ETLA
ELINKEINOELÄMÄN TUTKIMUSLAITOS
THE RESEARCH INSTITUTE OF THE FINNISH ECONOMY
Lönnrotinkatu 4 B 00120 Helsinki Finland Tel. 358-9-609 900
Telefax 358-9-601 753 World Wide Web: http://www.etla.fi/

Keskusteluaiheita – Discussion papers

No. 1124

Kari E.O. Alho

TRADE WITH THE WEST AND RUSSIA – A LONG-TERM PERSPECTIVE ON FINNISH ECONOMIC GROWTH, FLUCTUATIONS AND POLICIES*

* This is a part of the project “Opening of the Russian Economy and Its Integration with the European Union” (Grant No. 208203), financed by the Academy of Finland in its “Russia in Flux” research programme. Financial support by the Yrjö Jahnsson Foundation is also gratefully acknowledged. An earlier incomplete version of the paper was presented as a part of a joint paper with Pekka Ylä-Anttila in the seminar “Economic Convergence of Small Peripheral Countries in the post-Second World War. Examples of Finland, Ireland and Portugal”, at University of Helsinki, September 27-28, 2007. I thank the participants of the seminar and of project team seminars at St. Petersburg State University and ETLA, especially Ville Kaitila, for comments, Rolf Maury from ETLA for skilful assistance in data gathering and construction, and Professor Markku Rahiala from Oulu University for guidance in statistical testing. The usual disclaimer applies.

ISSN 0781-6847 22.02.2008

ALHO, Kari E.O., **TRADE WITH THE WEST AND RUSSIA – A LONG-TERM PERSPECTIVE ON FINNISH ECONOMIC GROWTH, FLUCTUATIONS AND POLICIES**. Helsinki: ETLA, Elinkeinoelämän Tutkimuslaitos, The Research Institute of the Finnish Economy, 2008, 28 p. (Keskusteluaiheita, Discussion Papers, ISSN, 0781-6847; No. 1124)

ABSTRACT: The paper considers growth and fluctuations in the Finnish economy in the post-war period starting from her long-run dual strategy vis-à-vis export markets in Western Europe and Russia. Finland has wanted to utilise the more rapid growth based on deeper integration in the former, but has simultaneously wanted to reap the gains linked to her proximity to the latter. We build a theoretical open economy model based on export supply and demand and then for the whole economy and analyse the role of economic policies, notably exchange rate policies in this connection. Empirically, we estimate the relationships using the SVAR methodology identifying the relevant demand and supply shocks and shocks in policy responses. The results clearly show that shifts in competitiveness have played a key role in boosting both categories of exports. However, firms have been able to shift on their own in exports from the Russian market to the West when needed. Productivity gains have been linked to Western exports, but not to exports to Russia. From a macroeconomic point of view exchange rate policies have been roughly as important as fiscal policies to explain economic fluctuations, although the conclusion on this quite sensitively depends on the SVAR model used. However, economic policies have been less important than the aggregate demand and supply shocks.

Key words: Exports, macro economy, economic policies, SVAR

JEL Classification: F41, F43, F12

ALHO, Kari E.O., **TRADE WITH THE WEST AND RUSSIA – A LONG-TERM PERSPECTIVE ON FINNISH ECONOMIC GROWTH, FLUCTUATIONS AND POLICIES**. Helsinki: ETLA, Elinkeinoelämän Tutkimuslaitos, The Research Institute of the Finnish Economy, 2008, 28 s. (Keskusteluaiheita, Discussion Papers, ISSN, 0781-6847; No. 1124)

TIIVISTELMÄ: Tutkimus tarkastelee kasvua ja sen vaihteluita Suomen taloudessa sodan jälkeisenä aikana lähtien liikkeelle maan kaksinaisesta strategiasta suhteessa vientimarkkinoihin lännessä ja idässä. Suomi on halunnut päästä mukaan syvenevään ja nopean kasvun tuottaneeseen integraatioon lännessä, mutta samalla hyötyä läheisyydestään idän markkinoihin nähden. Rakennamme teoreettisen avoimen talouden mallin, joka rakentuu vientitarjonnan ja -kysynnän varaan, ja sen pohjalta makromallin, jossa erittelemme talouspolitiikan, erityisesti valuuttakurssipolitiikan roolin. Empiirisesti estimoimme riippuvuudet käyttäen rakenteellisen vektoriautoregressiivisen eli SVAR-mallin menetelmää ja identifioimme siinä relevantit kysyntä- ja tarjontashokit sekä innovaatiot politiikanteossa. Tulokset osoittavat, että kilpailukyvyn siirtymät ovat olleet keskeisiä molemmille vientikategorioille. Kuitenkin yritykset ovat kyenneet siirtymään omaehtoisesti viennissään Venäjän markkinoilta lännen markkinoille tarvittaessa ja eliminoimaan näiden shokkien vaikutuksen kokonaisvientiin. Tuottavuuden lisäykset ovat olleet peräisin länsiviennistä, mutta eivät Venäjän-viennistä. Makrotaloudelliselta kannalta valuuttakurssipolitiikka on ollut karkeasti yhtä merkittävää taloudellisten vaihteluiden kannalta kuin finanssipolitiikka, vaikkakin tämä johtopäätös on herkkä käytetyn mallispesifikaation suhteen. Toisaalta talouspolitiikan rooli on ollut vähäisempi kuin yleensä kysyntä- ja tarjontashokkien vaikutukset.

Asiasanat: Vienti, talouden kasvu ja vaihtelut, talouspolitiikka, rakenne-VAR

JEL koodit: F41, F43, F12

1 Introduction

All open economies need a strategy which culminates in the export sector of the country. As Stiglitz (2007, 63) summarises: "… the most successful [developing] countries in the world have achieved their success through trade – through exports". This strategy has to be defined in terms of industrial structure, goods, markets, and trade policy formed in a harmonious combination with the firm strategies and their capabilities to trade. Only rarely, if ever, is a country so small that it even approximately meets the conditions of perfect competition with perfectly elastic demand for its products in the global market, which would make the export strategy as unessential. The need for export strategy holds irrespective of whether we consider the specialisation of the country in terms of the classical trade theory based on comparative advantage, or using a more recent approach of intra-industry trade, or the theory formulated for globalisation, i.e., trade in tasks.[1] The last-mentioned approach, at least so far, emphasises more the import strategy of the firms in terms of where to produce their intermediate goods and perform tasks of their value chain. But it, too, ultimately stresses the balance in the export market as a determinant of its basic outcome. The importance of the export strategy of a small country is also recognised in the literature on trade and growth using endogenous growth models.[2] In addition, we have to ask also the role of economic policies, operating on the supply or demand side, whether they have been conducive to growth, neutral or have even hampered it.

Finland is a border country to Russia on the North-Eastern boundary of Western Europe towards the East. This geographical position distinguishes Finland from all other Western European (EU-15) countries. It has had, of course, a major impact on her political and economic destinies. The Finnish long-run economic strategy has been to seek growth through exports from the Western markets for two reasons. First, as also seen in Figure 1, economic growth in the West has been clearly higher than in the East and the former market is large in size in comparison to the latter and the home market. Second, over the long-run the Western economic integration has produced lower trade barriers in relation to the East, so that they have been dismantled more in Western European integration than in the Eastern markets over the period covered in Fig. 2. Accordingly, over the long run, Finland has shifted her exports to the West, but has simultaneously wanted to reap the benefits linked to her proximity to the Russian market. Accordingly, exports to Russia currently make a double share for Finland as compared to the average EU-15 in relation to GDP. We shall ask in the subsequent empirical analysis, how this dual strategy has worked and what has been the role of exchange rate policy in realising this strategy in a successful way.

From the classical gravity model estimations we already know that geographical proximity is a core factor conducive to trade, in addition to the economic weight of the partner. This means that the neighbouring countries can have a sizeable effect on the country concerned. However, it may also be that the neighbouring countries have the same comparative advantage based on a similar raw material endowment, so that they are also competitors to each other in the world market. An open economy is thus closely linked to its border and core trading partners. But it may in good conditions escape from these "fetters" or, on the other hand, may perform more poorly than what the opportunities offered by its neighbours could deliver. In good circumstances the country is able to overtake its neighbours as has been the case for Finland. As can be seen from Figure 1, Finland has exceeded in economic growth her two border neighbours

[1] See Grossman and Rossi-Hansberg (2006a, 2006b) and Baldwin (2006).
[2] See on this e.g. Feenstra (2004).

Sweden and Russia. But what can also be seen is that the economic fluctuations, booms and busts, have been in the Finnish economy much larger than in Sweden, and likely to be in part connected to the closer ties of Finland to the Russian economy with even wilder fluctuations.

The existence of a beneficial export market structure is important for the long-run developments, while in the short run it is important that the country is able to make shifts between the markets when needed. The trend growth of the Finnish Western exports during the post-war period has been roughly double that in the Russian trade. On the other hand, the fluctuations in the export volumes have been four times bigger in the Russian market than those in the Western exports. Irrespective of the slow overall growth over a longer time span, the Russian markets have at times grown more vigorously than those in the West, as is the case also recently, when there has been a strong revival in Finnish exports to Russia during the post-communist era of transition, fuelled by the vigorous growth in the Russian demand linked to high global prices on oil. Also earlier at times the bilateral trade with the Soviet Union served as a countercyclical cushion for the Finnish economy in connection with the oil price hikes, see on this mechanism e.g. Alho et al. (1986). The share of the trade with Russia is, of course, much smaller than that with the West, reflecting the differences in the size of the respective markets, see Fig. 2.

The Finnish big exporting firms have typically been engaged in both these markets, although not with the same presence. Alho et al. (1986) and Kotilainen et al. (2003) presented evidence on the differences in the structure of the Finnish exports and imports to and from the Russian market in comparison to the West. Clearly, it seems that in the post-communist period the composition by industries of Finnish exports to the Russian market have become much more similar to that of exports to the Western markets when compared to the Soviet period. This could reduce the cost related to the risks attached to the presence in the Russian markets so that a shift, if needed, is now easier to make than earlier between the two export markets.

Figure 1. The real income levels at PPP, international prices of 2004, €

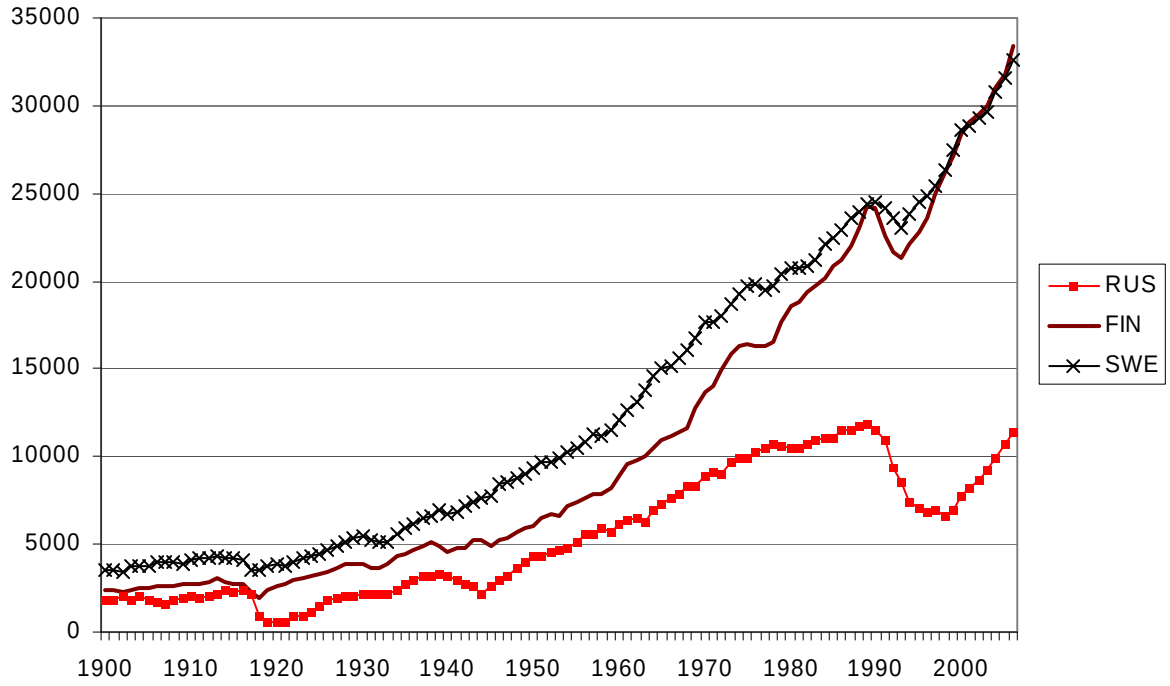


Figure 2. The share of Finnish exports to Russia and the West in relation to GDP

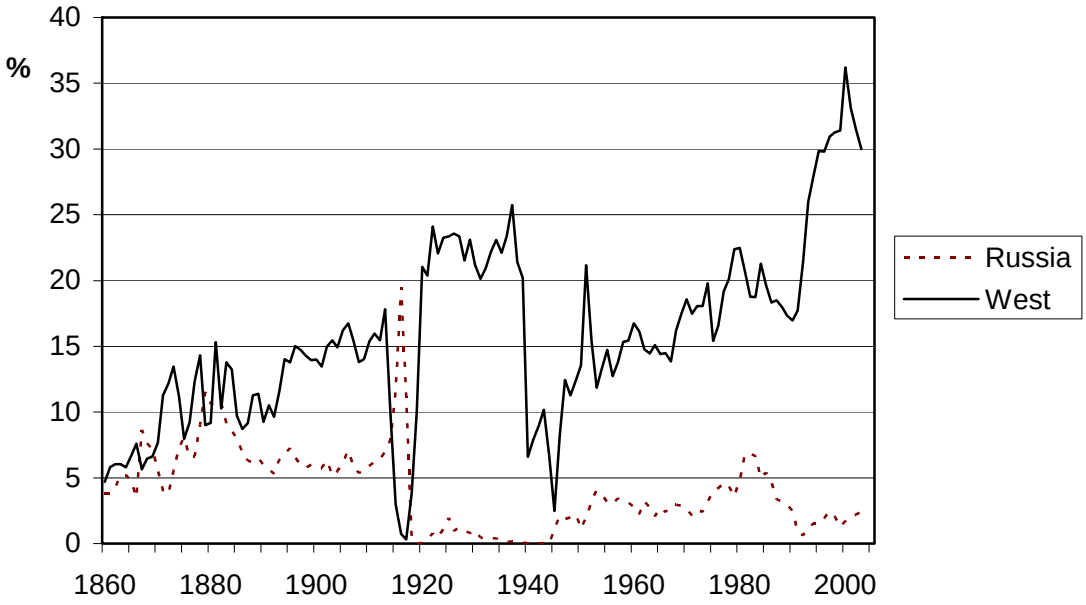
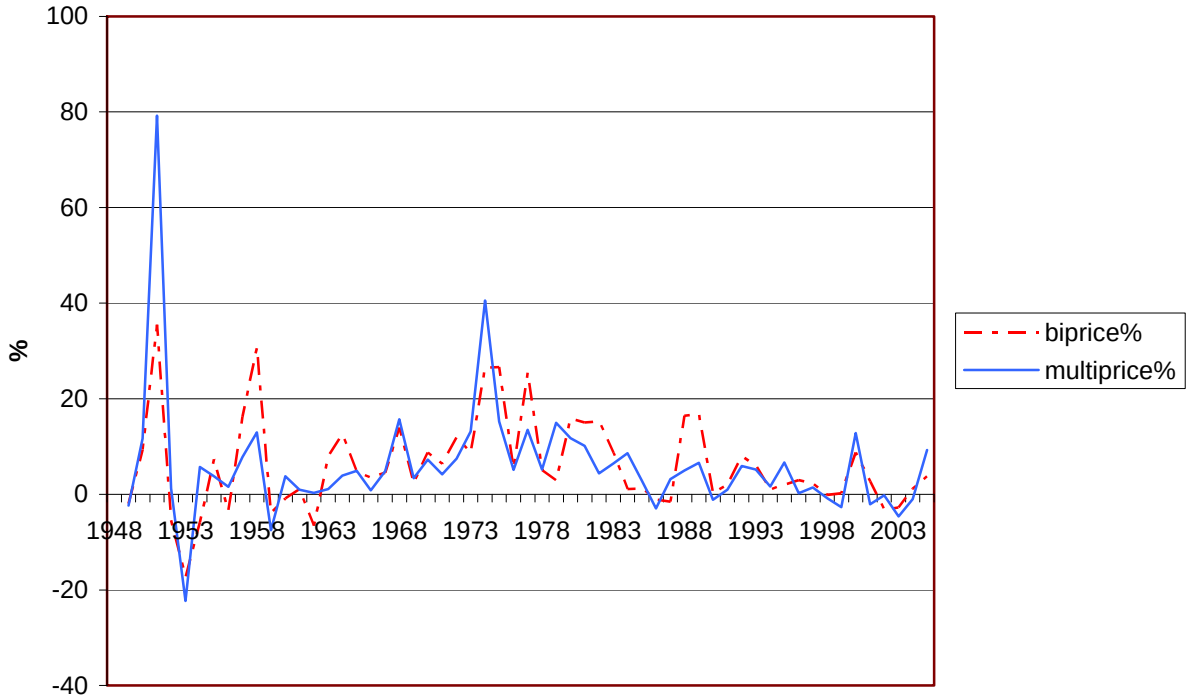


Figure 3. The export price indexes, % change



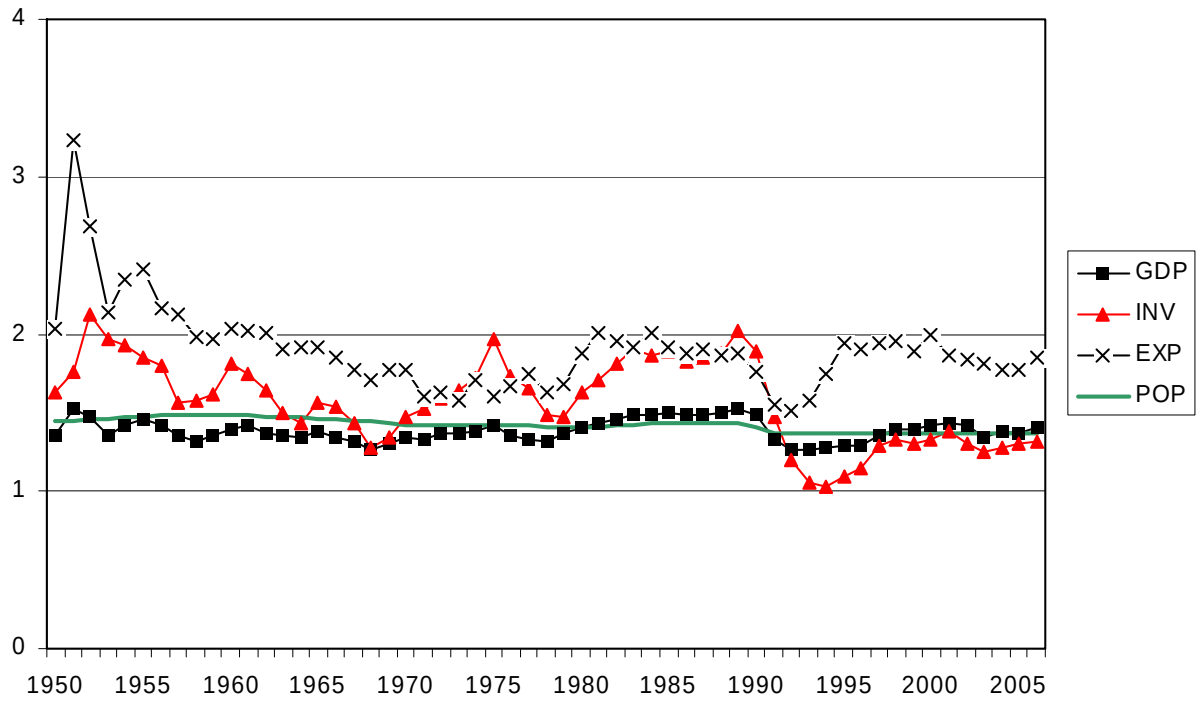
The export prices have evolved as follows, see Figure 3. The price rises have been fairly similar in the two markets. However, over the long run, the export prices to Russia (bilateral) have risen somewhat faster than those to the Western market.

The market utilisation view is, of course, only one, although key aspect of the export strategy. Exports have to be founded on the basis of the comparative advantage of the country. Another

angle linked to this export market structure, which has at times been launched in Finland in this connection, is the structural policy view. This has been presented in the manner that engagement in the Eastern market, as based earlier on a bilateral trade arrangement with the Soviet Union, diminished the economic innovativeness of Finnish firms to penetrate more actively into the Western markets. We shall also delve into this problem setting, and try to assess this issue in terms of the empirical analysis of foreign trade below. Namely, the recent literature in international economics is interested in the diversity and heterogeneity of firms with respect to exporting and the causality between exports and productivity and the characteristics of the firms in terms of especially, productivity, see the survey by Greenaway and Kneller (2007) and the review in OECD (2007). Here we analyse this issue from the point of view of the dual export strategy of Finland.

To shed more light on the Finnish convergence in terms of her main export market in Western Europe, let us depict in Figure 4 the export (EXP), GDP (at PPP), investment (INV) and population (POP) shares of Finland in the aggregate of the EU-15 countries.

Figure 4. The Finnish share in the aggregate EU-15, %

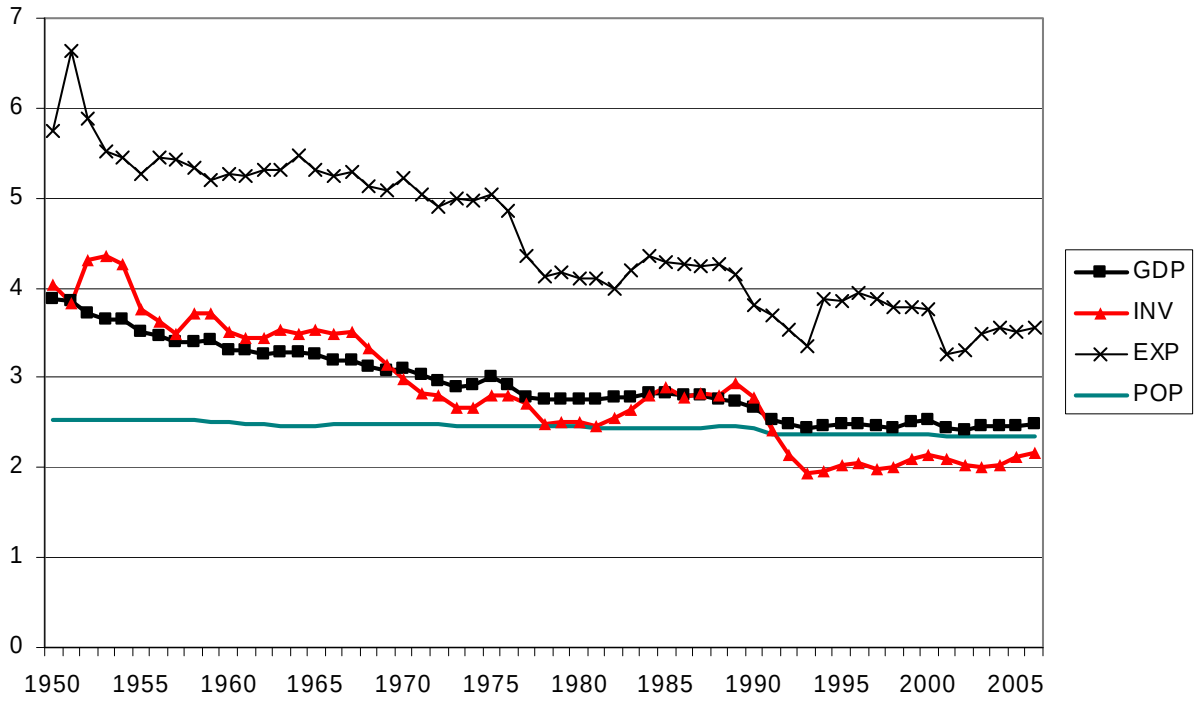


The Finnish export market share in this group of countries has been fairly constant, although we can also discern a really high share in the very first years of the post-war period.[3] This same situation was for many other countries an indirect reflection of the then abnormally low exports of (West) Germany and her return to a more normal situation in the 1950s. In the Finnish case we can also discern the fairly marked rises, and reversals of a similar magnitude, but not always, in the export share coinciding with the Finnish large devaluations of the currency in 1957, 1967, 1977-78 and 1991-92 (see also Fig. 6). The Finnish GDP share has been steadily at 1.5%, interrupted, however, by the severe downturns, but corresponding to the population

[3] The sharp rise in the early 1950s for both Finland and Sweden was linked to the Korean boom in export prices of forest industry products, compare also to Fig. 3.

share, 1.4%. The investment share, being higher than the income share, shows that the Finnish strategy was quite investment orientated up to the late 1980s and that since then there has happened a marked change in the structure of the economy and exports towards less capital intensive industries, notably electronics. On average, the investment share is clearly higher than the GDP share and in this sense the coinage of the concept of "inefficient capital" can get some credibility (Pohjola, 1996). However, this situation has changed to its reverse in the 1990s.

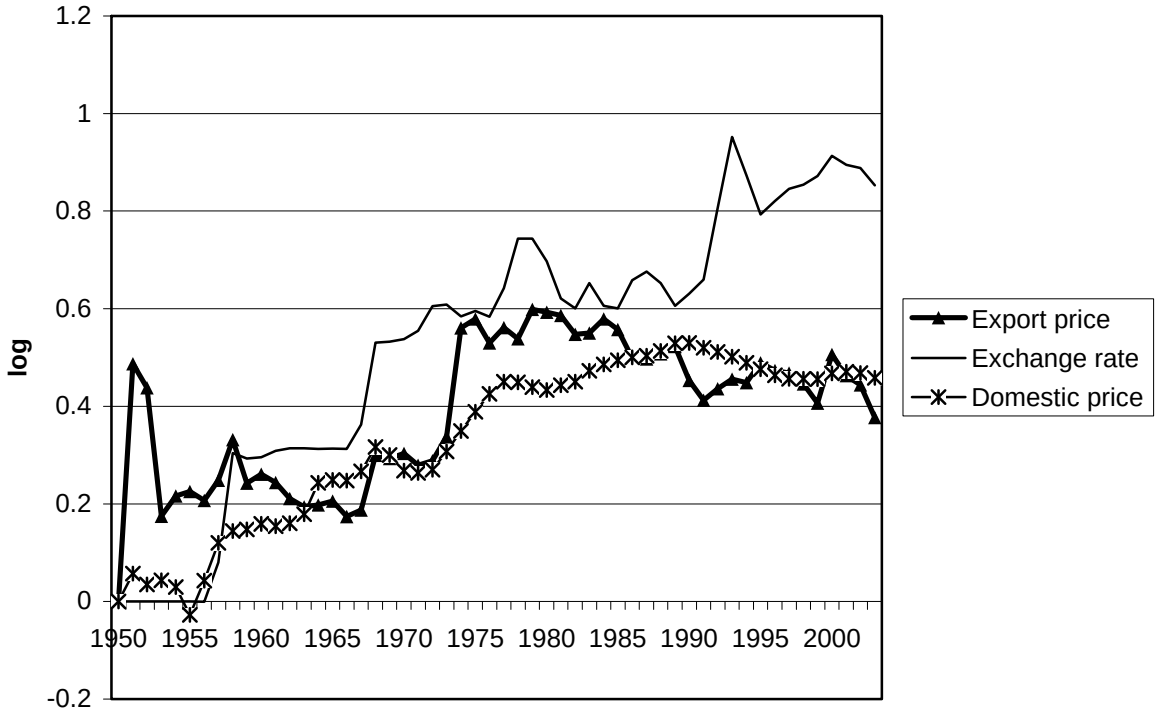
Figure 5. The Swedish share in the aggregate EU-15, %



In Figure 5 we depict the same situation for Sweden. This reveals that Sweden has been in a way a "sunset" country in a European context during the post-war period up to the late 1980s and she has lost her market shares which were abnormally high in the early post-war period, in comparison to the Swedish population share. This means that the Finnish overtaking of Sweden (see Figure 1) is not so much a reflection of the especially high performance of the Finnish economy than an unsatisfactory trend, or convergence "from above", of the Swedish economy towards the EU average.

Figure 6 shows the key open economy price ratios of the Finnish economy in relation to the foreign. This reveals, first, the same picture as Burstein, Eichenbaum and Rebelo (2003, 2005) report that the domestic price level has risen less than what has been the magnitude of devaluations, i.e. there has been a real depreciation. However, a part of the rise in the exchange rate has been channelled to foreign buyers so that the rise in the export price has been less than what the rises in the exchange rate would have predicted. The domestic and export prices in relation to the foreign have evolved in relative terms fairly uniformly with each other. On the other hand, the marked deviation between the exchange rate and the domestic and export relative price ratios has arisen only in the 1990s when the relative trends in domestic price levels turned into decline, irrespective of the devaluation.

Figure 6. The relative export price (in domestic currency), the domestic price and the effective exchange rate index in Finland "year 1950 = 1", in logs *

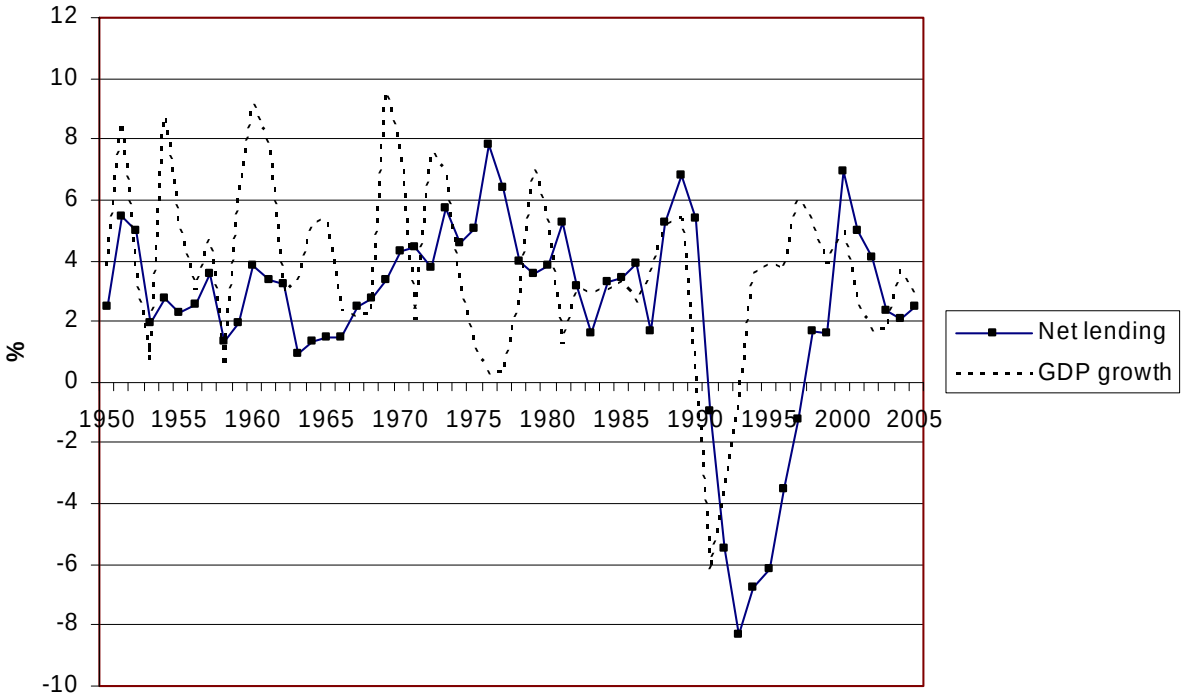


* Export price is the export price (in domestic currency) in relation to the foreign, the exchange rate is the currency index, the domestic price is the relative cpi, measured in national currencies.

However, under typical classical assumptions the exchange rate policies are neutral in the long run with respect to output, and productivity rises with respect to exports, but not necessarily vice versa. However, in connection with many recent economic crises, where the exchange rate has depreciated strongly, a markedly smaller rise in the domestic price level has been experienced. This has happened also in Finland, as analysed by Burstein, Eichenbaum and Rebelo (2003, 2005). We shall present a more thorough analysis of this outcome in connection with our theoretical open economy model in the next section.

The fiscal policy stance is depicted in Figure 7. The overall fiscal strategy with a persistent budget surplus has been to contain the demand side of the economy so that the current account deficit could have been held in check and resources channelled to the vigorous private investment activity.

Figure 7. The public sector net lending in relation to GDP and GDP growth, %



The "true" story behind the Finnish growth and convergence is, of course, very complex and multifaceted as it is for all other countries as well.[4] In this paper we want to address this issue from three angles. First, we raise the question of what is the impact of the existence of the dual export markets and study the following question: Has Finland been able to utilise the prospects of the Russian market without bearing in effect the large risks connected to it and what is the role of the economic, notably exchange rate, policies in alleviating, at times when needed, the shift from the Russian to the Western export markets and vice versa and the export downturns more general. Linked to this, we raise the issue of the influence of the dual export strategy on productivity growth, and finally, we are interested to examine the overall role of the exchange rate (monetary policy) and fiscal policy, in the short and long run in Finnish macro economic developments. Are they neutral in this respect, and if not, why?

For Sweden, several studies have been made with the purpose to disentangle the relative role of domestic and foreign shocks. Recently, Linde (2004) got the somewhat unexpected result that the role of fiscal policy shocks in the Swedish post-war fluctuations has been dominating in comparison to the foreign shocks.

We divide the empirical analysis into three parts: first, we analyse the dual export, competiveness and productivity block and then carry out a macroeconomic analysis focusing on GDP, inflation and the policy variables, and finally, combing the two approaches to a single model. The key empirical finding of the paper using the SVAR analysis is that the Finnish firms have had the capacity to make shifts between the two main export markets on their own so that shocks in the markets have been neutralised from having an effect on total exports. Competitiveness has been, however, crucial to growth in both export categories. The inverse

[4] Compare e.g. to the analysis by Kokkinen et al. (2007) who emphasise the production structure with respect to industrialisation in the Finnish post-war convergence.

reaction to competitiveness has been similar in the short run to both export components but over time the reaction has been more vigorous to Russian exports. Productivity gains have been linked more with Western exports while exports to Russia have been neutral or even negative in this respect. The macro model reveals a short-run deflationary impulse of devaluation on GDP, which turns into a positive impulse response on GDP over the medium run and turns over the long run into neutrality. Finally, we combine the both models to a unified model for export determination and the macro economy. The variance decomposition reveals that the foreign demand shocks are important for the Russian exports, and the foreign demand and the domestic private demand shocks have been marked for GDP growth when compared to the role of the supply shocks. Western exports have been dominated by exchange rate shocks. The role of exchange rate policies has been of a similar magnitude that of fiscal policies in the Finnish economy as to variability of economic activity. However, this result varies between the macro model and the complete model.

The rest of the paper proceeds in such a way that in Section 2 we derive the theoretical open economy model. Section 3 turns to the empirical SVAR analysis of the export structure, Section 4 to that of the macro economy and Section 5 combines the export SVAR with that of the macro economy. Section 6 summarises.

2 The theoretical open economy model based on export strategy

Recent research in international trade has emphasised the role of the entry and exit decisions of firms with respect to foreign markets, see e.g. Alessandria and Choi (2007). A firm has to pay an up-front sunk cost of exporting to a market and it also has to pay a smaller cost if it continues to export to the foreign market. Here we use this idea in a slightly different way so that we also consider the shifts from one export market to the other which involve extra costs.

So, the export firm has to pay a cost τ_{0j} in terms of domestic labour to engage overall to the export market j. In addition, it has to pay a cost τ_{1j} per unit and period of continuing its exports to this export market j. Further, we assume that there is a cost τ_{2j} per unit of additional export, i.e. if the volume of export is desired to be increased, but this cost is not saved if the export volume is reduced to market j, so that there is an asymmetry in this sense. All these costs are measured in terms of domestic labour, in contrast to Alessandria and Choi (2007) who take them to be defined in terms of foreign labour.

So, the export firms maximise the expected present value of profits,

$$V = \sum_t \rho^{-t} E_t \begin{bmatrix} e_{1t} P_{X1,t} Q_{1t} + e_{2t} P_{X2,t} Q_{2t} - W_t(\tau_{11} Q_{1t} + \tau_{21} Q_{2t}) \\ -\tau_{21} W_t f(Q_{1t} - Q_{1,t-1}) - \tau_{22} W_t f(Q_{2t} - Q_{2,t-1}) \\ -(\tau_{01} + \tau_{02}) - c_{Qt}(Q_{1t} + Q_{2t}) \end{bmatrix}, \qquad (1)$$

where ρ is the discount factor, e_j is the exchange rate (units of domestic currency per unit of foreign currency j), Q_1 is volume of exports to the Western market and Q_2 those to Russia, W is the wage rate, the function f(x) has the property, f = 1, if x > 0, f = 0 otherwise, and c_Q is the unit cost of production (see below). We do not have to assume that a typical firm in the export sector exports in the baseline to both markets.

The export demand in the market j is assumed to be based on a CES utility function, see e.g. Anderson and van Wincoop (2003) and Alho (2005), so that the import demand functions in country j are derived from a CES utility function for aggregate consumption D_j,

$$D_j = \left[\sum_{i=1}^{N} a_{ij}^{1/\sigma} Q_{ij}^{(\sigma-1)/\sigma} \right]^{\sigma/(\sigma-1)}, \sigma > 0, \qquad (2)$$

where Q_{ij} is the volume of exports from country i to j with N being the number of exporting countries, the a_{ij}'s are the country-specific positive preference (distribution) parameters summing to unity and σ is the elasticity of substitution between imports from various origins. The import demand functions are then,

$$Q_{ij} = a_{ij} D_j \left(\frac{p_{ij}}{P_j}\right)^{-\sigma}, \qquad (3)$$

where p_{ij} is the price set by the exporters of country i in the market of country j in foreign currency and, being dual to the quantity index (2), P_j represents the CES price index of the consumption basket in country j,

$$P_j = \left[\sum_{i=1}^{N} a_{ij} p_{ij}^{1-\sigma} \right]^{1/(1-\sigma)} . \quad (4)$$

From (3) we can derive the market share s_{ij} of the value of exports $X_{ij} = p_{ij}Q_{ij}$ in country j, in relation to GDP of the latter, yielding

$$s_{ij} = \frac{X_{ij}}{Y_j} = a_{ij} \left(\frac{p_{ij}}{P_j} \right)^{1-\sigma} , \quad (5)$$

where Y_j is GDP (in nominal terms) of country j and the budget constraint $Y_j = P_j D_j$ is imposed.

We next consider the export supply decision of a monopolistic firm of country i in the market of country j. For this we need to specify that the aggregate demand D_j is given by the function

$$D_j = \kappa_j P_j^{-\varepsilon}, \varepsilon > 0 , \quad (6)$$

where κ_j is a scale factor representing the size of the country concerned. Note that typically $\varepsilon < \sigma$. Let there be K_i identical exporting firms in country i. The optimal supply decision of an exporter in country i maximizing profit in market j is derived from Eq. (1) to be the following,

$$p_{ij}(1 + \varepsilon(p_{ij}, Q_{ikj})) = t_{ij} c_i , \quad (7)$$

where c_i is the combined marginal cost of production and exporting in (1) in country i and Q_{ikj} denotes analogously the volume of exports of firm k of country i in the market of country j, t_{ij} is the trade barrier factor (inverse of unity minus the ad valorem barrier per unit of exports) between countries i and j, and $\varepsilon(z_i,z_j)$ denotes the elasticity of the variable z_i with respect to the variable z_j. Using (3), (6) and the general result from index number theory that $\varepsilon(D_j,Q_{ikj}) = s_{ikj} = X_{ikj}/Y_j$, i.e., the market share of exporter k in the market of country j, and summing over the identical K_i firms, we get the following from (7), (see e.g. Alho, 2005 for more details),

$$e_{ij} p_{ij} \left[K_i (1 - \sigma^{-1}) + (\sigma^{-1} - \varepsilon^{-1})(s_{ij} + h_j (1 - s_{ij})) \right] = K_i c_i t_{ij} . \quad (8)$$

Here h_j is the conjectural variation parameter in the proportional output game[5] and $s_{ij} = \sum_{k=1}^{K_i} s_{ikj} = X_{ij}/Y_j$. The supply equation (8) allows for price discrimination between various export markets. It is therefore more general than the assumption of uniform pricing, which takes place when competition is perfect ($h_j = -s_{ij}(1 - s_{ij})^{-1}$ and σ approaches infinity). Note that under perfect competition, the export price only depends on the unit cost and the respective trade barrier. But otherwise under imperfect competition, the bigger the country, measured by the number of firms, the lower the export price which its firms charge.

[5] I.e., the parameter h_j is in relative terms the output response by the competitors to a one percent rise in the output of the firm concerned in market j. If e.g. h_j is zero, we have the case of Cournot competition.

Insert then (5) into (8) to produce an equilibrium between export demand and supply. Let us first concentrate on the basic case of Cournot competition, i.e. when h = 0. Using the approximations y ≈ log(1+y) for small y and log(x) ≈ x − 1 for x around unity, we can now derive the following differential relationship,

$$d\log(p_{ij}/P_j) = -\frac{\sigma^{-1}-\varepsilon^{-1}}{K_i}da_{ij} + \frac{1}{1+A_{ij}}(-d\log e_{ij} + d\log t_{ij} - d\log P_j + d\log c_i), \quad (9)$$

where $A_{ij} = (\sigma^{-1}-\varepsilon^{-1})(a_{ij}/K_i)(1-\sigma) > 0$, if σ > 1, as is the normal case. From this core result we see that the relative export price, which determines the volume of exports (see Eq. (3) above) or the market share (Eq. (5)), is closely linked to the real exchange rate of the country measured by the combined domestic production and export costs in terms of the foreign price level.

Now, consider the case when the demand in the Russian market dwindles so that the preference a_{ij} goes down as happened when the bilateral trade with the Soviet Union came to an end in 1991, and there was a need to search for compensating markets in the West, involving additional costs (see Eq. (1)). Now there is on the basis of (9) an autonomous reduction in the export price through the first term on the right-hand side and also through a possible devaluation of the exchange rate, which can alleviate this shift in the market structure.

Turn then to the price formation in the economy. We divide the production in the economy into two parts: the export and domestic sector. We distinguish the domestic final goods, exported and produced under monopolistic competition, and home goods, produced from domestic and foreign intermediate inputs also under imperfect competition, and the perfect competition intermediate goods domestic sector. These goods are used in domestic consumption and investment. For simplicity, we assume that the country is specialised in the sense that the export good is not consumed domestically.

The total unit cost c of the exporting firm is based on the exporting costs as specified in (1) and on the production cost, denoted by c_Q. Let us next describe the latter. It is based on the aggregate price of the domestic intermediate goods (I) used in investment in the export industry and the effective labour cost,

$$c_Q = (P_I(r+\delta))^{\gamma}(W/A)^{1-\gamma}, 0<\gamma<1, \quad (10)$$

where A is the indicator of labour augmenting technical process, r the real interest rate and δ the rate of depreciation. Following Blanchard (2006, 30) we assume that the (European) wages reflect both wage bargaining and individual wage formation. So, we specify that

$$W = A(eP_X(1-s_X))^{\theta}P_I^{1-\theta}, 0<\theta<1\ , \quad (11)$$

where as new symbols, e is the effective exchange rate, P_X the aggregate export price in foreign currency, and s_X the share of exporting costs in the overall revenue (see their definition in Eq. (1)). The middle term on the right-hand side reflects the net sales, (profitability) of the export firms, playing a key role in the rent sharing in wage bargaining between the unions and the firms, and the last term reflects the effect of individual labour supply based on the wage rate in relation to consumer prices.

We assume that the firms in the intermediate goods sector produce varieties out of domestic (H) and foreign components (M), under perfect competition, so that the aggregate production in the sector is

$$I = \left[\int_0^1 \left(M_n^{\xi} H_n^{1-\xi} \right)^{(\upsilon-1)/\upsilon} dn \right]^{\upsilon/(1-\upsilon)}, \upsilon > 0 \ . \tag{12}$$

This means that in the symmetric case, leaving unessential constants aside,

$$P_I = (eP^*)^{\xi} (P_H)^{1-\xi}, 0 < \xi < 1, \tag{13}$$

where P* is the aggregate foreign price level, i.e. price on imported goods, and P_H is the price on domestic nontradable goods. The price of domestic nontradable sector is determined, leaving again the unessential constants aside, by

$$P_H = \frac{\tau}{\tau - 1} (W / A)^{\mu} P_I^{1-\mu}, 0 < \mu < 1, \tau > 1, \tag{14}$$

where τ is the perceived elasticity of demand. With some manipulation we can derive the basic result, that if the real interest rate r + δ and the share s_X of exporting costs in relation to total revenues remain unchanged, there is a neutrality with respect to exchange rate policies in the sense that the domestic unit cost c_Q rises, ceteris paribus, with unitary elasticity with respect to the exchange rate e. So, on the basis of (9) the export price remains unchanged in foreign currency and the domestic currency price of exports and the overall price level rise pari passu with the exchange rate.

Another aspect suggested sometimes to be behind the smaller rise in the export price than the devaluation (see Fig. 6), is the rapid gain in productivity, part of which is extended to the foreign purchasers in terms of price reduction. This is also the story told by many open economy models, see Gagnon (2008). In the basic setup formulated above this does not take place, and, again, the domestic wage cost rises pari passu with productivity and the export price remains unchanged. These basic outcomes are, of course, in confirmation with the prototype case of a small open economy. In this sense the imperfect export competition model brings no difference to the classical results. We have,

Outcome 1. There is a basic neutrality of the export equilibrium with respect to nominal exchange rate changes and productivity rises.

However, this is not what has happened in Finland, especially in the 1990s as Figure 6 above revealed, i.e., the ratio P_X / P^*, went down while the exchange rate went up. So, we have to seek for explanations to this. As a reaction to the puzzle of small rises in domestic prices after big devaluations, Burstein, Eichenbaum and Rebelo (2003, 2005) introduce the possibility of price stickiness in the nontradable sector, which leads to less than unitary reaction in the domestic price level as a reaction to a devaluation. Technically, this is introduced through a stepwise function in the mark up factor in Eq. (14) if the unit cost rises. The outcome of price stickiness in the nontradable sector is, of course, one possibility which emerges after the big rises in the exchange rate in the early 1990s. However, for the Finnish case the most notable factor was the coincident smaller rise in the export price and in the domestic overall price levels, these two being of the same magnitude.

We now want to suggest a few other, in our mind perhaps more plausible, reasons for this outcome. We divide the analysis into the short- and long-run situation and start with the former.

Another possibility which emerges from Eq. (10) is that the domestic nominal interest rate is kept unchanged through accommodative domestic monetary policies after a devaluation so that the consequent rise in the domestic inflation is eliminated from having a countervailing effect on the domestic interest rate. The logic to this outcome is that there should be a consistency between the two sides of the monetary policy so that an expansionary stance in one field of policy is not eliminated by a conflicting one in another. So, we in effect make a distinction between the exchange rate and interest rate policy. The rationale for this is that typically previously, before the late 1980s, the foreign financial flows and domestic financial markets were regulated, which could at least over a certain period imply a deviation from the open interest parity. Another point to be made is that the devaluations were in a way unexpected, as they are in a vector autoregressive model, see below, so that offsetting capital flows were not marked. This means that the real capital cost $r + \delta$ in (10) goes down after a devaluation. Another possibility is that a devaluation is expected, as it was after liberalisation of foreign capital flows in the late 1980s and, consequently, the domestic interest rate rose before the devaluation in a currency speculation, and a devaluation allowed the interest rate to return to more normal and lower nominal and thereby lower real interest rate, too. Altogether, there can be a marked reduction in the unit cost of the export sector and of the domestic nontradable sector after a devaluation, and thereby a reduction in the relative export price measured in the foreign currency and a change in the export market share. However, this can only be a temporary change as the real rate of interest will over time return to its long-run equilibrium level, see below.

Next, related to the cost of exporting, one possibility for the smaller rise in export prices and domestic costs is that, simultaneously, the exporting costs have risen (see Eqs. (1) and (11) above), e.g., as the Russian market collapsed in the early 1990s (see Figures 1 and 2). We have for the overall cost of the exporting firms,

$$d\log c = (1-s_X)d\log c_{\underset{\sim}{Q}} + s_X d\log c_X \,. \tag{15}$$

Note that when the export cost rises, there is a pressure for the export price to rise, see (9) above) and the domestic costs to go down. So, on balance, the real devaluation coming through this channel is not likely to be big. Further, this impact is also likely to be a temporary one as after some time the export market structure returns to normal in the sense that the extra cost related to the shift between the export markets in Eq. (1) disappears.

Let us still consider three additional reasons for a long-run *permanent* real depreciation after a nominal devaluation. If the parameter h_j, measuring the degree of competition in the export market j rises, i.e. there is a more monopolistic export market, we can derive from Eq. (8) the result that there is a rise in the export market price p_{ij} charged by the domestic producers. This would suggest that one factor behind the Finnish export pricing in the 1990s is that the Finnish exporters have engaged in a more competitive global market, notably in mobile phones and electronics more general.[6] Another reason for a permanent real depreciation can be that the wage setting curve in (11) has shifted downward, as is what happened in connection with

[6] Another aspect of this outcome may be explained in the sense that the relevant foreign price indicator is not the overall price level but a more disaggregated price of tradables, or a subsection of them.

the deep crisis in the Finnish economy in the early 1990s when the labour share declined markedly while the unemployment rate skyrocketed.

With a numerical simulation of the above framework we can infer that the reduction in the export price setting through a lowering of the h-parameter is not alone sufficient to lead to a similar long-term lowering in the relative export price and domestic price level as was depicted in Fig. 6 to have happened in Finland in the 1990s.[7] Analogously, we can also infer that wage moderation alone is not itself sufficient to lead to this outcome.

The third possible case is the one where the preference (a_{ij}) for Finnish exports goes down, as happened when the Soviet Union collapsed in 1991 and the favourable bilateral trade regime was suddenly abandoned. In effect, this led to a situation where the Finnish market share in the Russian imports declined abruptly. This can also lead to a reduction in the Finnish export prices in the Russian market on the basis of Eq. (9). However, a numerical simulation shows that this effect cannot alone lead to a rise in competitiveness in connection with a nominal devaluation. So, we get altogether,

Outcome 2. In the short run a real depreciation can be linked to a reduction in the real rate of interest and a rise in the exporting costs. A long-run shift in the real exchange rate can take place through a simultaneous change towards a more competitive global export market and a moderation in the domestic wage claims.

We then want to proceed from the export side to a complete macroeconomic model. Turn to the aggregate demand side of the economy and the determination of total output. Output in the export sector is determined in the manner explained above by the equilibrium between export demand and supply. The output in the nontradable sector is determined by the relevant domestic consumer demand, investment demand and government purchases. The aggregate consumer demand is simply given by the sum of the expected after-tax future human wealth and the value of the current financial wealth. The consumer demand of the domestically produced goods is then based on this total expenditure and the relative price P_H/P_M. As in many small open economies a part of the stock of debt by the firms is borrowed in foreign currency, a devaluation therefore means that that there is through the consequent capital loss a deflationary shock when a part of the value of the net financial assets will be wiped away in this connection. The real income is thus given by GDP less the interest expenses on the foreign debt. In the basic case of a small open economy the relative price P_H/P_M is fixed, as both the nominator and denominator follow the foreign price level in domestic currency. The investment demand is determined by the expected capital cost $r + \delta$.

Thereby we write for the equilibrium output Q_H in the nontradable sector,

$$Q_H = f_H(r+\delta, Q, eB_0, g), f_1 < 0, f_2 > 0, f_3 < 0, f_4 > 0\,, \tag{16}$$

where Q is GDP, B is the stock of debt in foreign currency, e is now the effective exchange rate and g is an indicator of the expansionary stance in fiscal policy. GDP is then

$$Q = (eP_X X + p_H Q_H)/P_Q\,, \tag{17}$$

[7] See the Appendix for a numerical calibration of the model.

where P_Q is the price on GDP. Let us in the following denote by q the log deviation of output from its potential level, denoted by Q_N, and in the same manner by q_i^* the same deviation in the export market, i = 1, 2. We now have for the output gap,

$$q = a_1 q_1^* + a_2 q_2^* + a_3(\log e + \log P^* - \log P) - a_4(i - \pi) + a_5 g - a_6 \log e\,, \qquad (18)$$

where i is the nominal interest rate, π the rate of inflation, and the coefficients a_i are all positive. On the basis of what has been suggested above, the aggregate supply curve (inflation) of the economy is given by

$$\pi = b_1 d(i - \pi) + b_2(\hat{e} + \pi^*) + b_3 q - b_4 \hat{c}_X + b_5 dh\,, \qquad (19)$$

where as new symbols d(x) is the difference (change) of x, π* is the foreign inflation rate and a caret refers to percentage change. The rationale of the output gap in this expression is the lagged adjustment of the actual prices towards the desired in a Calvo type of mechanism, while above we considered the desired price setting.[8] Next, we need the policy reaction functions. For the domestic interest rate policy we specify in a standard manner that,

$$i - \pi = \bar{r} + c_1(\pi - \pi^*) + c_2 q - c_3 \hat{e}\,, \qquad (20)$$

where the last term follows from what has been stated above on the combination of exchange rate and monetary policies. The equilibrium real interest rate $\bar{r}$ is solved from the equilibrium of the economy so that $q = 0$. The exchange rate and domestic monetary policies are separated from each other so that in the short run PPP does not hold, but holds in the long run, i.e. we have

$$\hat{e} = f_1 q + (\pi - \pi^*) + f_2 \hat{c}_X + f_3(da)\,, \qquad (21)$$

where the last term refers average preference parameter facing Finnish exports. The first term follows from the general countercyclical reaction of the exchange rate and the last term follows from what has been stated above that the exchange rate policy may react to an adverse changes in the export markets and consequent rise in export costs.

We can further write for the output gap,

$$q = \log Q - \log Q_N\,, \qquad (22)$$

where Q_N is the natural level of output. This gives the outcome:

$$d \log Q = dq + d \log Q_N\,, \qquad (23)$$

where

$$\log Q_N = \log Q_{N,t-1} + \hat{A}_t\,, \qquad (24)$$

[8] Above, we paid attention to the wage moderation, linked to an adverse demand shock. Here we have considered this effect to be included in the output gap.

i.e. it rises together with the rise in productivity. From Equations (19) and (20) we can derive the following neutrality constraints,

$$b_2 = 1, c_1 = c_3 \ , \tag{25}$$

which guarantees that there is a long-run neutrality in the sense that the supply curve is vertical at the level of full employment, i.e., $q = 0$, and the real interest rate parity holds. Note that Eq. (21) is immaterial in this sense. By writing that $q_t = dq_t + q_{t-1}$ and approximating that the initial situation is one of full employment, $q_{t-1} \approx 0$, we come to a situation where $q_t \approx dq_t$. Similarly we have that $d(i-\pi) = (i-\pi) - \bar{r}$, so that we get, by combining (19) and (20), the following expression,

$$\pi - \hat{e} - \pi^* = k_1(d\log Q - \hat{A}) - k_2\hat{c}_X + k_3 dh, \tag{26}$$

where $k_1 = (c_2 + b_3)/(1 - b_1 c_1)$, assumed to be positive. The reaction function by the fiscal policy is,

$$g = g_1 q + g_2(\pi - \pi^* - \hat{e}) \, . \tag{27}$$

In the long run the budget is in balance. The whole model is now made up of the following equations. The aggregate output, GDP, is reached by combining (18), (20) and (23),

$$d\log Q = \bar{a}_1 \hat{q}_1^* + \bar{a}_2 \hat{q}_2^* + \bar{a}_3(\hat{e} + \hat{P}^* - \hat{P}) + \bar{a}_5 dg - \bar{a}_6 \hat{e} + \hat{A} \, . \tag{28}$$

We can infer with our framework that a permanent devaluation of the real exchange rate leads to a permanent boost in output. The inflation equation is made by Eq. (26). We can infer that the demand and supply shocks have similar effects on GDP and opposite effects on competitiveness, i.e., inflation. The policy responses are as depicted above in (21) and (27). In the long run the economy is driven by technology shocks, i.e. the rises in the potential output and the nominal side emerges under the stipulated condition as a residual independent of it.

To proceed, let us add shocks η_i to the equations (18), (21), (24), (27) and (28). We define these shocks η_i to be uncorrelated with each other. The theoretical model is now ready, but to create a link between exports and productivity, we specify that in (24) the productivity rises are also dependent on the foreign shocks having their effects on the export performance.

3 Analysis of the dual export market structure

We now turn to the empirical analysis and carry it out in three stages, first for the export optimum, secondly for the macro model. The third step combines these two approaches into a unified model.

Let us first analyse the export structure and the role of competitiveness and productivity in this connection. As said above, we are interested in the dual export market strategy and the links between the markets and the role of exchange rate policies therein. We formulate the export model on the basis of what has been derived above as to export behaviour, i.e. Eq. (3) combined with Eq. (9).

Altogether the following system will be analysed. We have had annual data for the post-war period at our disposal. To make the export volumes as comparable and stationary, we have transformed them into the form of their contribution to the volume growth of Finnish GDP. To be more exact, we have analysed the variables XWEST, XRUS = percentage contribution of the growth in respective volume of exports to GDP volume growth[9], COMP = percentage change of the price competitiveness (real exchange rate, i.e. of eP*/P), and PROD = percentage growth in productivity, measured by the real GDP per employed. The exogenous variable for the collapse of the Russian market and a coincident rise in the exporting cost was depicted by a dummy variable for the year 1991.

We next introduce the empirical methodology, the SVAR model, which is specified in the following way,

$$y_t = A(L)\, y_{t-1} + Bx_t + A_0^{-1} u_t, \tag{29}$$

where y is the vector of endogenous variables, with now y_1 = XWEST, y_2 = XRUS, y_3 = COMP, y_4 = PROD, and u is the vector of the structural shocks, where u_1 is the demand shock in the Western markets, u_2 the same in the Russian markets, u_3 the shock to the real exchange rate, and u_4 a productivity shock and L is the backward difference operator, x the vector endogenous variables, and A_0 indicates the short-run simultaneous relations between the variables. We have estimated the unrestricted VAR using five lags for the period 1950-2003.

We specify the identifying restrictions as short-run constraints in the following way,

$$A_0^{-1} u_t = D v_t, \tag{30}$$

where v is the estimated reduced form residual of the unrestricted reduced form VAR and the elements of A_0^{-1} are the following,

$$\begin{aligned}
v_1 &= \Pi_{11}u_1 + \Pi_{12}u_2 + C(3)u_3 \\
v_2 &= \Pi_{21}u_1 + \Pi_{22}u_2 + C(4)u_3 \\
v_3 &= (-C(5) + \Pi_{31})u_1 + (-C(5) - \Pi_{31})u_2 + \ldots + C(5)u_4 \\
v_4 &= C(6)u_1 + C(7)u_2 + \ldots + C(8)u_4
\end{aligned}, \tag{31}$$

[9] So, e.g. using the above symbols in Section 2, $XWEST_t = 100 * (Q_{1,t} - Q_{1,t-1}) / Q_{t-1}$.

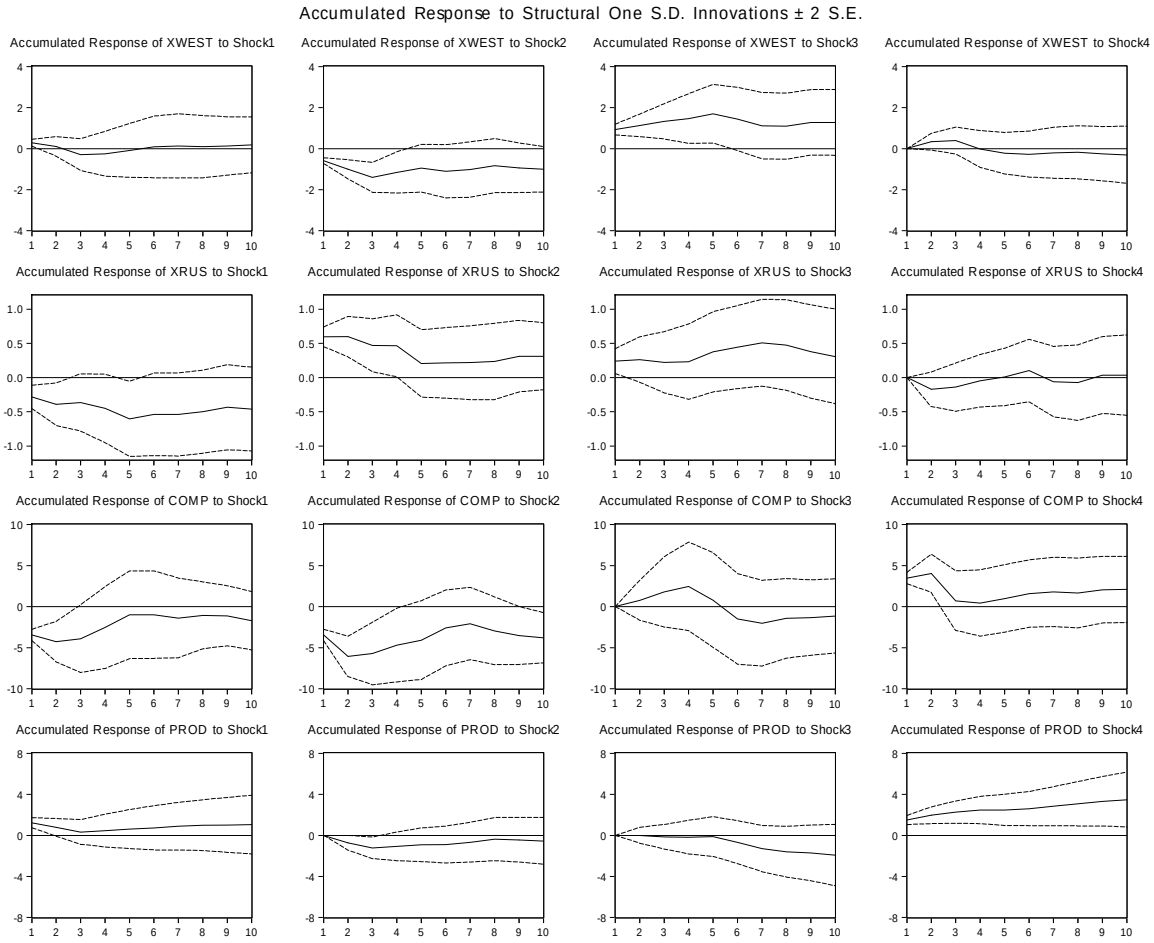
with Π's and C's being unknown coefficients. However, we need further constraints as in its most general formulation (31) is underidentified. So, we test for four specifications in this set up. Take first the dual export market situation and its connection to (31). We define that the firms have been able to make shifts between the two export markets on their own, if $\Pi_{11} + \Pi_{21} = \Pi_{12} + \Pi_{22} = 0$, and we call this hypothesis as H_{EXP0}. So, this means that the Finnish firms have autonomously been able to carry out shifts between the exports markets when needed and have been able to neutralise adverse shocks in the Russian market by expanding export to the Western market. If this type of an automatic adjustment is not possible and it has had to rely on intervention by exchange rate policies, this is defined as the case H_{EXP1} where $\Pi_{21} = \Pi_{12} = 0$. If the autonomous shift has only concerned the Russian exports we have the case H_{EXP2}, $\Pi_{21} = \Pi_{12} + \Pi_{22} = 0$.

Note that these hypothesis are not all nested. In this case we have simply compared the respective values of the likelihood functions. On the basis of the empirical results, we clearly infer that the hypothesis H_{EXP0} of firm driven shifts between the two export markets prevails and H_{EXP1} is clearly rejected in comparison to it. The hypothesis H_{EXP0} is also clearly better than the case where this shift only applies to the Russian market, i.e., $H_{EXP2.}$ So, our maintained hypothesis is that these identification restrictions mean that the two export volumes react to the respective market shocks (i.e. to shocks u_1 and u_2) in an offsetting way implying that a full compensation is achieved so that the total exports stay intact irrespective of the shocks. The two export markets have been substitutes for each other in this sense.

The next stage in testing is on the third row of (31), whether competitiveness has reacted in a symmetric way to both exports, i.e., whether the parameter $\Pi_{31} = 0$ or not. The former case is accepted with a clear margin. The third step was to test, whether the productivity rises have reacted differently to shocks in the Western and Russian markets. The case of C(7) = 0 is clearly accepted in comparison to the symmetric case of C(6) = C(7). So, the productivity rises have clearly been linked to positive Western market shocks. The fourth test is whether the two export categories react in a mutually similar way to shocks in competitiveness. The outcome is that the reactions have not been similar, and stronger with respect to Western exports, which is plausible, as this category of exports has faced a stronger competitive pressure than the exports to Russia.

The overall result of the estimation with the preferred set up is the following. The model is over identified with three degrees of freedom. These constraints are accepted by the data (p = 0.371). Figure 8 depicts the impulse responses.

Figure 8. The impulse responses of the export SVAR *



* Shock 1 = demand shock in the Western market, shock 2 = demand shock in the Russian market, shock 3 = competitiveness shock, shock 4 = productivity (supply) shock.

The results show that both export components react fairly strongly to shocks in the other export market in a way offsetting each other, as was discussed above. There is, however, the difference that the shock in the Western market only has a statistically significant positive short-run impulse on Western exports but fades away over time, while the exports to Russia react permanently to a shock in the Western market. Both export components react positively to competitiveness, although the effect on the Russian trade becomes insignificant over time. Competitiveness reacts to overall slow growth in exports, not to the dual export market structure. An overidentifying test that competitiveness is independent from a shock to the Russian trade was clearly discarded. The permanent improvement in competitiveness which has taken place (see the discussion in Section 2) is in this estimation reflected as a permanent offsetting reaction of competitiveness to the shocks in the Russian trade. The reaction of competitiveness to productivity shocks meets the predictions derived above in Section 2 in Outcome 1 concerning the short-run positive effect, combined with the long-run neutrality of productivity shocks on competitiveness and thereby on the export equilibrium.

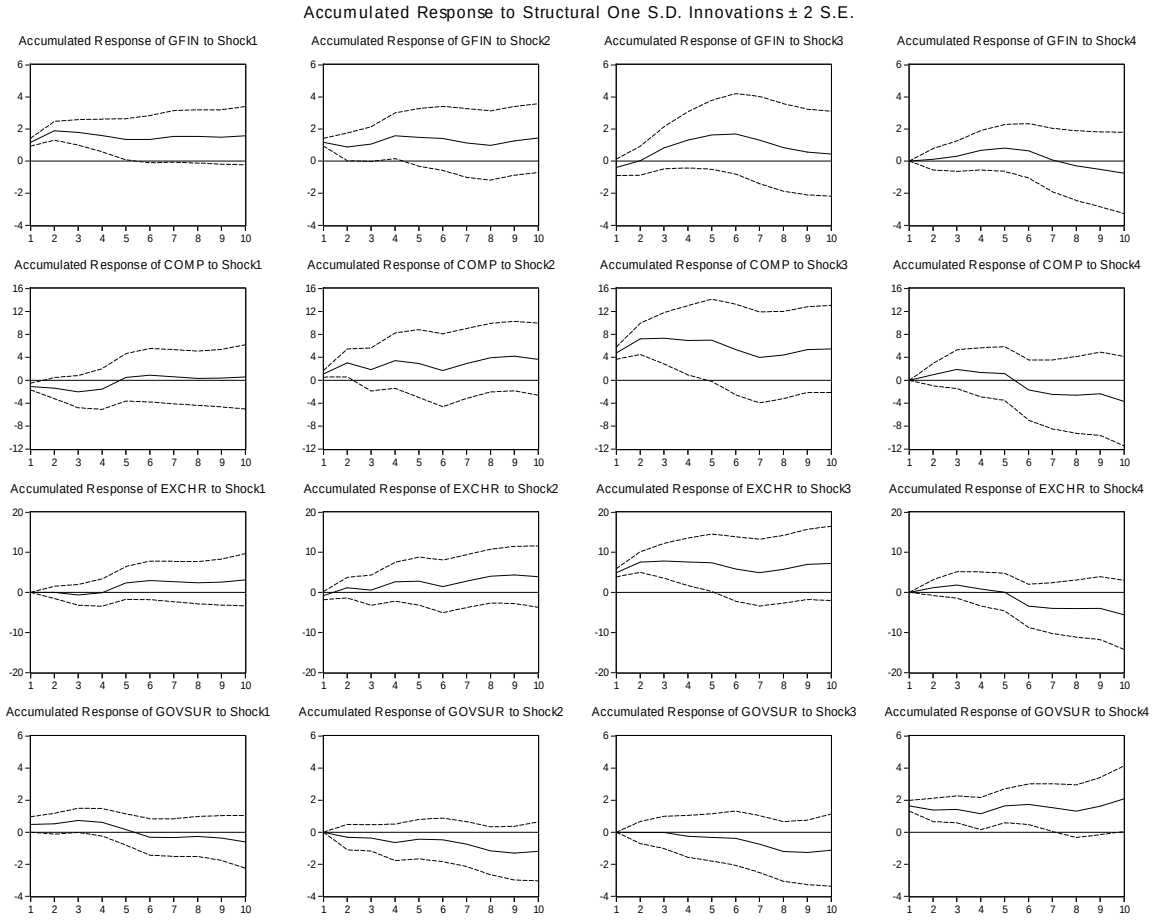
4 Analysis of the macroeconomic fluctuations and economic policies

Turn next to the model for the whole economy. It comprises of the equations (28) and (26), and the policy reaction functions (21) and (27). Thereby we analyse the following variables: y_1 = GFIN = GDP growth, y_2 = COMP (see above, i.e., $\hat{e} + \pi^* - \pi$), y_3 = EXCHR (i.e. $\hat{e}$) and y_4 = GOVSUR, i.e. difference in the government budget surplus in relation to GDP. As exogenous variables we use a dummy for 1991 to represent the shift in h, and the collapse of the trade with the Soviet Union. Now, we use the following short-run identification scheme. We identify the aggregate (private) demand (shock 1) and productivity shocks (shock 2), in the manner introduced above in Section 3 so that the demand and productivity shocks have an identical effect of GDP while offsetting shocks to competitiveness (inflation). Shock 3 is the monetary policy shock, unexpected nominal devaluation and shock 4 a fiscal policy shock. Accordingly, the identification scheme is the following,

$$\begin{aligned} v_1 &= C(1)u_1 + C(1)u_2 + C(2)u_3 \\ v_2 &= -C(3)u_1 + C(3)u_2 + C(4)u_3 \\ v_3 &= \qquad C(5)u_2 + C(6)u_3 \\ v_4 &= C(7)u_1 + \quad \ldots \qquad\qquad + C(8)u_4 \end{aligned} \tag{32}$$

We assume that the demand impulse to GDP growth has an effect on the budget balance together with the policy shock related to fiscal policy. The model is overidentified with two degrees of freedom. Overall, the restrictions are not rejected by data, but, however, with only a slight margin (p = 0.027). The impulse responses are in Fig. 9.

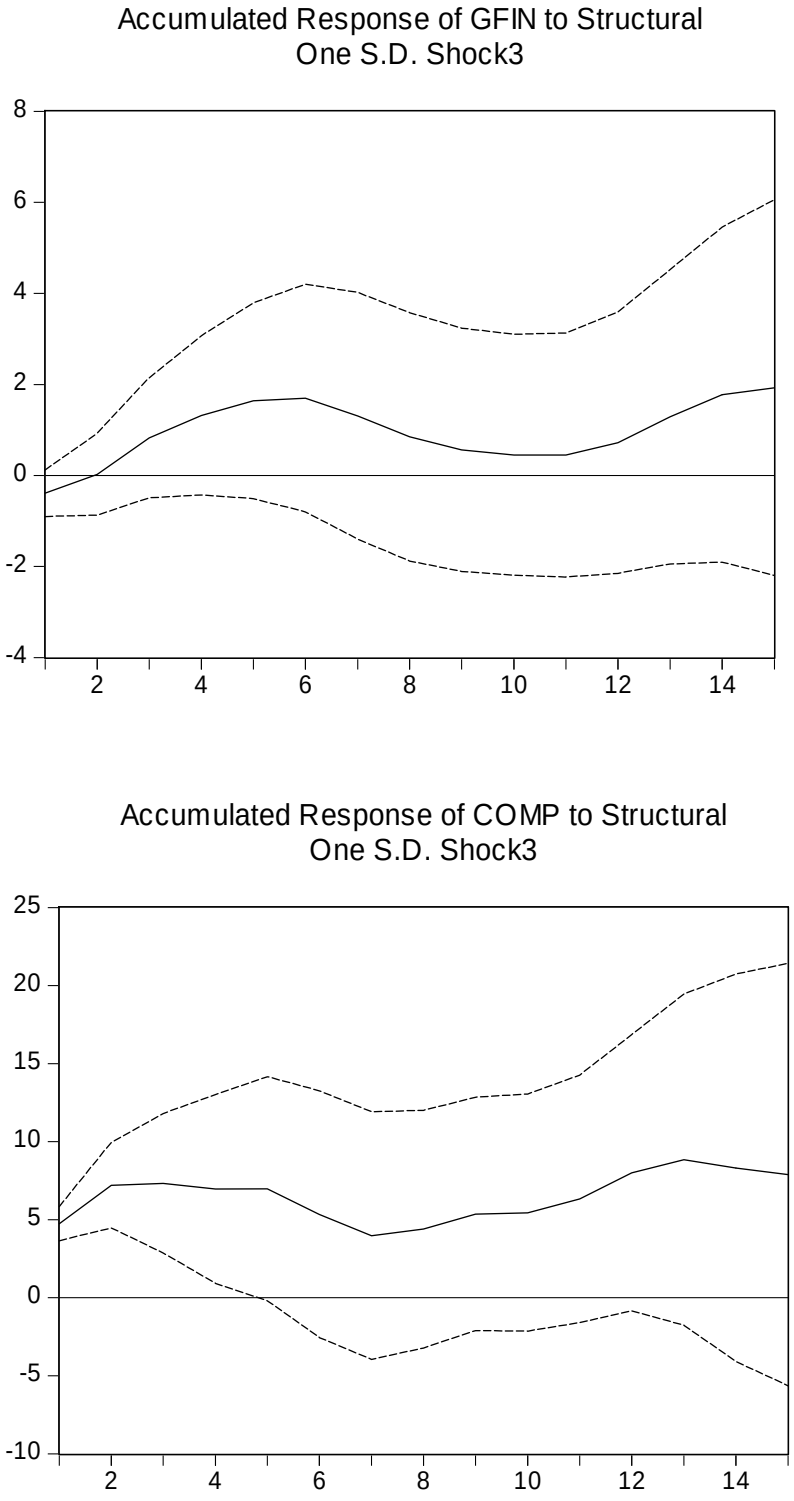
Figure 9. The impulse responses of the macroeconomic structural VAR *



* Shock 1 = aggregate demand shock, shock 2 = aggregate supply shock, shock 3 = monetary policy innovation, shock 4 = fiscal policy innovation.

The response to a shock in exchange rate policies is, as suggested by the theoretical model, deflationary in the short run, but turns then through a gain in competitiveness to a positive impact on GDP growth, while it then again fades away towards neutrality. However, as shown by Fig. 10, the response once again rises in the very long run, corresponding what was stated above in Section 2, if a nominal evaluation leads to a permanent gain in competitiveness as is shown in Fig. 10. This result of non-neutrality is, however, not significant statistically. The demand and productivity shocks drive the GDP growth, and on competitiveness the demand shocks have a negative effect and supply shock positive one, as should be according to the theoretical model. The supply shocks, however, are only significant as to GDP growth in the short run, which is somewhat puzzling.

Figure 10. The impulse response on GDP and competitiveness of a nominal devaluation shock *



* Shock 3 is the nominal devaluation innovation

The impact of the demand shocks has been very marked on the budget balance. The impact of exchange policies on competitiveness has been dominant, especially in the short run. However, we have not been able to estimate in a meaningful way the impact of fiscal policies which should be procyclical in the short run.

5 The combined model

Let us finally analyse exports and the macroeconomic fluctuations in full by combining the two models of Sections 3 and 4 into one. So, we analyse the following variables, y_1 = XWEST, y_2 = XRUS, i.e., percentage contribution of the growth in respective volume of exports to GDP volume growth, y_3 = GFIN = GDP growth, y_4 = COMP (i.e., $\hat{e} + \pi^* - \pi$), y_5 = EXCHR, rate of nominal devaluation, (i.e. $\hat{e}$) and y_6 = GOVSUR, i.e. difference in the government budget surplus in relation to GDP.

The identification scheme used is now a combination of those in Sections 3 and 4 and is the following,

$$
\begin{aligned}
v_1 &= C(1)u_1 \quad - C(2)u_2 \quad + \ldots + \quad C(3)u_5 \\
v_2 &= -C(1)u_1 + C(2)u_2 \quad + \ldots + \quad C(4)u_5 \\
v_3 &= C(5)(u_1 + u_2 + u_3) + C(5)u_4 + C(6)u_5 + C(7)u_6 \\
v_4 &= -C(8)(u_1 + u_2 + u_3) + C(8)u_4 + C(9)u_5 \\
v_5 &= C(10)(u_1 + u_2) \quad + \quad \ldots \quad + \quad C(11)u_5 \\
v_6 &= C(12)(u_1 + u_2 + u_3) \quad + \quad \ldots \quad + \quad C(13)u_6
\end{aligned}
\quad , \qquad (33)
$$

where the shocks are, analogously as above, u_1 the shock in the Western market, u_2 shock in the Russian market, u_3 the domestic private demand shock, u_4 the supply shock, u_5 the exchange policy innovation and u_6 the fiscal policy innovation. The fiscal policy specification follows the idea that the budget surplus has a Keynesian impact on GDP, and vice versa, the budget balance is affected by aggregate demand fluctuations. The model has eight overidentifying restrictions. However, a problem is that they are not satisfied with the data, although the signs of the coefficients match the a priori desiderata. We use this scheme only to analyse the variance decomposition, see Table 1.

Table 1. Variance decomposition of the variables k years ahead, %

Shock	Exports to the West			Exports to Russia			GDP		
	k = 1	k = 5	k = 20	k = 1	k = 5	k = 20	k = 1	k = 5	k = 20
West	17.2	10.6	11.3	43.7	31.5	20.7	18.6	15.2	15.9
Rus.	14.4	16.6	14.1	36.4	35.0	24.7	18.6	13.4	11.5
Private demand	0	9.0	14.0	0	7.0	10.0	18.6	30.1	23.9
Supply	0	5.6	11.0	0	9.4	13.2	18.6	18.7	15.0
Deval.	68.4	49.7	31.7	19.9	14.8	13.7	1.4	4.1	14.2
Fiscal policy	0	8.4	17.8	0	2.5	17.7	24.4	18.5	19.6
Sum	100	100	100	100	100	100	100	100	100

Shock	Competitiveness (real exchange rate)			Nominal exchange rate			Fiscal surplus		
	k = 1	k = 5	k = 20	k = 1	k = 5	k = 20	k = 1	k = 5	k = 20
West	23.2	15.3	18.7	43.4	26.8	24.4	16.0	9.6	11.5
Rus.	23.2	15.2	12.3	43.4	23.1	15.0	16.0	18.5	14.1
Private demand	23.2	33.4	26.8	0	18.4	16.3	16.0	22.1	17.9
Supply	23.2	18.0	17.0	0	8.8	11.8	0	1.9	3.7
Deval.	7.3	7.2	10.4	13.2	10.1	12.2	0	10.4	16.6
Fiscal policy	0	11.0	14.8	0	12.8	12.2	51.9	37.5	36.2
Sum	100	100	100	100	100	100	100	100	100

Table 1 reveals that the fiscal policy has been more important than exchange rate policy as to GDP variability in Finland. In comparison to Sweden, as based on Linde (2004), we anyway conclude that the fiscal policy has been playing a much more minor role in Finland than in Sweden. However, this is not the whole picture as the variance decomposition in the macroeconomic model in Section 4 (not shown here, available upon request from the author) gives the results that the exchange rate policies have been more dominant than fiscal policies as to GDP fluctuations in Finland. However, this result is questioned by the fact that we were not able to reach a result on fiscal policy satisfying the a priori constraint on the sign of its impulse response on GDP in Section 4. Of the other effects in Table 1, the exchange rate changes have been quite dominant as to Western exports.

6 Conclusion

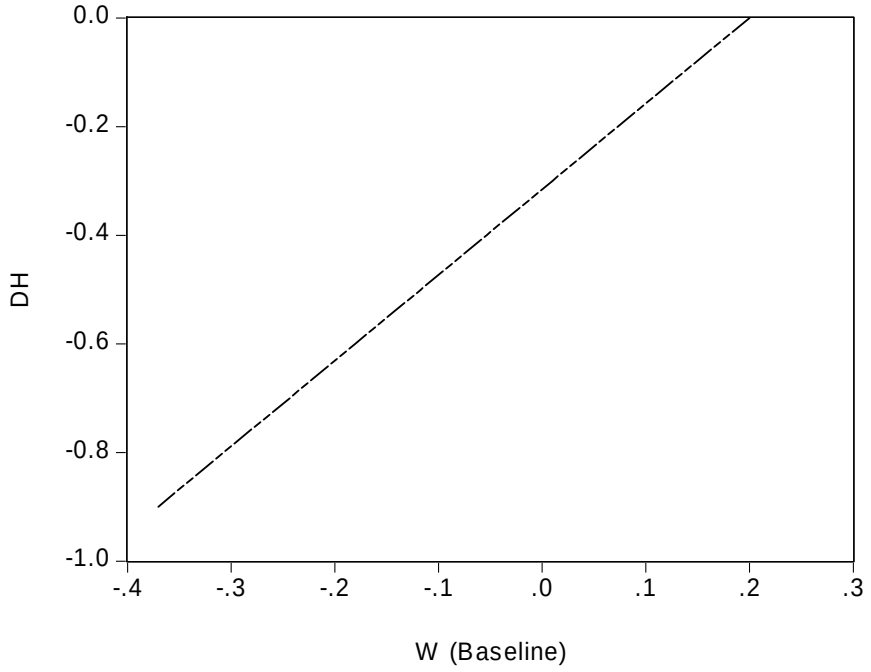
We have here given an outline and analysis of growth of the Finnish economy in the post-war period. We have found that the dual export market strategy has worked in a meaningful way, so that shifts between the two major markets have been possible when needed. The productivity gains seem to have been more linked to Western exports, as is also plausible, given the economic structure of the Russian market in the Soviet era. As to economic policies, we reached somewhat conflicting results, depending on the model specification, on the respective roles of exchange rate and fiscal policies in Finnish economic fluctuations.

The time span, half a century, is so long that it, of course, raises some doubts as to the viability of the empirical analysis. We, however, assume that the macroeconomic forces linked to exports and the domestic economy still apply to the overall fluctuations in the new institutional surroundings of the domestic economy as well.

Appendix. The numerical solution of the model in Section 2

We use the following numerical values for the analysis of the log-linear theoretical model in Section 2, A = 5 based on an elasticity of substitution being 6, $\gamma = 0.4$, $\theta = 0.3$, $\xi = 0.6$, $\mu = 0.7$.

We get the following diagram for the equilibrium relationship between the wage moderation in relative terms (W) and the negative export price shock through the h parameter (dh in the figure below), which gives the outcome of an equal change in the domestic price level and export price in domestic currency, when the size of an devaluation is 20 per cent. Starting from the upper right-hand corner, where the standard neutrality result holds, we trace this relationship down to the left and conclude that both adjustments are needed to produce the Outcome 2 above.



References

Alessandria, G. and Choi, H. (2007): "Do Sunk Costs of Exporting Matter for Net Export Dynamics?", The Quarterly Journal of Economics, Vol. CXXII, February, 289-336.

Alho, K. (2005): "A Gravity Model under Imperfect Competition", ETLA Discussion paper, No. 962.

Alho, K., Forssell, O., Huttunen, J., Kotilainen, M., Luukkonen, I., Mattila, O.-T., Moilanen, J. and Vartia, P. (1986): Neuvostoliiton-kauppa Suomen kansantaloudessa (Trade with the Soviet Union in the Finnish Economy, in Finnish, with English summary), ETLA Series B, No. 50.

Anderson, J.E. and van Wincoop, E. (2003): "Gravity with Gravitas: A Solution to the Border Puzzle", The American Economic Review, Vol. 93, No. 1, March, 170-192.

Baldwin, R.E. (2006): Globalisation: The Second Unbundling, in Finnish Prime Minister's Office Publications, 18/2006.

Burstein, A.T., Eichenbaum, M. and Rebelo, S. (2003): "Why Are Rates of Inflation So Low After Large Devaluations", CEPR Working paper, No. 3178.

Burstein, A.T., Eichenbaum, M. and Rebelo, S. (2005): "Modeling Exchange Rate Passthrough After Large Devaluations", CEPR Working paper, No. 5250.

Feenstra, R.C. (2004): Advanced International Trade, Princeton University Press.

Greenaway, D. and Kneller, R. (2007): "Firm Heterogeneity, Exporting and Foreign Direct Investment", The Economic Journal, Vol. 117, No. 517, February, F134-F 161.

Gagnon, J.E. (2008): "Growth-Led Exports: Implications for the Cross-Country Effects of Shocks to Potential Output", The B.E: Journal of Macroeconomics, Vol. 8, Iss. 1, Contributions), Article 2, available at http://www.bepress.com/bejm/vol8/iss1/art2.

Grossman, G. and Rossi-Hansberg, E. (2006a): "Trade in Tasks: A Simple Theory of Offshoring", Princeton University, August 2006.

Grossman, G. and Rossi-Hansberg, E. (2006a): "The Rise of Offshoring: It's Not Wine for Cloth Anymore", Princeton University, August 2006.

Kokkinen. A., Jalava, J., Hjerppe, R. and Hakkarainen, M. (2007): "Catching up in Europe: Finland's Convergence to Sweden and EU15", Pellervo Economic Research Institute, Working Papers, No. 93.

Kotilainen, M., Kaitila, V., Widgrén, M. and Alho, K. (2003): Suomen ja Venäjän taloussuhteiden kehitysnäkymät (Prospects of Economic Relations between Russia and Finland, in Finnish), ETLA Series B, No. 205.

Linde, J. (2004): "Swedish Postwar Business Cycles: Generated Abroad or at Home?", Scandinavian Journal of Economics, Vol. 106, No. 4, 623-645.

OECD (2007): Staying Competitive in the Globalised World – Moving up the Value Chain.

Pohjola, M. (1996): Tehoton pääoma: uusi näkökulma taloutemme ongelmiin (Inefficient Capital: A New View on the Problems of Our Economy, in Finnish), Werner Söderström Ltd.

Stiglitz, J.E. (2007): Making Globalisation Work, Penguin.

E L I N K E I N O E L Ä M Ä N T U T K I M U S L A I T O S (ETLA)
THE RESEARCH INSTITUTE OF THE FINNISH ECONOMY
LÖNNROTINKATU 4 B, FIN-00120 HELSINKI

Puh./Tel. (09) 609 900 Telefax (09) 601753
Int. 358-9-609 900 Int. 358-9-601 753
http://www.etla.fi

KESKUSTELUAIHEITA - DISCUSSION PAPERS ISSN 0781-6847

Julkaisut ovat saatavissa elektronisessa muodossa internet-osoitteessa:
http://www.etla.fi/finnish/research/publications/searchengine

No 1093 SAMI NAPARI, Gender Differences in Early-Career Wage Growth. 03.05.2007. 40 p.

No 1094 OLAVI RANTALA – PAAVO SUNI, Kasvihuonekaasupäästöt ja EU:n päästörajoituspolitiikan taloudelliset vaikutukset vuoteen 2012. 07.05.2007. 24 s.

No 1095 OLAVI RANTALA, Kasvihuonekaasupäästöjen ennakointi ja EU:n päästörajoituspolitiikan vaikutusten arviointi. 07.05.2007. 22 s.

No 1096 JANNE HUOVARI – JUKKA JALAVA, Kansainvälinen ja vertaileva näkökulma Suomen tuottavuuskehitykseen. 12.06.2007. 36 s.

No 1097 JARLE MØEN, Should Finland Introduce an R&D Tax Credit? Reflections Based on Experience with Norwegian R&D Policy. 12.06.2007. 14 p.

No 1098 RITA ASPLUND – OUSSAMA BEN-ABDELKARIM – ALI SKALLI, An Equity Perspective on Access to, Enrolment in and Finance of Tertiary Education. 09.08.2007. 48 p.

No 1099 TERTTU LUUKKONEN, Understanding the Strategies of Venture Capital investors in Helping their Portfolio Firms to Become International. 17.08.2007. 24 p.

No 1100 SARIANNA M. LUNDAN, The Home Country Effects of Internationalisation. 21.08.2007. 43 p.

No 1101 TUOMO NIKULAINEN, Identifying Nanotechnological Linkages in the Finnish Economy. An Explorative Study. 25.09.2007. 31 p.

No 1102 HELI KOSKI, Do Technology Diffusion Theories Explain the OSS Business Model Adoption Patterns? 29.10.2007. 26 p.

No 1103 JUKKA JALAVA – PIRKKO AULIN-AHMAVAARA – AKU ALANEN, Intangible Capital in the Finnish Business Sector, 1975-2005. 29.10.2007. 25 p.

No 1104 BÖCKERMAN, Petri – JOHANSSON, Edvard – HELAKORPI, Satu – UUTELA, Antti, Economic Inequality and Health: Looking Beyond Aggregate Indicators. 05.11.2007. 21 p.

No 1105 MIKA MALIRANTA – RITA ASPLUND, Training and Hiring Strategies to Improve Firm Performance. 08.11.2007. 45 p.

No 1106 ESTEBAN FERNÁNDEZ VÁZQUEZ – BART LOS, A Maximum Entropy Approach to the Identification of Productive Technology Spillovers. 08.11.2007. 21 p.

No 1107 SAMI NAPARI, Is There a Motherhood Wage Penalty in The Finnish Private Sector? 20.11.2007. 46 p.

No 1108 ANTTI LÖNNQVIST, Intellectual Capital and Productivity: Identification and Measurement of the Relationship at Company-Level. 20.11.2007. 20 p.

No 1109 MIKA MALIRANTA – PETRI ROUVINEN, Aineettomat investoinnit Suomen yrityksissä vuonna 2004: kokeilu yritysaineistoilla. 20.11.2007. 16 s.

No 1110 ANNU KOTIRANTA – ANNE KOVALAINEN – PETRI ROUVINEN, Naisjohtoiset yritykset muita kannattavampia? 20.11.2007. 23 s.

No 1111 MIKA MALIRANTA – SATU NURMI – HANNA VIRTANEN, It Takes Three to Tango in Employment: Matching Vocational Education Organisations, Students and Companies in Labour Markets. 07.12.2007. 36 p.

No 1112 EDVARD JOHANSSON – PETRI BÖCKERMAN – ANTTI UUTELA, Alcohol Consumption and Sickness Absence: Evidence from Panel Data. 10.12.2007. 10 p.

No 1113 MIKA WIDGRÉN – KARI ALHO – MARKKU KOTILAINEN – NUUTTI NIKULA – VILLE KAITILA, Avautuva talous ja aluekehitys – suhteellinen etu ja kasautumisvoimat tuotannon sijoittumisen ohjaajina Suomessa. 12.12.2007. 79 s.

No 1114 MIKA MALIRANTA – SATU NURMI, Does Foreign Presence Stimulate Creative Destruction in Local Markets? 17.12.2007. 15 p.

No 1115 VILLE KAITILA – KARI E.O. ALHO – NUUTTI NIKULA, Growth Prospects of Emerging Market Economies in Europe – How Fast will They Catch up with the Old West? 31.12.2007. 46 p.

No 1116 MIKA MALIRANTA – PIERRE MOHNEN – PETRI ROUVINEN, Is Inter-firm Labor Mobility a Channel of Knowledge Spillovers? Evidence from a Linked Employer-Employee Panel.02.01.2008. 26 p.

No 1117 PIA NYKÄNEN, Sukupuolen vaikutus nuorten toimihenkilöiden urakehitykseen. 07.01.2008. 84 s.

No 1118 MIKA PAJARINEN – PETRI ROUVINEN, Verkostoitumisen yhteys yritysten kannattavuuteen ja kasvuun: Empiirisiä havaintoja. 14.01.2008. 14 s.

No 1119 JYRKI ALI-YRKKÖ – OLLI MARTIKAINEN, Ohjelmistoalan nykytila Suomessa. 21.01.2008. 19 s.

No 1120 SAMI NAPARI, Sukupuolten ammatillinen segregaatio Suomen yksityisellä sektorilla vuosina 1995-2004. 22.01.2008. 30 s.

No 1121 DEREK C. JONES – PANU KALMI – TAKAO KATO – MIKKO MÄKINEN, The Effects of Human Resource Management Practices on Firm Productivity – Preliminary Evidence from Finland. 28.01.2008. 29 p.

No 1122 KARI E.O. ALHO (Ed.), Tax/benefit Systems and Growth Potential of the EU. 31.01.2008. 89 p.

No 1123 VILLE KAITILA – ANNI NEVALAINEN – MIKA MALIRANTA – REIJO MANKINEN, Tuottavuuden mittaaminen – Suomi kansainvälisessä vertailussa. 27.02.2008. 39 s.

No 1124 KARI E.O. ALHO, Trade with the West and Russia – A Long-term Perspective on Finnish Economic Growth, Fluctuations and Policies. 22.02.2008. 28 p.

Elinkeinoelämän Tutkimuslaitoksen julkaisemat "Keskusteluaiheet" ovat raportteja alustavista tutkimustuloksista ja väliraportteja tekeillä olevista tutkimuksista. Tässä sarjassa julkaistuja monisteita on mahdollista ostaa Taloustieto Oy:stä kopiointi- ja toimituskuluja vastaavaan hintaan.

Papers in this series are reports on preliminary research results and on studies in progress. They are sold by Taloustieto Oy for a nominal fee covering copying and postage costs.