openness to international trade may increase productivity and economic growth through various channels. First, higher openness expands the scale of the market, leading to more foreign competition and access to a greater variety of products. Second, the increase in scale induces specialization and innovation because new opportunities arise. Third, openness may lead to spillovers of technological and organisational knowledge.[46]

In this chapter, we investigate how the increase in goods and services trade resulting from the internal market (IM) has affected the economic growth of the EU and of the Netherlands. The income effects of the IM via FDI will be briefly addressed in Chapter 7.

6.2 Empirical growth model

Our empirical analysis of the growth effects of EU membership follows a large empirical literature on the determinants of economic growth (e.g., Barro (1991); Mankiw *et al.* (1992); Islam (1995a)). In this literature per capita GDP in country *i* at time *t* (y_{it}) is regressed on initial GDP per capita $y_{i,t-\tau}$ (with τ spanning some pre-defined period of time), the country's investment rate *I/Y*, rate of population growth *n*, and a number of variables related to total factor productivity.[47] Levine and Renelt (1992) and Sala-i-Martin (1997) provide robustness analyses of the explanatory variables used in this empirical growth regression approach.

For our purposes we approximate total factor productivity by openness to international trade, primary education, and secondary education.[48] The growth regression equation that we specify to relate per capita income levels in year *t* to its determinants, including openness to trade, is as follows:

$$\begin{aligned}\ln(y_{it}) = {} & \beta_1 \ln(y_{i,t-\tau}) + \beta_2 \ln(I_{it}/Y_{it}) + \beta_3 \ln(n_{it} + 0.05) + \beta_4 \ln(predu_{it}) \\ & + \beta_5 \ln(sedu_{it}) + \gamma \cdot O_{i,t-\tau} + \lambda \cdot EU_{it} + \eta_t + \varepsilon_{it}\end{aligned} \tag{6.1}$$

The main variable of interest is $O_{i,t-\tau}$, the initial trade-openness defined as total export plus total import as a ratio to GDP (cf., e.g., Frankel and Romer (1999); Frankel and Rose (2002)).

[46] See Rivera Batiz and Romer (1991), Rivera Batiz and Romer (1994), Romer (1994), Coe and Helpman (1995).

[47] We follow Mankiw *et al.* (1992) and Islam (1995b)), who derive the growth regression equation from the neoclassical Solow growth model. For this purpose, the relevant variable to reflect replacement investments per capita contains not only the population growth rate, but also the rate of exogenous technological progress (*g)* and the rate of depreciation of capital (*δ*). Following the literature, we assume that technological progress and depreciation are equal across countries and set the sum of both equal to 0.05. As a result, the variable (n_i+g_i+δ_i) becomes (n_i+0.05).

[48] The empirical relationship between openness and growth has been investigated in a large number of papers, such as Dollar (1992), Sachs and Warner (1995), Frankel and Romer (1999), Frankel and Rose (2002) and Alcalá and Ciccone (2004).

In line with, e.g., Mankiw *et al.* (1992), Islam (1995b) and Bond *et al.* (2001), we include human capital proxies as a further determinant of productivity. We use attainment levels for primary (*predu*) and secondary (*sedu)* education (in percentages of population aged over 15). To capture any direct effects of EU membership on income levels (which run through channels other than trade openness), we include a dummy variable for EU membership. Period-specific effects are included as well. Appendix 5 more elaborately discusses the derivation of the growth regression equation from the neo-classical growth model framework.

Given the problems related to the potential endogeneity of initial per capita income and openness (see Rodriguez and Rodrik (2001) and Islam (1995b)), we adopt a panel data model specification. The problems of endogeneity arise from potential omitted variable bias in the growth regression equation. The initial level of total factor productivity may differ across countries. Although we include openness to international trade and education variables to capture these differences, many more factors will be of influence on total factor productivity differences, most of which are not easily measurable. Most notable, persistent differences in initial technological knowledge are subsumed in the random error component in the regression model. Most likely, these country-specific effects will not be randomly distributed and may be correlated to some of the explanatory variables in the model, such as openness to trade and investment rates. This would cause endogeneity bias, because the error component is correlated to the regression variables. A second source of endogeneity bias is the potential reverse causation between openness to trade and income levels. Although we use initial openness to explain subsequent income levels, the time lag may be insufficient to solve potential simultaneity bias. A third source of endogeneity bias is that initial total factor productivity is a determinant of initial income per capita. This leads to correlation between a regression variable (*viz.*, initial income) and the error term in the model. Panel data estimators are better suited to control for such sources of endogeneity bias (Islam (1995b); Bond *et al.* (2001)).

We have divided the total time span of *T* years into periods of each 5 years ($\tau = 5$), which form the panel observations for each country. Due to limitations to data availability, we choose to divide the period between 1960-2004 into 8 periods of 5 years and a final period of 4 years. Since we include the five-year lag of income per capita as a regression variable, the model is a dynamic panel data model.

All variables, except openness and the EU membership variable, are expressed in terms of natural logarithms, as is common in the literature. Openness is expressed as a perunage. The EU membership variable equals 0 for non-member countries, 1 if a country was member for a whole panel period of 5 years, and 0.2, for example, if it was member for only 1 out of 5 years in a given period. The investment rate and the augmented population growth rate are averages for each 5-year period. Openness and human capital levels are start-of-period values, as is initial

income per capita.[49] The database used for growth regression covers the period 1960-2004. We use the Penn World Table 6.2 for data on income per capita, investment rates, population growth, and openness. All variables are expressed in constant international prices (PPP adjusted). Human capital data are from Cohen and Soto (2007).

6.3 Estimation results

We are interested in the effect of changes in openness over time on the level of per capita income. In particular, we are interested in the income effect of changes in openness resulting from IM. Next, we proceed to estimate the growth regression model to derive estimates for the effect of changes in openness on per capita income levels over time. These parameter estimates are necessary to assess how changes in openness caused by IM affect income levels for the Netherlands and the EU as a whole. Table 6.1 presents the regression results for the per capita income equation specified in equation (6.1).

The first specification presents the results for a pooled OLS estimation. The results show that initial income, the investment rate, population growth and openness all statistically significantly affect per capita income. In the growth regression literature, a benchmark measure often used to compare the outcomes of different specifications is the rate of convergence implied by the estimation results. The growth regression equation used here is based on the neo-classical Solow growth model. The convergence rate indicates how fast the economy moves to the long-run growth path, the so-called steady state, on which per capita income growth is fully determined by the rate of technological progress, which is assumed to be exogenous to the model (see, e.g., Mankiw *et al.* (1992) and Islam (1995a)). The implied rate of convergence (λ) of 1.2% in the first specification is comparable to findings derived elsewhere in the literature (see, e.g., Islam (1995a); Bond *et al.* (2001)). In a meta-analysis of the convergence rates reported in the growth regression literature, Abreu *et al.* (2005) report that around one third of the convergence rates reported are within the range of 1%-3%. This range also contains the mode of the estimates reported. Since OLS is likely to lead to biased results due to omitted variables bias, pooled OLS is not our preferred method of estimation. In fact, the coefficient on initial income in OLS regression is likely to be biased upward (Bond *et al.* (2001)).

[49] A typical panel observation would be, e.g., the period 1960-1965. The dependent is log income per capita in 1965. Initial income is per capita income for 1960 ,and likewise for openness and human capital. The EU membership variable and investment rate are averages over 1960-1964. The averages do not include 1965 for two reasons. First, 1965 would already be included to compute the average for the subsequent panel observation (i.e., the period 1965-1970). Second, it seems most natural to consider investment over 1960-1964 to determine capital stocks in 1965. In this way, moreover, averages are indeed actually computed over 5 years instead of 6 years. The augmented population growth rate is the average growth of population levels between 1960 and 1965, augmented with the term 0.05 as explained before.

Table 6.1 Growth regressions for a panel of five-year span data[a]

	(1) Pooled OLS	(2) Within groups	(3) System GMM	(4) GMM: balanced panel
Log initial income per capita	0.94***	0.80***	0.95***	0.93***
	(0.01)	(0.02)	(0.03)	(0.04)
Log investment rate	0.09***	0.05**	0.13***	0.19***
	(0.02)	(0.02)	(0.03)	(0.04)
Log augmented pop. growth rate	– 0.22***	– 0.08	– 0.15	– 0.16
	(0.05)	(0.07)	(0.18)	(0.16)
Log primary school attainment	0.00	0.01	0.04**	0.02
	(0.01)	(0.02)	(0.02)	(0.02)
Log secondary school attainment	0.02*	0.01	–0.00	0.01
	(0.01)	(0.02)	(0.03)	(0.04)
Initial openness	0.05***	0.09***	0.09***	0.03
	(0.02)	(0.01)	(0.02)	(0.06)
EU membership indicator	0.00	0.03	0.00	–0.03
	(0.01)	(0.03)	(0.04)	(0.03)
Constant	– 0.20	1.39***	– 0.18	– 0.15
	(0.15)	(0.28)	(0.52)	(0.31)
Implied rate of convergence (λ)	0.01	0.04	0.01	0.01
Observations	601	601	601	344
Number of countries	81	81	81	43
Adjusted R-squared	0.99			
F-statistic	5162.46	195.97	1626.07	3478.00
within R-squared		0.84		
AR(2) p-value			0.71	0.68
Hansen p-value			0.82	0.78

Dependent variable: log end-of-period real gdp/capita (constant prices, PPP adjusted). Robust standard errors in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%; period dummies not reported.

[a] The final period covers 4 years: 2000-2004.

Panel estimation using the "within groups" estimator has been suggested as a solution for bias related to omitted country-specific effects. This method subtracts country-specific means over time from each variable, cancelling out the country-specific effects. The estimator thus exploits only variation in the time dimension to estimate the parameters. The results for this estimator show that most key variables, including openness, are qualitatively robust. The parameter on initial income, however, shows a marked quantitative change. It is much smaller, which results in a higher speed of convergence. In fact, the "within" estimator has been shown still to suffer from endogeneity bias in finite samples for dynamic panel data models. For a small T (as in our application), the transformation results in a negative correlation between initial income and the error term. This leads to downward bias in the parameter estimate (see Roodman (2006)).

To overcome the problems with OLS and within-groups estimation Bond *et al.* (2001) suggest to use the system-GMM estimator developed by Arellano and Bover (1995) and Blundell and Bond (1998). This estimator extends the difference GMM estimator associated with, e.g., Arellano and Bond (1991). Difference GMM expresses the dynamic panel data

model in first differences, cancelling out the country-specific effects. The endogeneity in the differenced model is subsequently addressed by using suitably lagged levels of the regressor variables as instrumental variables. As shown by Bond *et al.* (2001), though, difference GMM is very sensitive to weak-instruments bias. Especially for persistent series, such as GDP per capita,[50] lagged levels may not provide good instruments for subsequent first-differences. Bond *et al.* (2001) argue that system GMM provides a solution, by estimating two equations: a first-differenced equation, using lagged levels as instruments, and a levels equation that uses suitably lagged first-differences as instruments. This estimator is able to provide consistent estimates even in finite samples, where the number of periods is small. Using lags to enforce exogenous instruments, the estimation does not suffer from bias due to omitted country-specific effects. Moreover, potentially endogenous regressors (such as openness) can also be effectively instrumented by lagged levels and lagged first differences. Hence, the endogeneity bias is explicitly addressed by system GMM.

The last two columns of Table 6.1 present the results of system GMM.[51] The first GMM estimation shows a high parameter on initial income and a positive and significant effect of initial openness on income over a 5-year period. The second estimation is acquired from a balanced panel, in which all countries are included each period. Although the results for the balanced sample show a general loss of efficiency (reflected by an increase in standard errors and a loss of statistical significance, e.g. for openness), the results appear qualitatively robust. Most parameters are within one standard deviation from the estimates in the larger panel. Statistical tests on autocorrelation in the levels equation, and on the validity of the instruments (Hansen test) give reassurance on the model specification. As in Bond *et al.* (2001), system-GMM estimation substantially increases the parameter estimate on initial income compared to within-groups estimation, and yields a convergence rate that returns within the 1%-3% range. A point of concern is that the estimated parameter on initial income is about equal to the OLS estimate. Given the expected upward bias of OLS, this is somewhat surprising. As a result, the implied rate of convergence of 1% is at the lower bound of the modal interval reported in Abreu *et al.* (2005). We will therefore be cautious when applying the growth regression estimates in the calculation of the income effect of IM-induced changes in openness. In these calculations, we will report a low and a high effect scenario. In the high scenario, we will use the regression results from our preferred GMM estimation (specification 3), which theoretically best addresses

[50] As β_1 is close to one, the possibility arises that the GDP series has a unit root. Papell and Prodan (2004), Papell and Prodan (2007) show that GDP does not have a unit root once structural breaks are taken into account.

[51] System GMM regressions have been performed using the 'xtabond2' command developed by Roodman (2006) for Stata. We have used two-step system GMM, with robust standard errors (Windmeijer's finite-sample correction). The instruments included in the first-differences equation of system GMM are: income per capita (lagged 2 to 4 periods), investment rate, population growth rate, primary school attainment, secondary school attainment, initial openness, and EU membership variable (all lagged two periods). For the levels equation, first-differences of the regressors, lagged two periods, have been used as additional instruments. The period dummies and the constant term have been included as standard instrumental variables (the latter only for the differences equation). The 'collapse' option has been used to reduce the number of instruments. The main criterion we have used to check validity of the instruments, and hence of the specification choice, was the Hansen test of overidentifying restrictions. Also, a test for autocorrelation in levels has been performed.

the endogeneity bias in finite-sample dynamic panel data models. In the low scenario, we will use the results from the within-groups estimation. Theory argues that this specification may suffer from a downward bias in the initial income parameter, which – as we will see – reduces the long-run effects of the IM on income per capita. The parameter on openness, measuring the direct 5-year impact of changes in openness on per capita income, is robust across both specifications used in our computations below.

6.4 The income effects of the Internal Market

We separately address the income effect of changes in openness resulting from increased trade in goods and from increased trade in services that are related to the IM for the Netherlands and the EU. Based on the parameters from the growth regression, we can derive an estimate for the effect of deepening and extension of the Internal Market since 1960 on the current level of per capita income (represented by 2005 income levels: the first year following our period of analysis). The effect of changes in openness that can be attributed to IM on per capita income levels can be computed as follows.[52] The total derivative of per capita income levels in the end-year T with respect to changes in openness in each period can be computed as follows from the parameter estimates in the growth-regression equation:

$$d\ln(y_{i,T}) = \sum_{t=1}^{T} \frac{\partial \ln(y_{i,T})}{\partial O_{i,t-1}} \cdot dO_{i,t-1} = \sum_{t=1}^{T} \beta_1^{T-t} \cdot \gamma \cdot dO_{i,t-1} \,. \tag{6.2}$$

Equation (6.2) reflects two effects of changes in openness related to the IM on per capita income levels. First, a change in openness at the beginning of a period raises income levels 5 years later, at the end of the period. This effect is captured in the growth regression by the parameter for openness (γ). Second, an increase in income per capita transfers to future income levels over time. This effect (captured by the parameter on initial income, β_1) is less than proportional, though, reflecting decreasing returns to reproducible production factors (physical and human capital) and convergence to a new steady state. Table 6.2 shows the estimated effect of IM integration over the past 4 to 5 decades on income levels for the Netherlands and the EU as a whole.

The effect of the IM on per capita income in 2005 from equation (6.2) can be seen as the cumulative effect of past integration steps. This effect arises during the transition to a new long-run steady state, which will be characterized by permanently higher income per capita levels. Given the convergence rate that we derive from the specifications used for the income effect

[52] None of the estimated models show a significant direct effect of EU membership on income levels. Regressions that excluded openness, but included the EU membership variable also did not yield a substantial, nor statistically significant, positive effect. Therefore, we believe that the effect of the IM on income is best proxied as a trade-induced effect captured by the changes in openness due to the IM. Therefore, we do not consider growth effects captured by the estimated parameter for the EU membership variable in the table below.

calculations, which ranges from 1.2%-4.5%, about half the distance to the long-run steady state would be crossed in 16 to 70 years. This implies that the major part of the income effect of the IM may not have been realized yet. Moreover, given that the effect of the IM on openness changes over time, it is an interesting question what the long-run effect of the IM on per capita income will be. Hence, we also derive an estimate for the ultimate long-run income effect of the current state of IM integration.

The long-run, steady state effect of a change in openness can be derived from the growth equation (6.1). The long-run income effect is computed by multiplication of the change in openness with the long-run parameter of openness. The log-run parameter is the semi-elasticity of income with respect to openness (cf. Frankel and Rose (2002)). We refer to Appendix 5 for the derivations. This leads to the following expression for the long-run income effect of a change in openness at time t = 2005:

$$\Delta \ln y^* = \frac{\gamma}{1-\beta_1} \cdot \Delta O_{2005} \tag{6.3}$$

We will use this formula to derive an estimate of the long-run (i.e., steady-state) income effect of the IM for the Netherlands and the EU as a whole, again for the low and high scenarios with respect to the growth regression specification. We separately address the income effect of changes in openness resulting from increased trade in goods and from increased trade in services that are related to the IM. The long-run effects are presented in Table 6.2. Before we present these long-run estimates, we first need to answer the question what would be a plausible scenario for the persistent, long-run effect of the IM on openness to international trade?

The long-run effect of the IM relies on the assumption that the effect on openness that is attributable to the IM persists over time. Ultimately, the IM would not have a separate effect if the counterfactual world without an EU-IM would succeed to reduce trade costs by exactly the same amount between EU countries by multilateral agreements. Our results on goods trade have indicated that the IM effect on openness continues to exist so far, although it has generally decreased over time. This may indicate that extension and deepening of the IM competes with multilateral declines in trade costs. How would this extend into the future?

We could assume that the IM will be extended in the future, by accession of new EU member states, and will be further deepened (e.g., in services markets). On the other hand, multilateral initiatives to reduce trade barriers, as well as competing regional integration blocs, might imply that the excess openness attributable to the IM may decline, all else equal. Thus, we have to find a balance between increasing integration among EU countries, resulting in higher international trade between them, and possible international developments affecting openness that are not directly related to the IM, but will affect the counterfactual world in which the EU and the IM would not exist. For this, we assume that these countervailing effects will balance out, such that the current effect of the IM on openness persists over time.

This appears to be a reasonable compromise. First, the current effect of the IM on openness is low, compared to the effect realized over the whole period of IM considered. As a result, the long-run effects reported in Table 6.2 underestimate the long-run effects if we continue to attribute the market integration achieved by European economies over time to the IM, rather than arguing that the IM has partly been caught up by multilateral developments. After all, these market integration effects have historically developed from EU integration. Second, there is no clear answer to the question what would have happened in terms of multilateral liberalization without regional integration blocs such as the EU, and the question what will happen in the future in terms of either multilateral or EU integration can only be addressed tentatively. Thus, we choose to compute the effect of the current (*viz.*, 2005) change in openness that can be contributed to the Internal Market on long-run income.

Table 6.2 Effect of IM on openness and income levels

	Δopenness[a]	Δ GDP per capita[b] (long run)		Δ GDP per capita[c] (realised)	
		low	high	low	high
Trade in goods					
NL	8.2[d]	3.7	14.8	4.0	6.3
EU	4.9	2.2	8.8	2.2	3.3
Trade in services					
NL	1.5	0.7	2.7	-	-
EU	0.7	0.3	1.2	-	-

[a] Trade (export plus import) as a percentage of GDP in 2005.
[b] Percentage of GDP per capita on the steady-state growth path.
[c] Percentage of GDP per capita in 2005.
[d] Corrected for re-exports.

Table 6.2 presents the effect of estimated changes in openness attributable to the internal market on income levels for goods and services trade. First, Table 6.2 presents estimates for the long-run effect of the current level of openness that is induced by the Internal Market. The first column indicates that, for the Netherlands, we have excluded re-exports from goods trade for compiling openness changes due to the Internal Market. Re-exports are qualitatively different from exports from domestic production, in that they generate less direct value added per euro exported. As a result, it may be argued that the productivity and growth inducing effect of re-exports is smaller as well. As a lower limit to these effects, we simply exclude re-exports from the calculation of openness changes that are relevant for assessing the income effects of goods trade for the Netherlands.

For the EU as a whole, we do not exclude re-exports. First, only few data are available on re-exports for countries other than the Netherlands, and comparability is problematic. Furthermore, leaving out Dutch re-exports would imply that import flows for economies such as Germany are omitted as well. As final imports, these flows should be relevant for growth

effects. Lastly, the distribution of these re-export flows across destinations is not directly observed. This complicates an appropriate treatment of re-export flows other than directly for the Netherlands.

The second column contains the change in openness for 2005 resulting from increased export and import of, respectively, goods and services assigned to the current level of Internal Market integration. The third column presents the estimated increase in the long-run income levels, for the Netherlands and the EU, on the steady-state growth path, calculated using equation (6.3). For this purpose, the long-run parameter in equation (6.3) is multiplied by the induced change of openness in perunage points. The long-run parameter varies across the two scenarios used for deriving the income effects, from 0.45 in the low scenario to 1.8 in the high scenario. This last long-run parameter estimate falls within the range of plausible long-run income effects of openness reported in Nordas *et al.* (2006).[53]

The long-run income effect of the Netherlands, as a relatively open economy that enjoyed a higher increase in openness from Internal Market integration, is higher than the EU average. For goods trade, the effects are 14.8% and 8.8% of GDP per capita in the long run, respectively, in the high scenario. In the low scenario, these long-run effects are 3.7% and 2.2%, respectively. For services trade, the long-run income effects are much smaller. In Chapter 4 we have seen that the increase in services trade in 2005 due to the IM is considerably smaller still, than the effect on goods trade. Moreover, the share of services in total trade is substantially smaller than the share for goods. As a result, the increase in total openness (as a percentage of GDP) that is attributable to IM effects on services trade is much smaller than for goods trade. Using the same parameters from our growth regressions to calculate the income effect, the long-run effect in the high scenario is estimated to be 2.7% for the Netherlands and 1.2% for the EU. In the low scenario, long-run effects on income per capita are 0.7% and 0.3%, respectively. Given that the extent of market integration for services is still considerably less developed in the IM than for goods trade, future developments in EU liberalization of services trade may have a large potential to reduce trade costs and increase services trade. Moreover, it is likely that the reduction in relative trade costs, resulting from both technological progress and liberalization, will increase the share of services in total trade. This would increase the future impact of services liberalization within the IM on total openness to trade, and hence on per capita incomes.

The long-run effects may only materialize over a considerable period of time. Given a convergence rate of $\lambda = 0.01$, which follows from the high scenario, it would take about 70 years to get half-way to the steady state after a shock in openness has materialized. To put the long-run effect into perspective with respect to the income gains that have already materialized from the past decades of Internal Market integration, Table 6.2 subsequently presents estimates for the effects that have already materialized from past changes in openness due to the Internal

[53] According to Nordas *et al.* (2006) 1% point increase in openness (defined as exports and imports divided by GDP) affects income by 0.9% to 3%.

Market. Changes of openness over the period 1960-2000 have been used to compute the accumulated transitional effect on per capita income in 2005, using equation (6.2).[54] The transitional income effect is only presented for changes in total openness (as a percentage of GDP) arising from the IM effect on goods trade over time. The transitional income effects from increased services trade are negligible, because the period of measurement is too short for substantial income effects to have arisen yet. For the Netherlands, the gain in income estimated for 2005 from IM integration across 1960-2000 ranges from 4.0% to 6.3%, depending on the scenario. For the EU as a whole, the interval is smaller: from 2.2% to 3.3% of per capita income.

[54] Specifically, we have computed the change in openness due to the IM for the initial year of each panel-observation from 1960-2000, and inserted these changes in openness into equation (6.2) to compute the effect on income per capita in 2005.

7 Conclusions

What has the Internal Market delivered after fifty years of market integration? With the concept Internal Market we refer to all integration activities in goods, services, capital and labour markets to deepen and to expand market integration. The Treaty of Rome describes market integration as a means of promoting prosperity in a broad sense.[55] Has the IM delivered prosperity? In this study we took the perspective of economists. What has market integration implied for incomes in Europe and, in particular, what has it implied for income in the Netherlands? Increased market integration implies more international economic cooperation, which is beneficial for stable political relations between countries. We do not consider these kinds of benefits here. Instead, we focus on the effects of market integration policies on trade in goods and services and on foreign direct investment. In addition, we estimate the income effects of EU market integration.

We have aimed to identify the IM effects on top of other economic developments like globalisation. So, the shares of trade that we ascribe to the IM should be interpreted as additional to world-wide trends. Also without this IM effect, much trade would have taken place within Europe. The IM effects reported in this paper are merely the *extra* effect of IM policies on trade foreign investment and income.

We have used panel estimation techniques for goods trade, services trade and foreign direct investment, examining both the development of bilateral trade and investment relations over time and the differences between countries pairs. In addition we have estimated the IM effect on other trade relations to account for substitution.

According to our estimates, the Internal Market has had the largest impact on inward and outward FDI Stocks, both for in the EU and for the Netherlands. We have to be careful here, because a rigorous theoretical framework explaining bilateral FDI flows is lacking. One consequence of this shortcoming is that we cannot take into account substitution effects, like we did for trade in goods and services. The net effects of the IM on FDI are therefore likely to be lower than what we have reported.

The share for goods trade which can be attributed to the IM is nearly as large as for FDI. The effects on services trade are smaller given the current stage of IM policies in which the Services Directive is not implemented. We have not studied the effects on labour migration because of the small migration flows within the EU.

As a share of goods trade, the IM-effect has diminished over time. Trade openness has increased around the world and some IM policies on standards and NTBs are more and more common in trade liberalization deals involving non-EU countries.

[55] Dekker et al. (2007) discuss this objective more extensively.

Table 7.1 Internal Market effects for the EU and the Netherlands

Market integration area	EU25	Netherlands
Goods exports	8	18
Goods imports	8	12
Services exports[a]	5	5
Services imports[a]	5	6
Inward FDI stocks	17	18
Outward FDI stocks	11	15

Numbers are percentages of total goods exports, imports services trade etc for the EU and the Netherlands for the year 2005.
[a] For services, the EU is EU15. For FDI, EU does not include these non-OECD countries: Baltic States, Cyprus, Malta, and Slovenia.
The Dutch numbers for goods are corrected for re-exports.

The trade-enhancing effects of the IM for goods and services is estimated to have increased GDP by about 3 percent of GDP for the EU and 6 percent for the Netherlands. This implies a 2200 euro rise in GDP per capita in the Netherlands. In a more conservative scenario in which openness has less effect on income, the income effects are 2 percent and 4 percent, respectively. For the Netherlands we have excluded re-exports from trade for compiling openness changes due to the Internal Market because re-exports generate much less value added per euro exported.

According to our estimations about half of the potential income gains of the current stage of IM integration have been realized until now. The other part will be realized the coming decades due to reallocation, productivity improvements and innovation. These movements are already triggered by IM integration but take a long time before they are materialized. Then the GDP effect for the EU could add up to nearly 10% and of the Netherlands to 17%.

The income effects of more FDI are very modest.[56] First of all FDI, flows and stocks are at most 10% of the total investment flows and capital stock in Europe. Second, capital market integration implied more FDI inflows and outflows. The net effect is much smaller. This does not explain all effects, because the underlying premise is that the extra FDI inflows and outflows are more productively used. A net FDI approach would underestimate these effects. Third, the changes in FDI stocks are gross effects because we could not estimate the possible substitution effects as explained in section 5. The economic literature does also not find substantial effects of more capital market integration in developed economies. Fourth, openness for trade and FDI are often intertwined. It is possible that in estimating the income effects of trade in section 6 implicitly the income effects of extra FDI are counted for income effects due to trade.

[56] A back of the envelope estimate suggests that the income effects of extra FDI is about 1%. Take the long term estimate on investment in table 6.1, third column. This is 2.6 (= 0.13/(1-0.95). Assume that the 18% increase in FDI stocks can be translated into an 18% increase in FDI flows. FDI flows are about 10% of total investment and the I/Y ratio is 0.2. Then the I/Y ratio increase by 0.36% points. Multiplying with 2.6 delivers about 1% income gain.

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Appendix 1: Description of the data

Trade in goods

Data on bilateral trade were obtained from the International Trade in Commodity Statistics (ITCS) database using the OECD's website. The ITCS database is maintained by the OECD and the UNSD. Data on all countries was retrieved and most developing countries were aggregated by (sub-)continent in order reduce the number of zero trade flows and to focus on the OECD. As a rule reported imports were used as the primary source. When a country did not report any imports for a specific partner, the exports reported by the partner were used in stead.

An important exception to this rule has been made for all intra-EU trade flows from 1992 onwards. The establishment of the Single Market in that year had the side effect that data on intra-EU trade no longer could be collected from customs forms. Instead, trade statistics are gathered from data on value-added tax, the so-called INTRASTAT methodology. Due to sensitivity to fraud and other factors, intra-EU trade statistics suffered (and still suffer) from under-reporting. Because reported imports turn out to be more affected by underreporting than reported exports, the latter kind of data were used as a primary source for intra-EU trade from 1992 onwards. (In many cases, underreporting was so large that reported exports even exceeded reported imports despite the cif/fob difference.) The median cif/fob ratios in the years immediately prior to 1992 were used to correct for this exceptional treatment of INTRASTAT data.

Bilateral data on Dutch re-exports and re-imports were based on the approximations made by Mellens *et al.* (2007) (Statistics Netherlands does not (yet) publish bilateral re-exports and re-imports data.) They derive their approximation by combining time series data on total Dutch re-exports and re-imports with data on the sectoral composition of re-exports and re-imports available for recent years only.

Table 7.2 List of countries and aggregates (trade in goods)

Australia	Malta	*Extended sample:*
Austria	Netherlands	Argentina
Belgium and Luxembourg	New Zealand	Australia
Bulgaria	Norway incl. S. & JM. excl. Bouvet	Brazil
Canada	Poland	Chile
Cyprus	Portugal	China
Denmark	Romania	India
Finland	Spain	Indonesia
Fmr. Czechoslovakia	Sweden	Mexico
Fmr. USSR	Switzerland incl. Liechtenstein	South Africa
Fmr. Yugoslavia	Turkey	Sri Lanka
France incl. Monaco & overseas	USA incl. PR. & Virgin Isds.	Suriname
Germany	United Kingdom	Thailand
Greece		Venezuela
Hungary	*Aggregates:*	Zimbabwe
Iceland	East Asia and Pacific	
Ireland	Latin America and Carribean	
Italy incl. San Marino & Vatican	Middle-East and North Africa	
Japan	South Asia	
Korea, Rep. of	Subsaharan Africa	

Gross Domestic Product and Value Added

The primary source for data on nominal GDP and value added is the World Bank's World Development Indicators (WDI) CD rom (edition 2007). For several (European) countries, the WDI does not contain data on GDP in the earlier years of the sample. In particular, no GDP data was reported for West Germany prior to 1971. In these cases, additional data from the IMF's International Financial Statistics (IFS) database was used to lengthen the series, scaling the IFS data to avoid structural breaks.

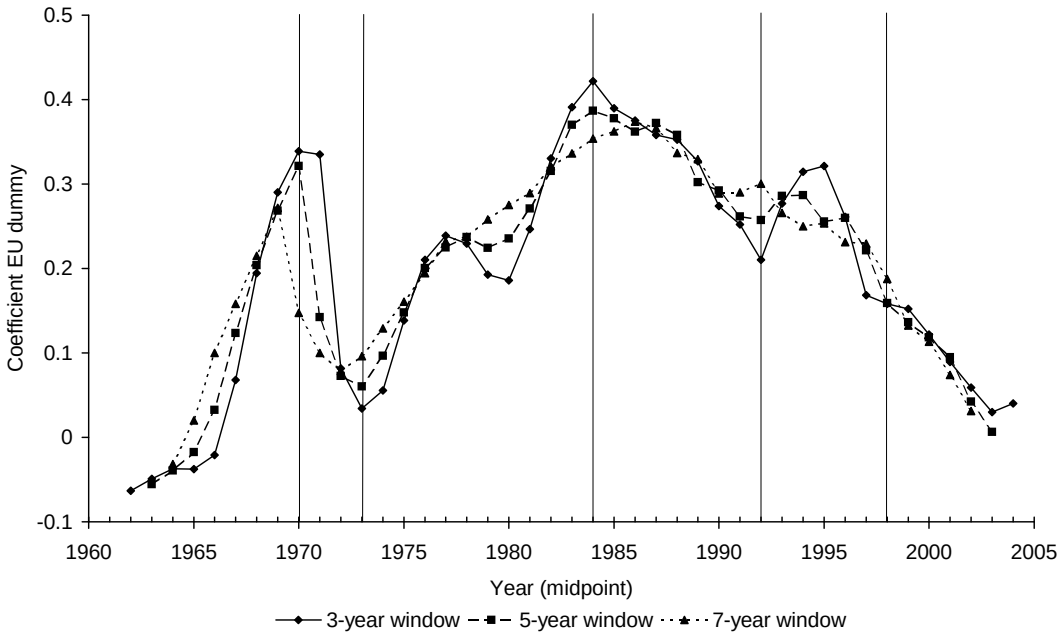
Appendix 2: Choice of spline intervals for trade in goods

Chapter 3 studies how the IM has affected the trade in goods over time using a spline (a "flexible trend") for EU-members. The choice of the years at which the slope of the spline is allowed to change is determined ex-ante and influences the precision with which IM-effect is measured. Estimating a cross-section gravity equation for all years separately can give an idea of how the EU-membership has affected trade over the years. A repeated cross-section, however, turns out to produce coefficients on the EU-dummy that are highly volatile.

A less volatile alternative is a so-called rolling regression. This involves estimating a (pooled) regression on a fixed number of subsequent years or "window", shifting the window for each regression by adding a later year to and dropping the first year from the previous sample. A rolling regression is thus similar to a moving average.

Figure 7.1 shows the results of a rolling regression of bilateral trade on the log of importer GDP plus the log of exporter GDP, the log of distance, dummies for common-border and common language, and an EU dummy.[57] The figure shows the estimated coefficient of the EU dummy for a three-year window, a five-year window, and a seven-year window. The vertical lines indicate the chosen breakpoints for the slope of EU spline.

Figure 7.1 Rolling regression results for windows of 3, 5 and 7 years[a]



[a] Vertical lines indicate the breakpoints chosen for the spline.

[57] Data on distance, common border and common language were obtained from the website of CEPII.

After the observed peak in 1970, a steep decline sets in until 1974. A possible explanation for this trough is the collapse of Bretton Woods in 1971 and the oil crisis of 1973. The second oil crisis (1979) might also have left a mark on intra-EU trade. These results are robust to including a generic dummy for the years 1971 to 1974

Appendix 3: Robustness of calculations on counterfactual trade

Trade in goods

All results presented in the main text were based on the method for calculating counterfactual trade proposed by Straathof (2008). Table 7.3 compares this method (SYS) with two other approaches. First, the "conventional" method of "setting the EU dummy to zero" without taking into account trade diversion, yields a consistently higher proportion of Dutch trade that is due to the IM, than the SYS approach. The other method is Bonus Vetus with GDP weights (BVO-GDP) as suggested by Baier and Bergstrand (2007a). This linear approximation consistently leads to smaller IM-effects.

Table 7.3 Share of Dutch exports and imports due to the IM: robustness of trade diversion calculation

Year	Conventional	Total effect			Expansion effect	
		SYS	BV-GDP	Traditional	SYS	BV-GDP
Exports						
2005	0.22	0.18	0.13	0.10	0.08	0.02
1961-2005	0.25	0.21	0.14	0.08	0.06	0.02
1961-1969	0.14	0.12	0.09	0.00	0.00	0.00
1970-1972	0.23	0.20	0.15	0.00	0.00	0.00
1973-1983	0.23	0.19	0.14	0.06	0.05	0.01
1984-1991	0.30	0.24	0.17	0.08	0.06	0.02
1992-1997	0.28	0.23	0.15	0.08	0.06	0.02
1998-2005	0.23	0.18	0.13	0.10	0.07	0.02
Imports						
2005	0.16	0.12	0.07	0.06	0.03	-0.01
1961-2005	0.20	0.16	0.10	0.06	0.04	0.00
1961-1969	0.14	0.11	0.09	0.00	0.00	0.00
1970-1972	0.21	0.17	0.13	0.00	0.00	0.00
1973-1983	0.18	0.14	0.09	0.04	0.03	0.00
1984-1991	0.25	0.19	0.12	0.05	0.04	0.00
1992-1997	0.24	0.18	0.11	0.07	0.04	0.01
1998-2005	0.18	0.13	0.08	0.07	0.04	0.00

"Conventional" ignores trade diversion; "SYS" is the method used in the main text; "BV-GDP" refers to Bonus Vetus with GDP weights

Appendix 4: Robustness of estimation results

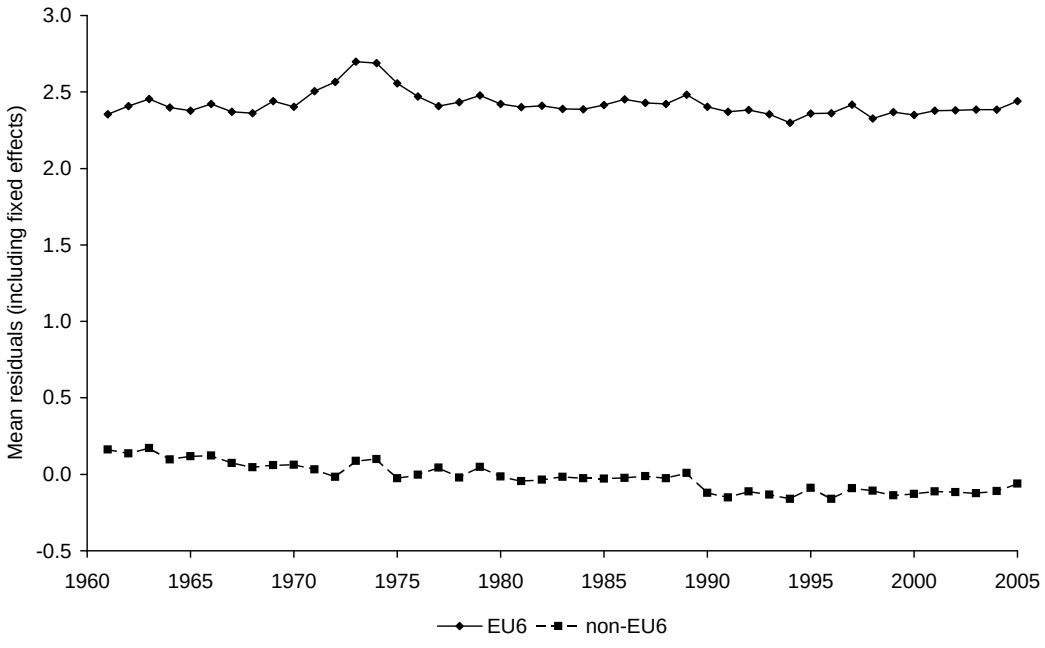
Trade in goods

Bun and Klaassen (2007) criticised studies of the effect of the Euro on trade (e.g. Frankel and Rose (2002)) for their failure to take into account trends in residuals. If residuals of a gravity equation exhibit an upward trend, then including a dummy for a discrete event, like the introduction of the Euro, then that dummy will have a positive coefficient even when the discrete event has had no impact on trade. Bun and Klaassen showed that the introduction of the Euro has had hardly any effect on trade once a trend was added for each pair of countries.

The case of the IM, however, differs from the case of the Euro as the construction of the IM has not been a discrete event, but a gradual one. Including pair wise trends would not work when measuring such a gradual effect because most genuine IM-effects would be filtered out.

Nevertheless, the criticism of Bun and Klaassen implies that any trend in the residuals should not be larger for EU-members than for other countries. Figure 7.2 displays the average residuals per year for EU6 countries and for all other countries. The underlying regression model has a single spline for all members of the EU (model (1) of Table 3.2). The figure shows that there is no trend in the mean residuals of EU6 countries, nor for the mean of the rest. The mean residuals are higher for the EU6 because of the inclusion of pair wise fixed effects.

Figure 7.2 Mean trend in residuals for EU6 members and other countries



All estimation results presented in the main text relied on bi-annual country dummies as a means to control for multilateral resistance. It is also possible to transform variables prior to estimation as proposed by Baier and Bergstrand (2007a) and Straathof (2008). Table 7.4

compares the dummy method (1) with Baier and Bergstrand's GDP-weighted transformation (4), Baier and Bergstrand's n-weighted transformation (5), Straathof's system approach (3), and Straathof's system approach instrumented with BVO-n transformed variables (2). The transformations proposed by Baier and Bergstrand outperform the other models in terms of significance and have coefficients close to those of the dummy model.

Table 7.4 Estimation results for transformed variables

		(1)	(2)	(3)	(4)	(5)
GDP		0.52 ***	0.20	0.77 ***	0.60 ***	0.60 ***
		(0.01)	(0.26)	(0.02)	(0.09)	(0.09)
EU	1961-1969	2.24 ***	2.98 ***	2.67 ***	2.24 ***	2.60 ***
		(0.23)	(0.24)	(0.57)	(0.27)	(0.26)
	1970-1972	– 4.18 ***	-3.72 ***	– 5.27 **	– 4.71 ***	– 5.26 ***
		(0.98)	(0.66)	(1.98)	(1.01)	(0.94)
	1973-1983	0.84 **	0.31	0.96 *	0.92 ***	0.92 ***
		(0.29)	(0.26)	(0.40)	(0.25)	(0.23)
	1984-1991	0.17	0.62	– 0.22	– 0.09	– 0.06
		(0.23)	(0.38)	(0.46)	(0.23)	(0.20)
	1992-1997	– 0.42	– 2.61 ***	– 0.80	– 1.02 ***	– 0.62 *
		(0.37)	(0.40)	(0.58)	(0.27)	(0.29)
	1998-2005	– 0.96 ***	– 0.48	– 0.96	– 1.34 ***	– 1.22 ***
		(0.27)	(0.43)	(0.52)	(0.22)	(0.27)
Transformation		none	SYS	SYS	BVO-GDP	BVO-n
Country-year dummies		yes	no	no	no	no
Year dummies		no	yes	yes	yes	yes
Instruments		none	BVO-n	none	none	none
N*T		51586	51586	51586	51586	51586
# parameters		799	51	1457	51	51
R^2-adj.		0.83	0.77	0.77	0.75	0.75

Driscoll-Kraay standard errors with lag one between brackets; stars indicate statistical significance levels: *5% **1% and ***0.1%.

The countries chosen for the base sample are mainly OECD countries and Middle and Eastern European countries (see the first two columns of Table 7.2). All other trade flows are aggregated by (sub-) continent for two reasons. First, in this way a set of relatively homogenous countries is created, such that bias due to unobserved country characteristics is limited. Second, because it reduces the number of zero-trade flows.

In order to test for the sensitivity of our main results, the base sample is extended with the major developing countries (listed in the third column of Table 7.2). Table 7.5 compares regression results for the two samples. The models (1), (2), (4) are results for the base sample presented earlier and have been included for reference only.

Model (3) refers to estimation with n-weighted Bonus Vetus transformed variables using the extended sample. In comparison with model (2), coefficients tend to be closer to zero and have larger standard errors. The sign is the same for both models except for the period 1984-1991.

Model (5) refers to estimation with variables transformed by Straathof's system approach using the extended sample. Compared with the base sample (4), coefficients again tend to be closer to zero and less significant.

Do these results suggest that using the base sample leads overestimation of the EU effect? Not necessarily. A number of large developing countries have experienced rapid economic growth in combination with substantial trade liberalization. This has stimulated trade with and between these countries. Failure to control for this process of catching up is likely to have blurred the EU effect in regressions using the extended sample.

Table 7.5 Estimation results for extended sample of countries

		(1)	(2)	(3)	(4)	(5)
GDP		0.52 ***	0.60 ***	0.62 ***	0.77 ***	0.84 ***
		(0.01)	(0.09)	(0.08)	(0.02)	(0.02)
EU	1961-1969	2.24 ***	2.60 ***	1.90 ***	2.67 ***	2.00 **
		(0.23)	(0.26)	(0.41)	(0.57)	(0.70)
	1970-1972	– 4.18 ***	-5.26 ***	– 3.02 *	– 5.27 **	– 2.71
		(0.98)	(0.94)	(1.45)	(1.98)	(2.39)
	1973-1983	0.84 **	0.92 ***	0.53	0.96 *	0.46
		(0.29)	(0.23)	(0.33)	(0.40)	(0.48)
	1984-1991	0.17	-0.06	0.52	– 0.22	0.29
		(0.23)	(0.20)	(0.29)	(0.46)	(0.54)
	1992-1997	– 0.42	-0.62 *	– 0.37	– 0.80	– 0.43
		(0.37)	(0.29)	(0.33)	(0.58)	(0.66)
	1998-2005	– 0.96 ***	-1.22 ***	– 0.41	– 0.96	– 0.27
		(0.27)	(0.27)	(0.27)	(0.52)	(0.57)
Transformation		no	BVO-n	BVO-n	SYS	SYS
Country-year dummies		yes	no	no	no	no
Year dummies		no	yes	yes	yes	yes
Instruments		none	none	none	BVO-n	BVO-n
Sample size		base	base	extended	base	extended
N*T		51586	51586	88819	51586	88819
N		1406	1406	2550	1406	2550
# parameters		799	51	51	1457	2601
R^2-adj.		0.83	0.75	0.63	0.77	0.66

Driscoll-Kraay standard errors with lag one between brackets; stars indicate statistical significance levels: *5% **1% and ***0.1%.

Appendix 5: The extended Solow growth model

The Solow growth model still provides the background for much of the empirical literature on economic growth. We briefly present an extended Solow model for the purpose of deriving the growth regression equation specified in the paper. For a more detailed description, see Mankiw *et al.* (1992); Islam (1995a). The derivations below are most closely based on Islam (1995a).

The Solow model

In the Solow model, aggregate output of an economy at a given point in time, *t*, (*Y*) is determined as a function of labour (*L*), capital (*K*), and efficiency in production (*A*). The factor A is denoted total factor productivity (TFP) and is determined by the level of technological knowledge, institutions, climate, openness to trade, education, and other more or less tangible factors. The basic growth model is usually formulated mathematically using a Cobb-Douglas production function:

$$Y_t = K_t^{\alpha}(A_t L_t)^{1-\alpha}, \tag{1}$$

where α is the elasticity of output with respect to capital and lies between 0 and 1.

The model takes the average annual growth of labour as determined exogenously, and denoted by *n*. Similarly, the average annual growth of technological knowledge (driving the long-run development of TFP) is assumed exogenous, and denoted as *g*. Using these features, we can express the variables in terms of "effective worker units" by dividing through with *AL*. We denote these reformulated variables by lower case letters with tilde.

Due to the diminishing marginal product of capital, the model economy moves to a steady state, in which investments in capital per effective worker exactly compensate for the rate of depreciation (δ), and the exogenous growth in effective labour ($n+g$). As a result, steady-state growth in income per capita is totally determined by the pace of exogenous technological development. The steady-state level (depicted by a '*') of income per effective worker follows as:

$$\tilde{y}^* = \left(\frac{I/Y}{n+g+\delta}\right)^{\alpha/1-\alpha}, \tag{2}$$

where *I/Y* stands for the exogenous investment rate.

This steady-state equation can be the basis for empirical analysis of per capita income differences across countries. However, it requires us to assume that countries are in their steady state at any given point in time (or deviate from it only randomly). Most of the empirical growth

studies instead use a generalization of the equation that describes the behaviour of income levels out of their steady-state growth path, using a first order Taylor series approximation around the steady state (see Islam (1995a)).

$$\frac{d \ln \tilde{y}_t}{dt} = \lambda(\ln \tilde{y}^* - \ln \tilde{y}_t) . \tag{3}$$

The equation above implies that the economy, roughly speaking, closes a fraction lambda of the gap to the steady state each year, where lambda equals $(n+g+\delta)(1-\alpha)$. This implies that the level of income per effective worker at a point t in time can be described as follows:

$$\ln \tilde{y}_t = (1-e^{-\lambda t}) \ln \tilde{y}^* + e^{-\lambda t} \ln \tilde{y}_0 , \tag{4}$$

where t_0 denotes the initial period considered. Substituting in the determinants of steady state income per effective labor unit yields:

$$\ln \tilde{y}_t = (1-e^{-\lambda t}) \frac{\alpha}{1-\alpha} \ln(I/Y) - (1-e^{-\lambda t}) \frac{\alpha}{1-\alpha} \ln(n+g+\delta) + e^{-\lambda t} \ln \tilde{y}_0 \tag{5}$$

This equation could be estimated empirically, if it were not for the fact that income per effective worker cannot be observed directly. Usually, therefore, the equation is expressed in terms of per capita income levels for estimation, using that per capita income equals:

$$y_t \equiv \tilde{y}_t \cdot A_t = \tilde{y}_t \cdot A_0 e^{gt} . \tag{6}$$

The equation describing per capita income at time t becomes:

$$\begin{aligned} \ln y_t &= (1-e^{-\lambda t}) \frac{\alpha}{1-\alpha} \ln(I/Y) - (1-e^{-\lambda t}) \frac{\alpha}{1-\alpha} \ln(n+g+\delta) + e^{-\lambda t} \ln y_0 \\ &+ (1-e^{-\lambda t}) \ln A_0 + gt. \end{aligned} \tag{7}$$

Extending the Solow model: education and openness as determinants of TFP

For our purpose, we extend the Solow model, by explicitly including openness to international trade as a determinant of total factor productivity. Moreover, we follow Islam (1995a) in including human capital as a further determinant of productivity as well. Including openness as well as human capital, the growth regression specified in the main text of Chapter 6 is in line with the main core determinants of income per capita considered in the growth regression literature.

We re-specify the production function to explicitly include human capital (reflected by two measures of educational attainment) and openness to international trade.

$$Y_t = K_t^{\alpha} (A_t' L_t)^{1-\alpha} \, predu_t^{\mu} \, sedu_t^{\nu} \, e^{\varphi \cdot O_t}, \tag{8}$$

where *predu* and *sedu* are primary and secondary schooling attainment rates, and *O* stands for openness to international trade (total trade as a perunage of GDP). As we have filtered the contribution of education and openness from total factor productivity, the variable *A'* reflects other productivity determinants (most notably the state of technological knowledge).

Assuming steady-state levels of educational attainment (cf. Islam (1995a)) and openness, equation (7) can now be reformulated into:

$$\begin{aligned} \ln y_t = {} & e^{-\lambda t} \ln y_0 + (1-e^{-\lambda t}) \frac{\alpha}{1-\alpha} \ln(I/Y) - (1-e^{-\lambda t}) \frac{\alpha}{1-\alpha} \ln(n+g+\delta) \\ & + (1-e^{-\lambda t}) \frac{\mu}{1-\alpha} \ln(predu^*) + (1-e^{-\lambda t}) \frac{\nu}{1-\alpha} \ln(sedu^*) + (1-e^{-\lambda t}) \frac{\varphi}{1-\alpha} O^* \\ & + (1-e^{-\lambda t}) \ln A_0' + gt. \end{aligned} \tag{9}$$

The estimations in the main text of Chapter 6 drop the restrictions on the regression parameters that emerge from the Solow model, leaving them free to be determined separately. This leads to the following growth regression equation that largely corresponds to equation (6.1):

$$\begin{aligned} \ln(y_{it}) = {} & \beta_1 \ln(y_{i,0}) + \beta_2 \ln(I_i / Y_i) + \beta_3 \ln(n_i + 0.05) + \beta_4 \ln(predu_{i,0}) \\ & + \beta_5 \ln(sedu_{i,0}) + \gamma \cdot O_{i,0} + \varepsilon_{it} + \eta_t \end{aligned} \tag{10}$$

To derive the long-run parameters used to assess steady-state effects, we note that income per effective worker is constant in the steady state. Hence, we can reformulate the model for the steady state, such that:

$$\begin{aligned} \ln\left(y_{i,t}^*\right) = {} & \frac{\beta_2}{1-\beta_1} \ln(I/Y)_i + \frac{\beta_3}{1-\beta_1} \ln(n_i + 0.05) + \frac{\beta_4}{1-\beta_1} \ln(predu_i) + \frac{\beta_5}{1-\beta_1} \ln(sedu_i) \\ & + \frac{\gamma}{1-\beta_1} \cdot O_{i,0} + \frac{\varepsilon_i}{1-\beta_1} + \frac{\eta_t}{1-\beta_1}. \end{aligned} \tag{11}$$

Since we assume that the growth of technological knowledge is exogenous, the derivative of steady state income per capita (in logs) with respect to trade openness follows directly (cf. Frankel and Rose (2002)).