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# BANK OF FINLAND DISCUSSION PAPERS

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Information Services Department

4.9.1995

Compilation of Early Warning Indicators for  
Foreign Trade Employing a Cut-Off Survey

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# Compilation of Early Warning Indicators for Foreign Trade Employing a Cut-Off Survey<sup>1</sup>

<sup>1</sup> Markus Lahtinen has drawn the charts and made the calculations.

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# Compilation of Early Warning Indicators for Foreign Trade Employing a Cut-Off Survey

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## Abstract

In order to bridge the lack of the official foreign trade statistics compiled by the Board of Customs caused by Finland's entry into the EU and to secure the availability of current account estimates with a five week delay, the Bank of Finland decided in the autumn 1994 that a special survey for foreign trade will be built. It was felt necessary that the balance of payments statistics must continue to come out without any halt.

It seems evident that within rather wide limits exports and imports can be estimated with the cut-off survey. However, monthly variations being very large, it is of utmost difficulty to give precise monthly estimates for the trade balance. The current preliminaries produced by the Bank as well as by the Customs may give wrong signals to the market if single monthly observations are concerned.

The Bank of Finland survey data may describe the underlying developments in the foreign stability with reasonable reliability. In addition, the use of robust economic relationships could be one way to economize and to speed up statistical systems. However, to have consistent short term information on trade balance, only one reliable information system is no doubt preferred. Therefore, the Board of Customs should make every effort to make their statistical system functional so that information are available with only a few weeks delay and the reliability of the old foreign trade statistic could be reached.

## Tiivistelmä

Taatakseen vaihtotaseen ennakkolukujen ja maksutasetilaston jatkuvan saannin Suomen Pankissa päätettiin syksyllä 1994, että ulkomaankaupasta pidetään yllä erityiskyselyä niin kauan kuin Tullihallitus saa uudet tilastojärjestelmänsä toimi- maan normaaleilla tuotantoviipeillä.

Laskelmat osoittavat, että ulkomaankaupan arvoja on mahdollista arvioida vain suuryrtyksille osoitetun kyselyn avulla. Koska kuitenkin ulkomaankauppa- tietojen kuukausittainen, erityisesti satunnainen vaihtelu on erittäin suurta, tark- kojen ja luotettavien kauppataseen kuukausiarvioiden teko on vaikeaa. Sekä Suomen Pankin kyselytulokset että tullin ennakkoarviot voivat antaa taseesta

väärää tietoa, vaikka kaikki viennin ja tuonnin arviot olisivat luotettavuusrajojen sisällä.

Silti kyselytieto on hyödyllistä ja jokseenkin luotettavaa indikaattoritietoa ulkomaankaupan kehityssuunnasta. Tässä yhteydessä on onnistuneesti kokeiltu sitä, että talouden perusrippuvuuksista tehtyjen yksinkertaisten mallien avulla tilastojärjestelmiä voidaan testata ja ennakoindikaattorien tuotantoa nopeuttaa. Silti on tärkeää, että Tullihallitus saa tilastojärjestelmänsä toimimaan niin tarkasti ja nopeasti, että rinnakkaisista tietolähteistä voidaan luopua.

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# 1 Introduction

Finland's entry into the European Union did not only make our country a part of borderless Europe but also deprived us of our earlier high quality and rapidly attained foreign trade statistics. The first preliminaries for January 1995 from the combined Finnish Intrastat version and renewed customs statistics were available at the end of June.

In order to bridge the lack of foreign trade statistics compiled by the Board of Customs and to secure the availability of current account estimates with a five week delay, the Bank of Finland decided in the autumn 1994 that a special survey for foreign trade will be built. It was felt necessary that the balance of payments statistics must continue to come out without any halt.

The financial flows and stocks data for the balance of payments are based on a monthly bank and enterprise survey. The enterprise part of this was a natural starting point for the planning of a new commodity trade survey.

## 2 Target populations and the samples

Finland is a country of small enterprise population. The total amount of operating enterprises in the corporation register is some 260 000. The distribution of these firms according to the size is very skewed and only a small fraction of enterprises is employed in foreign trade. According to the Board of Customs<sup>1</sup> there were 6 500 exporters and 10 300 importers in Finland having more exports or imports than FIM 100 000 in 1993. A relatively small number of enterprises accounts for the bulk of the Finnish foreign trade, because the distribution of trade by enterprises is even more skewed than the enterprise size distribution. Major exporters make up a much larger share of the total than the same number of importers in total imports.

The enterprise survey of financial flows and stocks covers almost 100 per cent of foreign financial liabilities of the sector.<sup>2</sup> The same group of enterprises is also surveyed for direct investments annually. This group of firms, 84 industrial and commercial concerns, covered some 70 per cent of export flows in 1994. The figure is calculated as a monthly average over the May–December-period of 1994. The coverage calculations were based on the transactions data by enterprises supplied by the Board of Customs for quality control in the balance of payments. Cross-checks were made against the official annual concentration statistics of foreign trade for 1993 compiled by the Board of Customs.

In the imports, the coverage attained with the original sample was not satisfactory. In order to have the same coverage in imports as in exports, the number of enterprises had to be increased more than threefold. Some 70 per

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<sup>1</sup> Board of Customs, SVT1 Foreign trade, Ulkomaankaupan keskittyminen vuonna 1993.

<sup>2</sup> Enterprise distributions in financial assets and liabilities as well as in exports have been discussed in detail in Hilpinen (1992).

cent coverage in imports required a sample of 263 enterprises including all the 84 enterprises in the export survey.

### 3 Target variables and grossing up

The survey is constructed to produce only the total values of exports and imports, since the breakdowns by commodities or by branches have not been considered important enough. Accordingly, the enterprises are defined by their institutional unit e.g. by their organization number and not by their industrial site. Similarly, it was agreed in the beginning with the respondents that the invoiced value of foreign trade is the value to be reported. This means that the trade clause (cif, fob) may vary considerably. The respondents should, however, also report the trade clause used.

Later, when large differences between the Bank of Finland data and the Customs data have become evident, instructions have been given to the enterprises to report to the bank according to similar concepts and definitions as to the Customs. In many cases firms tell having done so. Many organizational and timing problems remain in reporting to two different authorities. However, the response to the Bank of Finland has been in practise 100 %.

Grossing up to the population level is rendered "stratified". This is partly due to the unevenly distributed growth of the Finnish exports in the present upswing. The growth of the value of the exports has been very clearly concentrated on pulp and paper industries and on the new telecommunication industries. In the paper industry, export prices, in addition to volumes, have also risen considerably during the early 1995. Similarly, enterprises can be found whose imports are subject to volatile variations stemming especially from price movements. These are crude oil and ore importers, which also are very large importers.

Thus the samples were divided into two groups according to the size of exports or imports. In exports the seven largest and in imports three largest were separated. Similarly, ship building and paper machine enterprises are separated when large consignments occur.

When grossing up the results, the above mentioned enterprises are added as such, whereas the rests of the samples are multiplied by their share of total exports or imports less the share of major exporter or importers.

Table 1.

**Stratas in grossing up (may–dec 1994)**

	Exports		Imports	
	number	per cent of value*	number	per cent of value*
Largest firms <sup>3</sup>	7	35	3	15
Other firms in the sample	77	34	260	52
Not surveye <sup>d</sup>	..	31	..	33
Total	..	100	..	100
Grossing-up factors		1.90 ((100–35)/34)		1.62 ((100–15)/52)

\* rounded to the nearest total

The grossing up procedure in detail is in the appendix; the example is taken from June 1995.

The exclusion of the fast growing trade and exceptionally large consignments from the grossing-up procedure was tested against not excluding them. In the exports, the results differed markedly so that the latter procedure gave much larger estimates, even difficult to accept in view to the historical record of the time-series and other current economic developments. In imports, no notable differences between methods were found. However, there is a risk for similar biases without stratified treatment, for example, if much larger than average crude oil shipments occur in a certain month.

## 4 Future work

It is evident that to establish a new statistical system for foreign trade takes a much longer period than the Board of Customs originally planned. In addition, according to their recent comments, a permanent production lag of six to seven weeks is foreseen and can probably be achieved during 1996. This slightly exceeds the six weeks agreed in the EMI for the EMU balance of payments. The current delay of the national BoP is slightly less than five weeks as stipulated by the central bank policy planning and monitoring system.

It is very likely that in addition to the reminder of 1995, the early warning indicator of foreign trade is also needed in 1996 for monetary policy reasons. The indicator should be available in five weeks after the end of the month in question. The survey should not lead to double work to the respondents. In the survey, foreign trade must be defined as identically as possible with the official foreign trade statistics, even though perfect matching is beyond reach.

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<sup>3</sup> In exports more than FIM 300 million a month and in imports more than FIM 220 million a month on average.

According to recent estimates, these definitional problems do not result in a more than five per cent discrepancy. The publication of this indicator some weeks before official trade figures is probably not appropriate.

The maturing upswing of the Finnish economy certainly brings new enterprises into the groups of both exporters and importers. The new enterprises are most likely small and medium sized firms and difficult to trace in the register. Thus the coverage of the current sample will deteriorate and the grossing-up procedure will become obsolete in the course of 1995 and later yield increasingly more biased results. The risk of bias might be greater in imports where the original population is already larger. The selection of firms and the estimation procedures must be made more efficient.

The updating of the sample for 1996 suffers from the fact that detailed data by enterprises from 1995 supplied by the Customs are not very reliable and because of delay cover only a few months. The survey responses even by large enterprises of monthly data in early 1995 to the Bank of Finland and to the Board of Customs digress considerably – much more than five per cent. These differences must be rectified as much as possible and the major exporters and importers should report in a consistent manner to both authorities as long as the separate Bank of Finland survey is needed.

## 5 Validity testing of the estimates

Foreign trade time series up to the end of 1994 include a large irregular component when series are divided to level, trend, seasonal and irregular components. This breakdown is based on univariate modelling, that is, the various components are derived from the history of time-series. This is also a traditional working method among statisticians; when new data are received their correctness are first judged against their own historical values.

According to calculations made with STAMP-time series package, more than 70 per cent of monthly variance both in exports and in imports have been of irregular character in the univariate case.<sup>4</sup> In view to this fact, assuming that the variance pattern is still the same, two slightly different information systems may produce controversial results for the trade balance, exports and imports estimates being in both within the 95 per cent confidence limits (see charts 1A and 1B). How should the effect of large irregular variation be taken into account while judging the results in the estimation of single monthly values? Can we assume as above that the variation pattern of the new survey data or of the new Board of Customs data is similar to the former foreign trade data?

The exercise below tries to limit the set of possible results from statistical systems of foreign trade with robust economic relationships where explanatory variables are easily and early available.

Quantitative tests of the economic rationale of the results in exports are rather difficult to carry out because the demand variables for Finnish exports with their special structure are not simple to find and are available only with

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<sup>4</sup> See STAMP user guide, chapter 4.2, exceptional observations of time series are omitted as outliers.

rather long lags. Almost the opposite can be said about the modelling of the imports. The relationship between cyclical movements of domestic production activity (whereof early warning indicator is also available) and imports has often been verified in econometric models.

We can also establish an intuitive lower limit for the foreign trade values in early 1995, since the price indices are already available. In early 1995, the growth of foreign trade values over the year should be clearly more than price increases.

Standard result in the estimations of the immediate income elasticity of imports is that it is unity or slightly more. It is also very likely that this elasticity varies over the cycle; it is higher during the upswing and boom periods than in the recession.

The dynamic immediate elasticity of commodity imports to overall economic activity according to BoF4 model is 1.24. The KESSU model of the Ministry of Finance has disaggregated import equations and currently no dynamic aggregated elasticity is available. In the equations, the relationships between various categories of imports and production are set to unity. In the calculations made by the high level employment group chaired by Mr. Matti Pekkanen during the autumn 1994, the income elasticity of imports of 1.5 was used.<sup>5</sup>

The propensity to import has probably also increased during the recent ten years. In the booming years of late 80's, firms initiated specialization processes and started to acquire semifabricants from low-cost countries. The slump of early 90's hit most severely the import-competing industries for domestic demand and thus the propensity to import grew even more. On the other hand, the accentuated need to economize production processes may work for lower imports when inventories are kept at minimum level.

In addition to structural changes, also some short-run timing factors may affect the fixed relationships between variables when economic rationale of various estimates are considered. One example of these might be the factors behind smaller imports than expected in early 1995. The tax treatment of third country imports changed when Finland joined the EU and some import hoarding took place during the last months of 1994.

## 6 Calculations

During the first half of 1995 the average export prices have been some 6 per cent higher than a year earlier; as mentioned, the rise has been concentrated on paper and pulp prices. This growth – assuming no change in volumes – can be taken as a yardstick to judge which should be the minimum growth of exports preliminaries should reveal. As expected, both estimates, which in January were only 500 million apart clearly exceed the above established lower limit (see charts 2A and 3A).

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<sup>5</sup> See the reports of the BoF4-model, of the Kessu IV-model and the report of The Employment Group of President of the Republic.

In imports the lower limits given by the price changes are the import values of 1994, since the price increases have been practically nil.

The reference for the import model was taken from the monthly indicator of the gross domestic product which is available until May. According to this information the average annual growth rate has been almost 6 per cent. The income elasticity of the BoF4-model was chosen for calculations which produce import values somewhat lower than those received from the Bank of Finland survey. The Board of Customs estimate for January is surprisingly low, emphasizing the counter effect of the import hoarding taking place in November and December 1994 (see charts 2B and 3B).

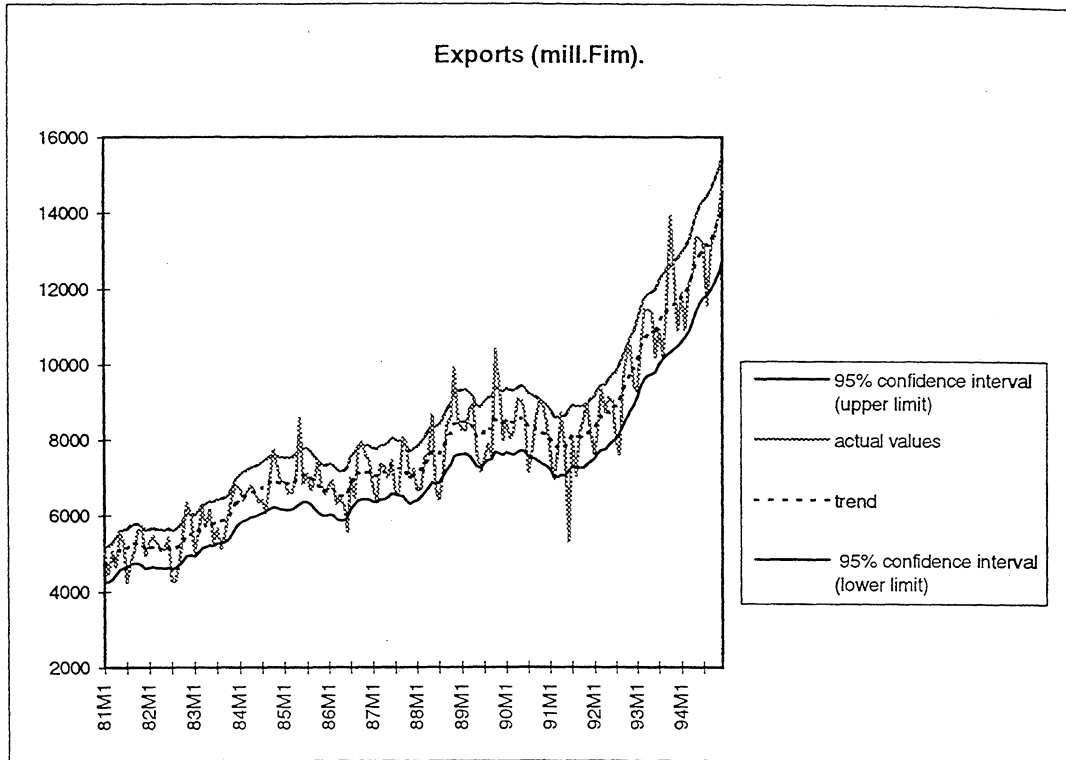
## 7 Conclusions

It seems evident that within rather wide limits exports and imports can be estimated with the cut-off survey. However, monthly variations being very large, it is of utmost difficulty to give precise monthly estimates for the trade balance. The current preliminaries produced by the Bank as well as by the Customs may give wrong signals to the market if single monthly observations are concerned.

Later, when cyclical and seasonal components can be established, the Bank of Finland survey data may describe the underlying developments in the foreign stability with reasonable reliability. In addition, the use of robust economic relationships could be one way to economize and to speed up statistical systems. However, to have consistent short term information on trade balance, only one reliable information system is no doubt preferred. Therefore, the Board of Customs should make every effort to make their statistical system functional so that information are available with only a few weeks delay and the reliability of the old foreign trade statistics could be reached.

Chart 1.

1A



1B

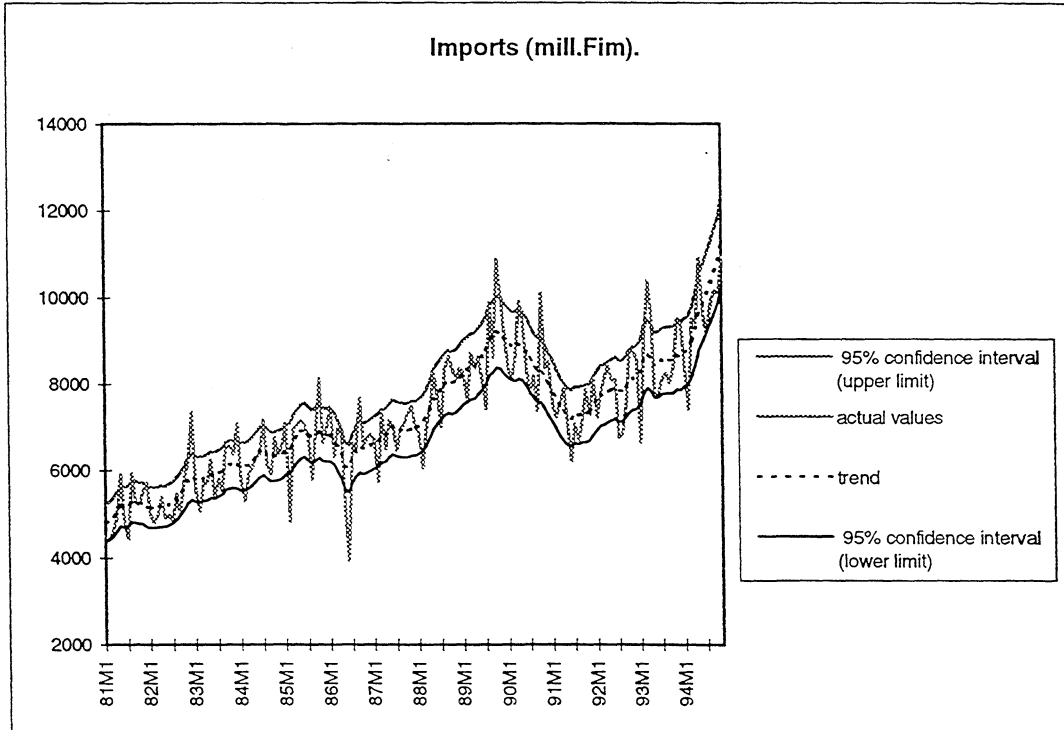
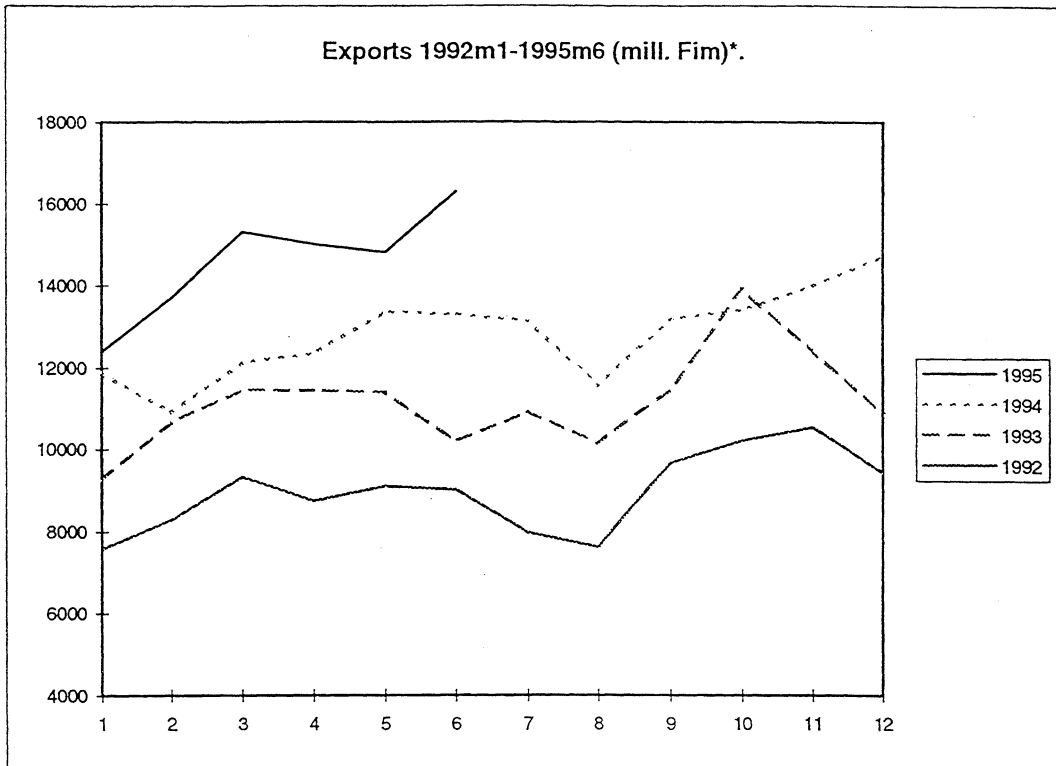
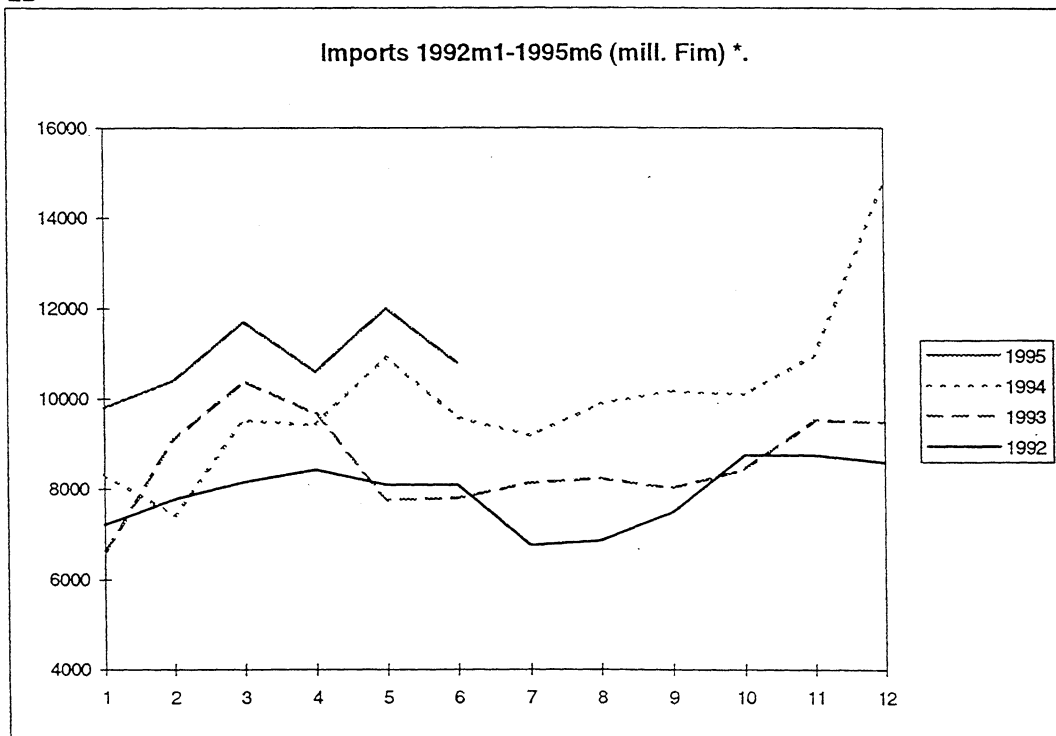


Chart 2.

2A



2B

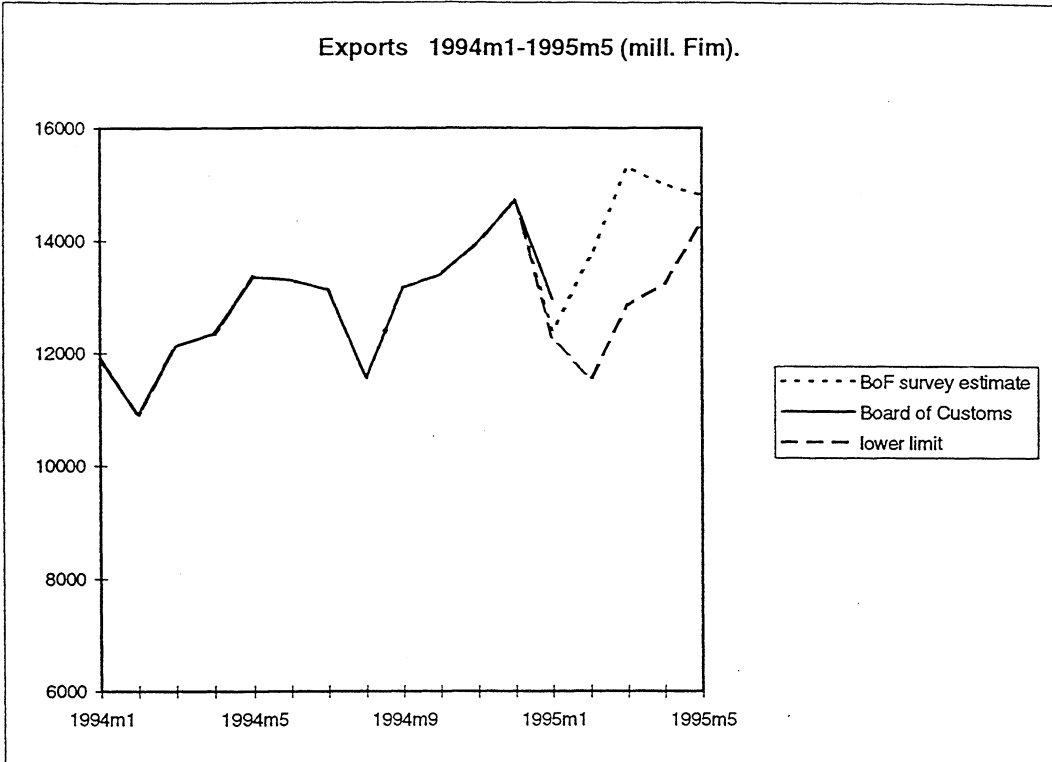


\*=Figures from 1995m1 to 1995m6 are the Bank of Finland estimates.

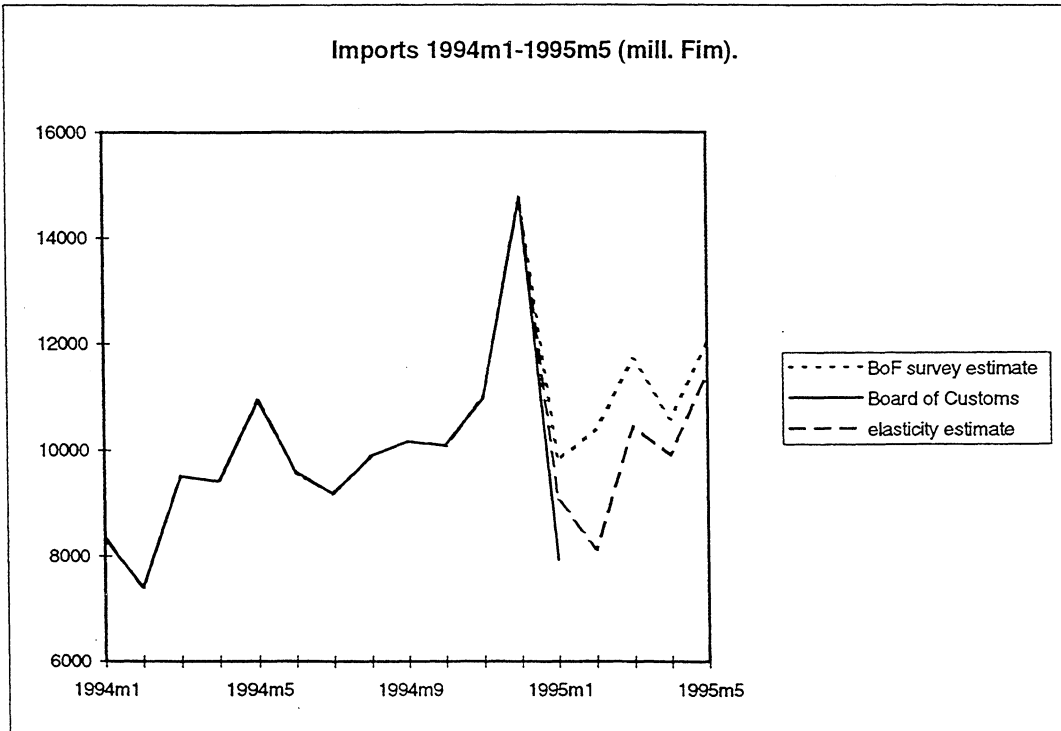


Chart 3.

3A



3B



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## The Grossing-up Procedure

Month:	9506
<b>Exports</b>	
Result from the survey	12 745.9
Large 7 total	7 300.8
Ships	1 483.9
Exports excl. large7 + ships	3 961.2
Multiplier	1.90
Grossed up	7 526.3
<hr/>	
Estimate for total exports	16 311.0 (16 300)
<b>Imports</b>	
Result from the survey	7 412.3
Large 3 total	1 972.0
Imports excl. large 3	5 440.3
Multiplier	1.62
Grossed up	8 813.3
<hr/>	
Estimate for total imports	10 785.3 (10 800)
<b>Trade account</b>	<b>5 525.7</b> (5 500)

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