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# MACROECONOMIC EFFECTS OF EUROPEAN INTEGRATION ON THE FINNISH ECONOMY: A simulation study

by
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# MACROECONOMIC EFFECTS OF EUROPEAN INTEGRATION ON THE FINNISH ECONOMY; A SIMULATION STUDY**

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ABSTRACT

The aim of this study is to discuss and to quantify the macroeconomic effects of further European integration on the countries outside the European Community. We use Finnish economy as an example in our quantitative analysis. However, for the most part of the study the analysis is in general level and thus can be applied to many other countries as well, especially to other EFTA countries.

During the course of the study we assume that the integration process as described in the White Paper of 1985 is successful, and that Finland will not become a member of the Community. Instead, Finland will create close relations with the internal market by participating into the process of creating the European Economic Space (EES), together with other member countries of EFTA.

By using the results of economic theory and existing studies on the effects of integration, we make a simulation study with an econometric macromodel to quantify the consequences of this alternative. This study is organized in the following way. Section 2 outlines the methodology used for this study. Section 3 contains a short description of the econometric macromodel used in the course of the study. In section 4 we discuss the design of the simulations for our purpose, and in section 5 we present the outcome of these simulations. Evaluation of the simulation results and concluding remarks are made in the final section.

The simulation results presented in section 5 are the first quantitative estimates of macroeconomic consequences for the Finnish economy resulting from further European integration. According to the results, by participating into the integration process according to the way indicated by the government, there are clearly positive results from the integration to Finnish economy. The size of these effects indicate that the need for participating the economic integration process in Europe is obvious.

TIIVISTELMÄ

Tutkimuksen tarkoituksena on selvittää Länsi-Euroopan yhdentymiskehityksen kokonaistaloudellisia vaikutuksia niiden maiden osalta, jotka eivät kuulu Euroopan yhteisöön. Tutkimuksen empiirisessä osassa pyritään arvioimaan esimerkinomaisesti Suomen kansantalouteen kohdistuvia integraation taloudellisia vaikutuksia.

Lähtökohtana tutkimuksessa pidetään sitä, että Länsi-Euroopan yhdentymisprosessi toteutuu siinä laajuudessaan kuin se on kuvattu nk. valkoisessa kirjassa. Suomen osalta on oletettu, että Suomi ei tule liittymään jäseneksi Euroopan yhteisöön, vaan osallistuu läheisesti sisämarkkinoiden toimintaan Euroopan talousalueen (European Economic Space) puitteissa muiden Efta-maiden kanssa.

Tutkimuksessa pyritään arvioimaan ekonometrisen kokonaistaloudellisen mallin avulla edellä kuvatun vaihtoehdon mukaisia integraation kokonaistaloudellisia vaikutuksia käyttämällä hyväksi olemassa olevia sekä talousteorian että tehtyjen empiiristen tutkimusten tuloksia.

Tutkimuksen sisältö on seuraava. Luvussa 2 käydään läpi tutkimusmetodi. Luvussa 3 esitellään tutkimuksessa käytetty makromalli lyhyesti. Luku 4 sisältää tutkimuksessa suoritetun mallisimuloinnin idean ja luku 5 siitä saadut tulokset. Viimeisessä luvussa tarkastellaan saatuja tuloksia sekä arvioidaan simuloinnin merkitystä.

Luvussa 5 esitettyjen tulosten perusteella voidaan päätyä siihen lopputulokseen, että integraatiokehitykseen osallistuminen on Suomelle tärkeää taloudellisen hyvinvointimme kannalta.

CONTENTS

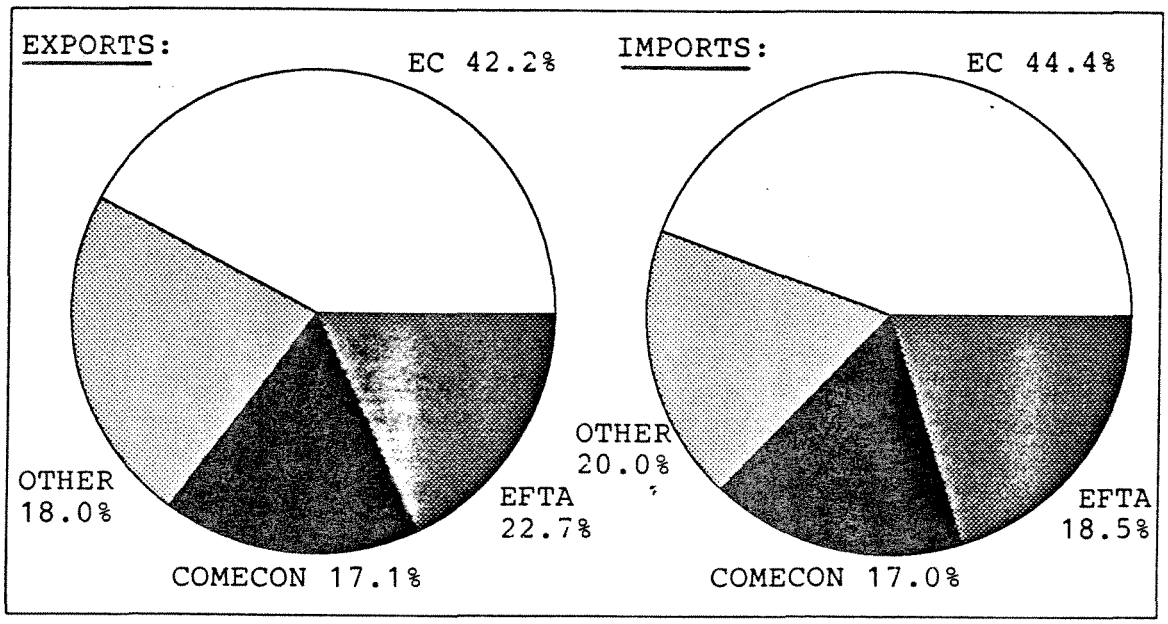
## 1. INTRODUCTION

The importance of the European economic integration process to countries outside the Common market, and especially to countries belonging to the European Free Trade Association (EFTA), has been under discussion especially during the last few years when the integration process has experienced a revitalization. The year 1992 and its implications must be the most popular topic of talks among businessmen and politicians, as well as in the headlines of various newspapers and magazines throughout the world during the past few years.

For members of the EC, the year 1992 means, among other things, completion of the process that is creating a new economic power, "the Fortress of Europe". For the outsiders, the year 1992 means - to large extent - uncertainty.

The importance of the EC to Finnish foreign trade can be clearly seen in Figure 1. Almost half of the total value of Finnish foreign trade is traded with EC countries. Finnish exports to the EC are dominated by different products of forestry, while imports from the EC consist of a variety of other manufactures.

FIGURE 1. FINLAND'S FOREIGN TRADE IN 1987 DIVIDED BETWEEN THE MAJOR TRADE BLOCKS (% SHARE)



Even though the EC and EFTA already in practice form a free trade area in manufactured goods (in the sense that there are no tariffs and no quantitative restrictions concerning their trade in manufactured goods), there still remain some obstacles which prevent the total integration of these markets. These obstacles include customs procedures and various policy measures that de facto create local markets within the area (e.g. public procurement policies, national technical standards, and subsidies to local industries). In addition to visible obstacles of trade, Venables and Smith (1988) have found that there exist both a substantial home-market bias of sale by European firms, and a tendency to price less aggressively in their home market than in their export market.[1]

One of the aims of further integration among the members of the community is to remove the remaining obstacles to free trade and thus receive beneficial economic effects through:

(1) direct cost saving,
(2) further specialization along the lines of comparative advantage,
(2) exploiting the economies of scale, and
(3) increased competition.

It is also a goal of the EFTA countries to benefit from the factors mentioned above. In the Luxembourg Declaration of 1984, members of the EFTA and EC established the form of their future co-operation; it was to create the European Economic Space (EES). The goal of the EES was to create an economic union between EFTA and EC countries in such a way that EFTA countries could co-operate in the EC's integration process without being forced to join the Community.[2]

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[1]It has to be remembered that the above is only true in case of manufacturers. The obstacles to trade of agricultural goods and services, as well as obstacles to free movements of capital and labor, still remain between the EC and EFTA countries. It is, especially, the removal of these latter barriers of trade that the further integration process has to deal with.

[2]See e.g. Skolnik (1988) for further details about the aims of the EES from the point of view of the EFTA countries.

For members of the Community, it has been estimated that in terms of GDP, further integration would result in 3.2 - 5.7 % cumulative growth rate on average in the medium-term.[3] Even though the time is at hand when Finland, among others, has to take concrete steps in terms of legislation dealing with the ongoing integration process, there have been very few studies made that give guidance to policy makers about the effects of integration on countries outside the EC.[4]

The aim of this study is to discuss and to quantify the macro-economic effects of further European integration on the Finnish economy.

During the course of the study we assume that the integration process as described in the White Paper of 1985 is successful, and that Finland will not become a member of the Community. Instead, Finland will create close relations with the internal market by participating into the process of creating the European Economic Space (EES), together with other member countries of EFTA.

By using the results of economic theory and existing studies on the effects of integration, we make a simulation study with an econometric macromodel to quantify the consequences of this alternative. This study is organized in the following way. Section 2 outlines the methodology used for this study. Section 3 contains a short description of the econometric macromodel used in the course of the study. In section 4 we discuss the design of the simulations for our purpose, and in section 5 we present the outcome of these simulations. Evaluation of the simulation results and concluding remarks are made in the final section. Finally, a detailed list of equations of the QMED-model and list of symbols used in this study are to be found in the appendices.

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[3]These estimates are often referred to because they are presented in the study initiated by the Commission of the EC, see "The Economics of 1992".

[4]However, Flam and Horn (1989) and Lundberg (1989) present together a detailed survey and discussion about the effects of European integration on the Swedish economy.

## 2. METHODOLOGY

In order to translate the effects of integration from microlevel to macrolevel, we follow the methodology used in the study initiated by the Commission of the EC.[5] First we try to quantify the necessary exogenous effects of integration in terms of our model and then we use a macroeconometric model, the QMED-model (the Quarterly Model of the Economics Department of the Bank of Finland), to simulate the dynamic effects of integration in the medium-term.

The fundamental problem with this kind of study is to insert integration into the model as accurately as possible. The method used was basically the following. We first chose the model variables that would describe the integration effect in question as well as possible. Then we used all available information in order to quantify the shock, first in terms of what is its size in Finnish economy, and then in terms of the model variable that we used to introduce that shock into the model. For simplicity, we did not try to make any specific time schedule for these shocks, but followed the principal that all of the shocks were introduced evenly into the model over a period of four years. Since we simulated the model for nine years altogether, it meant that the shocks were fully in force for five years after they were inserted into the model.

The results of our simulations are presented as deviations from the base run. Thus, we do not make any forecasts about the absolute level of GDP or its changes, but concentrate on describing the dynamic effects of the integration process. The base run represents the alternative where no further integration process takes place in Europe.

It is obvious that the consequences of integration to the Finnish economy depend on the policy measures that Finland pursues due to the integration (via EFTA or independently). The two extreme alternatives are that Finland becomes a member of EC or that Finland does not make any changes because of integration. Since neither of these two

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[5]The study is reported in "The Economics of 1992".

alternatives are likely to occur, we chose a third alternative where we assumed that in practice Finland, together with other EFTA countries, is integrated into the common market but without common economic policy.[6,7] This means, for example, that frontier controls are eased, technical standards are unified, markets are more or less integrated, liberalization of capital controls happens, etc. However, the fact that economic policies would not be unified would mean differences between the members of EC and the outsiders.

## 3. GENERAL PROPERTIES OF THE QMED-MODEL

The QMED-model is a small, aggregative quarterly model of the Finnish economy. The main purpose of the model is use in short- and medium-term forecasting and in policy analysis. One of the main purposes in building the QMED-model has been to create a quick and easy-to-use model which is mainly based upon the quarterly Finnish National Accounts.

The model consists of 36 endogenous and 40 exogenous variables, the number of stochastic equations being 21. However, there are only 15 main behavioral equations in the model since 6 of the stochastic equations are auxiliary equations for income accounting, the structure of private consumption expenditure, employment and the labor force.[8]

The QMED-model includes behavioral equations for households, firms, foreign and financial sectors, and prices and wages. The emphasis of

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[6]This kind of alternative is described by official statements by the government about European integration and Finland's position towards it, see Finland and the Western European Integration Process".

[7]One possibility would be to compare the different alternatives in terms of their macroeconomic consequences (as they were studied in the beginning of 1970's in Finland by the ERGI-project group, see e.g. Pöyhönen (1972)). Taking into account the lack of quantitative information that would be needed for this kind of study and the limits of the model used in this study, it would be very difficult, if not impossible, to produce any results that would be accurate enough for that kind of purpose.

[8]For a detailed description of the QMED-model, see Lahti (1989).

the model is laid on the description of the behavior of the real sector of the economy. Hence, in order to keep the size of the model small, and also due to the uncertainty how to model the transmission mechanism between the real sector and the monetary sector, a detailed monetary sector is not included in the model. Basically, the QMED-model is a Keynesian macromodel in which effective demand plays a crucial role. There are, however, some features which differ from the standard Keynesian framework:

(i) prices, wages, and interest rates are not completely rigid,
(ii) the capacity variable is endogenous, which allows for supply side effects,
(iii) the demand for labor and capital depend on relative prices and some demand shift variables,
(iv) inflationary, wage, and income expectations are modelled according to the rational expectations hypothesis.

A novel feature of the model is its treatment of expectations. It is assumed that both households and firms base their inflationary, income, and wage expectations on the RE hypothesis. Wages are affected by inflationary expectations. Households' decisions, on private consumption and investment in residential capital, are affected by expected real income and expected real interest rates. Finally, demand for capital and labor are determined by expectations about real wages and real interest rates. Thus we have included rational expectations in all of the most essential domestic demand components and in the wage equation in the model. The rest of the prices follow a simple mark up -rule and thus expectations are not needed there. There are no rational expectations implemented in the foreign sector. However, since the behavior of the foreign sector is crucially determined by exogenous variables in the model, the implementation of rational expectations would not fundamentally change the behavior of the model.

The second essential ingredient of the model is, in addition to the treatment of expectations, the existence of generalized Error Correction Mechanisms which take care of both the short-run dynamics and the long-run constraints.

There are some exogenities in the model due to Finnish institutions that have to be remembered when analyzing the simulation results. First, the exchange rate is fixed in the model due to the fixed exchange rate index system. Second, due to the assumption of a small open economy, all import prices and world market prices are exogenous. Third, the treatment of negotiated wage rate differs depending on the purpose of use of the model. Since the unionizing rate is about 80 % in Finland, and thus collective agreements covering the whole economy are of crucial importance in the process of determination of levels of wages and prices, the negotiated wage rate is often treated as exogenous for forecasting purposes. On the other hand, for policy simulation and for long-term forecasts an equation for the negotiated wage rate can be added to the model.

In the model specification, the QMED-model represents some kind of consensus among economists. Economic theory has played an important part in drafting the equations of the model, but the final form of the equations is often reached via empirical evidence using the principle of parsimonity in fine-tuning. Only a few artificial restrictions have been placed upon the parameters of the model.

A full list of equations of the QMED-model is presented in Appendix 1.

## 4. EXECUTION OF THE SIMULATIONS

### 4.1 General remarks

The most difficult and crucial step in this study was to translate the integration effects on the Finnish economy in terms of the QMED-model so that it can be used in simulating the dynamic macroeconomic effects of integration. Underlying the various details of our simulations are some common principles:

- We assumed that the internal market program laid out in the White Paper is successful and and that a corresponding agreement is reached in the negotiations between the EFTA and EC to establish EES.

- Because we had no further information about the schedule of the integration process, we assumed that all integration effects are in force by the end of the year 1992. The actual adjustment period is thus four years before the effects are fully in force in our model.

- The simulation period is nine years (36 quarters) starting from the beginning of the year 1989. Taking into account the model properties and its original purpose, it is the simulation of medium-term effects for which the QMED-model is most suitable.

- We have assumed that there are no changes in economic policy methods during the simulation period. For example, the exchange rate is fixed and the budgetary policy is unchanged.[9]

The choice of our simulations depends not only on economic theory, but also on the structure of the QMED-model and on guesses about the results of the ongoing process of trade negotiations between EFTA and EC. Thus, it has to remembered that some of the integration effects that are likely to come about are very difficult, if not impossible, to describe within a macromodel framework, e.g. improvement in innovation atmosphere or changes in commercial strategies. Also, due the fact that Finland will remain outside the Community and thus will not enjoy all of the benefits resulting from the common market, we did not include measures that had more to do with common economic policy within the simulation set presented like the opening-up of the public procurement and possible harmonization of taxation, etc.

Taking the abovementioned facts into account, we designed the following simulations for the QMED-model to describe the dynamic macroeconomic effects of further European integration on the Finnish economy.

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[9]Examples of simulations including accompanying economic policy measures evaluating the integration effects in the EC are presented in "The Economics of 1992", pp. 162-168.

## 4.2 Removal of obstacles to trade

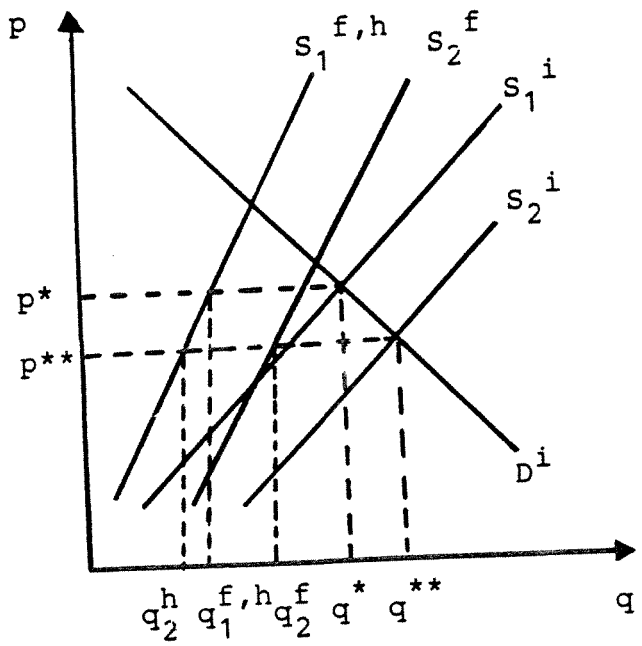
The removal of obstacles to trade (border controls, technical barriers to trade, harmonization of standards, opening up of public procurement, etc.) between EC countries and EFTA means that prices of imported EC and EFTA goods fall within this area. This leads to more trade, further specialization and exploitation of economies of scale within these countries, and, to some extent, to the substitution of EC and EFTA goods for goods produced outside the joint EC and EFTA markets.

These effects can be illustrated in a simple supply and demand diagram of an industry like in Figure 2. We start from a market situation where $D^i$ represents the demand for products of a single industry in the home country. $S_1^f$ and $S_1^h$ represent the supply of those products by foreign firms and domestic firms, respectively. $S_1^i$ is then the total supply curve in the market. The equilibrium price and quantity supplied is p* and q*. The supply of the products to the consumers in the market is equally divided between domestic and foreign firms, both producing the quantity equal to $q_1$.

Now, suppose that the obstacles to trade that resulted real costs to the foreign firms in the original situation are removed. For the domestic firms, in their home market, it has no effect on their supply. But because some real costs are saved by the foreign firms due to the removal to the obstacles of trade they are eager to supply more of the good at each price, i.e. their supply curve shifts downward from $S_1^f$ to $S_2^f$. That shifts the total supply curve from $S_1^i$ to $S_2^i$. As a result, the new market equilibrium is at p** and q** ($p^* > p^{**}$ and $q^* < q^{**}$). Foreign firms have increased their sales to the market from $q_1^f$ to $q_2^f$, while domestic firms have lost sales by the amount equal to $(q_1^h - q_2^h)$. Both the domestic and the foreign firms have experienced a reduction in their selling price equal to (p* - p**).

In Figure 2, the supply curve not only represents the supply of firms based in the home country (e.g. within EFTA and EC), but also the supply curve of the firms based in any other country that does not

FIGURE 2. REMOVAL OF OBSTACLES TO TRADE




benefit from the reduction of the barriers of trade (e.g. the countries outside EFTA and EC).[10]

When the barriers of trade are removed between EC and EFTA countries, but not between the rest of the world and EC-EFTA block, some of the increased EC and EFTA exports will displace sales by firms based outside. Unlike the firms based in EC-EFTA block, those outside firms will not experience any offsetting increase in their exports. Thus, integration represents discriminatory liberalization among EC and EFTA countries, which can have a strategic negative effect on the rest of the world, altering the terms of competition in a way that favors firms in EC and EFTA at the expense of firms based outside.

Also, as a result of further specialization and exploitation of economies of scale within EC and EFTA the goods produced within this area become relatively cheaper than the goods produced in the rest of the world for the other markets.

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[10]The removal of the kind of trade barriers that we are faced with in Europe (e.g. frontier controls) would most likely also benefit the countries based outside, but they are unlikely to experience the benefits as fully as the members of EFTA and EC.

If we translate the effect described above into Finnish terms of trade, the effect in all the markets on Finland's terms of trade is thus slightly positive. The terms of trade for Finland do not alter with respect to other EFTA countries and members of the EC[11]. The positive effect on the terms of trade of Finland is due to the fact that with respect to the rest of the world, Finnish exporters find themselves in a better position of competition in the EC and EFTA markets because of the free trade agreement.[12]

There are two studies that have produced quantitative estimates of the size of existing obstacles of trade. Ernst and Whinney[13] has estimated in their study for the European Commission that the removal of frontier controls would reduce intra-Community import prices on average by about 1.7 %. Pelkmans, Wallace and Winters (1988) have estimated that the costs imposed by customs procedures, testing requirements and so on are equal to between 1-3 % of the value of trade.

Taking these estimates into account, we estimated that the Finnish import prices (pm) will fall by 2.2 % because of integration and that the reduction is evenly distributed over years 1989-1992.

The positive terms of trade effect was brought into the model by increasing the price of competitors to Finnish exporters (pf) by 0.25 % per year for the period of 1989-1992.[14]

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[11]To be precise, there might be some small deterioration in terms of trade of Finland relative to the members of the Community due to the fact that Finland is not a member of the Community and thus cannot enjoy all the positive effects of integration (for example we have assumed that Finland will be left out from the process of opening-up of public procurement).

[12]Especially this is true for forestry products (that form the major part of Finnish exports) because the competition comes from countries outside EC (e.g. from Canada).

[13]See "The Economics of 1992", pp. 44-49.

[14]It has to be noted that due the fact that Finnish export prices (pxl) are linked to competitors' price (pf) in the QMED-model, the over all positive effect in the Finnish terms of trade was of magnitude of 0.5 per cent.

## 4.3 Supply side effects

The term "supply side effects" includes various consequences of integration that are due to a change in the strategic behavior of firms. These consequences of integration include e.g. exploitation of economies of scale, reduction of monopoly rents due to increased competition, and the reduction of X-inefficiencies.

Supply side effects are essentially microeconomic in nature and work their way through to macroeconomic sphere principally via two channels. First, increased competition reduces the monopoly power of firms and lowers the prices charged by these firms. The firms have to lower their costs of production by either eliminating the areas of production with low productivity or by exploiting economies of scale. Second, increased integration and competition (i) enable better allocation of resources, (ii) force firms to further improve their internal organization, and (iii) lead to better exploitation of economies of scale.[15]

The effects of economies of scale in the case of market integration has been illustrated in the literature in the following way.[16] Figure 3 presents a situation in the market of a certain industry in two countries h and f. $D_{h,f}$ is the identical demand curve for this commodity in both h and f, and $D_{h+f}$ is their joint demand curve. $AC_f$ and $AC_h$ are the average cost curves for this commodity in f and h respectively. Note that downward sloping AC curves represent the existence of economies of scale. At the starting point both h and f impose tariffs which at the optimum are Corden's (1972) made-to-measure

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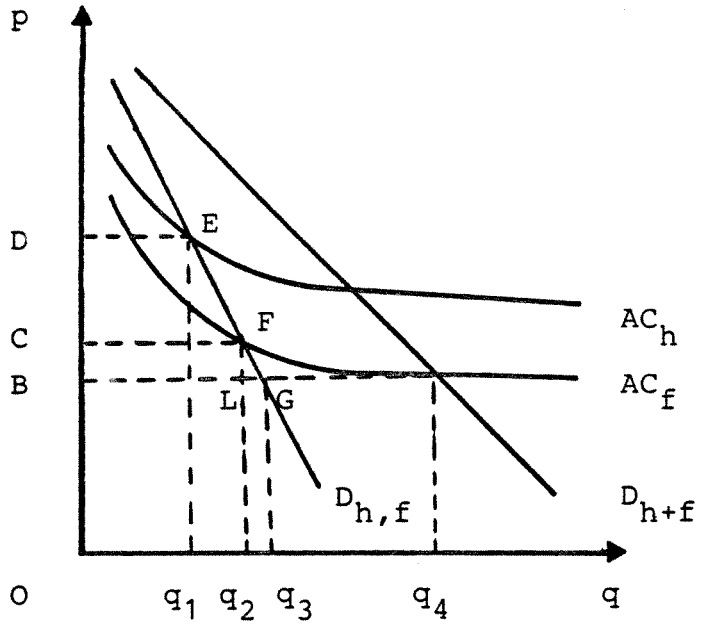
[15]Apart from the conventional effects through comparative advantage, presence of economies of scale within the EC can make location of manufacturing production in Finland less attractive in the future because, as Kurgman (1988) proposes "in the presence of economies of scale goods tend other things equal to be produced in the country or region that offers the largest market". This could in particular affect those branches of the Finnish industry that need a lot of labor in their production in the case where Finland would not agree to free movement of labor across its borders.

[16]See, e.g. El-Agraa (1985) for specific analysis on custom unions.

tariffs (tariffs which encourage domestic production to a level that just satisfies consumption without giving rise to monopoly profits). These tariffs are equal to AD and AC for h and f, respectively, resulting in $Oq_1$ and $Oq_2$ production in h and f, respectively.

When h and f enter into a customs union (or integrate their markets further in any other way), f, being the cheaper producer, will produce the entire union output, $Oq_4$, at price OB. Note that this might require a common external tariff rate if the world supply curve would be at the lower price level than B. However, this gives rise to consumption in both h and f of $Oq_3$ with gains of BDEG and BCFG for h and f respectively. Part of these gains, BDEI for h and BCFL for f, are 'cost reduction' effects, i.e. the initial cost of this amount has been reduced due to economies of scale.

FIGURE 3. ECONOMIES OF SCALE AND ECONOMIC INTEGRATION




In the QMED-model it is possible to take supply side effects into account even though it is basically a demand orientated model. This is made possible by a variable that represents the excess capacity in the manufacturing sector (cap) linking demand for inputs and output. Thus we have simulated the supply side effects in the model by altering the level of capacity variable in the model.

It is evident that the abovementioned factors should increase the productivity of the firms. Thus, in terms of the QMED-model, it means that the excess capacity of the manufacturing firms should increase compared to the pre-integration period. The crucial question then becomes the size of this effect. Because there are no straight forward estimates on the size of this effect we had to use our own estimate to perform this simulation.[17]

To get an estimate of the size of the supply side effects, we used the following method. First, we assumed that like the other effects of integration, it would take four years before the supply side effects would be fully exploited. Then we assumed that the firms would need a period of five years to adjust their production capacity in the level where they do not waste their resources, i.e., have too much excess capacity. The "optimal" level of excess capacity of the firms was assumed to be the level that they held before the integration simulation started, i.e. at the end of the year 1988. How the size of the supply side effects in our simulation is determined by iterating the size of the shock in the capacity variable in such way that the "optimal" level of excess capacity of the manufacturing firms after nine years of simulation is reached.

By using the method above, the excess capacity of the manufacturing firms has to be increased by two percentage points by the end of the fourth year of the simulation period. Note that basically capacity effect is temporary (as we have described), but it has also permanent effects in the economy e.g. because of increased capital stock.

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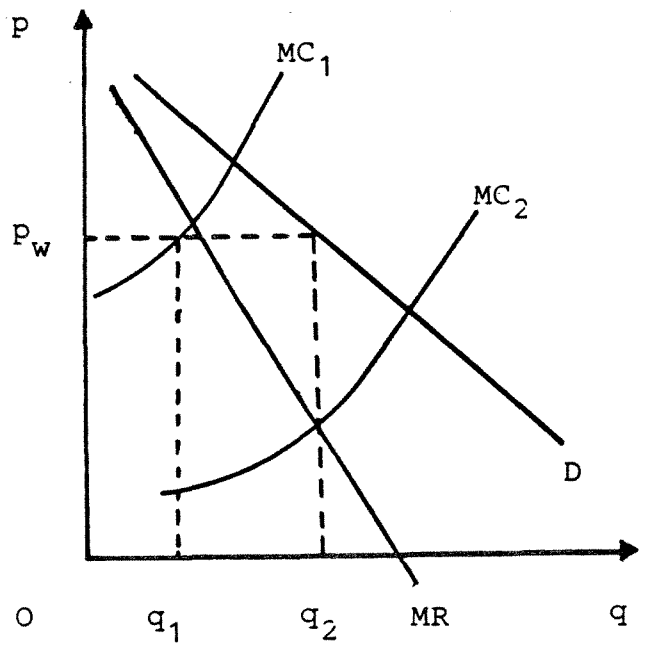
[17] In the simulation study for the EC, supply side effects were introduced into the Hermes model by a fall in unit costs of production, a fall in sales prices, and increased productivity of capital in parallel with introduction of new vintage investments in the capital stock. The size of these shocks represented a little more than 3 % of Community GDP. For more details, see Annex B in "The Economics of 1992".

## 4.4 Liberalization of financial services

The liberalization of financial services would allow greater freedom of competition between financial institutions in Europe. The effects of increased competition on prices and costs can be illustrated as in Figure 4.[18] In Figure 4 the industry (in this case financial service industry) is faced with perfectly elastic import supply at price $p_w$. This supply is going to discipline domestic producers who are assumed to have monopoly power. The competition effect will vary in intensity according to the efficiency of the domestic producers described by the level of their marginal costs. For $MC_1$ the domestic producers will provide services equal to the amount of $q_1$ and the rest ($q_2 - q_1$) is imported. If the level of marginal costs of he domestic producers were at $MC_2$, the domestic producers would control the entire market. Similarly, the lower the barriers of protection, the lower the level of the price pw and the smaller the difference between the price and the domestic marginal cost.

FIGURE 4. EFFECTS OF LIBERALIZATION OF FINANCIAL SERVICES TO PRICES AND COSTS




[18] See Jacquemin (1982).

On the basis of the analysis above, the expected effects of the liberalization of financial markets is two fold: firstly, a fall in prices of financial services, and secondly, a possible reduction of the level of domestic marginal costs, reflecting the desire of domestic firms not to loose their markets.

Price Waterhouse[19] has calculated the costs of financial services within EC and estimated the reduction of prices of financial services due to increased competition for firms and households. For households the reduction of costs in financial services would mean that (i) for short-term credits the interest rate margin would fall by two percentage points on average, (ii) for long-term credits the respective fall in the interest rate margin would be 0.3 percentage points, and (iii) the cost of other financial services would fall by 10 %. For firms the liberalization of financial services would mean that (i) for long-term credits they would benefit from a fall in the interest rate margin by 0.5 percentage points, and (ii) the cost of other financial services would fall by 12 % on average.

The Finnish Bankers' Association (1989) has made a comparable study on the costs of financial services in Finland and the results show that the prices of financial services in Finland are below the average price of these services within the EC. Thus it seems quite acceptable to expect a reduction of the prices of financial services in Finland to be of the same order of magnitude as within the EC.

Since there is only one interest rate (r) in the QMED-model that affects both the behavior of households and firms, we aggregated the effects of financial liberalization into this variable. We estimated that a reduction by 0.8-0.9 percentage points in the long term in the interest rate would reflect the liberalization process in financial services.[20] Again, the reduction of the interest rate was evenly

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[19]See "The Economics of 1992", pp. 86-94.

[20]Technically, we decreased the discount rate (rd) in the QMED-model by 0.25 percentage points per year (during 1989-1992) in order to achieve the fall in the long-term interest rate (r).

distributed for the years 1989-1992.[21]

## 4.5 Income effects

The primary effects of increased integration within the EC seem to be a loss of real income in the non-member countries mainly due to the negative terms of trade effect. On the other hand, increased real income within the EC, as expected by the members of the EC, should increase the demand of imports from the non-member countries and have thus a positive effect on the real income in these countries. For example, it was argued when the EEC was founded that this positive income effect would dominate the negative income effects of integration for the non-member industrial countries.[22]

This effect of increased income within the Community will also increase the demand for Finnish exports to the EC regardless of the outcome of the negotiations between EFTA and EC. There are some estimates on the dynamic macroeconomic effects of integration to the members of the Community made with the Hermes and Interlink models. According to this study initiated by the European Commission the medium-term increase in the GDP of the whole Community is around 4.5 %.[23]

We simulated the effects of this income effect on the Finnish economy with the QMED-model by increasing the value of foreign import demand variable (f) by 4.8 %. Again, the time path of increased foreign import demand was evenly distributed for years 1989-1992 as suggested by the results gained from the abovementioned macromodels.

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[21]It is not only the liberalization of financial services that is likely affect the level of interest rates in Finland, but also the effects of integration to exchange rate policy. För the discussion of these effects in case of Sweden, see e.g. Svensson (1989).

[22]Balassa (1962).

[23]See "The Economics of 1992", pp. 189-197.

## 5. SIMULATION RESULTS

The overall macroeconomic consequences of further European integration seem to be very promising for the Finnish economy, as can be seen in Table 1 where our simulation results are presented in detail. The medium-term effects given by our model after the completion of integration indicate that GDP would rise roughly by 2-3 %, inflation would fall by 1 %, and the balance of payments would improve by 5-6 billion FIM.

When looking the effects more closely, we can see that in medium-term all of the components of aggregate demand have risen due to integration. Private consumption rose by 0.5 % and housing investments by 0.2 %, mainly due to fall in the general price level and in interest rates. Manufacturing investments rose by 2.6 % and were mainly driven by increased foreign demand for Finnish exports.

TABLE 1. MACROECONOMIC CONSEQUENCES OF COMPLETION OF EUROPEAN INTEGRATION ON THE FINNISH ECONOMY

| time | 92.4 | 93.4 | 94.4 | 95.4 | 96.4 | 97.4 |
|---|---|---|---|---|---|---|
| y | 1.9 | 2.1 | 2.3 | 2.4 | 2.6 | 2.7 |
| mt | 1.9 | 1.8 | 1.7 | 1.7 | 1.6 | 1.5 |
| xt | 6.0 | 6.2 | 6.4 | 6.7 | 6.9 | 7.0 |
| c | 0.4 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| ih | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |
| if | 1.7 | 2.1 | 2.2 | 2.3 | 2.5 | 2.6 |
| pc | -0.7 | -0.8 | -0.8 | -0.8 | -0.8 | -0.8 |
| pq | -0.0 | -0.1 | -0.2 | -0.2 | -0.3 | -0.3 |
| w | -0.4 | -0.5 | -0.5 | -0.5 | -0.5 | -0.6 |
| bp | 3.2 | 3.7 | 4.2 | 4.7 | 5.3 | 5.9 |
| r | -0.8 | -0.9 | -0.9 | -0.9 | -0.9 | -0.9 |
| q | 2.4 | 2.6 | 2.8 | 2.9 | 3.1 | 3.2 |
| l | -0.1 | -0.1 | -0.1 | -0.1 | -0.1 | -0.1 |

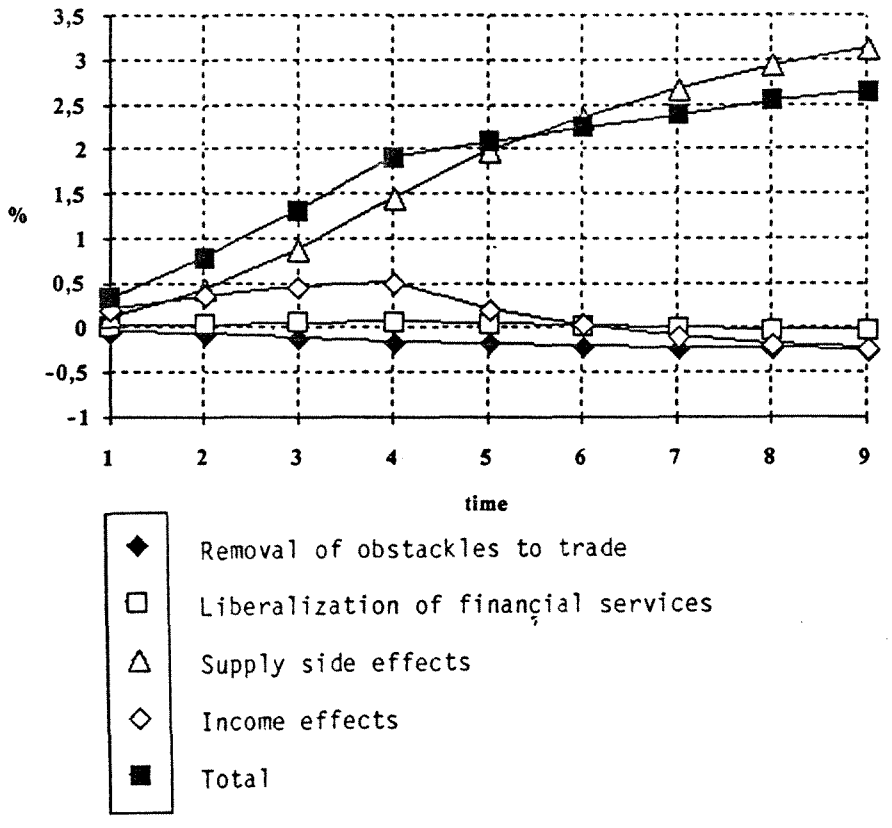
Effects are given as cumulative percentage differences between base and variant for all other variables except for the interest rate, r, and the balance of payments, bp, in which effects are given as absolute differences in % and billions of FIM respectively. For symbols, see Appendix 2.

The cumulative increase in total exports at the end of simulation period was as high as 7 %. This was mainly caused by the supply side effects (the capacity effect is directly included in the export equation) and by the income effect. During the same period, imports rose only by 1.5 %, which led to an improvement in the balance of payments of almost 6 billion FIM.

The inflation rate fell by approximately 1 % due to the fall in import prices and in wages. A decrease in wages is caused by the fall in import prices and the capacity effect which is present in the wage equation.

Finally, it might look a bit surprising that wage earner's employment fell by some 0.1 % even though industrial production rose by 3.2 %. This is partly due to increase in real wages, and partly due to our choice of simulating the supply side effects via increased excess capacity, which dampens on the demand for labor and outweighs the positive effect on labor demand caused by increased aggregate demand.

FIGURE 5. GDP EFFECTS OF DIFFERENT INTEGRATION SIMULATIONS IN THE MEDIUM TERM



If we to look at the GDP effects in terms of contribution by different integration effects shown in Figure 5, it is clear that the supply side effects dominate the total outcome in the long run. This brings up another weakness of our simulation. The total outcome is clearly affected by our choice of the size of the supply side shock. The lack of more detailed knowledge about the size of that particular effect is a weakness that needs more attention in future work. There are also some peculiarities in the import equation of the QMED-model, which give quite odd results in the long-run with respect to the income effect. Imports in the QMED-model react strongly to the increase in the aggregate demand and thus they grow faster than domestic demand, resulting in a negative effect on GDP in the long run.

If we compare our results with those published in the Commission's report, we find that the two are very similar. In both studies we find a clear positive effect on GDP, a negative effect on inflation and a positive effect on the external balance. The sizes of these effects are also very similar.[24] It is natural to think that since we have assumed that Finland will not be a member of EC, it would not get all the benefits of the integration in full scale, which then explains the more modest gains from integration than within the EC.

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[24]According to simulations made with the Hermes and Interlink models, the macroeconomic consequences for the total Community are the following:

| | 1 year | 2 years | medium term (6 years) | | | |
|---|---|---|---|---|---|---|
| | | | simul. | range[1] | | |
| Relative changes (as %) | | | | | | |
| y | 1.1 | 2.3 | 4.5 | 3.2 | to | 5.7 |
| pc | -1.5 | -2.4 | -6.1 | -4.5 | to | -7.7 |
| pq | -1.6 | -2.8 | -6.3 | -4.7 | to | -8.0 |
| Absolute changes | | | | | | |
| empl. (* 1000) | -525 | -35 | 1840 | 1350 | to | 2300 |
| budg. bal. (% of y) | 0.2 | 0.7 | 2.2 | 1.5 | to | 3.0 |
| ext. bal. (% of y) | 0.3 | 0.4 | 1.0 | 0.7 | to | 1.3 |

1) Reflects the margin of error by the 'upstream' studies carried out by the external consultants.

It is also evident that the importance of the supply side effects compared with the other shocks is similar in both simulations. These kinds of results are also reached by industry simulations made by Smith and Venables (1988). Clearly the importance of liberalization of financial services is different in these two simulations. In the EC the liberalization of financial services results to an increase in GDP by 1.5 % but the same shock in the QMED-model results to a zero effect. The QMED-model cannot really take into account the radical changes in the Finnish financial markets during the latter part of 1980's (due to the period of estimation of the model), and thus it most likely underestimates the role of interest rates in the present situation.[25]

## 6. CONCLUSIONS

The simulation results presented in section 5 are the first quantitative estimates of macroeconomic consequences for the Finnish economy resulting from further European integration. According to the results, by participating into the integration process according to the way indicated by the government, there are clearly positive results from the integration to Finnish economy. The size of these effects indicate that the need for participating the economic integration process in Europe is obvious. In this way our results support some earlier studies of both qualitative (Krugman (1988)) and quantitative nature (Norman (1989)) on the effects of integration on EFTA countries. Also compared with the results received by the study initiated by the Commission of the EC, our results are of the same sign and magnitude as could be expected taking into account differences in the degree of integration and economic theory.

There are important reservations that should be taken into account when judging the value of these rather precise looking consequences.

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[25]At this context it has to be remembered that the possible harmonization in the taxation of capital income in Europe is likely to affect the outcome of integration simulations. However, we have not made any estimations about that process in this study.

First, the size and the time path of the shocks introduced into the model are not "precise" simulations of integration. Rather, a great deal of uncertainty and simplification is attached to them as is stressed in section 4. Second, pertaining to the model used in this study, we have to note that it not specifically designed for this purpose and thus some of the effects of integration are difficult to simulate. Also, the model is based on the historical data which in some cases is outdated (this is especially true with respect to liberalization of financial services). Third, it has to be remembered that even though our simulation captures those effects of integration that we simulated, there are various kinds of consequences resulting from the integration process that are extremely difficult to capture in any kind of model simulation (changes in business strategies, changes in innovation climate, etc.). Finally, we should take into account the Lucas critique when interpreting the simulation results, asw with all model simulation exercises of this kind.

However, the need for estimates of the macroeconomic effects of the integration is obvious e.g. from the point of view of the policy makers. By using an econometric macromodel in the analysis, we are able to see not only the static effects of integration but also the dynamic effects with a tool that has gone through a thorough analysis of its dynamic properties. The existing market rigidities are also built in into this kind of model. An aggregate macromodel, like the QMED-model, enables us to see the mechanisms behind the outcome of the simulation. That is important when we judge the results, since it is not only the final size of the consequence that we are interested in, but also the way that it has come about, for example, for anticipating structural changes in industry, preparing social policies, and so on.

APPENDIX 1. QMED-MODEL: LIST OF EQUATIONS (OLS ESTIMATES)

Households:

(I.1) $yhw = wn*l + .0030\ T - 1.4734$
$(26.89)\quad (295.3)$
$R2 = .921 \quad D\text{-}W = .670 \quad SE = .016$

(I.2) $yhf = .9034\ pc + .0831\ (lo*w) + .0090\ T + 4.6909$
$(12.33)\quad (1.106)\quad (6.074)\quad (8.484)$
$R2 = .998 \quad D\text{-}W = .506 \quad SE = .028$

(I.3) $YH = (1-TAX) * (YHW + YHF).$

(I.4) $c = .5950\ c(-1) + .4104\ yhr(+1) - .0016(R-(400*\Delta pc(+1)))$
$(7.376)\quad (5.145)\quad (1.449)$
$- .6851\ \Delta pc(+1) + .0228\ d1 + 1.7998$
$(1.544)\quad (2.568)\quad (4.733)$
$R2 = .992 \quad D\text{-}W = 2.474 \quad SE = .012$

(I.5) $cl = -.6181\ ck(-1) + 1.8550\ c - .5411\ (pcl-pcs)(-1.5)$
$(4.772)\quad (13.77)\quad (2.608)$
$- 3.5424$
$(4.167)$
$R2 = .968 \quad D\text{-}W = 1.066 \quad SE = .029$

(I.6) $CK = .9021\ CK(-1) + CL$

(I.7) $CS = C - CL.$

(I.8) $ih = .5938\ ih(-1) + .1663\ yhr(+1) - 1.9918\ hk(-1)$
$(5.182)\quad (.6529)\quad (3.122)$
$+ 14.0616\ n - .0013\ (R-(400*\Delta pc(+1))) - .4498\ pcih$
$(3.273)\quad (.7543)\quad (2.216)$
$- 87.5091$
$(3.216)$
$R2 = .733 \quad D\text{-}W = 2.264 \quad SE = .045$

(I.9) $HK = .9937\ HK(-1) + IH$

Firms:

(I.10) $\Delta if = \Delta ye - .25\ \Delta wrr(+1) - .0011\ \Delta(R-(400*\Delta pi))(-1)$
(1.459)
$- .4124\ (if-y)(-1) - .0635\ d2*(if-y)(-1)$
(4.679) (4.220)
$+ .3222\ \Delta f(-4) + .1136\ d3 + .1109\ d4 + .1129\ d5$
(1.499) (3.123) (3.348) (3.440)
$- .9262$
(4.723)
R2 = .552 D-W = 2.239 SE = .046

(I.11) $K = .9815\ K(-1) + IF$

(I.12) $I = IF + IH + GI + IR$

(I.13) $\Delta l = 1.3439\ \Delta yi - .0525\ \Delta wrr\ (+1) - .2239\ (1-n)(-1)$
(3.117) (1.119) (4.811)
$- .0490\ cap(-1) + .1983\ \Delta l(-4) - .0047\ d6$
(3.160) (2.151) (1.329)
$+ .0235\ d7 + .0078\ d8 - .3294$
(7.304) (4.384) (4.809)
R2 = .646 D-W = 1.524 SE = .004

(I.14) $LO/N = - .0011\ T + .00001\ T2 + .0892$
R2 = .923 D-W = 1.165 SE = .003

(I.15) $LT = L + LO$

(I.16) $LN/L = .0032\ T + 2.0476$
R2 = .903 D-W = 2.091 SE = .020

(I.17) $ULC = WN*L\ /\ Y$

(I.18) $q = .4402\ q(-1) + .5523\ z + .0835\ ig - .1083\ d9 - 1.5473$
(5.401) (5.845) (1.711) (5.166) (4.218)
R2 = .988 D-W = 1.369 SE = .020

(I.19) $cap = .0063\ T - 2.0659 + .7\ k + .3\ n - q + mr$
(17.22) (137.8)
R2 = .886 D-W = .246 SE = .005

Foreign sector:

(I.20) $\Delta x = -.6690\ \Delta pxf(-2) + .7997\ \Delta f + .6381\ \Delta f(-2)$
(2.555) (3.090) (2.495)
$+ .3599\ cap(-2) - .3462\ \Delta x(-4) - .3692\ (x-f)(-1)$
(2.768) (3.448) (3.617)
$+ .3627\ (x-f)(-2)$
(3.568)
R2 = .553 D-W = 2.181 SE = .052

(I.21) XT = X + XE + XR.

(I.22) $\Delta m = 1.1841\ \Delta z + .7039\ \Delta pzm - .2503\ cap(-1)$
(3.927) (4.120) (1.919)
$- .4835\ (m-z)(-1) + .2626\ (m-z)(-2)$
(4.418) (2.066)
$+ .2044\ (m-z)(-3)$
(1.722)
R2 = .569 D-W = 2.342 SE = .055

(I.23) MT = M + MO.

(I.24) BP = (X*PX + (XE+XR)*PXR - MT*PM)/100 + CT + TP.

Financial sector:

(I.25) $R = .7324\ R(-1) + .2401\ RD + 9.4443\ \Delta pc + 3.3325\ \Delta dr$
(9.173) (2.936) (1.375) (1.818)
R2 = .892 D-W = 1.750 SE = .546

Wages and prices:

(I.26) $\Delta wc = gp(-3) + .6111\ \Delta pc(-3) + .4039\ \Delta(w-wc)(-3)$
(2.660) (2.777)
$+ .0523\ d10 - .0058$
(2.552) (.946)
R2 = .242 D-W = 2.285 SE = .020

(I.27) $\Delta w = .1085\ \Delta 4pc(+1) - .0108\ cap(-1) + .8941\ \Delta wc$
(7.927) (1.132) (18.50)
R2 = .886 D-W = 1.915 SE = .005

(I.28) $\Delta pc = .3052\ \Delta wn + .1274\ \Delta wn(-1) + .2319\ \Delta wn(-2)$
(5.905) (2.508) (4.572)
$+ .0777\ \Delta pm + .0579\ \Delta pm(-1) + .0531\ \Delta pm(-2)$
(3.139) (2.301) (2.097)
R2 = .695 D-W = 1.975 SE = .007

(I.29) $\Delta pg = .5946\ \Delta wn + .2183\ \Delta wn(-3) + .0990\ \Delta pm + .0081 d11$
(7.839) (3.030) (2.750) (1.035)
$- .0525\ d12 + .0282\ d13$
(7.186) (3.873)
R2 = .725 D-W = 1.963 SE = .010

(I.30) $\Delta pi = .5909\ \Delta wn + .0429\ \Delta pmo + .0434\ \Delta pm(-2)$
(5.688) (3.434) (.786)
$+ .1817\ \Delta pi(-1) + .0117\ d14 + .0129\ d15$
(1.560) (.973) (1.209)
R2 = .437 D-W = 2.173 SE = .015

(I.31) $\Delta px = .3001\ \Delta wn + .5030\ \Delta pf + .1920\ \Delta er(-4)$
(2.821) (3.845) (1.393)
$+ .1560\ \Delta 2(\Delta px(-2)) + .0600\ d16 + .0572\ d17$
(2.272) (4.452) (5.959)
R2 = .705 D-W = 2.047 SE = .019

(I.32) $\Delta(pxr-px) = - .5606\ (pxr-pf)(-1) + .1075\ d18 - .1542$
(4.228) (1.332) (4.151)
R2 = .280 D-W = 2.092 SE = .078

GDP identities:

(I.33) $Z = C + IF + IS + XT$

(I.34) $Y = C + G + I + IS + XT - MT + SD$

(I.35) $YV = (PC*C + PG*G + PI*I + PX*X + PXR*(XE+XR) - PM*MT + PV*(IS+SD)) / 100.$

(I.36) $PQ = 100 * (YV/Y).$

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Small letters as symbols of variables refers to logarithmic (natural log) transformation and capital letters, in turn, to untransformed expression. The number of lags in quarters is shown in parenthesis after each lagged variable (i.e. (-1) refers to period t-1 and (+1) to period t+1). $\Delta$ denotes the first backwards differencing operator and $\Delta 4$ denotes the fourth backwards differencing operator. T-ratios are shown in parenthesis below each estimated parameter, R2 = coefficient of determination, D-W = Durbin - Watson statistics and SE = standard error of estimate.

APPENDIX 2. LIST OF VARIABLES OF THE QMED-MODEL
(EXOGENOUS VARIABLES ARE UNDERLINED)

| | |
|---|---|
| bp | balance of payments |
| c | private consumption |
| cap | capacity utilization rate in manufacturing (excess capacity) |
| ck | stock of durables |
| cl | consumption of durables |
| cs | consumption of non-durables and services |
| ct | capital transfers from abroad (net) |
| dr | real domestic (long term) debt of the government |
| d1-d18 | dummy variables |
| er | exchange rate |
| f | foreign import demand |
| g | public consumption |
| gi | public investment |
| gp | rate of change in labour productivity (five-year moving average) |
| hk | stock of residential capital |
| i | total fixed investment |
| if | manufacturing investment |
| ig | public consumption and investment |
| ih | housing investment |
| ir | other fixed investments (residual) |
| is | inventory investments |
| k | stock of capital, manufacturing sector |
| l | wage earners' employment (working hours) |
| ln | number of employed |
| lo | employment (excluding wage earners' employment) (working hours) |
| lt | total employment (working hours) |
| m | imports (excluding oil) |
| mo | imports of oil |
| mr | scale parameter for capacity utilization |
| mt | total imports |
| n | working-age population |
| pc | private consumption prices |
| pcih | pc - pih |
| pcl | prices of durables |
| pcs | prices of non-durables and services |

| | |
|---|---|
| pf | foreign producer prices, manufacturing |
| pg | public consumption prices |
| pi | investment prices |
| pih | housing investment prices |
| pis | prices of inventory investment |
| pm | import prices |
| pme | import prices (excluding oil) |
| pmo | import prices of oil |
| pq | GDP deflator |
| px | export prices of goods (excluding bilateral) |
| pxf | px - pf |
| pxr | export prices of services and bilateral goods |
| pz | deflator of aggregate private demand |
| pzm | pz - pm |
| q | manufacturing production |
| r | long term interest rate (five year government bond yield) |
| rd | discount rate |
| s | employers' social security contributions |
| sd | statistical discrepancy |
| t | linear trend |
| tax | tax parameter (1-average direct tax rate) |
| tp | transfer payments from abroad (net) |
| ulc | unit labour cost |
| w | wage rate |
| wc | contract wage rate |
| wn | w*(1+s) |
| wr | w*(1+s) - pq |
| wrr | w*(1+s) - pc |
| x | exports of goods (excluding bilateral exports) |
| xe | bilateral exports |
| xr | exports of services (excluding bilateral exports) |
| xt | total exports |
| y | gross domestic product at constant 1985 market prices (GDP) |
| ye | instrumental variable for output (determined by f and g) |
| yh | households' disposable income |

| | |
|---|---|
| yhf | households' income from entrepreneurship, property holdings, transfer payments, etc. |
| yhr | yh - pc |
| yhw | households' income from wages and employers' social security contributions |
| yi | instrumental variable for output (determined by xe, f, (px-pq) and ig) |
| yv | gross domestic product in current prices |
| z | demand for goods and services (excluding public demand) |

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