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## Changes in Finland's international investment position, 1985-1998: A brief statistical analysis

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# BANK OF FINLAND DISCUSSION PAPERS

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18/99

**Jorma Hilpinen – Heikki Hella**

Statistics Department  
1.12.1999

## Changes in Finland's International Investment Position, 1985–1998 A Brief Statistical Analysis

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**Changes in Finland's International  
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# Changes in Finland's International Investment Position, 1985 – 1998

## A Brief Statistical Analysis

Bank of Finland Discussion Papers 18/99

Jorma Hilpinen – Heikki Hella  
Statistics Department

### Abstract

This paper attempts to describe and compare developments in the components of Finland's net international investment position (NIIP). The data consist of sectoral flows and valuation items over the period 1985 – 1998, which is, for analytical purposes, broken down into two subperiods: before and after the Finnish markka was floated. The study focuses on the main sectors, ie banks, corporations and the central government. Valuation items (changes in exchange rates and equity prices) are also important in the decomposition of the NIIP, particularly as regards recent history of equity prices. The mean and variability of each item is estimated, and for some items also bivariate robust variance tests are carried out.

The major feature in Finland's balance of payments has been nonresidents' increased interest in Finnish equities as an object of investment. This phenomenon, along with the boom in share prices, has in recent years raised the equity holdings of foreigners to the rank of most significant item in Finland's international investment position. Another important feature in the BOP is the rapid growth of the central government's foreign debt due to the deep recession of 1991 - 1994. In respect to Finland, it is important to note the different stories told by developments in NIIP vs net external debt components: NIIP figures indicate that ownership of corporations based in Finland has indeed become global and that the value of shares has been increasing, whereas net external debt figures indicate that the economy has succeeded in restoring external indebtedness to pre-recession levels.

The results also confirm that the Finnish banks still contribute prominently to variations in Finnish BOP flows. As regards the late 1980s and early 1990s, this can be inferred from the highly bank-oriented structure of Finnish financial markets, but the same holds true during the 1990s as well in the period of recovery from economic crisis.

Key words: balance of payments, international investment position,  
net external debt

# Suomen ulkomaisen nettovarallisuuden muutokset 1985–1998

## Lyhyt tilastollinen analyysi

### Suomen Pankin keskustelualoitteita 18/99

Jorma Hilpinen – Heikki Hella  
Tilasto-osasto

### Tiivistelmä

Tämä artikkeli kuvaa Suomen ulkoisen nettovarallisuusaseman kehitystä viimeksi kuluneen runsaan kymmenen vuoden aikana. Artikkelissa vertaillaan sektoreittaisia pääomavirtoja ja maksutasetilaston arvostuseriä (prosentteina BKT:stä) vuosina 1985–1998 siten, että tarkasteluajanjakso on jaettu kahteen osaan eli aikaan ennen ja jälkeen markan laskemista kellumaan syyskuussa 1992. Sektorit ovat pankit, yritykset ja muut, keskuspankki sekä valtio. Lisäksi tarkastellaan varallisuusaseman kannalta tärkeitä valuutta- ja pörssikurssien vaihteluja. Artikkelissa tarkastellaan kunkin erän keskiarvoa ja varianssia ja tehdään pareittaisia testejä robustien varianssien yhtäsuuruudesta.

Tärkein piirre Suomen maksutaseen kehityksessä on se, että ulkomaalaisten kiinnostus suomalaisiin osakkeisiin on kasvanut. Kun osakkeiden hinnat ovat samanaikaisesti moninkertaistuneet, ulkomaalaisten sijoituksista osakkeisiin on kasvanut. Toinen huomattava kehityspiirre on valtion ulkomaisen velan nopea kasvu laman aikana. Käsitteiden ulkomainen varallisuusasema ja ulkomainen velka eroa on korostettava; edellinen kuvaa yritysten kansainvälistymistä ja jälkimmäinen sitä, miten ulkomainen korollinen velka on vaihdellut. Viime vuosina ulkomainen nettovelka on onnistuttu palauttamaan 90-luvun lamaa edeltäneelle tasolle.

Tulokset osoittavat myös, että pankeilla on edelleen suuri vaikutus pääomavirtojen vaihteluun, vaikka usein on väitetty, että pankkien merkitys ulkomaisen rahoituksen välityksessä on vähentynyt. Koettu pankkikriisi näkyy tuloksissa, ja myös sekä yrityksiä että pankkien taserakenteiden laman jälkeinen paraneminen voidaan todentaa aineiston avulla.

Asiasanat: maksutase, ulkomainen nettovarallisuus, ulkomainen nettovelka

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# 1 Introduction

This paper aims to describe and study by main component the fluctuations in the Finnish IIP. These components are the Balance of Payments flows by institutional sector as well as the valuation changes induced by asset prices and exchange rate movements. Large structural and institutional changes of the Finnish economy are highlighted by dividing the sample period 1985–1998 into two subperiods (1985Q1–1992Q2 and 1992Q3–1998Q2).

The period before autumn 1992 can be characterised by a fixed exchange rate regime leading to continual credibility problems. A cyclical and monetary bubble ballooned in the last years of the 1980's, bursting into a deep recession and a banking crisis. The international capital markets became increasingly volatile, but the Finland remained largely outside.

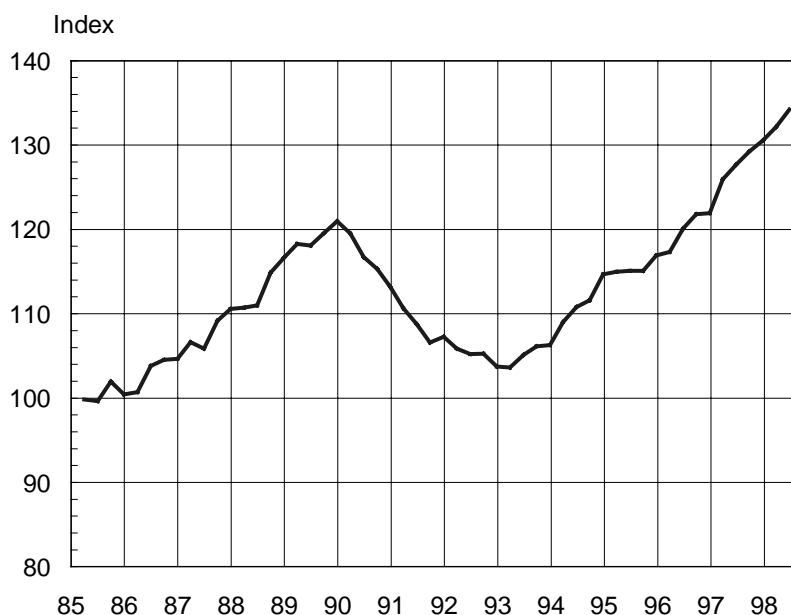
In September 1992, the Finnish markka was allowed to float and it depreciated steeply. The following year, the markka started to appreciate, and a few years later the stability of the exchange rate was regained. The recession and banking crisis greatly reshaped financial markets, production and institutional structures. The internationalisation of Finnish enterprises accelerated, and participation in international capital markets vastly expanded. Following membership in European Union and the EMU, the Finnish economy has been restructured to meet the new competitive conditions ushered in by the Economic and Monetary Union.

## 2 Growth, exchange rate and current account

After a long period of economic growth, the Finnish GDP decreased nearly 15 per cent during 1991–1993, experiencing the most severe economic recession of the 20th century. Total output began to revive 1993, and GDP reached the pre-recession level during 1996, with growth continuing thereafter.

Chart 1.

### Cross domestic product Volume index, 1985 = 100



The Finnish economy has been labelled as a small open economy with a high propensity to export and import. The share of exports of GDP has exceeded 30 per cent at its highest. The export industries have traditionally been energy and capital intensive, such as the pulp and paper industries, as well as the metal engineering industries. The recession was felt most severely in the consumer goods and service industries. After the recession of the 90's, the traditional export industries have strengthened their position in worldwide competition through mergers. The high tech industries have recently gained the position of major exporters.

After an era of credibility problems and pressures against the fixed rate, the Finnish markka was devalued in November 1991 and allowed to float in September 1992. In all, value of the markka depreciated some 30 per cent before it started to strengthen in spring 1993, regaining most of its value by mid-1995, after which it has been stable. Finland entered the EU exchange rate mechanism (ERM) in October 1996.

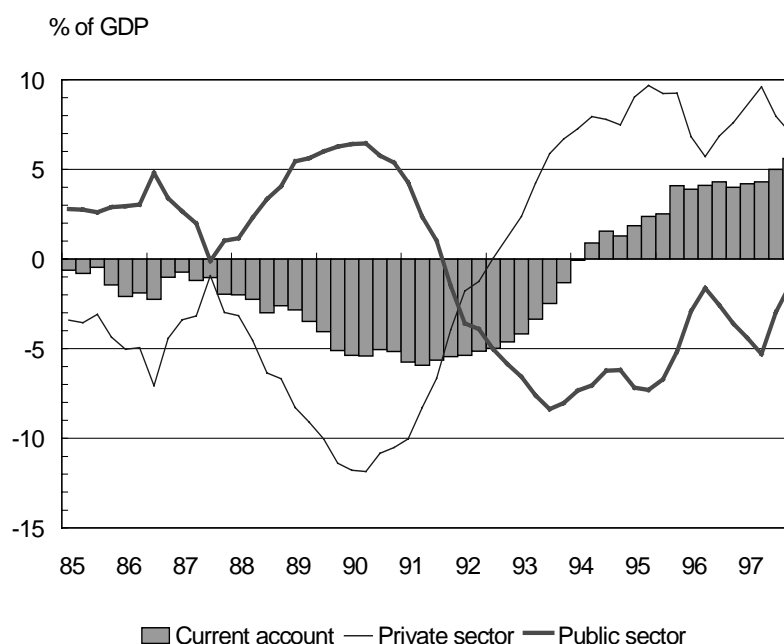
Chart 2. **The trade weighted currency index, 1982 = 100**



Over most of the post-war period, the Finnish economy has suffered from problems in foreign stability. Even as recently as from 1989 to 1992, the current account deficit amounted annually to some 5 per cent of GDP over four consecutive years. The deficit decreased to one fourth in 1993, while in the following year a surplus was achieved. The subsequent years have shown a continuing surplus, and in 1998 the current account surplus exceeded six per cent of GDP.

Chart 3.

### Net lending by sector



## 3 Decomposition of the Finnish IIP into flows by sector and valuation changes

The flow identity of the IIP is of the form<sup>1</sup>

$$A_t = B_t + C_t + D_t + E_t + F_t + G_t + H_t ,$$

where

A = Net IIP, liabilities less assets, total change (inflow +)

B = Banks, liabilities less assets, net change (inflow +)

C = Corporate sector, (and other sectors), liabilities less assets excluding shares and other equity items, net change (inflow +)

D = Corporate sector, (and other sectors), shares and other equity items, liabilities less assets, net change (inflow +)

E = Central government, liabilities less assets, net change (inflow +)

F = Net IIP liabilities less assets, valuation changes, excluding portfolio investment liabilities,

G = Portfolio investment, liabilities, valuation changes

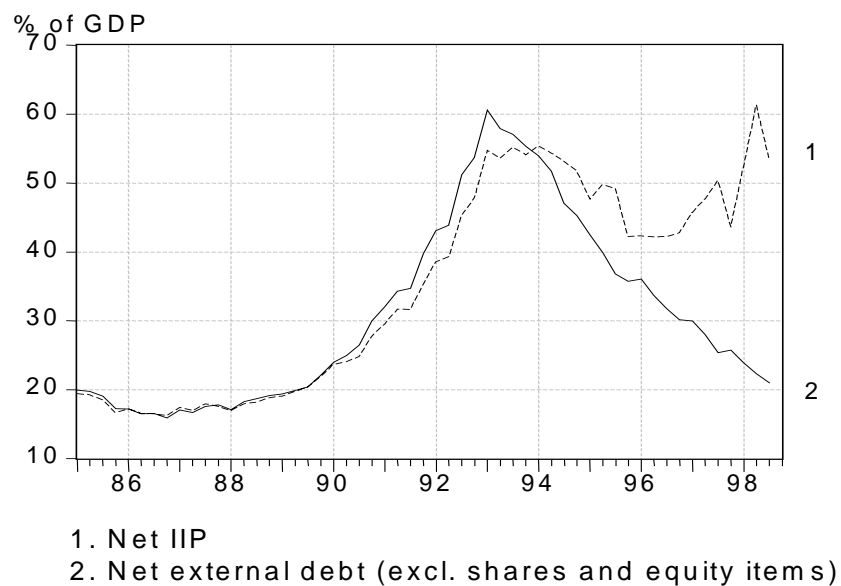
H = Reserve assets, net change (increase -)

All variables are expressed in percentage of the nominal GDP.

The sample period is 1985Q1 – 1998 Q2 and the subperiods 1985 Q1 – 1992 Q2 and 1992 Q3 – 1998 Q2.

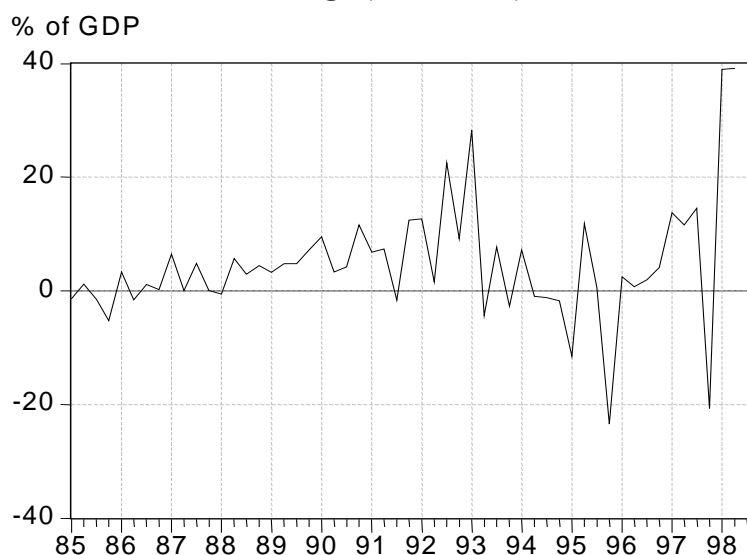
<sup>1</sup> The review of the Finnish Net IIP, see Kariluoto (1996, Section 5)

Chart 4.

**N IIP position (liabilities less assets)**

The mean and the standard deviation are presented below describing the development of the Net IIP (position and total change) and its components (also see Charts 4–10). The aim is to compare the size and variation of the quarterly sector flows and valuation changes both between variables in various subperiods and between the two subperiods. Ordinary statistical equality tests of mean, median and variance have been carried out for the total set of the Net IIP components. Tables I and II clearly reveal that the null hypothesis is rejected (all variables have equal value of a statistics). As shown below, carrying out the robust variance tests in pairs is of importance<sup>2</sup>, however.

Chart 5.

**NET IIP, total change (variable A)**

<sup>2</sup> See Brown & Forsythe (1974) and Levene (1960). Robust tests protect against the effects of outliers and other anomalies in data. Often it is important to carry out both robust and classical test and to compare the results. The first study conducted of the robust variance test is by Box (1953), who first used the word robust in a statistical meaning.

Table 1.

Mean value

A	B	C	D	E	F	G	H
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Quarterly:

$3.55 = 3.04 + 0.29 - 0.75 + 1.31 - 0.00 + 0.04 - 0.38$  : Period I 1985Q1–1992Q2

$6.11 = -4.04 - 2.15 + 1.16 + 3.71 + 1.47 + 6.52 - 0.56$  : Period II 1992Q3–1998Q2

$4.70 = -0.11 - 0.46 + 0.10 - 0.11 + 0.65 + 2.93 - 0.46$  : Total 1985Q1–1998Q2

Monthly:

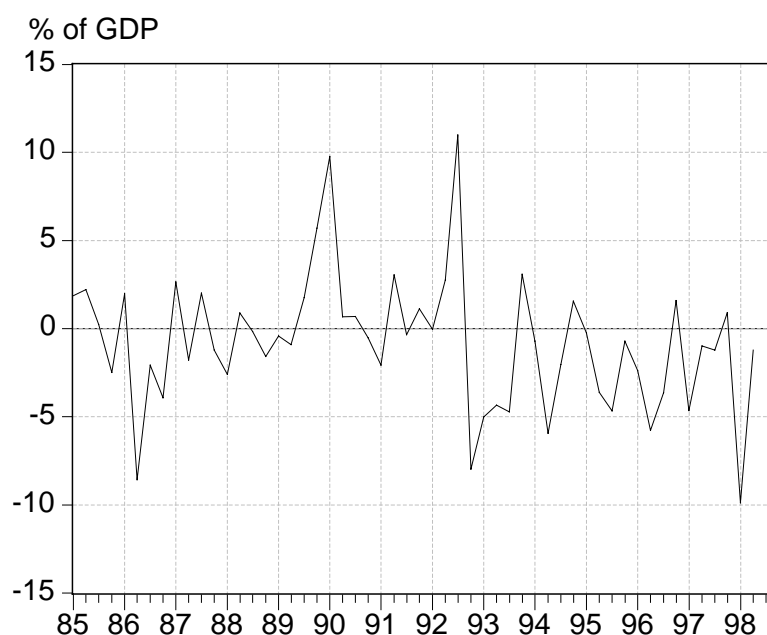
$4.58 = -3.21 - 2.72 + 0.90 + 3.12 + 0.90 + 6.27 - 0.68$  : Period 1992:M10–1998:M10

### 3.1 Private sector interest-bearing debt

According to Table I, the foreign financial flows of both the banks and the corporate sector were reversed when moving from period one to period two. The current account deficits had caused high levels of foreign indebtedness in Finland during the 80's. Banks have had a prominent position in conveying foreign finance via their balance sheets to the enterprise sector in a small country with a persistent shortage of capital. Only large international enterprises were able and allowed to acquire finance from global capital markets or had direct ties to foreign banks. After the mid 80's, the liberalisation of financial markets made substantial capital imports possible. This foreign finance was fatal to both domestic sector enterprises with limited risk-bearing ability as well as to banks when the recession hit in 1990. The repeated devaluations of the markka made foreign finance very expensive and many bankruptcies resulted.

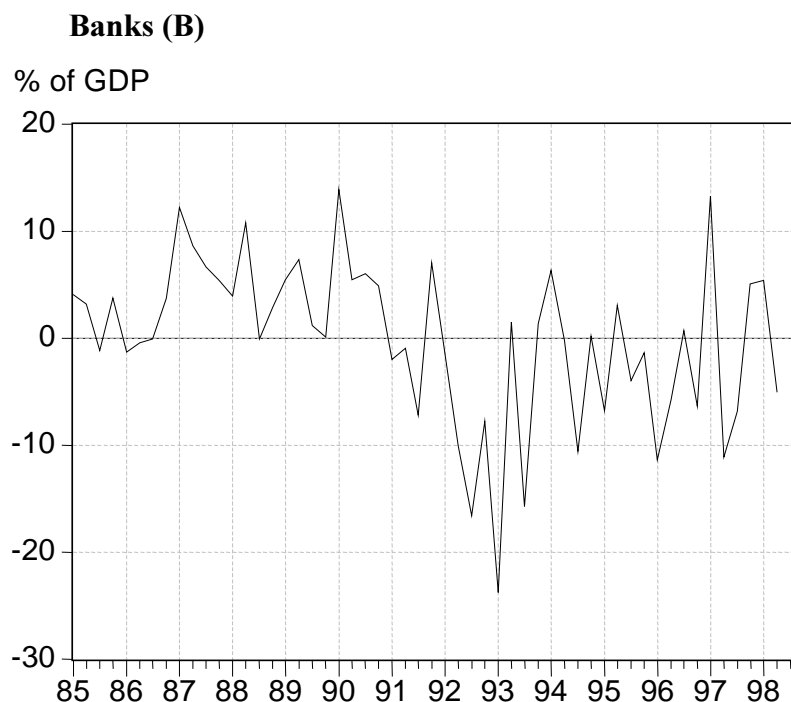
Chart 6.

#### Corporate sector, excl. shares and equity items (C)



Having survived the deep recession of the early 90's, enterprises and banks quickly paid back the bulk of their foreign loans and amortised most of their bonds issued in foreign currencies. The banking crisis caused by the recession resulted in major mergers between commercial banks and in the partial demolition of the savings bank system. Today, the largest commercial bank has a market share of some 40 per cent. After the recession, the foreign borrowing and the issues of bonds abroad by the private sector have remained fairly modest.

Chart 7.



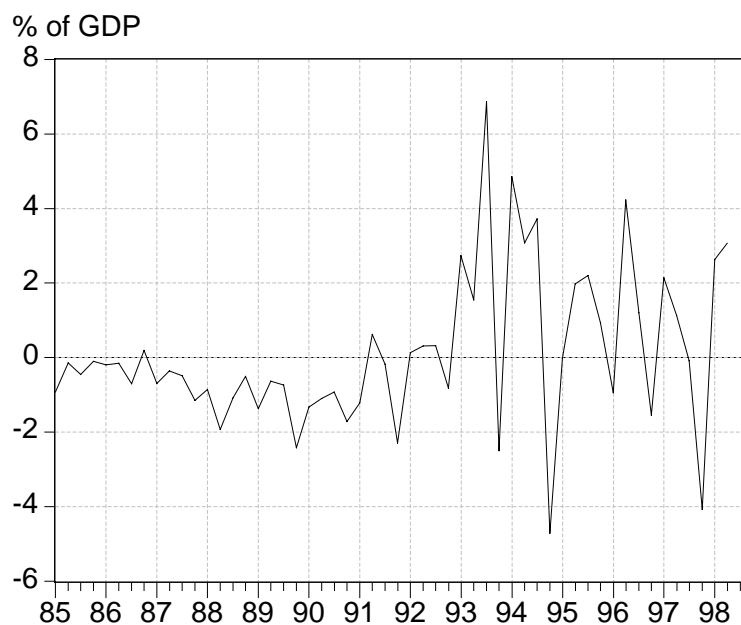
### 3.2 Equity items and asset prices

After 1992, foreign liabilities in the form of shares and equity grew in Finnish enterprises (D) as a result of Finnish shares becoming more interesting as an object of investment. The most dramatic change since 1992 is revealed in item G, the valuation changes of portfolio liabilities (mainly stocks)<sup>3</sup>. Currently, the major part of the liabilities in the Finnish Net IIP consists of Finnish shares in foreign ownership, the value of this stock representing almost 70 per cent of GDP. Most of the increase in this stock, in 1998 some 80 per cent, is attributed to the rise in equity prices. The boom on the stock market and a consequent rise of equity prices has contributed most to the liability side of the IIP, while Finnish residents have displayed only passive interest in foreign equities.

<sup>3</sup> See also chart 9.

Chart 8.

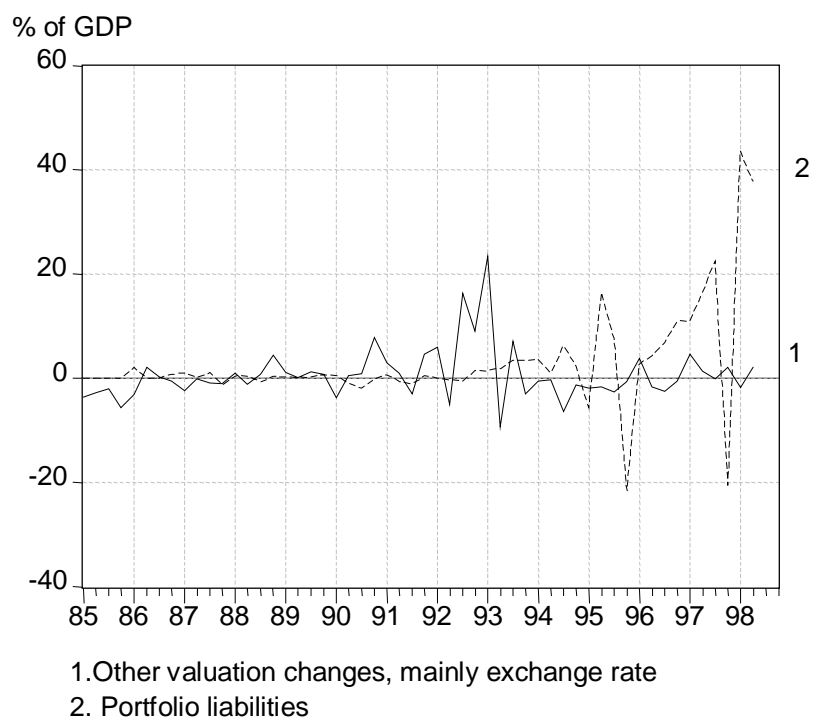
**Corporate sector, shares and equity items (D)**



Swings in the exchange rate have been apparent in the data after September 1992, when the Finnish markka was allowed to float (see item F).

Chart 9.

**Valuation changes (F and G)**



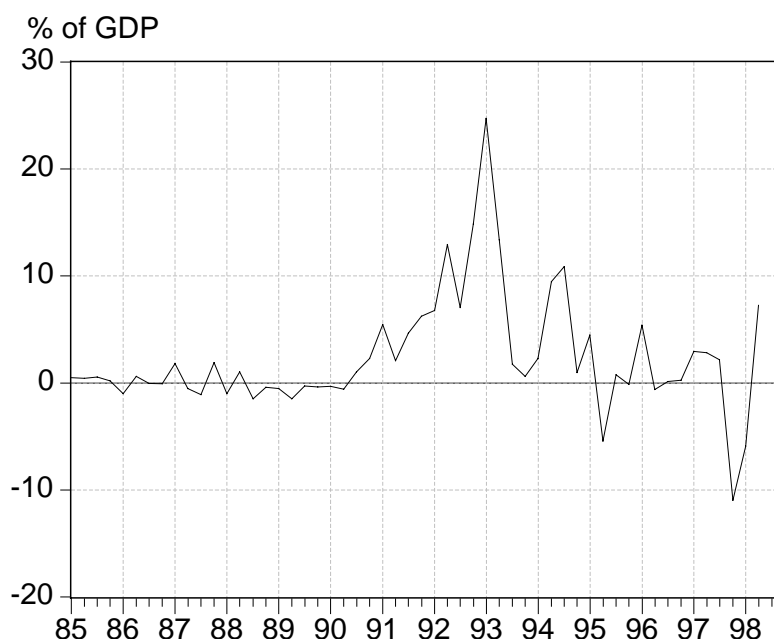


In the IIP, direct investments abroad and in the domestic economy are a considerable part of foreign assets and liabilities of the non-bank sector. Large-scale mergers both in banking and in export industries have recently led to vast single transactions. The direct investment abroad stock, being some 20 per cent of the GDP, is twice the level of foreign direct investment in Finland.

### 3.3 Central government capital movements

The strong growth of the net foreign debt of a central government in deep cyclical recession with shrinking tax revenue and growing unemployment outlays is depicted in item E in Table I. During the 1980's, the debt of the public sector was negligible in Finland. However, the net borrowing requirements of the central government were annually some seven per cent of GDP on average from 1992 to 1995, and accordingly, the central government debt rose over a few years to about 70 per cent of GDP. The balance between central government income and outlays was restored in the 1999 budget. During the first half of the 90's, the central government acquired substantial amounts of foreign finance, but more recently borrowing has taken place from domestic sources. The central government foreign debt currently stands at some 25 per cent of GDP.

Chart 10. **Central Government (E)**



Summing up, the role of banks has been dominant especially in the first period as shown in Table I. Banks contributed on average to over 85 per cent in the change of the net IIP. In addition to banks, central government and asset prices (mainly equity prices) were important factors for change in the IIP during the second period, the effect of the asset prices being the largest.

### 3.4 Variability of components

Table 2.

Standard deviation							
A	B	C	D	E	F	G	H
Quarterly:							
4.43	5.23	3.17	0.74	3.12	3.11	0.86	3.77
15.44	8.39	4.20	2.73	7.39	6.92	4.37	5.88
10.76	7.62	3.83	2.11	5.52	5.16	10.58	4.78
Monthly:							
27.93	12.07	6.28	4.48	10.92	9.29	26.45	10.18

Table II shows that the variability of most items is markedly larger in the second period than in the first. Totally, the coefficient of variation of the change in the IIP has grown from 1.25 to 2.53 from period one to period two. The valuation changes of portfolio liabilities (G) show the most striking increase of the variability, see Table II (rows 2 and 4). The coefficient of variation was in monthly case 6.10 in period two, almost three times that of the quarterly time series.

Monthly time series have, in general, considerably larger variability than the same time series with a quarterly frequency. This holds true especially when the flow data of the Balance of Payments are considered. However, the stock data studied do not display a similar increase of variability when the quarterly series are replaced by the monthly data. The larger variability of the monthly series obviously decrease their analytical relevance. When the monthly national flow data with large variability are aggregated, for example, to the Euroarea level, the statistical quality of the data is difficult to assess.

The equality of the value of the variances has been tested by comparing the key variables in pairs. Banks (B) and central government (E) are considered together as are banks (B) and corporate sector (C) as well as corporate sector (C) and central government (E). In addition, the two different valuation items, mainly exchange rates (F) and equity prices (G) are studied. The robust variance test<sup>4</sup> result strengthens the inference that banks' contribution has varied remarkably more than that of central government. A similar result emerges from the comparison of the variation between banks and corporate sector. As expected from earlier conclusions, the equality of the variance hypothesis is not rejected in the test between corporate sector and central government, as is the result between the two different valuation items.

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<sup>4</sup> Brown-Forsythe (1974).

## 4 Conclusions

This paper has endeavoured to describe and compare the development of the components of the Finnish Net IIP. The data consisting of sectoral flows and valuation items cover the period 1985–1998 and for analytical purposes two sub-periods, being before and after the floating of the Finnish markka. The study focuses on the main sectors; that is banks, corporations and the central government. Additionally, the valuation items (exchange rates, equity prices) have played an important role in the Net IIP decomposition, and particularly equity prices in recent years. The mean and variability of each item has been estimated, and for some items also bivariate robust variance tests were carried out.

The major feature of the Finnish BoP is the increased interest in Finnish equities as an object of investment. This phenomenon in hand with the price boom on the stock market has in recent years increased the equity holdings of foreigners to become the most significant item in Finland's IIP. At the same time, the globalisation of the major Finnish corporations has accelerated. A second feature is the rapid growth of the central government's foreign debt due to the deep recession and high unemployment from 1991 to 1994. The difference of the IIP and the net debt concepts in Finland must be emphasised; the IIP shows that the ownership of corporations based in Finland indeed has become global and the value of shares has been increasing, whereas the net debt shows that the economy has succeeded in restoring foreign indebtedness to pre recession levels.

The results above also confirm the fact that the Finnish banks still prominently contribute to the variation of the Finnish BoP flows. During the late 80's and early 90's, this can be inferred from the very bank-oriented structure of Finnish financial markets, but the same holds true during the 90's as well, even though it is argued that the role of banks has generally declined. Moreover, the pervasive crises of the banking sector is reflected in both subperiods. Even if enterprises have recently been more in a position to exploit the opportunities on the international capital markets, the banks' role was dominant when the economy was recovering from the recession, and both banks and the corporate sector made efforts to improve their balance sheets.

## Annex 1. Balance of payments statistics survey system

The total number of entities in the official register of enterprises and establishments is around 250 000 in Finland. The major export firms are large in relation to the size of the economy, but their number is limited and thus only a few firms are able to act in the international capital markets. In the early 90's, the Board of Customs reported that there were 6500 exporters and 10300 importers in Finland having more exports or imports than some 16 500 ecu (1993). The register of exporters and importers can be used as a frame for financial flow and stock surveys. The financial flows and stocks by enterprises can be made up with even smaller group of enterprises. For example, by surveying 80 – 90 consolidated enterprises some 70 per cent of exports can be covered but the same enterprises make up almost 100 per cent of the foreign assets and liabilities.

The total number of banks relevant for the BoP statistical reporting is ten, including in addition to commercial banks all savings- and co-operative banks reporting collectively via their central organisation, respectively, and the number of other financial institutions is 29. Other financial institutions constitute mainly of insurance companies and pension funds. In Finland, the domestic securities brokers carry on an important part of the securities trade of the residents with foreign papers as well as function as middlemen when nonresidents are trading with Finnish papers.

The statistical system employed in Finland can be characterised eclectic. Many sources for information can be used in compilation of the balance of payments statistics in a country with statistical tradition of good basic registers and a functioning collaboration between statistical authorities. This holds especially true in the current account where commodity trade, transport, travel and insurance can be based on special statistics not collected only for the balance of payments. The financial account surveys in turn serve the flow of funds statistics compiled by the Bank of Finland and Statistics Finland in collaboration. The consistency between the National Accounts and the Balance of Payments has always enjoyed high priority.

The system was built in the early 90's after the liberalisation of the exchange controls. Then the current account deficit and the growing indebtedness were major concerns of the economic policy. It was clear that the monthly information on these economic fundamentals were requested. The main invention of the system was to combine the stock and flow data as well as the income data to a single survey. In negotiations with banks and major enterprises the respondents informed that, in fact, the stock data were more readily available than the flow data. In addition, the combination of both made it easier for the respondents to be consistent in their reports.

For the monthly system a small non-probability sample on enterprises (less than hundred) was selected. The sample is updated annually and occasionally, like every fifth year, a 'census' survey is conducted. All banks are surveyed and only a few of the other financial institutions are exempted. All 26 securities brokers are surveyed for balance of payments purposes in order to cover the international financial activities of the households and small enterprises.

The monthly survey system is completed with annual surveys of direct investments abroad and in Finland. These surveys include more structural information and the sampling is more complex than in the monthly system. Additionally, nonrepetitive sections like the IMF survey on the geographical breakdown of portfolio assets can easily be included in the system in order to acquire more structural information.

## Annex 2. What is a robust variance?

The basic distinction between a classical (non-robust) and a robust variance estimator is that instead of the mean, some robust location estimator like the median is applied in the variance formula. Levene (1960) used the absolute difference from the mean. Brown and Forsythe (1974) developed the Levene test statistic by replacing the absolute mean difference with the absolute median difference. In the literature, this test is also known as the modified Levene test. This test appears to be superior in the robustness and power, i.e. it is robust against departures from assumption of statistical distribution (often normal) (see, eg Neter et al., 1996, p. 766). These departures occur for instance together with outliers in data. The modified Levene test does not require equal sample size.

# References

Bank of Finland, **Annual Reports**, Helsinki, various years.

Box, G.E.P. (1953) **Non-normality and tests on variances**, *Biometrika*, 40, pp. 318–335.

Brown M.B. and Forsythe A.B. (1974) **Robust Tests for the Equality of Variances**, *Journal of the American Statistical Association* Vol 69, pp.364 –367.

Kariluoto, Jarmo 1996 (1996) **Finland's Balance of Payments. Compilation methods, sources of information and time series for 1975 to 1992**, Bank of Finland Studies A:98.

Levene, H. (1960) **Robust Tests for the Equality of Variance**, in Olkin, Ghurye, Hoefding, Madow, Mann (eds.): *Contribution to Probability and Statistics*, Stanford University Press.

Neter, J., Kutner, M.H., Nachtsheim, C.J. and Wasserman, W. (1996) **Applied Linear Statistical Models**, Fourth Edition, Irwin, Chicago.

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