



BANK OF FINLAND

BULLETIN

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- Monetary policy and economic outlook
 - Macroeconomic shocks and the Nordic banking crises
 - Analysing monetary policy credibility with a model of the euro area
 - Currency crises: Some policy lessons
-

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Contents

Monetary policy and economic outlook	1
Macroeconomic shocks and the Nordic banking crises by Jarmo Pesola	11
Analysing monetary policy credibility with a model of the euro area by Juha Tarkka and Mika Kortelainen	18
Currency crises: Some policy lessons by Lauri Kajanoja	24
Items: Supplementary budget Commemorative coin for Aino Ackté and the opera	28
The Eurosystem's monetary policy instruments	29
Recent Bank of Finland research publications	32
Finland in brief	37
Visiting Scholars Programme	39
Balance sheet of the Bank of Finland	40
Charts	C1
Bank of Finland • Organization	

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Euro area economic growth has slowed and the near-term outlook has weakened. Recently published forecasts¹ indicate that real GDP will increase by only about 2%, or even less, in 2001. As regards the domestic demand component, growth decelerated already in the middle of 2000. During the first half of 2001, deteriorating economic performance around the world was clearly reflected in a weakening of exports from the euro area.

US economic growth has been sluggish since the summer of 2000, and other countries have also experienced a slowing of economic growth. Rapidly deteriorating conditions in the ICT sector have been key to the growth downturn and its spread from country to country. It is widely expected that the phase of sluggish economic growth – worldwide and in the euro area – will end sometime this year. However, there is a substantial risk that developments will turn out to be weaker than expected. In recent months, the dating of the anticipated upturn has generally been pushed forward in time and expectations of the speed of recovery have become more cautious.

Consumer prices in the euro area rose fairly rapidly in the early part of this year. It is however expected that inflation will decline during the latter half of this year and next year. As regards food prices, the pick-up in inflation should turn out to be temporary, and the rate of increase in energy prices has already slowed. The easing of economic growth could help to curb inflation pressures. It is expected that the changeover to euro banknotes and coins will not have a significant impact on consumer price inflation in the euro area.

Finnish economic growth in 2001 has been notably slower than estimated as late as spring of this year. Near-term growth prospects have also faded quickly. According to the Bank of Finland's forecast revision, GDP growth will slow to about 1.5% this year and the unemployment situation will weaken. The key factors behind the worsened outlook are changes that have occurred in the euro area and elsewhere in the international environment, and the various effects of these changes.

The rate of increase in consumer prices has remained relatively high in Finland, albeit the rise has been decelerating since early summer. The easing trend is expected to continue in the latter half of 2001 and in 2002, in line with expectations for the euro area as whole.

The weakening economic outlook in Finland means that the central government's surplus will shrink and the debt paydown will slow considerably as compared to recent-year outturns and prior estimates. In the effort to stabilise central government finances and create a structural surplus, the aim has been to ensure that in times of poor economic performance the 'automatic stabilisers' can be allowed to operate. In order to prepare for spending related to population ageing, it is essential that there be a clear and persistent structural surplus in central government finances. Considering the high cyclical sensitivity of the tax base, caution must be exercised in spending decisions.

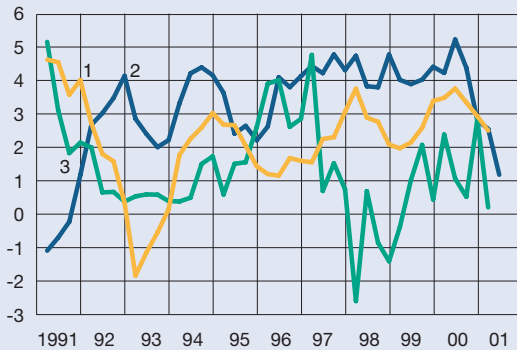
Prospects are poor for world economic growth in the near term

Growth of the world economy has slowed in the course of the last twelve months. US economic growth

¹ The August consensus forecast (compiled by Consensus Economics Incorporated) indicated euro area growth of 2.0% in 2001.

Chart 1. Real GDP growth

Change on year-earlier quarter, %

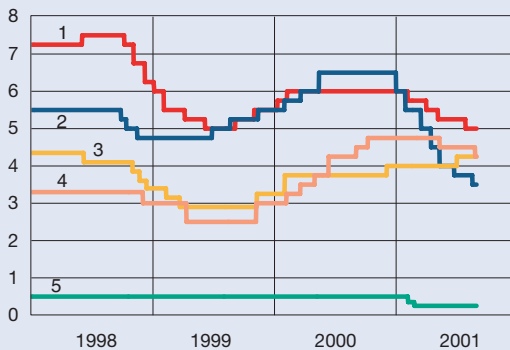


1. Euro area
2. United States
3. Japan

Sources: Eurostat and OECD.

Chart 2. Official interest rates

%



1. United Kingdom: repo rate
2. United States: fed funds target rate
3. Sweden: repo rate
4. Eurosystem: main refinancing rate / minimum bid rate (German repo rate before 1999)
5. Japan: discount rate

Source: Reuters.

has been modest since the summer of 2000, and growth has also slowed in Europe, Japan and several newly industrialised Asian countries (Chart 1). The near-term outlook for world economic growth has also weakened, and it appears that current-year growth will remain considerably below expectations that were generally held as late as last spring.

Weakening of actual and projected output in the ICT sector has been key to the slowing of real GDP growth, especially in the United States and increasingly in other countries. Large-scale investments made in ICT products in recent years and the accompanying rapid increase in production capacity have clearly been overblown, in light of present conditions. One result is that the rate of investment has slowed and, in the United States in particular, com-

panies have sharply adjusted inventories to lower demand levels.

It is widely expected that growth will pick up again in the major economies in 2002. Recovery should be most pronounced in the United States, but the Japanese and European economies are also expected to record faster growth. Behind these projections are reductions in interest rates and taxes that have been put in place in the United States and many European countries (Chart 2). Other relevant factors are an anticipated end to inventory adjustment and a pick up in investment in the US ICT sector. However, there is a high risk that economic performance will be weaker than expected. Accordingly, it is possible that growth will remain sluggish much longer than generally anticipated.

In addition to the uncertain outlook for economic growth in the industrial countries, unease in the international financial markets has also been exacerbated by financial disturbances in Argentina and Turkey. There is concern that these disturbances could spread to financial markets of other emerging countries. The likelihood of such contagion has been reduced – but not eliminated – by investor caution carried over from the Asian and Mexican crises and greater flexibility of exchange rate systems.

Euro area economic growth slowed by more than expected

Economic growth started to slow in the euro area already in mid 2000 after a softening of domestic demand. Private consumption in particular decelerated, due partly to higher energy and food prices, which reduced households' real disposable income. Subsequently, the slowing of world economic growth led to a decline in euro area exports and a further slowing of economic growth. Investment has also eased.

It appears that euro area economic growth will remain modest in the latter half of 2001, since export and investment prospects in particular have remained weak. The worsening employment situation is dampening prospects for growth of private consumption. Forecasts now indicate that GDP will grow by about 2% in 2001, compared to the 3% rate still generally anticipated at the start of this year, and even slower growth is possible.

Euro area inflation is expected to decline

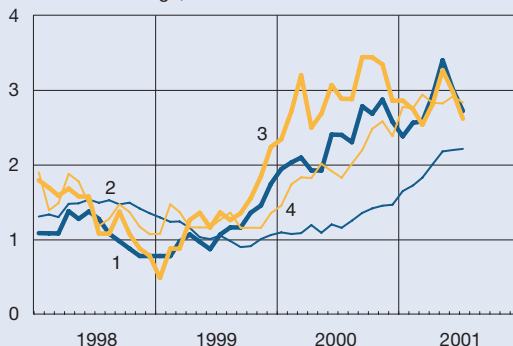
Euro area inflation was high in the first half of 2001 as food prices rose sharply (Chart 3). The foot-and-mouth and mad cow diseases put upward pressure on the prices of meats and other food products. The advance in prices also accelerated somewhat for non-energy industrial products and services. In recent months, however, inflation has slowed, due largely to a decline in energy prices.

Inflation is expected to slow further in the latter half of 2001 and in 2002. Indicators of this include stable oil prices and a sense that the acceleration in food prices is a temporary phenomenon. The weakening outlook for economic growth is also expected to reduce inflation pressures. However, there is a risk that the realised pick-up in inflation has boosted inflation expectations and that this could be reflected in future salary and price developments, eg in the form of demands for compensation in the coming wage negotiations. This would be detrimental in terms of inflation as well as employment prospects. It is noteworthy that the rise in fuel prices in particular has meant a decline in real incomes throughout the euro area economy – not only among households.

The changeover to euro banknotes and coins could have a slight, temporary effect on consumer price inflation, as prices of goods and services are rounded upward. The rounding will however correspondingly reduce future price increases. Moreover, it is likely that many prices will be rounded downward instead.

Chart 3. Harmonised Index of Consumer Prices

12-month change, %



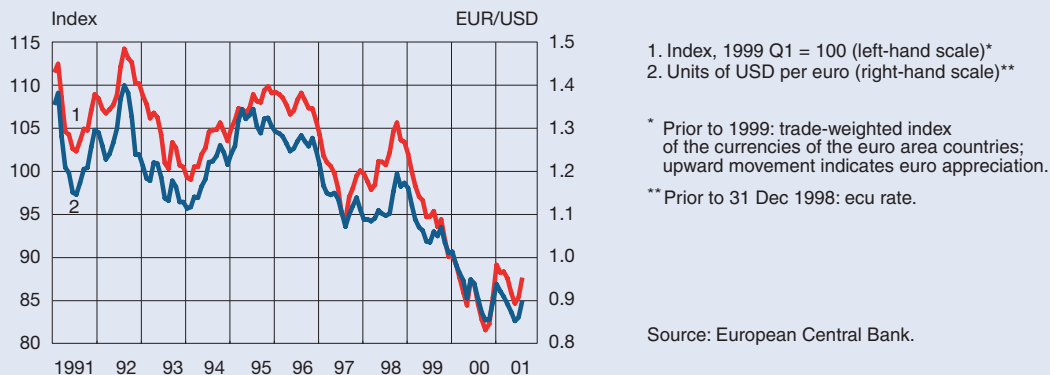
1. Euro area, total index
2. Euro area, total index excl. energy and unprocessed food
3. Finland, total index
4. Finland, total index excl. energy and unprocessed food

Source: Eurostat.

Chart 4. Euro area interest rates



Chart 5. Euro's effective exchange rate and USD / EUR



In any case, the euro changeover will in the long run serve to ease upward price pressures by facilitating price comparison and increasing competition.

Euro area monetary conditions are supportive of growth

The Governing Council of the ECB has lowered its official interest rates twice in 2001, in May and August, by a total of 0.5 percentage point. The minimum bid rate on the main refinancing operations is now 4.25%. The rationale for the rate cuts was a reduction in medium-term inflation risks. Correspondingly, money market interest rates have also fallen, partly in anticipation of the ECB's policy decisions (Chart 4).

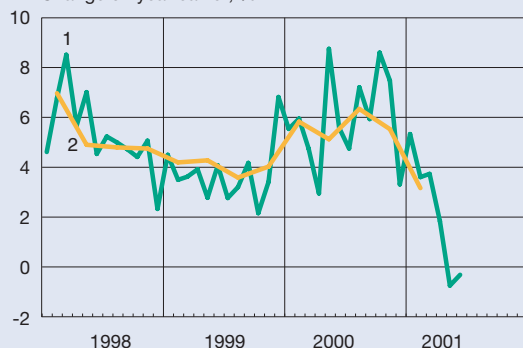
Overall monetary conditions in the euro area are relatively easy, with market interest rates fairly low and the euro's external value low (Chart 5). Euro area broad money (M3) growth has accelerated slightly in recent months. This could be partly due to unease in the stock markets and declining interest rates, both of which have boosted the demand for liquid bank deposits. The rate of growth in lending has, in contrast, continued to slow during the first half of 2001.

Finnish economic growth will slow by more than expected in the spring

Finland's real GDP grew much less in the first half of 2001 than was forecasted by the Bank of Finland

Chart 6. Finland's total output

Change on year earlier, %

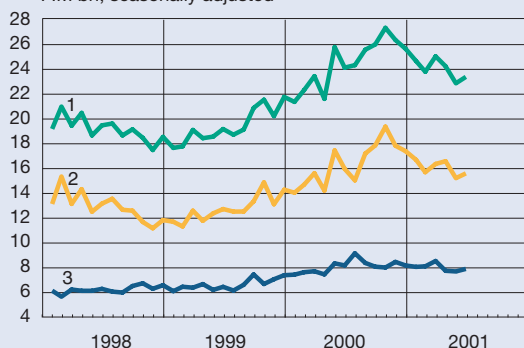


1. Monthly indicator of total output
2. GDP

Source: Statistics Finland.

Chart 7. Finland's goods exports by area

FIM bn, seasonally adjusted



1. Total goods exports
2. Exports to non-euro area countries*
3. Exports to euro area countries*

* Figure for June 2001 based on Bank of Finland estimate; Greece not included in euro area data.

Sources: National Board of Customs and Bank of Finland.

in spring 2001, and the near-term outlook has also deteriorated (Chart 6). The slowdown in economic growth is due primarily to a halt in export growth. Growth in the value of exports to the euro area came to a halt already in mid 2000. The value of exports to non-euro area countries continued to grow rapidly until the end of the year, after which it has declined (Chart 7). Moreover, inventory levels have been adjusted in line with weaker demand (see Box 1 for revisions to the Bank of Finland's forecast).

The recent weakness of Finnish export activity is largely due to a decline in exports of electronics products, which is a reflection of a worldwide slowdown of activity in the ICT sector. The slowing of the world economy has in fact had a more pronounced dampening effect on economic growth in Finland than in

many other European countries. Export activity has also been sluggish in many of Finland's traditional export sectors.

The decline in export demand led to a decline in industrial production in the spring of 2001, particularly in electronics products (Chart 8). Production has also fallen in the forest products sector, where attempts have been made to support prices via work stoppages.

Domestic demand for final products remained fairly strong in the first quarter. Investment in machinery and equipment was particularly robust, but private consumption also increased. This could not, however, prevent a slowing in the growth of total output against a background of declining exports and inventory investment.

Box 1. Revisions to the Bank of Finland's forecast: growth will be notably slower than previously forecasted

In the Bank of Finland's spring forecast, GDP growth for 2001 was estimated at 3.9%. Lower growth was considered possible in the event that a restoration of growth in the world – especially US – economy should fail to transpire. The change in the outlook for Finnish exports has indeed led to substantially slower-than-estimated economic growth.

In the spring forecast, exports were estimated to grow by about 6% this year but, due to weaker-than-estimated export activity in the early part of the year and a weaker outlook for the rest of the year, exports are now estimated to decline by 3.5% (Table). The slowing of export activity has affected all the main sectors, but an especially sharp fall has taken place in the electronics industry. The volume of exports is not expected to turn upward until 2002 Q1 (and then only modestly).

It is now estimated that this year's growth of private consumption will be almost a percentage point less than previously estimated, ie about 2.5%. Recent indicator data suggest that consumption is growing more slowly than projected in the spring. There are, however, a number of factors, such as lower interest rates, favourable wage developments and tax reductions, that could keep private consumption growth at a fairly reasonable rate. A slowing of real GDP growth will at some point have a dampening effect on invest-

ment. It is estimated that the process of inventory adjustment will continue and that the ratio of change in inventories plus statistical discrepancy to previous-year total demand will turn negative in 2001, contrary to what was projected in the spring. Growth rates for aggregate domestic demand and real GDP could slow this year to 2.3% and 1.5% respectively.

The unemployment rate continued to decline during the first half of 2001, but the employment-improving effect of economic growth could recede in the second half. A growth rate of some 2% is not enough to keep unemployment on a downward course. The decline in the unemployment rate has indeed already shown signs of coming to a halt and unemployment could begin to increase in the near future.

Economic growth in the latter part of the year – and especially next year – is closely tied to the recovery speed of international trade and particularly domestic ICT output. If both international trade and domestic demand for final products develop in a relatively favourable manner and the process of inventory adjustment ends by early 2002, real GDP growth should accelerate to nearly 2.5% in 2002. An even higher growth rate is possible since export growth could produce a positive surprise. On the other hand, if the recovery in exports is delayed until well into 2002, the above growth-acceleration scenario would be in jeopardy.

Table. Finland's aggregate supply and demand at 1995 prices, inflation, and employment

	Spring 2001 forecast			National accounts ¹	Forecast revision	
	2000	2001	2002		2000	2001
Change on year earlier, %						
Real GDP	5.7	3.9	3.3	5.7	1.5	2.4
Imports of goods and services	12.8	6.1	5.3	15.7	-3.4	1.2
Total supply	7.4	4.5	3.8	8.1	0.3	2.1
Exports of goods and services	17.7	6.1	6.1	18.1	-3.5	1.7
Consumption	2.2	2.8	2.6	2.3	2.2	2.3
Private consumption	3.0	3.2	2.8	3.0	2.4	2.5
Government consumption	0.4	1.8	2.0	0.7	1.9	2.0
Fixed investment	4.8	4.7	4.2	5.5	4.1	2.6
Private fixed investment	5.7	5.3	4.6	7.4	4.5	2.7
Government fixed investment	0.1	0.9	1.5	-5.4	1.3	1.5
Change in inventories plus statistical discrepancy, % of year-earlier aggregate demand	-0.2	0.2	-0.3	0.2	-0.2	0.0
Total domestic demand	2.5	3.6	2.5	3.3	2.3	2.3
Consumer inflation (HICP)², %	3.0	2.5	1.9	3.0	2.7	1.8
Employment	1.7	1.4	0.9	1.7	1.0	-0.4
Unemployment rate, %	9.8	9.2	9.0	9.8	9.4	10.0

¹ 12 Jul 2001.

² Harmonised index of consumer prices.

Sources: Statistics Finland and Bank of Finland.

Private consumption apparently continued to grow during the late spring and summer. Although the consumer confidence indicator has weakened considerably, consumers remain highly confident about their own finances, which could be a reflection of fairly favourable income and employment conditions. Employment growth, however, has focused this year largely on the services and general government sectors, as eg the number of municipal employees has increased (Chart 9). It is expected that employment conditions will deteriorate in the near term, which might dampen consumption demand.

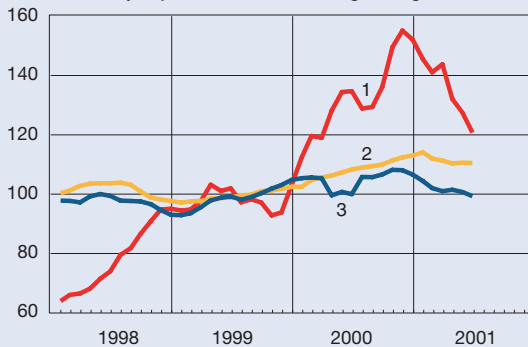
While Finland's real GDP in the first half of the year was below expectations growth prospects for the second half are also weaker now than indicated in the spring forecast. Thus growth in total output for the whole year is expected to be around 1.5%. The

present outlook for the world economy, as well as eg the industrial confidence indicator, signal the possibility of an even weaker performance.

Evaluating prospects for Finland's near-term economic performance is complicated by the recent years' increase in the importance of the ICT sector. Prospects for the sector can change quickly and in large amounts, as we have seen recently, eg in connection with technological advancement. At the moment, much additional uncertainty derives from the ongoing technological transition in telecommunications, of which even companies in the area have no clear idea of the duration and exact repercussions. Moreover, production in the area shifts readily from country to country, which complicates forecasting of Finland's real GDP. Even large forecast errors – in both directions – are possible.

Chart 8. Manufacturing output by sector

Index 1999 = 100,
seasonally adjusted, 3-month moving average



1. Electronics industry
2. Metals excl. electronics
3. Forest industries

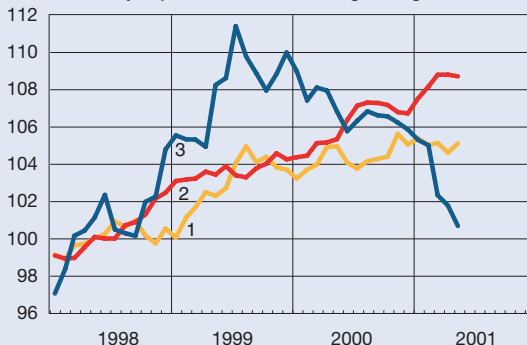
Electronics industry refers to Statistics Finland's class DL (manufacture of electrical and optical equipment).

Seasonally adjusted by the Bank of Finland.

Source: Statistics Finland.

Chart 9. Employment in Finland by sector

Index 1998 = 100,
seasonally adjusted, 3-month moving average



1. Manufacturing
2. Services
3. Construction

Source: Statistics Finland.

Inflation slowed also in Finland

Finland's inflation rate has remained fairly high. In late spring of 2001 inflation accelerated especially in the food sector, largely as a result of outbreaks of animal diseases in Europe. At the same time, energy products also became more expensive. Consumer price inflation, nonetheless, slowed in June-July, as energy prices again declined.

As is the case for the euro area, Finnish consumer price inflation is expected to decline gradually during the second half of this year and next year. The stabilisation of the price of oil, the expected reduction in the food-price effect and the slowing of economic growth will reduce inflation pressures.

In the spring the Bank of Finland forecasted a 2.5% higher average level of consumer prices in 2001 than in 2000, as measured by the harmonised index of consumer prices (HICP). In light of current information, there is no need for large revisions to this forecast. Next year consumer price inflation should slow further, to less than 2%.

It is possible that in the short run Finland will experience higher-than-forecasted inflation. Energy prices already have a history of surprises, and the same is true of food prices. Moreover, in areas where productivity improves slowly – especially in the services sector – salary developments could maintain inflation pressure even as demand falters (see Box 2 for labour productivity developments in different sectors). Inflation pressures in Finland could be further exacerbated by the changeover to euro banknotes and coins, as in the euro area as a whole, but the impact of this should turn out to be small and short-lived, provided goods and services providers do not use the changeover as a pretext for boosting prices. Such behaviour would tarnish the euro's reputation as a stabilising force in the economy.

In Finland, as in the whole euro area, the growth rate of the liquid money supply items has accelerated in recent months while the rate of growth of the lending stock has remained moderate. The amount of new housing loans raised has increased, which is a reflection of brisk activity in the housing market in the late spring and summer despite a deteriorating economic outlook. It is likely that conditions in the housing market will ease in the near future. It does not appear that a significant decline in housing prices is in the offing because interest rates have remained

low. The fall-off in housing construction will also help to support prices. Prolongation or deepening of the slowdown in economic growth, in concert with a greater-than-forecasted increase in unemployment, could however have a notable impact on the course of housing prices.

Companies' worsening financial results have abruptly reduced the budget surpluses

In Finland, general government – especially central government – finances have strengthened in the last couple years faster than was projected. Behind this have been two prime factors: companies' better-than-expected financial results and, in connection with the rise in share prices, a rapid increase in options income and capital gains. Now the course of development has reversed direction. Following the downturn in the world economy, the tax base for general government has narrowed rapidly, as share prices declined and companies' financial results weakened.

The current estimate is that the budget surpluses for 2001 will turn out to be only slightly smaller than estimated in the spring, as it will take some time before the shrinking tax base is reflected in tax revenues. The fall in corporate profits and impact of economic problems on domestic markets and employment will not have notable consequences for the general government balance until 2002. The slowing of growth in domestic demand and aggregate wages will however have a considerably smaller impact on central government finances than will the decline in corporate profits. Thus, from the standpoint of the central government balance, the key factor is the path of corporate profits in the coming years.

Corporate profits in the first half of 2001 have been at about 10–20% less than year-earlier profits. If financial results continue to weaken as rapidly in the second as in the first half of 2001 and the situation does not improve notably in 2002, company profits will return to their level of 3–4 years earlier. A profit shrinkage of such magnitude, along with weakening growth and employment conditions, would result in a ratio of central government balance to GDP that is only marginally positive in 2002.

The central government's structural surplus, however, appears to be fairly firmly entrenched. Since

Box 2. Large cross-industry differences in productivity developments

Finnish economic growth has been robust in recent years compared to that of many other industrial countries. Although there has been a sizable increase in labour input, a significant part of the growth derives from increased productivity. Private sector labour productivity (output divided by hours worked) in fact increased at an annual rate of 3.5% in the period 1996–2000. By historical standards the increase was not so great. In 1981–1985 the annual growth rate for productivity was nearly 4% and in the early 1990s 4.5%, which means the growth rate of productivity has actually slowed in recent years. During this period, productivity differences across sectors were exceptionally wide (Table). In fact, for the greater part of the Finnish economy, productivity growth was much slower than before in the second half of the 1990s (Chart).

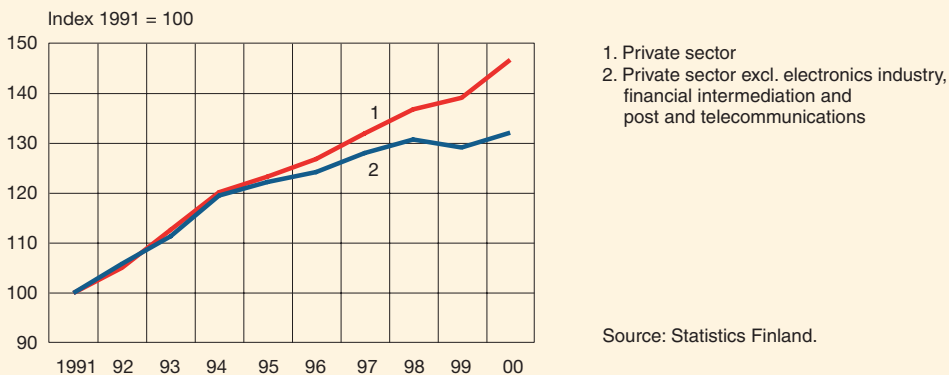
This means that productivity success stories in a few sectors have overshadowed a slowing of productivity growth in other sectors. Of the former, the electronics industry's rise in the last decade could form a unique chapter in Finnish history. The industry's export share has risen to over 30%, and it has had a considerable impact on real GDP growth in recent years. Annual productivity growth for the sector was well over 10% in the 1990s. The spread in the use of mobile phones has also boosted output in the post and telecommunications sector. Because economies of scale are highly significant in telecommunications, demand growth has brought sharp increases in labour productivity. In the financial and insurance sectors the importance of new technologies, such as payment ATMs and Internet links, is substantial. As demand for various financial ser-

Table. Labour productivity growth by sector

Change on year earlier, %	1991–1995	1996–2000	1998	1999	2000
Private sector	4.5	3.5	3.7	1.7	5.5
<i>of which</i>					
Manufacturing	6.9	6.1	5.7	6.3	10.0
Manufacturing excl. electronics industry	6.4	2.5	1.1	2.5	3.3
Electronics industry	10.9	19.2	27.2	16.3	29.2
Construction	0.5	0.0	0.9	-5.8	-2.3
Wholesale and retail trade and hotels and restaurants	1.5	2.5	5.9	1.9	3.0
Financial intermediation	1.4	12.5	-3.1	28.9	8.0
Post and telecommunications	6.1	12.9	14.8	17.0	10.1

Sources: Statistics Finland.

Chart. Labour productivity in Finnish private sector



vices has increased, labour productivity surged in the latter half of the 1990s.

Traditionally considered slow-productivity-growth areas are those services that do not readily benefit from technological advances. Construction is another area in which productivity growth has been lacklustre as, in recent years, are several manufacturing sub-sectors, particularly involving metals.

In the last couple years productivity growth has been marked by cyclical behaviour. In manufacturing (excl. electronics), the Asian and Russian crises had a dampening effect on the growth of both output and productivity in 1998, while labour productivity for the private sector as a whole was increasing much more rapidly. The pick-up in productivity

growth in 2000 was at least partly a rebound from the earlier sluggish growth pattern. According to preliminary data from Statistics Finland, companies' productivity grew at the excellent rate of 5.5% in 2000, and a number of other factors also boosted companies' profitability.

It is estimated that private-sector productivity growth will turn out to have slowed considerably in 2001, largely due to the performance of a few export sectors. Besides the electronics industry, productivity could be growing sluggishly in the forest industries. Even though the differences in productivity growth have narrowed this year, it is evident that they will widen again as Finland's export markets recover.

one-off factors, ie robust corporate profits, options income and capital gains, are estimated to have boosted the government surplus-to-GDP ratio by just over 2 percentage points in 2000, the central government's structural surplus amounted to some 2% of GDP. The central government's structural surplus has been enabled by a fairly tight hold on expenditures. Although in recent years budget expenditures have not been kept below expenditure ceilings, the gap has not been very wide. This has been partly because an improved employment situation and lower interest payments have made room for other expenditures.

The Government's 2002 budget proposal differs only slightly from the expenditure ceilings as revised in spring 2001. The proposed budget total was EUR 35.3 billion (FIM 209.6 bn). The central government is allocating slightly more to investment than was estimated earlier. In other respects the focal points of the budget are unchanged from the expenditure ceilings. The 2002 budget total, excluding debt servicing costs, is 4.3% higher than this year's budgeted level. Income-side changes follow the line agreed in the autumn 2000 wage settlement. It is proposed that income taxes be reduced by about EUR 565 million (FIM 3.4 bn) and estimated that the central government debt will decline by EUR 0.7 billion.

In light of the changed economic outlook, central government indebtedness is expected to decline considerably more slowly in the coming years, compared to recent-years' experience and earlier estimates. The current slowdown in growth clearly indi-

cates the kinds of problems that would already have materialised in central government finances if prior-years' spending had been increased in line with temporary growth in the surplus. Because the tax base is extremely cycle-sensitive, caution must continue to be exercised in the planning of expenditures. Thus there is good reason at this time to avoid cycle-related increases in spending. Thanks to the structural central government budget surplus, expenditures do not need to be cut either in order to meet the financial balance requirement of the Stability and Growth Pact. In the long run, in order to prepare for spending in connection with population ageing, it is essential to preserve the structural surplus in the central government budget.

In addition to spending pressures caused by population ageing, developments in the tax base will take centre stage in the long run as regards the balancing of budgets. The rapid growth in number of persons approaching retirement age highlights the importance of measures that will induce working-age persons to remain in the workforce and employed as long as possible. One way to improve employment opportunities would be to reduce the persistently wide tax wedge.

4 September 2001

■ **Key words: inflation, monetary policy, economic situation**

Macroeconomic shocks and the Nordic banking crises

by **Jarmo Pesola**, Senior Economist
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Bank of Finland

Three Nordic countries – Finland, Norway and Sweden – suffered from a severe banking crisis in the early 1990s. Many banks faced insolvency, and official intervention was required to recapitalise the banking systems. The result was that problem banks were merged with or taken over by other banks, or nationalised. Public support of the banks was estimated at about 7% of GDP in Finland and somewhat less in the other two countries.¹

Loan losses were the main cause of sharply negative banking profitability and banks' low levels of equity capital in the Nordic countries, as many and large credit risks were realised during the crisis. In the worst year, 1992, loan losses amounted to 8% of lending in Sweden and almost 6% in Finland (Chart 1). The close connection between bank customers' finances and loan losses can be seen by comparing, for each country, the timing of enterprise bankruptcies (Chart 2) and loan losses (Chart 1).

This article is based on a study of the causes of the banking crises in the Nordic countries (excl. Iceland), which relied mainly on an econometric model that clarifies the role of macroeconomic factors in causing the crises. The study was carried out in the Bank of Finland's research department in autumn 2000.²

¹ See Koskenkylä (2000).

² See Pesola (2001).

³ James Bell and Darren Pain give a practical example in their article 'Leading indicator models of banking crises – a critical review', in the Financial Stability Review, Issue No. 9, Bank of England, December 2000. A crystal glass is fragile because of the structure of its molecules. This is not problematic (ie does not cause a crisis) unless the glass is struck by a sufficiently hard blow (shock).

The interplay between financial fragility and economic shocks

The following simple approach was used to detect macroeconomic causes of the crises. A banking crisis, measured here by the ratio of banks' loan losses to lending, is the product of a joint cause in that a fragile financial system is hit by an economic shock.

Both are necessary factors in generating a crisis. Sufficiency, in turn, depends on the combined effect of the two factors. For example, in a very fragile system, a fairly weak shock will be sufficient to trigger a crisis.³ Table 1 gives a simple matrix presentation of crisis probability in different states.

Financial fragility can be proxied at the macro level by the ratio of banks' outstanding credit to GDP, ie aggregate indebtedness. A better indicator, ie the indebtedness or solidity of bank customers, cannot be used because of a lack of data.

An economic shock can come through an unexpected change in any of several variables that are important to bank customers: amount of sales or income, product prices, level of costs and/or interest rates. Moreover, a negative shock can start a debt deflation process, as the nominal value of debt remains intact while the outlook for income deteriorates.

The aim of this study was to search empirically for macroeconomic shocks that triggered crises in

Table 1. Crisis probability

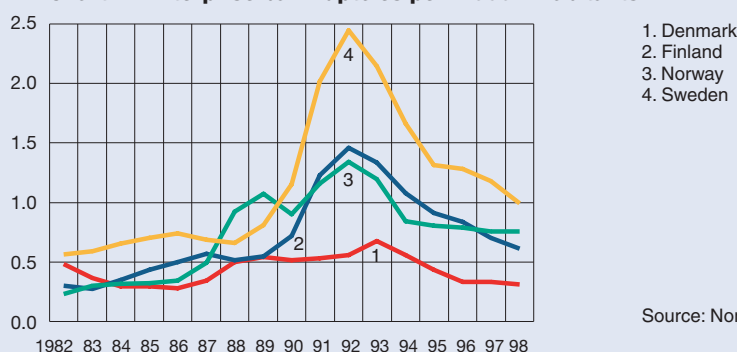
Fragility	Shock	weak	severe
	low		Unlikely
high		Possible	Likely

Chart 1. Banks' loan losses-to-lending ratio



Source: Nordic central banks.

Chart 2. Enterprise bankruptcies per 1 000 inhabitants



Source: Nordic central banks.

the fragile financial systems. The data cover the 1980s and 1990s in the four Nordic countries: Denmark, Finland, Norway and Sweden. Econometric estimation was performed using annual data and panel estimation. The estimated model is presented in the Box.

Rapidly increasing indebtedness in the 1980s

Increased indebtedness reflects increased financial fragility. It is clear that a heavily indebted bank customer – enterprise or household – is less able to weather a macroeconomic shock than one with a lighter debt burden. Realised credit risks cause loan losses to banks as firms go bankrupt and households become unable to repay their debts. We can also compare indebtedness at different time points in an economy or between economies. The likelihood of

realised credit risks is greater when total indebtedness is high than when it is low.

The evolution of aggregate indebtedness in the Nordic countries can be seen in Chart 3, which reveals wide fluctuations. Indebtedness, which was generally relatively low in the 1960s and 1970s, started to increase in the 1980s (somewhat earlier in Sweden). Domestic credit relative to GDP reached some 90% in Finland and Sweden, before falling sharply. Changes in indebtedness were most dramatic in Finland and most gradual in Denmark. The level of indebtedness has clearly remained on a higher level than before the 1980s in all the Nordic countries.

Exceptionally rapid growth in bank lending can lead to a subsequent surge in loan losses according to several research results. A surge in loan losses is highly probable, in particular, when lending growth is caused by a supply shift in lending – ie an increase in banks' willingness to lend. In this case, banks tend

to reduce interest rates charged on new loans and to lower minimum credit standards for new loans.⁴ It is likely that this was the case in the Nordic countries in the run-up to the recent banking crises.

There is fairly extensive evidence that a poorly regulated financial liberalisation programme, in particular, tends to end in a banking crisis. A lending boom is the natural outcome of liberalisation in a country that has had an overly regulated banking industry. The ratio of credit to GDP is usually considerably lower in tightly regulated countries than in countries with less repressed financial markets. Rapid liberalisation causes a sudden stock adjustment in the optimal amount of borrowing by bank customers. Consequently, a banking system is most at risk when financial deregulation and the macroeconomic environment combine to create an unsustainable

⁴ In contrast, an increase in lending due to a shift in borrowers' demand for bank loans or productivity will not necessarily lead to increased loan losses. See Keeton (1999, p. 61–63).

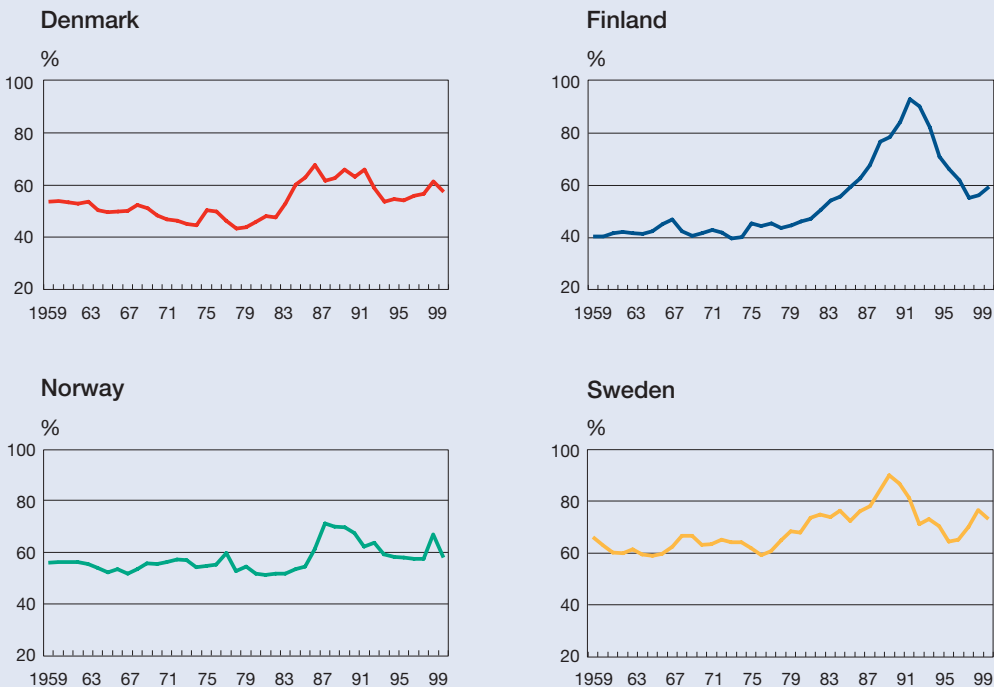
lending boom. The financial sector was liberalised in the Nordic countries prior to the recent crises and just before a world-wide economic upswing, though in Denmark the liberalisation took place a bit earlier.

Many Nordic banks felt compelled to aggressively expand their lending in order to secure their positions in the new deregulated environment. The aggressive lending policies were accompanied by a notable increase in risk taking. The banks in Finland, Norway and Sweden were relatively poorly capitalised as they faced deregulation, which made them vulnerable to loan losses in case of adverse economic shocks. This gave the banks an incentive for risk taking as a means of maximising the option value of deposit insurance.⁵

However, the explicit deposit insurance system (in Finland and Norway) lacked the resources to cover

⁵ Drees and Pazarbasioglu (1998, p. 15–21) summarise the main reasons for the banking crises in the Nordic Countries.

Chart 3. Aggregate indebtedness in the Nordic countries (banks' domestic credit-to-GDP ratio)



Source: IMF, International Financial Statistics.

the losses caused by an extensive systemic crisis. Hence an implicit, but obvious, government guarantee on banking might have increased further the risk taking incentive and moral hazard behaviour.

There is evidence that the lowering of Finnish banks' credit standards enabled at least part of the rapid increase in indebtedness. Several studies have found that one of the crucial reasons for huge loan losses in 1992–1994 was the banks' fierce competition for market shares, in which risk taking was to a large extent deliberate.⁶ Financial liberalisation in Norway very likely boosted loan losses because of poor decision-making, high risk taking, and outright fraud in bank lending.⁷

The situation prevailing in the Nordic countries before the economic recessions and banking crises of the 1990s thus resembles a shift in the supply of lending. The fact that banks' lending was based on unsustainable collateral values is sufficient for generating such an effect. References have been made to the role of the bubble economy, which caused a huge increase in collateral values in the Nordic countries.⁸ This raised collateral values to an unsustainable level, after which they collapsed.

Severe macroeconomic shocks in the late 1980s and early 1990s

Regarding the explanatory variables in the model, fragility was proxied by lagged aggregate indebtedness. It was felt that indebtedness affects positively loan losses, eg an increase in indebtedness tends to raise the amount of loan losses.

The plans of economic agents are based on the current state of affairs, the economic outlook and expectations. The outlook for GDP growth is assumed to represent generally the expected flow of income. This in turn affects investment and borrowing plans, ie future indebtedness. Furthermore, it is assumed that previous-period indebtedness is known when decisions are made.

Expectations are a very important factor in the shock/surprise variable. Unexpected factors, ie mac-

roeconomic shocks, lead to divergence between outcome and expectations. Although economic agents may try to react by changing their actions and plans, the effect of a shock can be seen in the number of bankruptcies and in loan losses.

OECD forecasts for the Nordic countries were used to proxy expectations of percentage changes in real GDP and in the GDP deflator. These represent commonly held expectations. The forecasts are published well in advance and are widely cited and commented on by media and experts in each of the countries.

The surprise (macro-level) variable used in the econometric analysis is a time series constructed as the difference between expected and observed values of the variable in question, in this case the OECD forecast from the preceding year vs observed GDP figures for each country.

As an example, both the actual outcome and the one-year-ahead OECD forecast of percentage change in real GDP are shown in Chart 4. It can be seen that the biggest swings in real GDP growth were poorly forecasted. However, the poor forecasts of eg the sharp drops in GDP in Finland and Sweden in the early 1990s reflected a fairly universal phenomenon; the OECD was certainly not alone.

It is expected that a positive GDP-surprise (where outcome exceeds expectation) reduces the amount of loan losses and vice versa, as income moves more favourably than expected in the positive case.

Interest rates, exchange rates and terms of trade are other relevant variables for formation of expectations that are mentioned in the literature. The difficulty is that usually there are no regularly and widely published predictions of these variables by the OECD or any other public body. However, assuming they behave as random walks, we can state that the static expectations are rational and accordingly any change in their value comes as a surprise. On these grounds, we assume that an increase in interest rates, a devaluation of the country's currency or a deterioration in its terms of trade will tend to increase loan losses.

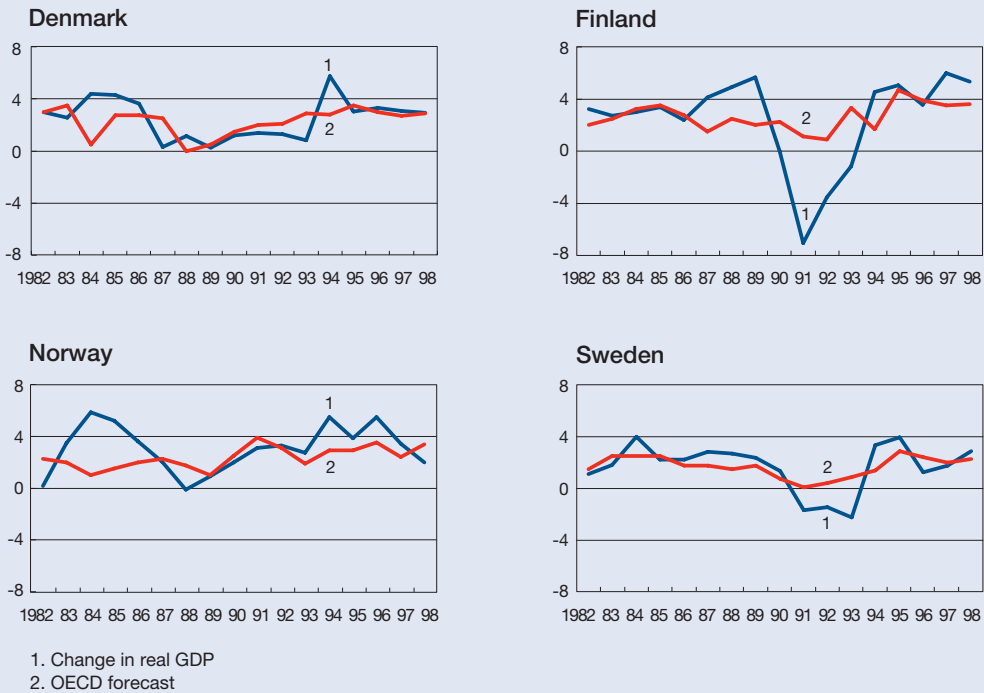
The static expectations for both interest rates and exchange rates can also be motivated by a period of regulation. Interest rates were very rigid during the era of regulation and exchange rates were typically pegged to currency baskets. There is usually some inertia in any change in the manner of forming expectations. Interest rates were liberalised in Finland, Norway and Sweden in the late 1980s. The curren-

⁶ See eg Vihriälä (1997, p. 130) or Nyberg and Vihriälä (1994, p. 12).

⁷ According to Ongena, Smith and Michalsen (2000, p. 4).

⁸ See Koskenkylä (2000, p. 4).

Chart 4. Change in real GDP and OECD forecast, %



Source: OECD, Economic Surveys.

cies of these countries were in fact pegged to the ECU in 1991 and 1992, before these countries adopted floating exchange rate regimes in late 1992. Interest rates increased substantially in the early 1990s as tension rose in the foreign exchange markets – a shock for many debtors. The increases were especially pronounced in Sweden and Finland.

Normally, variations in the outlook for GDP should not affect the ratio of loan losses to lending stock. However, during periods of strong growth, relaxed loan standards can generate lending booms that lead to increasing loan losses. It is possible that, with a significant degree of asymmetric information, mere expectations of exceptionally vigorous growth can initiate such a lending boom. Even borrowers who have no intention of repaying can get loans in certain cases, as banks' project-screening resources become stretched. In such cases no genuine shocks are needed to generate loan losses. Hence, the lagged GDP variable is used to capture the exceptional-lending-boom effect. The pre-crisis lending boom was exceptionally strong in Finland and Norway (Chart 3).

In a severe economic recession certain dynamics may operate, ie a vicious circle may emerge, in which bankruptcies and loan losses generate new bankruptcies and so on until a banking crisis ensues. A lagged dependent variable can capture some of the feedback effects in such a vicious circle. A positive relationship is assumed between the dependent variable and its lagged value.

Regime shifts caused by financial market deregulation, which took place in the Nordic countries during the 1980s, were taken into account by adding a dummy variable for each country that is set off at the crucial time of deregulation for the country in question.⁹ It is assumed that the amount of loan losses is smaller during the era of tight regulation than at other times.

⁹ The deregulation dummy is set at 0 for the period of financial regulation and 1 otherwise. For Denmark, the dummy value is 1 throughout the estimation period. For Finland, the year of change is 1987 and hence the dummy value is 0 until 1986 and 1 in 1987 and thereafter. The year of change is 1986 for both Norway and Sweden.

Box. The model and estimation result for the period 1983–1998

The equation for loan losses, estimated with annual panel data from the Nordic countries, is presented below (t-values in parentheses under the coeffi-

icients). The seemingly unrelated regression (SUR) technique is used for the estimation:

$$LL = 0.5 \cdot LL_{-1} + 0.1 \cdot YQ_{-5} - 0.2 \cdot (YS \cdot \frac{L_{-1}}{Y_{-1}}) + 0.3 \cdot (RQ_{-1} \cdot \frac{L_{-1}}{Y_{-1}}) + 1.0 \cdot D$$

(8.9)** (3.6)** (6.1)** (5.4)** (4.4)**

where:

- LL = banks' loan losses-to-lending stock ratio
- YQ = real GDP, percentage change
- YS = GDP-surprise (proxy for income surprise)
- L = bank lending stock
- Y = GDP
- RQ = change in real interest rate
- D = deregulation dummy
- Adjusted R-squared: 0.73

The total explanatory power (R-squared) is satisfactory; the signs of the regression coefficients are as expected; and all the coefficients are statistically significant.

The panel estimation procedure also calculates fixed-effect coefficients for each country. These mainly take into account the possibly different coun-

try patterns in relationships between variables. The country-specific fixed effects are:

Denmark	−0.5
Finland	−0.5
Norway	−0.6
Sweden	−0.1

Empirical results: the significant role of macroeconomic shocks

The above considerations suggest a basic model for estimating loan losses with the following structure (see Box). The explanatory variables in a linear equation are lagged loan losses, lagged real GDP, an income surprise variable times lagged indebtedness, change in the real interest rate times lagged indebtedness, and a deregulation dummy. Real GDP was lagged by five years in order to capture the effect of the strong economic boom in the late 1980s. All the coefficients should receive a positive sign, except for that of the income surprise variable (multiplied by indebtedness), which should get a negative sign. The estimation period is 1983–1998.

According to the estimation results, both the lagged effect of economic boom and shocks com-

bined with financial fragility seem to have significantly contributed to loan losses during the period of financial liberalisation and the following banking crises in the Nordic countries. The deregulation dummy also gets a statistically significant coefficient. It seems that about 1 percentage point of an increase in banks' loan losses is not captured by the other explanatory variables but is explained by the deregulation dummy. The lagged dependent variable is a strong explanatory variable, which could point to the existence of a feedback effect.

Another similar estimation experiment was carried out with enterprise bankruptcies (per capita) as the dependent variable. The estimation results were about the same as for loan losses.

Exchange rates and terms of trade were tested as additional variables to the basic model. Many firms – even in the sheltered sector – incurred foreign cur-

rency-denominated debt after the deregulation of the late 1980s, particularly in Finland. Subsequent devaluations of national currencies in the early 1990s suddenly increased the debt burdens of many firms and in too many cases led to financial stress. Thus changes in the exchange rate could explain some of the bankruptcies and loan losses. The so-called twin (currency and banking) crises have recently been the subject of intensive studies, particularly in connection with the recent Asian crisis.

Another possible explanatory factor is the terms of trade. Nordic countries' terms of trade developed favourably during the 1980s, which may have led to excessive investment and indebtedness and later to bankruptcies and loan losses.

These additional variables were added to the model, but their coefficients turned out not to be statistically significant. Moreover, the coefficient of the exchange rate in some cases got an unexpected positive sign. A positive sign could of course be correct, since a devaluation boosts the income of exporting firms and hence reduces bankruptcies and loan losses. Consequently, expectations of the sign may be ambivalent in this case. The lack of statistical significance of the exchange rate variable may derive from the fact that the interest rate, which reflects devaluation expectations, captures the most of the explanatory power of the exchange rate.

Concluding remarks

The results lend support to the widely held view that high indebtedness combined with negative macroeconomic surprises significantly contributed to the recent banking crises in Finland, Norway and Sweden. The results also reveal the effects of the pre-crisis financial liberalisation and lending boom on bankruptcies and loan losses. The econometric testing did not indicate direct effects running from exchange rates or terms of trade to the banking crises.

Denmark did not suffer a banking crisis because the macroeconomic shocks there were smaller and the initial debt burden lighter than in the other Nordic countries. This was due to, among other things, earlier and more balanced financial deregulation and

a different economic policy regime, as Denmark belonged to the EU's Exchange Rate Mechanism.

As a general conclusion one can say that it is important for financial stability that economic policy provide as stable an economic environment as possible, so that surprises/shocks can be avoided. For Finland, belonging to the Economic and Monetary Union (EMU) is one way of doing this, as is participation in ERM2 for Denmark. Another concern is how to prevent excessive financial fragility – and here financial regulation will play a crucial role.

14 August 2001

■ **Key words: financial deregulation, indebtedness, shocks, loan loss, banking crisis**

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Analysing monetary policy credibility with a model of the euro area

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Macroeconomic simulation models are important tools for forecasting and policy analysis and are used extensively by central banks. However, it is well known that expectations of future prices, incomes, and especially financial variables are important to the economy and that these pose very difficult theoretical and practical problems for the construction and use of such models. These difficulties are especially pronounced in monetary policy applications, where questions of expectations and confidence – ie credibility – are critical. Therefore, many – if not most – of the key monetary policy issues are actually beyond the scope of the standard model simulation practices of today.

At the Bank of Finland, work is being done to develop modelling approaches that will maximise the value of simulation models in monetary policy formulation and evaluation. In this article, we present some examples of this work, in connection with development of the Bank's new EDGE model of the euro area economy. The EDGE model is specifically designed for use in analysing credibility issues and other problems involving expectations.

Some of the challenges involved in the construction of useful simulation models for monetary policy applications are

- anticipated and unanticipated monetary policy actions have different (possibly even opposite) effects, which cannot be analysed with models that do not enable explicit treatment of expectations
- changes in policy rules or patterns will generally change the way expectations are formed and hence these policy changes cannot be analysed with models that do not specify the way expectations are formed and how expectations react to policy changes
- issues relating to credibility cannot be analysed with models that assume that the general public's expectations of monetary policy always coincide

with the intentions of the central bank. This is because credibility problems are often caused by less-than-perfect information, understanding or trust on the part of the general public regarding the rule or strategy followed in the conduct of monetary policy.

The last point above is particularly important, and we would claim that a main preoccupation of monetary policy-makers is actually management of, and reacting to, changes in private expectations. Devices such as central bank statutes and monetary policy commitments by policy makers are intended to inspire trust and hence to stabilise and control private agents' expectations. Yet, even under most developed monetary arrangements, private (market) expectations have a life of their own, to the extent that many of the serious monetary policy dilemmas facing policy-makers seem to arise because some expectations are at odds with what the policy-makers feel is justified.

Among the reasons why expectations may be a source of concern to policy-makers are that

- there is almost by necessity a degree of asymmetric (private) information on the actual policy 'rule' or strategy followed by monetary policy-makers. Typically the central bank understands its policy objectives and intended reaction patterns more precisely than the private sector
- there may be some uncertainty about the durability of (any) current policy regime. Indeed, one can envisage a situation with persistent 'equilibria', in which speculation about a regime switch creates conditions under which abandonment of the current policy regime becomes a risk to be reckoned with (eg peso problems)
- it may happen that the central bank and the general public do not agree on the interpretation of recent economic data and their implication for the economic outlook, in which case private expect-

tations and policy will be based on different interpretations.

The current standard paradigm for simulation models is to incorporate ‘model-consistent’ expectations, ie to assume that expectations always coincide with outcomes forecasted by the model. This approach is a significant improvement over certain more mechanical assumptions as to how expectations are formed, but it virtually assumes away all credibility problems, in the above-explained sense. Thus better analytical approaches are needed, and these are being developed.

Recent work done at the Bank of Finland’s Research Department, and discussed in this article, examines a ‘twin policy rule’ approach. Here, the ‘perfect foresight’ assumption of fully model-consistent expectations is abandoned where doing so is most natural, so that we allow for differences between the central bank’s actual policy rule and the general public’s perception of it. This describes the situation in which the central bank is better informed on the basis of its strategy than is the general public.

This modelling approach, of course, will not solve credibility problems, but it does help to deal with them in a useful way in forecasting and policy evaluation exercises. Economists using the model can make different assumptions on what the general public thinks about the central bank’s policy intentions and its interpretation of economic data. Then the consequences of these factors for economic performance and policy effects can be quantified.

EDGE: a simulation model of the euro area economy

EDGE is a *euro area dynamic general equilibrium* model, which we use to illustrate the above ideas on how to build models that can be used to quantify credibility effects. EDGE is a macroeconomic forecasting and policy model that has been calibrated to publicly available aggregate data for the euro area.¹ The model, which is the work of the Bank of Finland’s Research Department, is described more completely

¹ An important starting point in data construction was the work by Fagan et al (2001) in the context of the Area Wide Model of the ECB.

(incl. micro-theoretical foundations) in a recent paper by Kortelainen (2001).

EDGE is a structural model, consisting of equations that describe the behaviour of households, firms, financial markets, the government, and the central bank. The behavioural equations explicitly include expectations, and the model is solved in a fully forward-looking way so that expectations are generated simultaneously with the actual model forecast. The model is flexible in the sense that it can be used with a variety of monetary policy rules as defined by the model user. In particular, it can be used with dual monetary policy rules, as explained above. This enables analysis of situations of imperfect credibility, in which the public’s perception of the monetary policy rule differs from the rule actually followed by the central bank.

The standard version of the EDGE model consists of 37 equations, eleven of which can be classified as ‘behavioural’ in the sense of reflecting private behaviour. The model is thus fairly small compared to many forecasting models currently in applied use, but somewhat more detailed than most of the dynamic general equilibrium models built for research purposes.

The economics of EDGE are intended to summarise the current mainstream of macroeconomic theory. The most important features of the model are

- a fully forward-looking household sector, whose consumption/saving decisions are modelled in accordance with Blanchard’s (1985) stochastic life-times approach (see also Sefton and in’t Veld 1999)
- forward-looking valuation of private assets, based on present values of future capital incomes as expected by the private sector. In calculating the value of private assets, an exogenous equity premium is added to the interest rate used in discounting
- a floating, fully forward-looking exchange rate, determined by current and expected interest rates according to the uncovered interest rate parity theory
- ‘neoclassical’ modelling of the supply side, with Cobb-Douglas production technology and an endogenous capital stock accumulated from fixed investment
- forward-looking determination of investment on the basis of expected profits and adjustment costs

- of fixed capital (a similar formulation can be found in Willman et al 2000)
- forward-looking wage determination with some short-term nominal wage rigidity modelled as overlapping multiperiod contracts, as in Calvo (1983)
- forward-looking price determination with costly price adjustment, as in Rotemberg (1982)
- foreign trade determined on the basis of relative prices and world demand.

A fiscal ‘closure rule’ is used in the model, which ensures that the government debt-to-GDP ratio always converges in the long run to some prescribed constant, eg 60%. This is achieved via gradual adjustment of the direct tax rate to disequilibria in debt and deficit. For a wide range of policy and other shocks, the closure rule guarantees that the fiscal solvency constraint holds and that a long-run stock equilibrium exists.

The above features imply that the model includes certain ‘new Keynesian’ short-run properties. For example, fiscal and monetary policies have real effects in the short run. These effects are relatively short-lived, however, and in most cases the model converges quickly to the ‘neoclassical’ equilibrium growth path where available resources and technology determine the course of the economy. Expectations have a very strong impact on the short-run equilibrium, especially via the exchange rate. The dynamic properties of the model are illustrated in detail in the several diagnostic simulations presented in Kortelainen (2001).

To enable analysis of less-than-complete credibility, two versions of the EDGE model are employed. These differ from each other only in the way monetary policy (interest rate determination) is modelled:

1. the *actual model*, which includes the ‘correct’ monetary policy rule, as applied by the central bank
2. the *perceived model*, which includes the monetary policy rule as perceived by the private sector.

The two models are identical in all other respects. They are simulated together in such a way that the perceived model is used to solve for the expectations, which are then used for solving the actual model. The results from the actual model are the focus of our attention. Note that each successive period (quarter) solved with the actual model requires the updating of a complete future horizon of private sector expectations.

In the simulations reported below, the monetary policy (interest rate) rules employed are of the form $i = k + \pi + \phi(\pi - \pi^*)$, where i is the nominal interest rate and π the inflation rate. The parameter values used are $k = 0.012$ (corresponding to an equilibrium real interest rate of 4.8% pa) and $\phi = 1$, which determines the central bank’s reaction to deviations from the inflation target, π^* . While the baseline inflation target is 0.004 (1.6% pa), other targets are used in the course of simulation experiments.

The monetary policy rules employed here are somewhat simpler than the Taylor rule, which has become a benchmark for analysing monetary policy. The Taylor rule relates the policy interest rate to the ‘output gap’ between the economy’s actual and capacity output levels, as well as to the difference between actual and (central bank-) targeted inflation rates. In our calculations, the output gap variable is omitted in order to underline the modelled central bank’s commitment to a single objective – price stability. The reaction of the policy interest rate to deviations from the inflation target is somewhat stronger than with the basic Taylor rule (which has $\phi = 0.5$ as in Taylor 1993).

Examples of policy simulations

We now consider the behaviour of the model in two simulation experiments. In the first experiment, the inflation target is permanently lowered by 100 basis points from its baseline value of 1.6% pa. It is assumed that the policy change comes as a surprise to the private sector in the period in which it is effected and that it is completely credible. In subsequent periods private agents continue to accurately predict monetary policy. For example, the reduction in the inflation target might be accompanied by an announcement that is immediately and completely believed by private agents and hence incorporated in their expectations.

In the second experiment the inflation target is again lowered by 100 basis points, but here the private sector is assumed not to believe it has been changed. The lowering of the inflation target is again permanent, but in each of the subsequent periods private agents expect that monetary policy will permit higher inflation in the next period. Therefore, after the change the economy is in a situation where mon-

etary policy is persistently tighter than expected by the private sector, which is interpreted here as a situation of imperfect credibility.

The purpose of the two experiments is to illustrate the various consequences of credible vs non-credible disinflationary policies. Moreover, shedding light on the consequences of a persistent gap between actual and perceived inflation targets could help to quantify the costs of poor credibility in general.

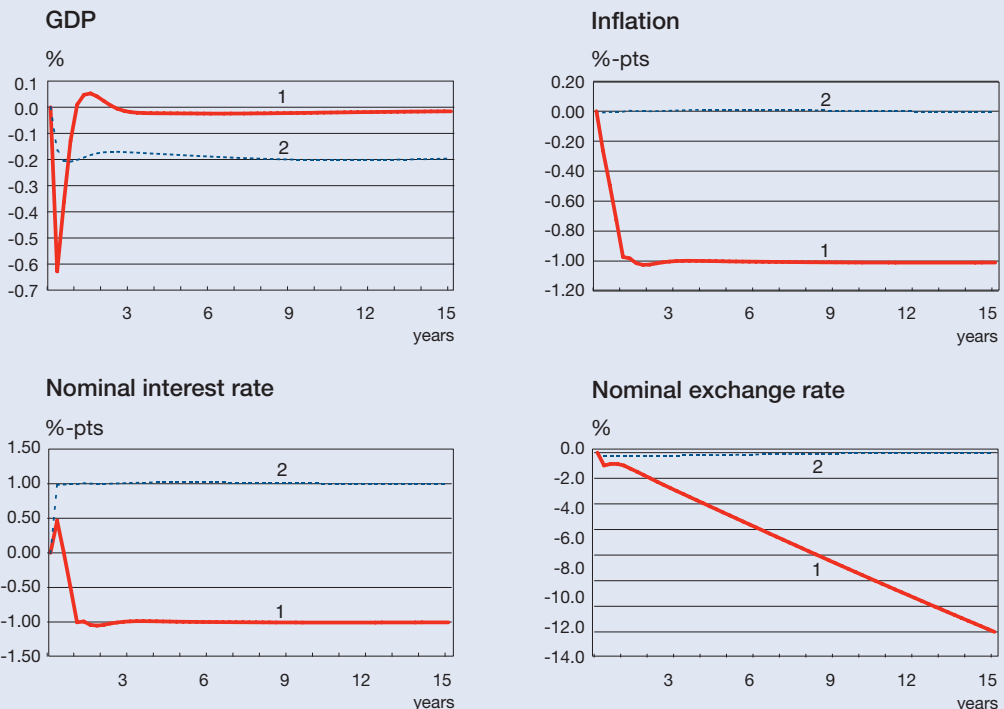
Note that in these simulation exercises, we assumed that the interest rates applied satisfy the central bank's monetary policy rule, given the prevailing economic conditions. This means that the central bank is able to predict inflation for the current period when it sets the interest rate for the current period. This is consistent with the idea that the central bank knows whether its policy is credible or not and can therefore predict its consequences correctly. The results would of course be different if the central bank

were to set its interest rates falsely assuming credibility. Although this latter alternative can be handled by the model, it is not considered here.

The main results of the experiments are presented in the Chart, with further details in Tables 1 and 2.

Let us first consider the results of a credible disinflation. In this case, the inflation rate declines to its new, lower target level in the course of one year and then remains stable. This is achieved in part directly via an adjustment in expectations (the announcement effect) but, because the model entails some price stickiness, a temporary interest rate hike is also required. Thus, for one quarter, the short-term interest rate is 50 basis points higher than in the benchmark scenario, after which it declines toward its new equilibrium. We see that ultimately the nominal rate settles at a level 100 basis points lower than before, so that the long-run solution obeys the 'Fisher equation' linking nominal interest rates to inflation.

Chart. Effects of disinflation with and without credibility



- 1. Change in inflation target is credible
- 2. Change in inflation target is not credible

Table 1. Credible change in the inflation target

Central Bank lowers inflation target by 1 percentage point and the private sector believes it.

Differences from baseline case. Years	Y1	Y2	Y3	Y5
GDP, %	0.01	0.02	-0.02	-0.02
Private consumption, %	0.11	0.06	0.01	-0.01
Private fixed investment, %	-0.11	-0.08	-0.08	-0.04
Inflation, %-pts	-0.97	-1.02	-1.00	-1.00
Real wage, %	-0.05	-0.01	-0.01	-0.01
Unemployment, %-pts	0.05	0.01	0.01	0.02
Nominal interest rate, %-pts	-1.00	-1.04	-0.99	-1.00
Exchange rate, %	-1.00	-2.01	-3.00	-4.90
Government debt/GDP, %-pts	0.40	0.26	0.17	-0.03
Government deficit/GDP, %-pts	-0.82	-0.82	-0.78	-0.78

Table 2. Disinflation without credibility

Central Bank lowers inflation target by 1 percentage point but the private sector does not believe it.

Differences from baseline case. Years	Y1	Y2	Y3	Y5
GDP, %	-0.20	-0.17	-0.17	-0.18
Private consumption, %	-0.13	-0.07	-0.06	-0.08
Private fixed investment, %	-0.08	-0.15	-0.21	-0.26
Inflation, %-pts	0.00	0.00	0.01	0.01
Real wage, %	-0.01	-0.01	-0.01	-0.02
Unemployment, %-pts	0.04	0.03	0.03	0.02
Nominal interest rate, %-pts	0.99	1.00	1.01	1.02
Exchange rate, %	-0.25	-0.24	-0.23	-0.17
Government debt/GDP, %-pts	0.67	1.00	1.17	1.19
Government deficit/GDP, %-pts	0.44	0.29	0.16	0.02

The exchange rate appreciates as a result of the tightening of monetary policy. There is an immediate appreciation of 1% (0.8% in real terms), after which the nominal exchange rate is permanently stronger than it would have been absent the disinflation episode. The trend of the nominal exchange rate simply reflects the change in the inflation rate, since there is no permanent impact on the real exchange rate.

Monetary policy has strong real effects in the short run, essentially because the model entails delayed price adjustment (due to multiperiod wage contracts and price adjustment costs). Thus, even a credible disinflationary change that comes as a surprise will induce a short-run real contraction in the model economy. Private consumption and exports are the main demand components affected in the short run. Their reactions are caused by the temporary policy effects on the real interest rate and real exchange rate. As a result, real GDP contracts by about 0.6% during the first year of the new policy stance albeit, by the end of the second year, the real effects vanish almost completely. Thus, whereas under perfect credibility disinflationary policy has a permanent effect on inflation, its effect on real output is temporary.

In considering the effects of a disinflationary policy that is not credible, we will see that the results are very different. First, inflation does not decline even though monetary policy is tightened. This derives mainly from the pronounced impact of expectations and past prices in the determination of the price level, compared with the smaller impact of current fundamentals. Moreover, the negative labour-

productivity effects of the higher real interest rate that emerges seem to neutralise any negative price effects that might otherwise derive from a real contraction. As a result of permanently above-target inflation, nominal and real interest rates remain higher than before the policy tightening. In this case, the increase in interest rates is about 100 basis points. The real exchange rate undergoes a slight but persistent appreciation.

The real effects, which are strongly negative, are transmitted mainly via exports and private consumption. Real GDP declines persistently by about 0.2% (ie a fifth of the disinflation sought by the central bank). A notable feature is that there is little immediate short-run impact compared to the credible policy alternative. This can be explained by the fact that since expectations do not adjust, and the price level does not react much either, we do not get the immediate adjustment problems that would otherwise derive from existing contracts and price adjustment costs. By contrast, the long-run costs of weak credibility are large, especially the output losses that accumulate over the years with a persistent 'credibility gap'.

An interesting aspect of the non-credible disinflation experiment is the impact on the budget. There is a large deterioration of the budget balance, partly because of the real contraction and accompanying loss of tax revenue, but also importantly due to higher interest rates (the calculation assumes the debt to be largely floating-rate or short-term). Even though the model includes strong mechanisms for rebalancing the budget (assumed to occur via tax in-

creases), the deficit persists to the third year after the shock and the government debt-to-GDP ratio remains above the baseline for a long time.

The long-run results that emerge from the second simulation can be used to assess the detrimental effects of a permanent upward bias in private sector perceptions of the central bank's inflation target. According to the EDGE model, with the parameter values used here in the monetary policy rule, the long-run costs of this type of credibility problem show up mainly in the high real (and nominal) interest rates and the depressed levels of output and private consumption due to the high real interest rate. By contrast, the unemployment-alleviating effects are not very large here, which may be due to the fact that the labour demand equation is strongly forward looking and that, in the simulation experiment, firms persistently believe that the low-inflation monetary policy will soon be abandoned.

19 July 2001

■ **Key words: economic models, expectations, credibility, monetary policy**

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Currency crises: Some policy lessons¹

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One of the most recent currency crises took place in Turkey. The Turkish government was aiming at reducing inflation via an economic programme based on an exchange rate target. On 19 February 2001, the market began to doubt the sustainability of the currency peg. The Turkish central bank had to defend the currency by raising interest rates and selling foreign exchange. The shift in market sentiment was abrupt, even though a similar, albeit temporary, loss of confidence had taken place three months earlier.

Because of the sudden loss of confidence, Turkish officials' determination to maintain the currency peg came under fire. The overnight interest rate was raised from 40% to over 4000% and, in the course of a couple days, the central bank sold foreign reserves worth more than USD 5 billion. However, the officials lost the battle for the external value of the currency. Three days after the onset of the crisis, the exchange rate target was abandoned, and the Turkish lira quickly shed about a third of its external value. This recent episode in Turkey is an enlightening example of a currency crisis.

A currency crisis is a situation in which market participants' confidence in a fixed exchange rate is eroded, and the central bank is forced to defend it by adjusting the short-term interest rate and/or intervening in the foreign exchange market. A currency crisis may or may not lead to a collapse of the currency peg.

Currency crises are often related to crises of the financial system, especially the banking system – as in Southeast Asia in 1997– or to foreign debt crises – as in Russia in 1998. A crisis of one type can trigger some other type of crisis. Currency crises and financial crises often have common roots, in economic imbalances and misaligned exchange rates. During 1992 and 1993, most Western European currency pegs came under recurrent bouts of market pressure.

The crises involved most of the currencies of the European Monetary System as well as Nordic currencies that were unilaterally pegging to the ECU. Only a few of these pegs remained intact through that period, and the changes included the widening of almost all of the official ERM fluctuation bands. In most of the European countries, except for Sweden and Finland, currency crises were not accompanied by financial crises.

Currency crises are, by definition, associated with significant variations in interest rates and/or exchange rates. More generally, they are related to key national and international policy issues. The possibility of a currency crisis must be taken into account in considering institutional arrangements such as exchange rate regimes, as well as measures to control international capital movements. The ongoing discussion of a new international financial architecture is related to currency crises, as is the 'Tobin tax' proposal.

The academic literature on currency crises, which emerged some twenty years ago, has been motivated largely by the need of politicians, central bankers and investors to understand – and if possible predict – such crises. The literature was initiated by Krugman (1979). The European and Asian currency crises of the 1990s spurred an onslaught of new research, including that of Obstfeld (1994) and Chang and Velasco (2000).

Academic research has focused on the links between currency crises and underlying economic factors that might cause them, ie those factors that can affect public authorities' will and ability to maintain a currency peg. These include variables that are generally regarded as determinants of exchange rate developments. For example, large current account deficits, expectations of loose monetary policies, or large

¹ The author's doctoral dissertation (Kajanoja 2001) deals with currency crises.

government deficits can lead to currency crises. Numerous empirical studies have attempted to uncover regularities concerning crisis determinants and leading indicators. However, finding empirical evidence on determinants of crises has turned out to be a formidable task.

Self-fulfilling crises

Currency crises typically burst forth on the scene, as in Turkey early this year. The abruptness of onset poses a challenge for the scientific study of crises. It is often the case that in the run-up to a currency crisis we do not observe sudden changes in the economic fundamentals that are presumed to induce such crises. One possible explanation for the abruptness of crises and the difficulties in empirically identifying their determinants is that there may be rapid shifts in expectations concerning future developments in economic fundamentals. These expectations usually cannot be observed in published economic data.

Another explanation that has been offered is that there may be self-fulfilling elements in currency crises. This means that, given the state of economic fundamentals, a currency crisis may or may not take place at a given moment of time, depending on market participants' expectations. That is, a currency peg might be vulnerable to a mere shift in market sentiment – absent any change in fundamentals. Economists have identified various mechanisms that might render a fixed exchange rate vulnerable to a self-fulfilling currency crisis. The precise meaning of 'self-fulfilling currency crisis' depends on what are considered to be economic fundamentals.²

Let us consider an example of a mechanism that can facilitate self-fulfilling currency crises. During a currency crisis, the public authority often faces a tradeoff between two objectives: maintaining the currency peg and keeping short-term interest rates at a desired level. Raising the interest rate is a means by which the public authority can defend the peg, whereas domestic policy goals may argue against higher interest rates. Market participants' expecta-

tions affect this tradeoff. Increases in devaluation expectations raise the level of interest rates, which increases the cost of defending a currency peg. Thus a change in devaluation expectations may validate itself, without any change in economic fundamentals, by reducing the public authority's willingness to maintain the peg. Theoretical models of currency crises of this nature are presented eg by Jeanne and Masson (2000) and Kajanoja (2001).

It is generally felt that a currency crisis cannot occur in a self-fulfilling manner if the economic fundamentals are sufficiently strong, meaning that they are clearly consistent with the fixed exchange rate. Regarding the effects that self-fulfilling shifts in market expectations can have in a crisis, let us consider two different situations. Firstly, the fundamentals may be deteriorating in a way that makes the eventual collapse of the peg inevitable. Here, self-fulfilling shifts in expectations can at most affect the timing of the crisis. In the second situation, the fundamentals are not very strong but not very weak either. Here, a self-fulfilling shift in market expectations can lead to the collapse of a peg that could have remained in place for several more years – absent any shift in expectations.

In the rest of this article, 'self-fulfilling currency crisis' will refer to the mechanism outlined above, in which self-fulfilling shifts in market participants' expectations affect the tradeoff faced by the public authority in choosing between maintaining a peg and keeping interest rates at a level that it deems optimal. The term will not refer to other mechanisms of self-fulfilling currency crises that have been identified in the academic literature, such as a situation wherein devaluation expectations affect wage increases and hence lead to real appreciation, thus validating devaluation expectations.³

At the time when a currency crisis is in progress, it is of course difficult to assess whether collapse of the peg is inevitable. Even with hindsight, the inevitability of the collapse is often difficult to determine, if one accepts the possible presence of self-fulfilling elements. However, it has been argued eg that the French, Belgian, and Danish currency pegs were not inconsistent with economic fundamentals in 1993, even though recurrent waves of market pressure led

² In the theoretical literature, a self-fulfilling currency crisis usually means that the economy moves from one equilibrium to another in a model characterised by multiple equilibria. The factors that are exogenous to such a model constitute the relevant economic fundamentals.

³ A theoretical model with such features is presented by Obstfeld (1994).

to the abandonment of the narrow ERM fluctuation bands, followed by significant temporary depreciation of these currencies.⁴ After the initial depreciations, these currencies' exchange rates vis-à-vis the Deutschmark subsequently re-entered their pre-crisis narrow fluctuation bands. Therefore, the crises involving these three currencies could be considered to be self-fulfilling. The empirical results of Kajanoja (2001) are consistent with this interpretation.

Currency speculation

Currency crises can be politically unpleasant for public authorities that have established currency pegs and are responsible for maintaining them. In some cases, a crisis has driven a public authority to place the blame on malevolent speculators. To a bystander, such contentions usually seem unfounded. When a currency crisis takes place, the vast majority of net selling of the currency is typically done by ordinary investors, borrowers, and companies involved in foreign trade – all of which attempt to reduce their exposure to the imminent exchange rate movements. According to one extreme view, the occurrence or non-occurrence of a currency crisis is always completely determined by underlying economic factors, so that there are never any aspects of self-fulfilment involved. If this is true, such contentions by public authorities are indeed always unfounded, since all crises that occur are inevitable.

However, placing the blame on malevolent investors may be slightly more plausible if self-fulfilling shifts in market expectations can affect the occurrence of a currency crisis. A shift in market expectations means that simultaneous changes are taking place in the expectations of a large number of market participants. A shift in the expectations of any single market participant per se cannot cause a currency crisis. Coordination of expectations is an important factor in a self-fulfilling currency crisis, in which a shift in market expectations does not derive from a change in market fundamentals. One possibility here is that the actions of a single large market participant, eg a hedge fund, serve as signals that

coordinate expectations and possibly trigger a currency crisis that would not otherwise have occurred. However, in practice, the impacts of such coordinating signals are likely to be limited in most cases to the exact timing of a currency crisis. Moreover, these signals have no effect on the underlying economic imbalances that seem in most cases to constitute the driving force behind a currency crisis.

Tobin tax

Proposals for a small tax on all foreign exchange transactions, ie a 'Tobin tax', have recently aroused considerable public interest. Some discussants have advocated such a tax as a means of preventing currency crises. There would probably be insurmountable practical problems in establishing a Tobin tax. In addition, the tax would have significant costly side effects. Considering these drawbacks, it is very difficult to take seriously the proposals for a Tobin tax. However, one can mentally put aside the drawbacks as well as some other considerations for and against such a tax and consider the effects it would have on the dynamics of different types of currency crises.

It is not impossible that a Tobin tax might have the potential to prevent or delay currency crises in some case. This follows from the fact that it would make foreign exchange transactions more costly for companies and households. Thus it would be more costly for a market participant to bet against a fixed exchange rate or, similarly, to protect itself against a possible movement in the exchange rate.

A currency crisis situation usually involves a series of bouts of increased pressure against the peg. In each instance, the interest rate rises on the currency that is expected to depreciate, and the country's central bank loses foreign reserves. The loss of reserves reflects the fact that market participants other than the central bank are selling the currency on net. Such realignment of portfolios ensues despite the fact that rising interest rates will make the shift turn out to be costly if, despite expectations, the currency that has been sold does not depreciate. Between such episodes of rising interest rates and reserve losses, there are often relatively tranquil periods marked by declining interest rates and increasing foreign reserves, as private market participants realign their portfolios toward assets denominated in the high-interest currency.

⁴ In August 1993, most ERM fluctuation bands were widened from $\pm 2\frac{1}{4}\%$ to $\pm 15\%$, with no changes in central parities. The only ERM band that was left unchanged was that between the Dutch guilder and Deutschmark.

During currency crises, market participants lack precise information as to both the will and ability of the public authority to maintain the currency peg as well as what other market participants intend to do. The repeated waves of pressure against the peg can thus be interpreted as market participants' testing of the durability of the peg in an environment marked by uncertainty. Such a series of tests may or may not lead to a collapse of the currency peg.

It is conceivable that a Tobin tax could prevent or delay a currency crisis because it would make it more costly for market participants to test the peg, since the tax would have to be paid on each exchange of currencies.⁵ The crisis-prevention capability of a Tobin tax requires a high degree of uncertainty as to the vulnerability of the peg. The prospect of even a fairly small depreciation, if sufficiently certain, will immediately trigger a currency crisis regardless of whether there is a Tobin tax.

Let us consider two different types of currency crises. In the first type, economic fundamentals gradually deteriorate over time to become patently inconsistent with the fixed exchange rate and a collapse of the peg becomes inevitable. In this case, a Tobin tax clearly would not prevent the collapse, although it might delay it.

The second type of a currency crisis is one in which economic fundamentals are not so bad as to imply inevitable collapse of the peg, but shifts in market expectations could lead to a self-fulfilling currency crisis and collapse of the peg. If the uncertainty concerning the vulnerability of the peg is sufficiently pronounced, a Tobin tax could, in principle, prevent the crisis and collapse of the peg. Therefore, it is possible to argue that a Tobin tax could have had the potential to prevent such currency collapses as the abandonment of the narrow ERM fluctuation bands of the French, Belgian and Danish currencies. As noted above, the bands seem not to have been obviously inconsistent with economic fundamentals and hence not preordained to set off fundamentals-based collapses. However, these particular currency

⁵ The use of currency derivatives, such as forward contracts, does not affect the considerations presented here. See Goldstein et al (1993, p. 40–43).

⁶ Obviously, the discussion here describes the situation in certain Asian-crisis countries better than in others, since economic developments have differed across them.

crises seem to have been relatively harmless, as they were not accompanied by severe disruptions in overall economic performance.

While it is possible that in some cases a Tobin tax might help to prevent a relatively harmless currency crisis by discouraging market participants from frequent testing of the strength of a currency peg, it apparently could not in the same way help to prevent the more severe crises. The latter include the Asian crisis of the late 1990s. With hindsight, it seems that at least the majority of the currency crises in South-east Asia were unavoidable, given the cumulated economic and financial imbalances in these countries.⁶ Thus it seems very unlikely that a Tobin tax would have saved the Asian fixed exchange rate regimes.

15 August 2001

■ **Key words:** currency crises, speculative attacks, exchange rate regimes, Tobin tax

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Items

Supplementary budget

In June Parliament approved the first supplementary budget for 2001. FIM 8.5 billion was allocated for additional net redemptions of central government debt. Moreover, it was decided that FIM 4.7 billion will be drawn from Treasury reserves to pay down the central government debt. The total debt will decrease by FIM 23.1 billion in 2001.

On the revenue side, tax receipts are projected to increase by FIM 3.1 billion in net terms. Income and capital tax revenue is estimated to increase from FIM 74.7 billion, as per the ordinary budget, to FIM 79.9 billion. In contrast, total receipts from taxes levied on vehicles and energy are expected to fall short of the budgeted amount by slightly more than FIM 2 billion. Dividend income, in turn, is likely to be FIM 2.5 billion higher than estimated in the ordinary budget.

Commemorative coin for Aino Ackté and the opera

On 6 June 2001 the Ministry of Finance decided on the striking of a silver commemorative coin in honour of the 125th anniversary of the birth of Aino Ackté. The nominal value of the coin is FIM 100, and the maximum number to be struck is 40,000.

The design of the commemorative coin for Aino Ackté and the opera is based on a proposal by the sculptor, Timo Rytkönen. The coin weighs 31 grams and measures 35 mm in diameter.

The obverse features the embossed text SUOMI FINLAND in curvature form to the upper left and the coinage year, 2001, at the bottom. In the centre and on the right-hand side there is an embossed hat brim and part of a portrait of a woman.

The face value, 100 MK, appears horizontally at centre-left on the reverse. On the upper right there is an embossed curtain or skirt hem and below that a shoe. The relief features the engraved year digits, 1876 and 1944, in intaglio, one above the other, and the text AINO ACKTÉ from top to bottom.

The new coin went on sale on 6 July 2001. The price of the normal BU version is FIM 189, incl. VAT, and the hand-struck proof version is priced at FIM 322.



The Eurosystem's monetary policy instruments

18 May 2001

Key interest rates

The main refinancing operations are the principal monetary policy instrument used by the Eurosystem¹. Changes in the interest rate applied in the main refinancing operations signal the stance of the Eurosystem's monetary policy and have a major impact on the shortest money market rates. From the beginning of 1999 to June 2000 the main financing operations of the Eurosystem were conducted using the fixed rate tender procedure. At its meeting on 8 June 2000 the Governing Council of the ECB decided that, starting from the operation to be settled on 28 June 2000, the main financing operations of the Eurosystem would be conducted as variable rate tenders, using the multiple rate auction procedure. Furthermore, the Governing Council decided to set a minimum bid rate for these operations. The minimum bid rate was initially set at 4.25%, the same level applied for the previous fixed rate tender operations. Since then the minimum bid rate has been changed three times. Effective 15 May 2001, the minimum bid rate is 4.50%. In the new procedure the minimum bid rate signals the monetary policy stance, which previously was indicated by the rate applied to fixed rate tenders.

The Eurosystem uses the rates on its standing facilities to bound overnight market interest rates. The interest rates on the marginal lending facility and the deposit facility are set separately by the Eurosystem.

¹ The European System of Central Banks (ESCB) comprises the European Central Bank (ECB) and the national central banks of the EU member states. The Eurosystem is composed of the ECB and the national central banks of the member states participating in Stage Three of Economic and Monetary Union. The Eurosystem's supreme decision-making body is the Governing Council of the ECB, which comprises the six members of the Executive Board of the ECB and the governors of the eleven national central banks forming the Eurosystem.

Effective 11 May 2001, the interest rate on the Eurosystem's marginal lending facility is 5.50% and the overnight interest rate on the deposit facility 3.50%.

Open market operations

Open market operations play an important role in the monetary policy of the Eurosystem. They are used for the purposes of steering interest rates, managing the liquidity situation in the market and signalling the stance of monetary policy. Open market operations are normally executed by the national central banks on the initiative of the ECB. Open market operations can be divided into four categories:

1) The *main refinancing operations* are weekly liquidity-providing operations executed by the national central banks through standard tenders and with a maturity of two weeks. They play a pivotal role in pursuing the purposes of the Eurosystem's open market operations and provide the bulk of refinancing to the financial sector.

2) The *longer-term refinancing operations* are liquidity-providing standard tender operations with a monthly frequency and a maturity of three months. These operations aim to provide counterparties with additional longer-term refinancing. In these operations, the Eurosystem does not intend to send signals to the market and therefore the operations are normally executed on the basis of variable-rate tenders.

3) *Fine-tuning operations* are executed on an ad hoc basis in order to smooth interest rate movements caused by unexpected changes in market liquidity. Fine-tuning operations are executed by the national central banks primarily as reverse transactions, but they can also take the form of outright transactions, foreign exchange swaps and the collection of fixed-term deposits. Fine-tuning operations are executed through quick tenders or bilateral procedures. Under

exceptional circumstances and by decision of the Governing Council of the ECB, the ECB may execute fine-tuning operations in a decentralized manner.

4) *Structural operations* are executed with the aim of adjusting the structural position of the Eurosystem vis-à-vis the financial sector. Structural operations can be executed through reverse transactions, outright transactions or the issuance of ECB debt certificates.

Standing facilities

The standing facilities are intended to limit excessive movements in overnight interest rates by providing or absorbing overnight liquidity and to signal the general stance of monetary policy. Two standing facilities are available: the marginal lending facility and the deposit facility. Counterparties can use the marginal lending facility to obtain overnight liquidity from the national central banks against eligible assets. The interest rate on the marginal lending facility provides a ceiling for the overnight market interest rate. Counterparties can use the deposit facility to make overnight deposits with the national central banks. The interest rate on the deposit facility provides a floor for the overnight market interest rate. Under normal circumstances, there are no quantitative limits on access to the standing facilities.

Minimum reserve system

The Eurosystem's minimum reserve system applies to credit institutions in the euro area and primarily pursues the aims of stabilizing money market interest rates and creating (or enlarging) a structural liquidity shortage. The reserve base of each credit institution is defined in relation to liability items on its balance sheet. The reserve base includes deposits, debt securities issued and money market paper. However, liabilities vis-à-vis other institutions subject to the minimum reserve system are not included in the reserve base. Liabilities included in the reserve base are subject to either a 2% reserve ratio or to a zero reserve ratio. Liabilities included in the reserve base and to which a zero reserve ratio is applied comprise deposits with an agreed maturity of over two years, repos and debt securities issued with an agreed maturity of over two years.

In order to pursue the aim of stabilizing interest rates, the Eurosystem's minimum reserve system enables institutions to make use of averaging provisions. Compliance with the reserve requirement is determined on the basis of the institution's average daily reserve holdings over a one-month maintenance period. Institutions' holdings of required reserves are remunerated at the interest rate of the main refinancing operations. When the main financing operations are conducted as variable rate tenders, the interest rate on minimum reserves is determined on the basis of the marginal interest rates applied in the tenders held during the maintenance period in question.

With effect from the beginning of 2001, the group of institutions in Finland subject to the minimum reserve requirement was extended to include all institutions, in addition to deposit banks, that are authorized to operate as credit institutions. The purpose of this change was to bring the definition of institutions subject to the minimum reserve requirement into line with the practice applied in other euro area countries. A list of the institutions subject to the Eurosystem's minimum reserve requirement is available on the ECB's website (<https://mfi-assets.ecb.int>).

Counterparties to monetary policy operations

Credit institutions subject to the Eurosystem's minimum reserve system may, in general, access the Eurosystem's standing facilities and participate in the Eurosystem's main refinancing operations and longer-term refinancing operations. The Eurosystem has, however, limited the number of counterparties for fine-tuning operations and structural operations to counterparties that are active players in the money market. For outright transactions, no restrictions are placed on the range of counterparties. For foreign exchange swaps, the counterparties must be counterparties for foreign exchange intervention operations who are active players in the foreign exchange market.

Assets eligible for monetary policy operations

Under the ESCB/ECB Statute, all the Eurosystem's credit operations must be based on adequate collat-

eral. The Eurosystem accepts a wide range of securities, issued by both public sector and private sector entities, as underlying assets for its operations. For purposes internal to the Eurosystem, eligible assets are divided into two categories. ‘Tier one’ consists of marketable debt instruments fulfilling uniform euro area-wide eligibility criteria specified by the ECB. ‘Tier two’ consists of assets, both marketable and non-marketable, that are of particular importance for national financial markets and banking systems and for

which eligibility criteria are established by the national central banks and approved by the ECB. Both tier one and tier two assets may be used as collateral for Eurosystem monetary policy operations. A list of eligible assets is available on the ECB’s website (<https://mfi-assets.ecb.int>). More detailed information on the Eurosystem’s monetary policy instruments is posted on the Bank of Finland’s website (<http://www.bof.fi/rhindex.htm>).

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6/2001

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7/2001

Mark De Broeck – Torsten Sløk **Interpreting Real Exchange Rate Movements in Transition Countries.** 41 p. ISBN 951-686-956-4, print; ISBN 951-686-957-2, online.

8/2001

Jarko Fidrmuc **The Endogeneity of Optimum Currency Area Criteria, Intraindustry Trade and EMU Enlargement.** 28 p. ISBN 951-686-958-0, print; ISBN 951-686-959-9, online.

Abstracts

Discussion papers

Gridlock Resolution in Interbank Payment Systems

Morten L. Bech – Kimmo Soramäki
9/2001

- Key words: payment systems, liquidity, gridlock, algorithms, settlement

The paper analyses the severity of gridlocks in interbank payment systems operating on a real time basis and evaluates by means of simulations the merits of a gridlock resolution algorithm. Data used in the simulations consist of actual payments settled in the Danish and Finnish RTGS systems. The algorithm is found to be applicable to a real time environment and effective in reducing queuing in the systems at all levels of liquidity, but in particular when intraday liquidity is scarce.

Declining labour share – Evidence of a change in underlying production technology?

Antti Ripatti – Jouko Vilmunen
10/2001

- Key words: production function, elasticity of technical substitution, input-augmenting technical progress, new economy

The study demonstrates that the decline in the labour share in Finland can not be explained by the Cobb-Douglas production function. Instead, we propose an approach based on the constant-elasticity-of-substitution (CES) production function with labour- and capital-augmenting technical progress. The model is augmented by imperfect competition in the output market. According to the empirical results based on estimation of the first-order-conditions, the technical elasticity of substitution is significantly less than unity (0.6) and hence the Cobb-Douglas production function is rejected. The growth rate of the estimated labour-augmenting technical progress has decreased in recent years, which is not consistent with the ‘new-economy’ hypothesis. Capital-augmenting technical trend has exploded during the same period, which provides a possible explanation for the rapid growth of the Solow residual. The main contributing factor behind the declining labour share is, however, the increasing mark-up.

Regime-dependent impulse response functions in a Markov-switching vector autoregression model

Michael Ehrmann – Martin Ellison – Natacha Valla
11/2001

- Key words: vector autoregression, regime switching, shocks, new economy

In this paper we introduce identifying restrictions into a Markov-switching vector autoregression model. We define a separate set of impulse responses for each Markov regime to show how fundamental disturbances affect the variables in the model dependent on the regime. We illustrate the use of these regime-dependent impulse response functions in a model of the U.S. economy. The regimes we identify come close to the ‘old’ and ‘new economy’ regimes found in recent research. We provide evidence that oil price shocks are much less contractionary and inflationary than they used to be. We show furthermore that the decoupling of US economic performance from oil price shocks cannot be explained by ‘good luck’ alone, but that structural changes within the US economy have taken place.

Yksityisasiakkaiden maksuliike-palvelujen hinnoittelu Suomessa

(Pricing of payment services for private customers in Finland)

Jenni Koskinen

12/2001

- Key words: payment services, service fees, hidden pricing, cross subsidisation

In Finland the barriers to competition came down in the latter half of the 1980s, when interest rate regulations were removed. This put competitive pressures on the banks. The higher-than-present level of interest rates that prevailed in the period prior to deregulation enabled income from payment transfers based on interest rate margins and lack of real time operability. Banks have openly priced payment services only since the first half of the 1990s.

This paper uses prices in effect in spring 2001 to analyse banks’ charges for payment services provided for private customers. In order to get a picture of pricing as a whole, specific examples are used to illustrate discounts granted on payment services. The Finnish banks included here, which offer private payment services, are Aktia Savings Bank, Handelsbanken (SHB), Sampo Bank, Mandatum Bank, Merita Bank, Okobank and Bank of Åland. The paper also examines the extent of hidden pricing. Hidden pricing generates income for banks and difficult-to-perceive costs to customers. Hidden pricing includes customers’ forgone income due to value date practices and delays in payment transfers. Hidden pricing also occur via so-called cross subsidisation, ie the bank covers a part of the costs from payment services by setting deposit interest rates low. On the other hand, hidden pricing via interest rate margins may entail tax advantages to the customer.

Today’s range of payment services is broad. Pricing for the same type of service varies from bank to bank, albeit it is fairly similar among the large banks. By contrast, pricing structures for different services differ very little from bank to bank: electronic payment services are cheaper than services provided manually by a teller. The purpose of price differentiation is to induce customers to use less of certain services and more of others.

Factors affecting asset price expectations: fundamentals and policy variables

Nico Valckx
13/2001

- Key words: stock prices; bond prices; return decompositions, fundamental factors

This paper examines what factors move US and European stock and bond markets, extending earlier work by Campbell and Ammer (1993). Inflation news is incorporated into the stock and bond decomposition and explicit attention is given to different horizons over which expectations are formed. Sensitivities to monetary policy instruments and fundamental factors are examined. The data are monthly. For the euro area, a unique data set is constructed. The results illuminate a number of widely-held preconceptions and confirm that inflation news volatility is a non-trivial factor in the stock and bond return decompositions.

Financial market volatility: informative in predicting recessions

Jan Annaert – Marc J.K. De Ceuster – Nico Valckx
14/2001

- Key words: business cycles, stock market volatility, interest rate volatility, probit model

It is commonly agreed that the term spread and stock returns are useful in predicting recessions. We extend these empirical findings by examining interest rate and stock market volatility as additional recession indicators. Both risk-return analysis and the theory of investment under uncertainty provide a rationale for this extension. The results for the United States, Germany and Japan show that interest rate and stock return volatility contribute significantly to the forecasting of future recessions. This holds in particular for short term predictions.

A value-at-risk approach to banks' capital buffers: An application to the new Basel Accord

Esa Jokivuolle – Samu Peura
15/2001

- Key words: new Basel Capital Accord, credit risk, internal ratings, value-at-risk

The rating-sensitive capital charges on credit risks under the new Basel Accord are likely to increase the volatility of minimum capital requirements, which may force banks to hold larger capital cushions in excess of minimum requirements. We analyse this claim on the basis of numerical simulations on hypothetical bank portfolios, in which the bank's choice of capital cushion is assumed to satisfy a value-at-risk-type constraint. The results suggest that the size of the cushion depends on the bank's credit portfolio risk and its chosen approach for calculating the minimum capital requirement. Although the more ratings-sensitive internal ratings based approach imposes lower minimum capital requirements on sufficiently high-quality credit portfolios than does the standardised approach, this capital relief is countered by the need for larger relative cushions under the former approach. The results imply that the cushions induced by greater rating sensitivity may influence both banks' choices between proposed approaches for calculating capital requirements as well as the aggregate level of post-reform bank capital. Hence these cushions should be given due consideration in the final calibration of the Basel risk weights.

BOFIT Discussion Papers

The Dynamics of Moonlighting: What is happening in the Russian informal economy?

Alessandra Guariglia – Byung-Yeon Kim
5/2001

- Key words: moonlighting, informal economy, labour supply

This paper uses rounds 5 to 8 of the Russian Longitudinal Monitoring Survey (RLMS) to analyse the dynamics of moonlighting by working-age persons.

We find that moonlighting is transitory and is generally associated with career shifts. Those respondents who expressed a desire to switch jobs in the past are in fact more likely to moonlight in the present, and to effectively switch jobs in the future. The career shifts tend to be toward self-employed activities. These results imply that the Russian secondary labour market, as part of the informal economy, can provide long-term benefits to the economy as an effective incubator for setting up new self-employed businesses.

International investors, contagion and the Russian crisis

Alexei Medvedev
6/2001

- Key words: financial markets, financial crises, Russia, contagion

The paper provides a detailed empirical assessment of the role of nonresidents in the development of the Russian financial crisis of 1997–1998. It is established that nonresidents behaved differently during the crisis period and significantly contributed to the collapse of the market for government bonds. In particular, we found that a sharp downturn in May 1998 was caused by contagious selling on the part of foreign investors following the Indonesian crisis. At the same time, we question the common view that nonresidents were largely responsible for market pressures at the initial stage of the crisis. In this paper we proceed somewhat beyond the discussion of the Russian crisis and propose an alternative explanation of contagious outflow of foreign capital. We combine CAPM and findings of Forbes and Rigobon (2001) to show that international portfolio investors are more sensitive to purely external shocks and less sensitive to purely domestic shocks.

Interpreting Real Exchange Rate Movements in Transition Countries

Mark De Broeck – Torsten Sløk
7/2001

- Key words: real exchange rates, transition, Balassa-Samuelson effects

Several transition countries have experienced strong real exchange rate appreciations. This paper tests the hypothesis that these appreciations reflect underlying productivity gains in the tradables sector. Using panel data for the period 1993–1998, the results give clear evidence of productivity-driven exchange rate movements in the central and eastern European and Baltic countries. Transition countries, particularly the EU accession countries that have begun to catch up, can expect to experience further productivity-driven real exchange rate appreciations. Evidence from a large cross-section of non-transition countries indicates that a 1% catch-up is associated with a 0.4% real appreciation.

The Endogeneity of Optimum Currency Area Criteria, Intraindustry Trade, and EMU Enlargement

Jarko Fidrmuc
8/2001

- Key words: optimum currency area, EMU, trade, business cycle, CEECs

This paper tests an endogeneity hypothesis of optimum currency area (OCA) criteria (Frankel and Rose 1998) on a cross-section of OECD countries between 1990 and 1999. The findings indicate that convergence of business cycles relates to intra-industry trade but not that there is a direct relationship between business cycles and bilateral trade intensity. To the extent that intra-industry trade is positively correlated with trade intensities, the results confirm the OCA endogeneity hypothesis. The endogeneity of OCA linkage criteria implies extensive business cycle harmonisation between CEECs and EU countries in the medium term.

Land, climate and population

Finland covers an area of more than 338,000 square kilometres. The total area is slowly increasing because of the steady uplift of the land since the last glacial era. The country shares frontiers with Sweden in the west, Norway in the north and Russia in the east and has a coastline bordered by the Baltic Sea in the south and west. Agricultural land accounts for 6% of the total area, forest and other wooded land for 68% and inland waters for 10%. Located between latitudes 60° and 70° north, Finland has warm summers and cold winters. Helsinki on the south coast has an average maximum temperature of 21° C (70° F) in July and -3° C (25° F) in February.

Finland has a population of 5,171,302 (31 December 1999) and an average population density of 17 per square kilometre. The largest towns are Helsinki, the capital, with 551,123 inhabitants, Espoo 209,667, Tampere 193,174, Vantaa 176,386 and Turku 172,107.

There are two official languages: 93% of the population speaks Finnish as its mother tongue and 5.7% Swedish. There is a small Lapp population in the north. Finnish is a member of the small Finno-Ugrian group of languages, which also includes Estonian and Hungarian.

Form of government

Finland is a parliamentary democracy with a republican constitution. From the twelfth century to 1809 Finland was part of the Kingdom of Sweden. In 1809 Finland was annexed to Russia as an autonomous Grand Duchy with the Tsar as Grand Duke. On 6 December 1917 Finland declared her independence. The republican constitution adopted in 1919 remains essentially unchanged today.

The legislative power of the country is exercised by Parliament and the President of the Republic. The supreme executive power is vested in the President, who is elected for a period of six years. The President for the current term, 1 March 2000 to 1 March 2006, is Ms Tarja Halonen.

Parliament, comprising 200 members, is elected by universal suffrage for a period of four years. Following the parliamentary elections of 1999, the seats of the various parties in Parliament are distributed as follows:

Social Democratic Party 51; Centre Party 48; National Coalition Party 46; Left Alliance 20; Swedish People's Party 12; Green League 11; Christian League 10; True Finns 1; and Reform Group 1.

Of the 18 ministerial posts in the present Government appointed in April 1999, 6 are held by the Social Democratic Party, 6 by the National Coalition Party, 2 by the Left Wing Alliance, 1 by the Swedish People's

Party, 2 by the Green League and 1 by an expert with no party affiliation. The Prime Minister is Mr Paavo Lipponen of the Social Democratic Party.

Finland is divided into 452 self-governing municipalities. Members of the municipal council are elected by universal suffrage for a period of four years.

International relations

Finland became a member of the BIS in 1930, the IMF in 1948, the IBRD in 1948, GATT in 1950, the UN in 1955, the Nordic Council in 1955, the IFC in 1956, IDA in 1960, EFTA in 1961, the ADB in 1966, the OECD in 1969, the IDB in 1977, the AfDB in 1982, the MIGA in 1988, the Council of Europe in 1989, the EBRD in 1991 and the EU in 1995.

Citizens of the five Nordic countries, Denmark, Finland, Iceland, Norway and Sweden, have enjoyed a common labour market, a passport union and reciprocal social security benefits since the mid-1950s. All the Nordic countries joined the Shengen area on 25 March 2001.

Having abolished most quantitative restrictions on foreign trade in 1957, Finland first took part in European free trade arrangements under the auspices of EFTA in 1961. Finland's free trade agreement with the EEC entered into force in 1974 and agreements for the removal of trade barriers were concluded with several eastern European countries as well. The agreement on the European Economic Area (EEA) between the member countries of EFTA and the European Union came into effect at the beginning of 1994. Finland became a member of the European Union on 1 January 1995. Finland and ten other EU countries entered Stage Three of EMU in 1999.

The economy

Output and employment. Of the gross domestic product of FIM 680 (EUR 114) billion in basic values in 2000, 1.3% was generated in agriculture, hunting and fishing, 2.3% in forestry, 28.4% in industry, 5.8% in construction, 11.5% in trade, restaurants and hotels, 9.5% in transport and communications, 4.3% in finance and insurance, 17.1% in other private services and 19.7% by producers of government services. Of total employment of 2.3 million persons in 2000, 6.2% were engaged in primary production, 28.1% in industry and construction and 65.7% in services.

In 2000 expenditure on the gross domestic product in purchasers' values amounted to FIM 783 (EUR 132) billion and was distributed as follows: net exports 9.4% (exports 42.7%, imports -33.3%), gross fixed capital

formation 19.3%, private consumption 49.5% and government consumption 20.7%. Finland's tax ratio (gross taxes including compulsory employment pension contributions relative to GDP) was 46.6%.

Average annual (compounded) growth of real GDP was 4.7% in the period 1950–59, 5.0% in 1960–69, 3.7% in 1970–79, 3.6% in 1980–89 and 1.7% in 1990–99. Finland's GDP per capita in 2000 was USD 23,495.

Foreign trade. EU countries absorb the bulk of Finnish merchandise exports. In 1996–2000 their average share was 55.5%. Over the same period, Finnish exports to other European countries (including Russia) accounted for 18.5% and to the rest of the world for 26.0%. During the same period the regional distribution of Finnish merchandise imports was quite similar to that of exports: EU countries accounted for 58.3%, other European countries for 17.4% and the rest of the world for 24.3%.

In 2000 the share of forest industry products in total merchandise exports was 27.1%, the share of metal and electrical products 55.7% and the share of other goods 17.2%. Raw materials and intermediate goods and energy together accounted for 53.1% of merchandise imports, capital goods for 24.0% and durable and non-durable consumer goods for 22.9%.

Forest resources. Finland has abundant forest resources but only limited amounts of other raw materials. The growing stock comprises 1,927 million cubic metres, of which 46% is pine, 36% spruce, 15% birch and 3% other broad-leaved species.

According to the National Forest Inventory for 1992–1998, the annual volume increment was about 76 million cubic metres. Over the same period the average annual drain was about 59 million cubic metres.

Finance and banking

Currency. Finland had its own monetary system from 1865 to 1998. The currency unit was the markka (plural markkaa), which was divided into 100 penniä (singular penni). During the last decades of this period the objective of foreign exchange policy was to maintain a fixed exchange rate in relation to a given currency basket. On 8 September 1992 the markka was allowed to float. On 14 October 1996 the markka joined the Exchange Rate Mechanism of the European Monetary System. Since the beginning of 1999 Finland has participated in the single currency area, in accordance with the Treaty establishing the European Community. The conversion rate for the markka, as confirmed by the Council of the European Union on 31 December 1998, is 5.94573. With effect from the beginning of 1999 the currency unit used in Finland is the euro, which is divided into 100 cent. The markka will, however, remain as the national denomination of the euro until the year 2002, and during this time notes and coins denominated in markkaa will continue to be used.

The Central Bank. The two new laws adopted in 1997 and 1998 make Finnish legislation compatible with

the requirements of the Treaty establishing the European Community and the Statute of the European System of Central Banks and the European Central Bank. The latter law, the new Act on the Bank of Finland, integrates the Bank of Finland into the ESCB. In performing the tasks of the ESCB, the Bank of Finland acts in accord with guidelines and instructions issued by the ECB. Under the Treaty, the primary objective of the Bank of Finland is to maintain price stability. The new Act did not change the division of responsibilities between the Parliamentary Supervisory Council and the Board. The tasks of the Council are connected with supervision of the Bank's administration and operations, administrative decisions and certain other responsibilities. The Board of the Bank of Finland comprises the Chairman (Governor) and a maximum of five (currently two) other members, all of whom are appointed by the President of the Republic upon a proposal from the Council. The Chairman of the Board is appointed for a seven-year term and the other members of the Board each for a five-year term. The Bank of Finland has a head office in Helsinki and four branch offices in other towns.

Other banks (28 August 2001). Finland has three major groups of deposit banks with a total of about 1,550 branches. In addition there are six smaller banks and banking groups. The commercial banks have a total of 17 foreign branches, subsidiaries and associate banks and 16 representative offices abroad. There are 40 savings banks, a group of cooperative banks (244) and 42 local cooperative banks. In addition, 7 foreign banks have branches and 7 foreign banks have representative offices in Finland.

Financial markets. The total stock of domestic credit amounted to FIM 735.5 (EUR 123.7) billion at end-December 2000 and was broken down by lender group as follows: deposit banks 58%; insurance companies 6%; pension insurance institutions 16%; other credit institutions 10%; central and local authorities and social security funds 10%.

In the money market, the total value of instruments outstanding was about FIM 130.6 (EUR 22.0) billion at end-June 2001; bank certificates of deposit accounted for 64% of the total and Treasury bills, commercial paper and local authority paper for the rest.

At end-December 2000 there were 108 companies on the Main List, 32 on the Investors' List and 17 on the NM List of the HEX, Helsinki Exchanges. At end-June 2001 total market capitalization was FIM 1,216.5 (EUR 204.6) billion for the Main List, FIM 7.4 (EUR 1.2) billion for the Investors' List and FIM 4.3 (EUR 0.72) billion for the NM List. Domestic bonds and debentures in circulation at end-June 2001 amounted to FIM 313.6 (EUR 52.7) billion; government bonds accounted for 80% of the total. Share turnover on the HEX, Helsinki Exchanges amounted to FIM 1,351 (EUR 227.2) billion in 2000. In January-June 2001 share turnover amounted to FIM 676.1 (EUR 113.7) billion.



VISITING SCHOLARS PROGRAMME

BANK OF FINLAND

The Bank of Finland, the national central bank, has 750 employees, some 30 of whom are involved in research. The Bank is located in Helsinki.

The Bank of Finland welcomes applications from foreign and Finnish scholars for a post under the Bank's Visiting Scholars Programme at the Research Department. Scholarships for six months are available for faculty or post-doctoral level research projects in two main research areas:

- (1) The modelling of monetary policy
- (2) The future of the financial services sector.

In the area of monetary policy modelling, we are especially interested in incorporating the analysis of credibility and policy uncertainty in applied models that could be used to analyze monetary policy in practice. The second area aims at illuminating the ongoing structural transformation of the global financial services industry, as driven by electrification and increased competition in particular. This area includes stability and other public policy aspects of the transformation.

A visiting scholar will be expected to conduct research based on a mutually agreed research plan. Articles stemming from the research are expected to be included in the Bank's Discussion Papers and may be published elsewhere as well. A visiting scholar should normally also give a lecture at the Bank to an audience of economists on his or her research topic as well as interact with other researchers engaged in projects in the same area.

Remuneration for visiting scholars will be commensurate with their research experience.

Persons interested in applying are invited to send

- a brief research proposal concerning either of the two areas
- a CV specifying the applicant's academic and research background, with the names of two or three referees

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Balance sheet of the Bank of Finland, EUR million

Assets	2001			
	25.5.	29.6.	27.7.	31.8.
1 Gold and gold receivables	463	502	502	502
2 Claims on non-euro area residents denominated in foreign currency	8 638	9 108	8 834	9 136
2.1 Receivables from the IMF	780	841	840	837
2.2 Balances with banks and security investments, external loans and other external assets	7 858	8 266	7 995	8 300
3 Claims on euro area residents denominated in foreign currency	856	885	897	786
4 Claims on non-euro area residents denominated in euro	0	0	0	0
4.1 Balances with banks, security investments and loans	0	0	0	0
4.2 Claims arising from the credit facility under the ERM II	–	–	–	–
5 Lending to euro area credit institutions related to monetary policy operations denominated in euro	501	2 183	1 192	1 971
5.1 Main refinancing operations	301	1 489	595	1 250
5.2 Longer-term refinancing operations	200	694	597	697
5.3 Fine-tuning reverse operations	–	–	–	–
5.4 Structural reverse operations	–	–	–	–
5.5 Marginal lending facility	–	–	–	24
5.6 Credits related to margin calls	–	–	–	–
6 Other claims on euro area credit institutions denominated in euro	4	4	4	4
7 Securities of euro area residents denominated in euro	–	–	–	–
8 General government debt denominated in euro	–	–	–	–
9 Intra-Eurosystem claims	768	768	768	768
9.1 Share in ECB capital	70	70	70	70
9.2 Claims equivalent to the transfer of foreign currency reserves	699	699	699	699
9.3 Claims related to the issuance of ECB debt certificates	–	–	–	–
9.4 Claims related to TARGET and correspondent accounts (net)	–	–	–	–
9.5 Claims related to other operational requirements within the Eurosystem	–	–	–	–
10 Other assets	560	593	571	572
Total assets	11 789	14 043	12 768	13 739

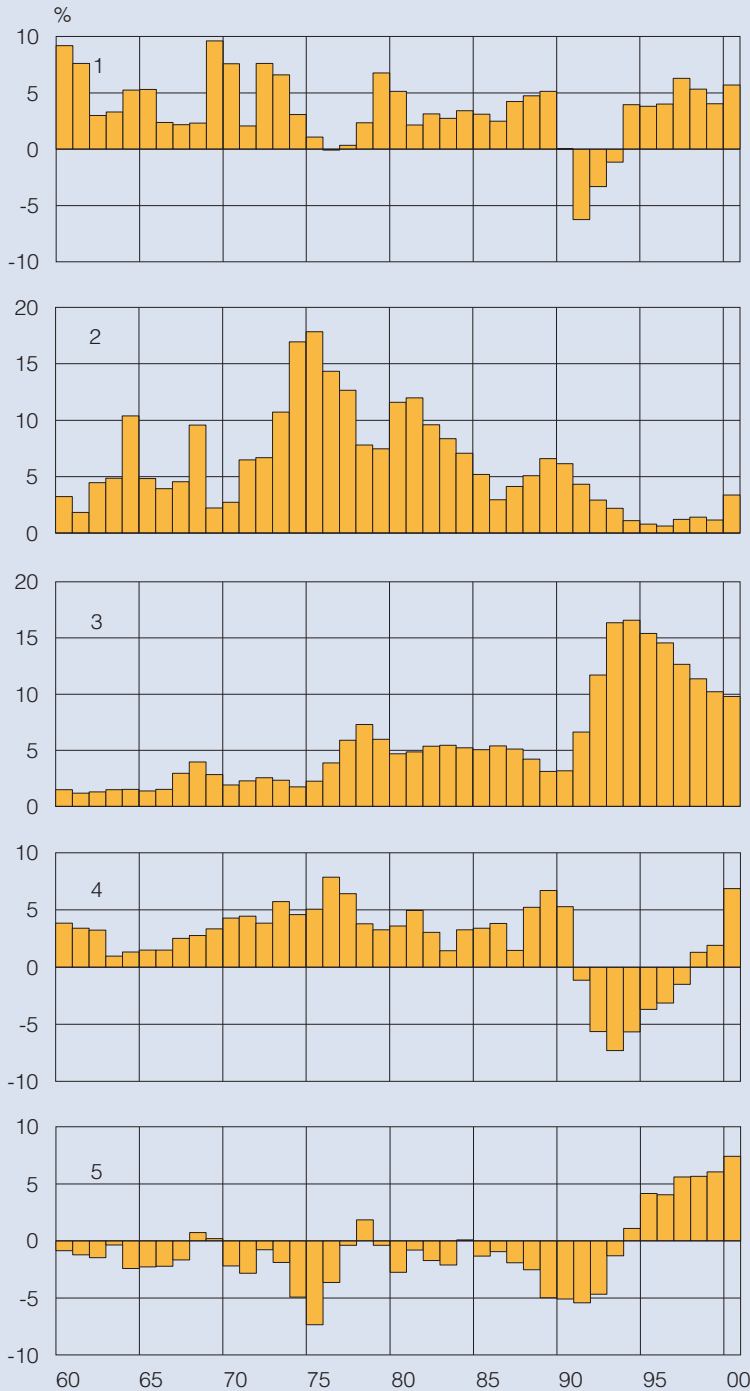
Totals/sub-totals may not add up because of rounding.

Liabilities	25.5.	2001		31.8.
		29.6.	27.7.	
1 Banknotes in circulation	2 688	2 721	2 717	2 632
2 Liabilities to euro area credit institutions related to monetary policy operations denominated in euro	1 953	1 822	2 021	2 017
2.1 Current accounts (covering the minimum reserve system)	1 953	1 822	2 021	2 017
2.2 Deposit facility	–	–	–	–
2.3 Fixed-term deposits	–	–	–	–
2.4 Fine-tuning reverse operations	–	–	–	–
2.5 Deposits related to margin calls	–	–	–	–
3 Other liabilities to euro area credit institutions denominated in euro	–	–	–	–
4 Liabilities to other euro area residents denominated in euro	1	1	0	1
4.1 General government	–	–	–	–
4.2 Other liabilities	1	1	0	1
5 Liabilities to non-euro area residents denominated in euro	153	189	255	1
6 Liabilities to euro area residents denominated in foreign currency	–	–	–	–
7 Liabilities to non-euro area residents denominated in foreign currency	137	395	105	267
7.1 Deposits, balances and other liabilities	137	395	105	267
7.2 Liabilities arising from the credit facility under the ERM II	–	–	–	–
8 Counterpart of special drawing rights allocated by the IMF	206	210	210	210
9 Intra-Eurosystem liabilities	1 183	2 996	1 755	2 888
9.1 Liabilities related to promissory notes backing the issuance of ECB debt certificates	–	–	–	–
9.2 Liabilities related to TARGET and correspondent accounts (net)	1 183	2 996	1 755	2 888
9.3 Liabilities related to other operational requirements within the Eurosystem	–	–	–	–
10 Other liabilities	264	307	302	321
11 Revaluation account	1 129	1 326	1 326	1 326
12 Capital and reserves	4 076	4 076	4 076	4 076
Total liabilities	11 789	14 043	12 768	13 739

Charts

1. Finland: key economic indicators
2. Price stability in the euro area and Finland
3. Monetary aggregates for the euro area
4. Growth of the money stock in the euro area and Finland
5. Eurosystem interest rates and money market rates
6. Eurosystem (Bank of Finland) interest rates
7. Official interest rates
8. Euribor rates, daily values
9. Euribor rates, monthly values
10. Differentials between ten-year yields for Germany and selected euro area countries
11. International three-month interest rates, daily values
12. Three-month interest rates in the Nordic countries, daily values
13. International long-term interest rates, daily values
14. International three-month interest rates, monthly values
15. Three-month interest rates in the Nordic countries, monthly values
16. International long-term interest rates, monthly values
17. Yields on Finnish benchmark government bonds
18. Yields on five and ten-year Finnish government bonds
19. Bank reference rates in Finland
20. Bank deposit rates in Finland
21. Bank lending and deposit rates in Finland
22. Interest rates charged by Finnish banks on new lending to households
23. Stock of bank lending in Finland
24. Stock of bank deposits in Finland by interest rate linkage
25. Stock of bank deposits in Finland by tax treatment
26. Liabilities of Finnish monetary financial institutions included in monetary aggregates for the euro area
27. Euro area and Finnish banks: growth of deposits
28. Euro area and Finnish banks: growth of lending
29. Euro exchange rates against the US dollar and the yen, daily values
30. Euro exchange rates against the US dollar and the yen, monthly values
31. Euro exchange rates against the pound sterling and Swedish krona
32. Euro exchange rates against the Scandinavian currencies
33. Euro's external value and Finland's competitiveness indicator
34. Competitiveness indicators for Finland
35. Selected stock price indices in the euro area, daily values
36. Selected stock price indices in the euro area, monthly values
37. Listed shares in Finland: total market capitalization and non-residents' holdings
38. Securities issued in Finland
39. Bonds issued in Finland
40. Mutual funds registered in Finland
41. Central government revenue and expenditure in Finland
42. Public sector balances in Finland
43. Public debt in Finland
44. Net lending in Finland by sector
45. Finland: goods account and current account
46. Finland: services account and income account
47. Regional distribution of Finnish exports
48. Finnish exports by industry
49. Finland's foreign trade: export prices, import prices and terms of trade
50. Non-residents' portfolio investment in Finnish shares
51. Finland: direct investment
52. Finland's net international investment position
53. Industrial confidence indicator in the euro area and Finland
54. Consumer confidence indicator in the euro area and Finland
55. Finland: GDP and industrial production
56. Unemployment rate in the euro area and Finland
57. Level of industrial earnings in the euro area and Finland
58. Selected asset prices in Finland

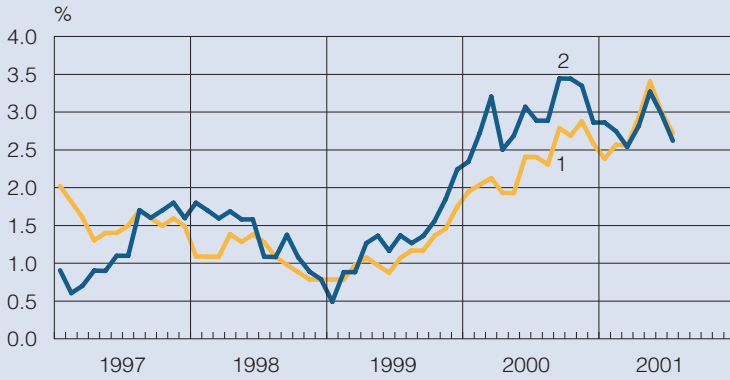
1. Finland: key economic indicators



1. GDP, volume change from previous year
2. Consumer prices, change from previous year
3. Unemployment rate
4. General government fiscal position, % of GDP
5. Current account, % of GDP

Sources:
 Statistics Finland and
 Bank of Finland.

2. Price stability in the euro area and Finland

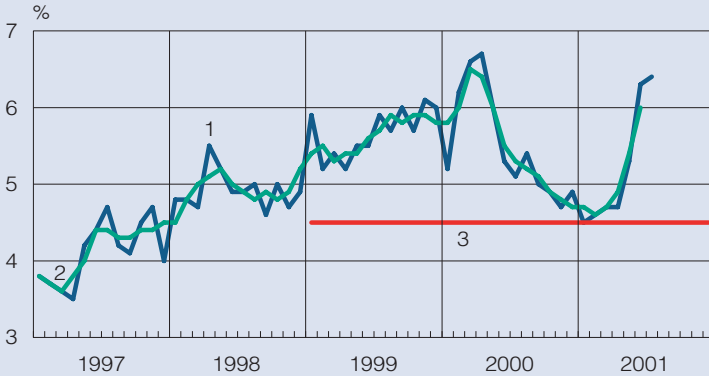


Harmonized Index of Consumer Prices, 12-month percentage change

- 1. Euro area countries
- 2. Finland

Sources: Eurostat and Statistics Finland.

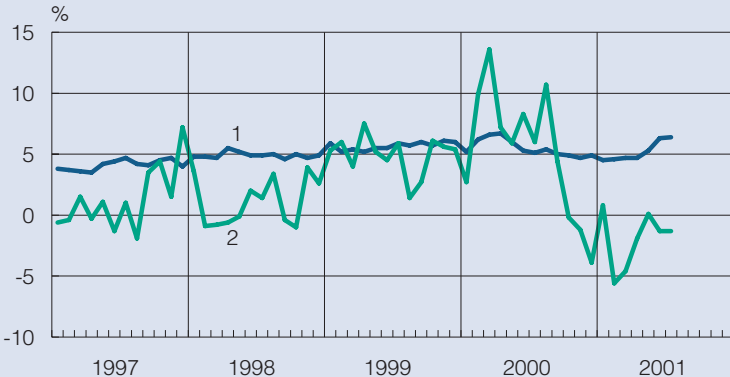
3. Monetary aggregates for the euro area



- 1. M3, 12-month percentage change
- 2. M3, 12-month percentage change, smoothed by means of a 3-month moving average
- 3. Eurosystem's reference value for the growth of M3

Source: European Central Bank.

4. Growth of the money stock in the euro area and Finland

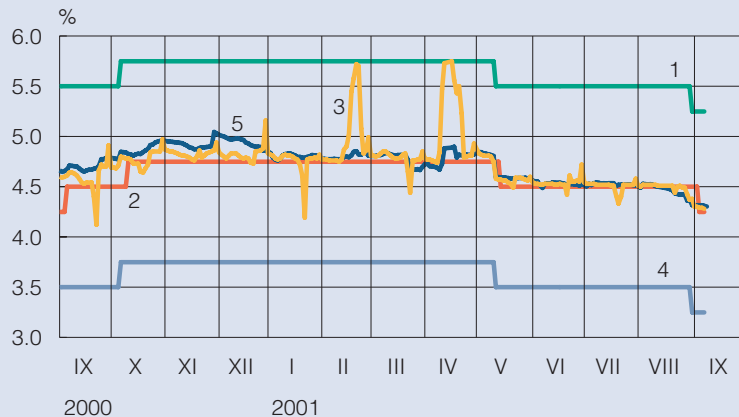


12-month percentage change

- 1. M3 for the euro area
- 2. Deposits and other liabilities of Finnish monetary financial institutions included in M3

Sources: European Central Bank and Bank of Finland.

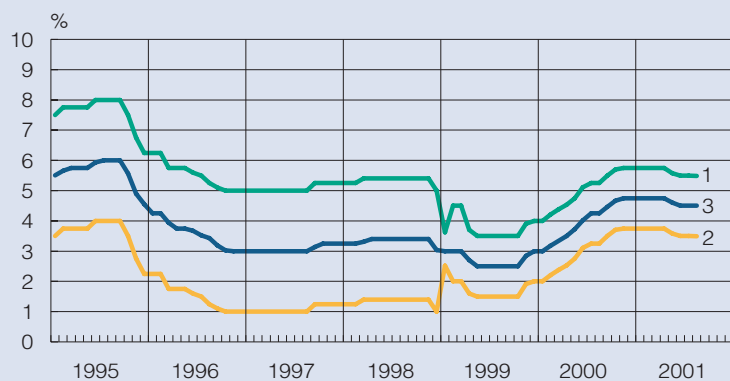
5. Eurosystem interest rates and money market rates



1. Marginal lending rate
2. Main refinancing rate / minimum bid rate
3. Eonia rate
4. Deposit rate
5. 1-month Euribor

Sources:
European Central Bank and Reuters.

6. Eurosystem (Bank of Finland) interest rates

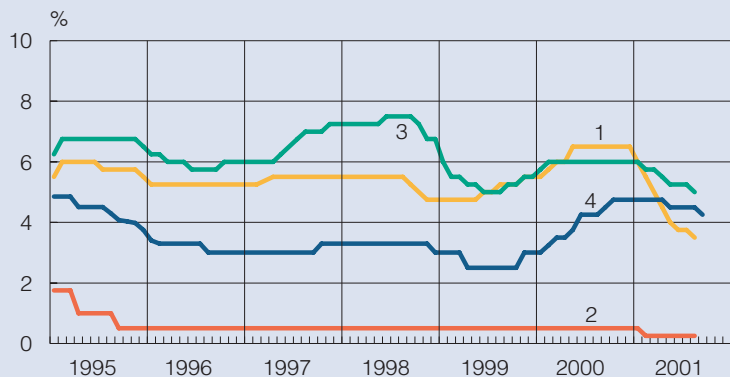


Bank of Finland interest rates until end-1998

1. Marginal lending rate (liquidity credit rate until end-1998)
2. Deposit rate (excess-reserve rate until end-1998)
3. Main refinancing rate / minimum bid rate (tender rate until end-1998)

Source:
European Central Bank.

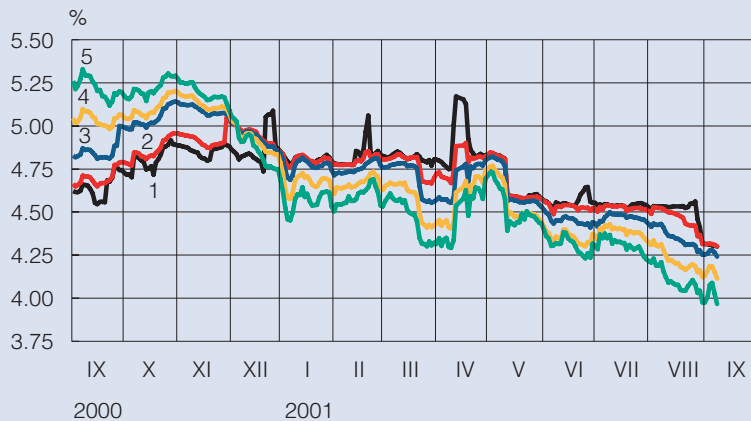
7. Official interest rates



1. USA: fed funds target rate
2. Japan: discount rate
3. United Kingdom: repo rate
4. Eurosystem: main refinancing rate (German repo rate until end-1998)

Source: Bloomberg.

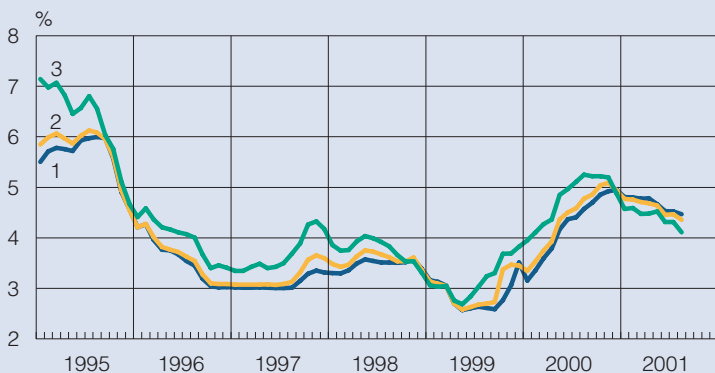
8. Euribor rates, daily values



- 1. 1-week
- 2. 1-month
- 3. 3-month
- 4. 6-month
- 5. 12-month

Source: Reuters.

9. Euribor rates, monthly values

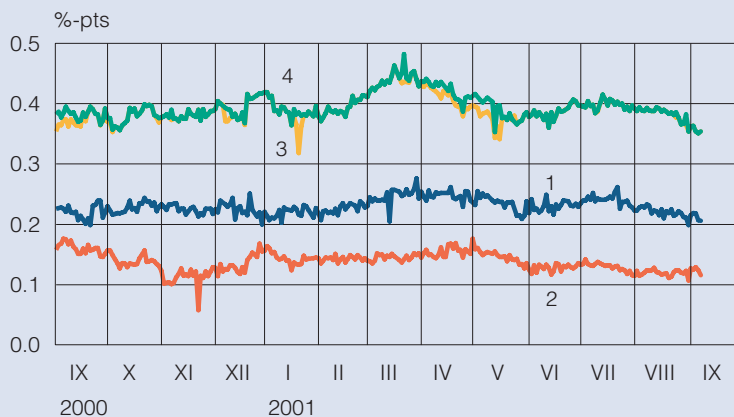


Helibor rates until end-1998

- 1. 1-month
- 2. 3-month
- 3. 12-month

Source: Reuters.

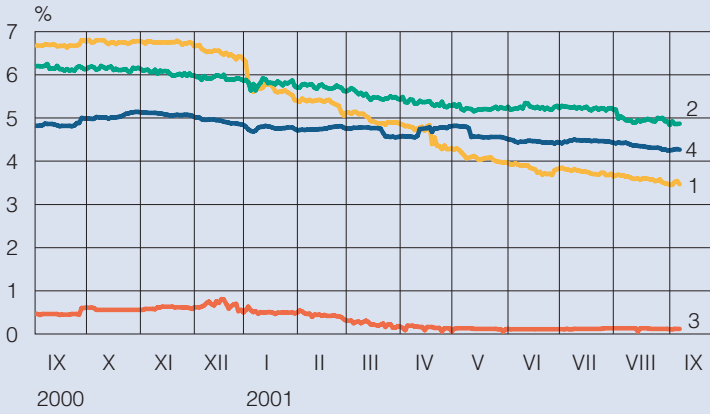
10. Differentials between ten-year yields for Germany and selected euro area countries



- 1. Finland
- 2. France
- 3. Italy
- 4. Largest differential

Source: Reuters.

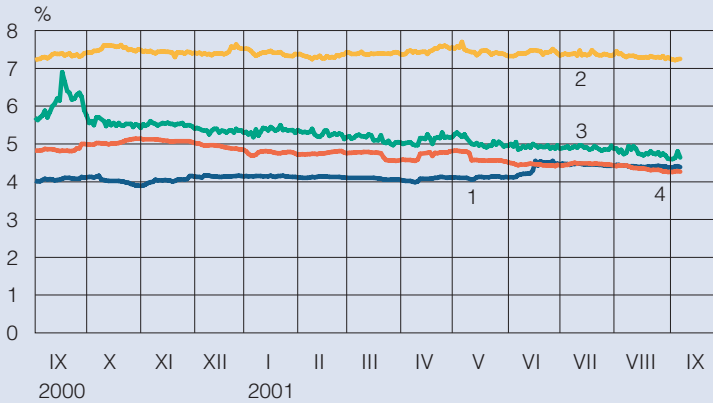
11. International three-month interest rates, daily values



- Interbank rates
1. United States
 2. United Kingdom
 3. Japan
 4. Euro area

Source: Reuters.

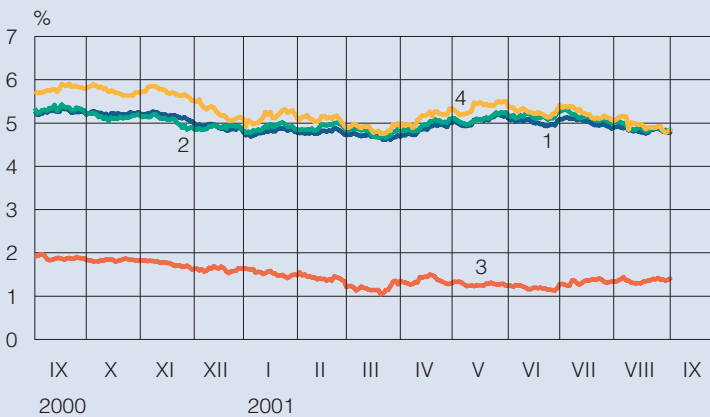
12. Three-month interest rates in the Nordic countries, daily values



- Interbank rates
1. Sweden (Stibor)
 2. Norway
 3. Denmark
 4. Finland (Euribor)

Source: Reuters.

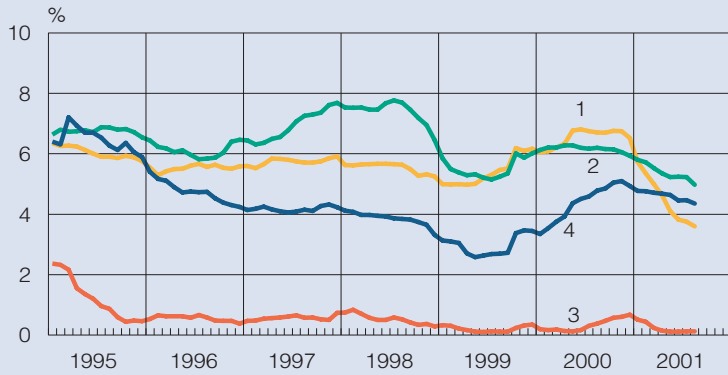
13. International long-term interest rates, daily values



- Yields on ten-year government bonds
1. Germany
 2. United Kingdom
 3. Japan
 4. United States

Source: Reuters.

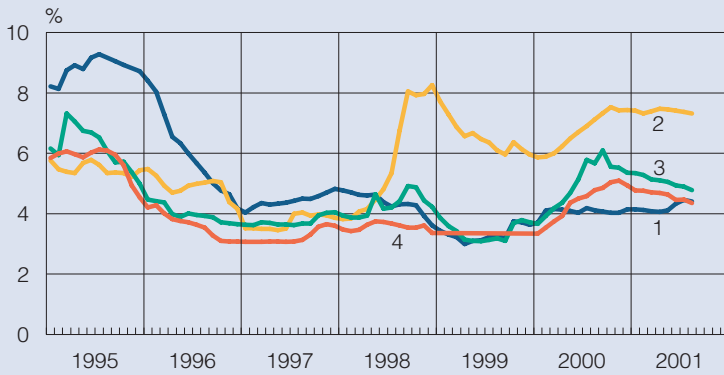
14. International three-month interest rates, monthly values



- Interbank rates
1. United States
 2. United Kingdom
 3. Japan
 4. Euro area

Source: Reuters.

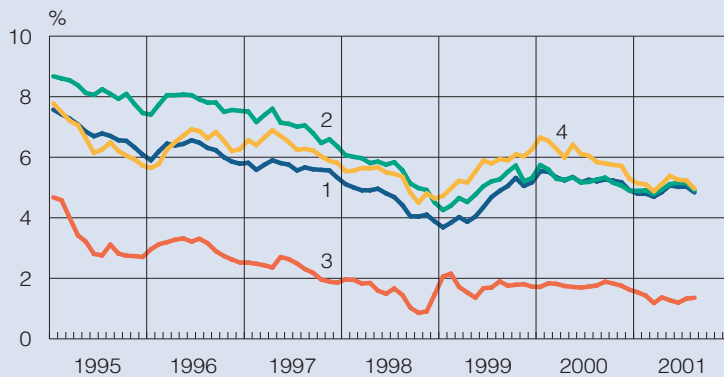
15. Three-month interest rates in the Nordic countries, monthly values



- Interbank rates
1. Sweden (Stibor)
 2. Norway
 3. Denmark
 4. Finland (Euribor; Helibor until end-1998)

Source: Reuters.

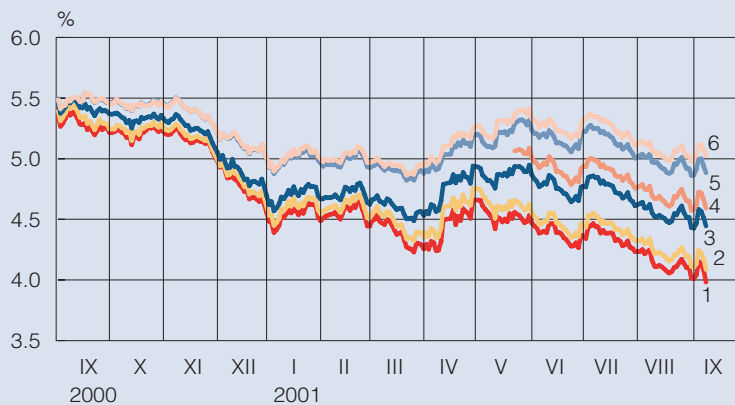
16. International long-term interest rates, monthly values



- Yields on ten-year government bonds
1. Germany
 2. United Kingdom
 3. Japan
 4. United States

Source: Reuters.

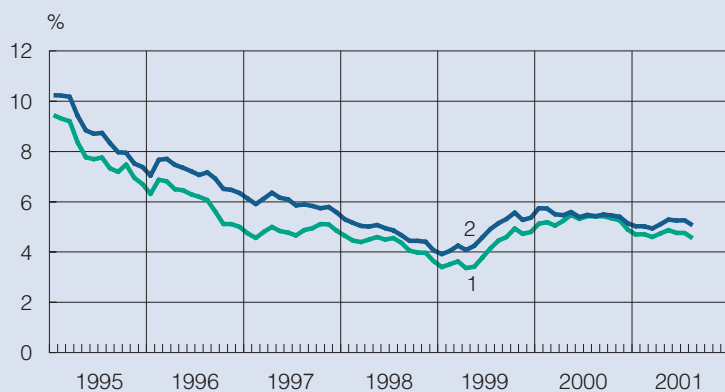
17. Yields on Finnish benchmark government bonds



1. Bond maturing on 12 November 2003, 3.75%
2. Bond maturing on 15 March 2004, 9.5%
3. Bond maturing on 18 April 2006, 7.25%
4. Bond maturing on 4 July 2007, 5%
5. Bond maturing on 25 April 2009, 5%
6. Bond maturing on 2 February 2011, 5.75%

Source: Reuters.

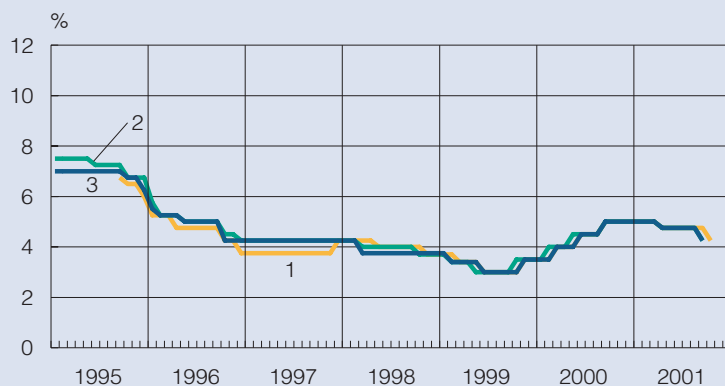
18. Yields on five and ten-year Finnish government bonds



1. 5 years
2. 10 years

Source: Reuters.

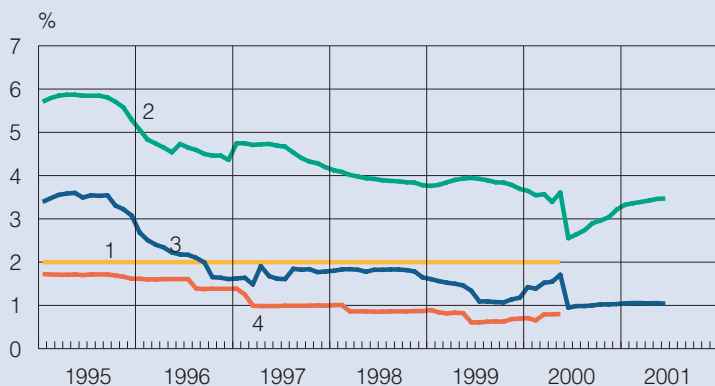
19. Bank reference rates in Finland



1. Merita prime
2. Sampo prime
3. OKOBANK group prime

Source: Banks.

20. Bank deposit rates in Finland

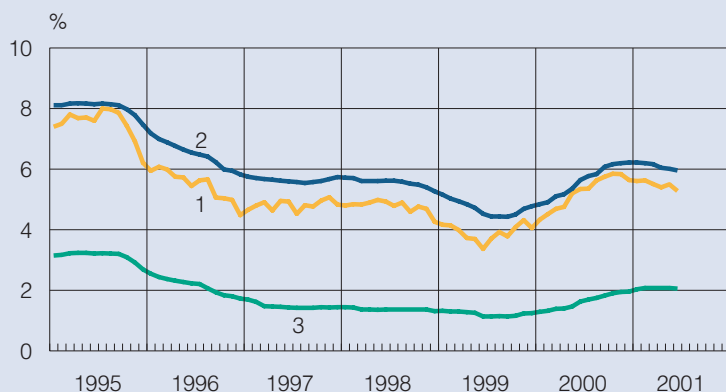


The tax treatment of deposits changed on 1 June 2000.

1. Rate on tax-exempt transaction accounts (upper limit)
2. Average rate on fixed-term deposits subject to withholding tax
3. Average rate on cheque and transaction accounts subject to withholding tax
4. Average rate on tax-exempt cheque and transaction accounts

Source: Bank of Finland.

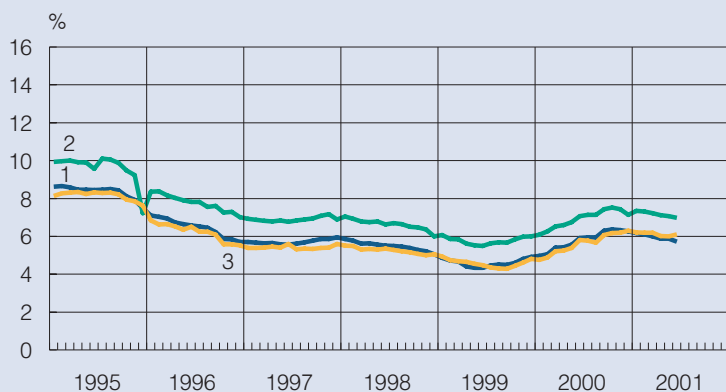
21. Bank lending and deposit rates in Finland



1. Rate on new lending
2. Average lending rate
3. Average deposit rate

Source: Bank of Finland.

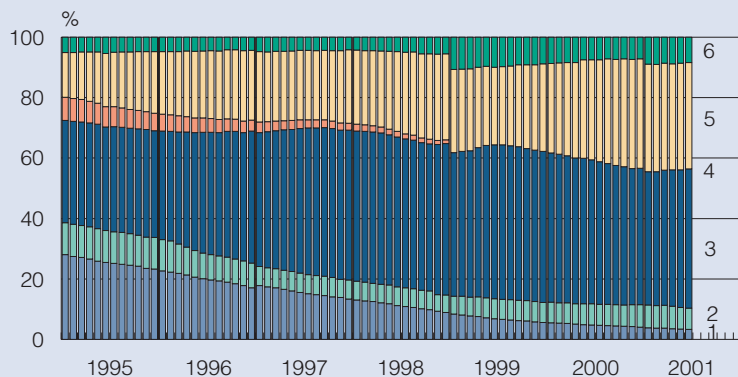
22. Interest rates charged by Finnish banks on new lending to households



1. New housing loans
2. New consumer credits
3. New study loans

Source: Bank of Finland.

23. Stock of bank lending in Finland

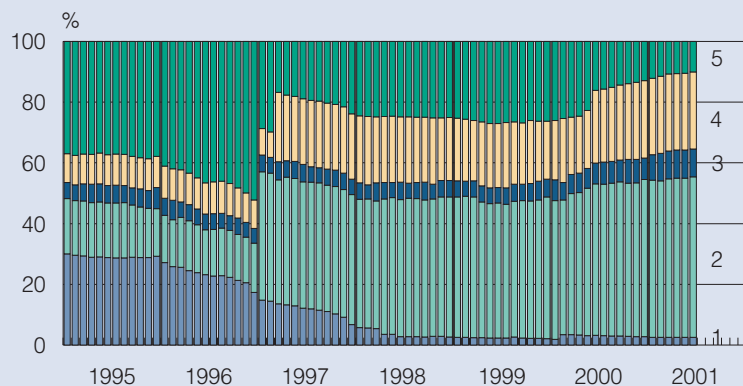


Interest rate linkages, percentages

1. Linked to base rate
2. Fixed-rate
3. Linked to Euribor (Helibor until end-1998)
4. Linked to 3 and 5-year reference rates
5. Linked to reference rates of individual banks (prime rates etc)
6. Other

Source: Bank of Finland.

24. Stock of bank deposits in Finland by interest rate linkage

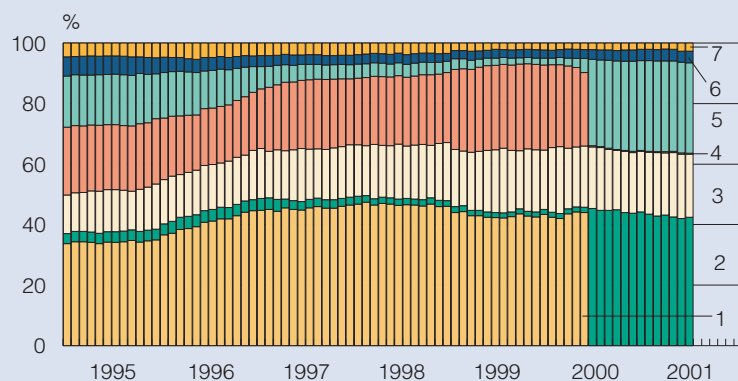


Interest rate linkages, percentages

1. Linked to base rate
2. Fixed-rate
3. Linked to Euribor (Helibor until end-1998)
4. Linked to reference rates of individual banks (prime rates etc)
5. Other

Source: Bank of Finland.

25. Stock of bank deposits in Finland by tax treatment

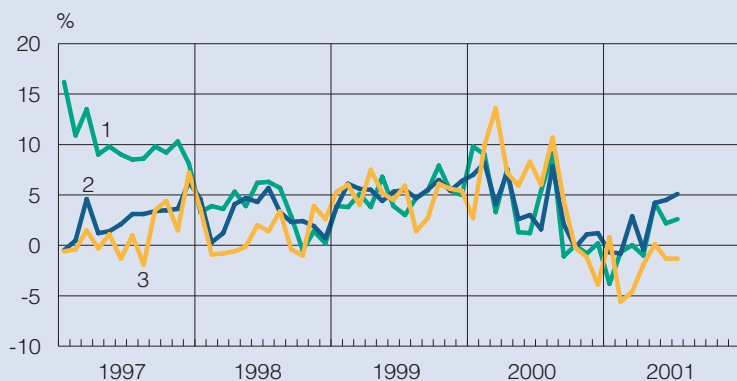


The tax treatment of deposits changed on 1 June 2000.

1. Tax-exempt cheque and transaction accounts
2. Cheque and transaction accounts subject to withholding tax
3. Other taxable cheque and transaction accounts
4. Tax-exempt fixed-term accounts and other accounts
5. Fixed-term accounts and other accounts subject to withholding tax
6. Other taxable accounts
7. Foreign currency accounts

Source: Bank of Finland.

26. Liabilities of Finnish monetary financial institutions included in monetary aggregates for the euro area

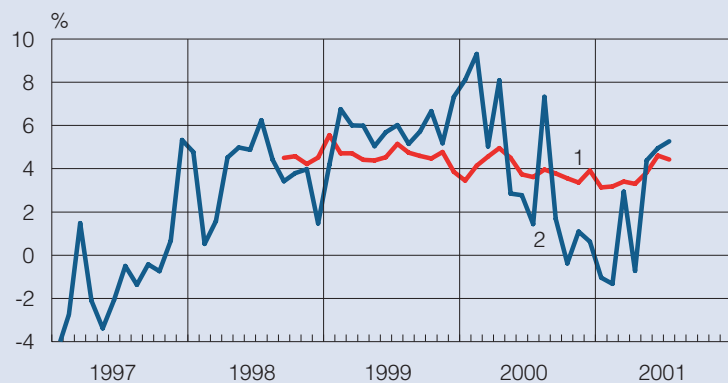


12-month percentage change

1. Items included in M1: transaction accounts (=overnight deposits)
2. Items included in M2: all deposits except fixed-term deposits of over 2 years
3. Items included in M3: M2 deposits plus certain securities and other items

Source: Bank of Finland.

27. Euro area and Finnish banks: growth of deposits

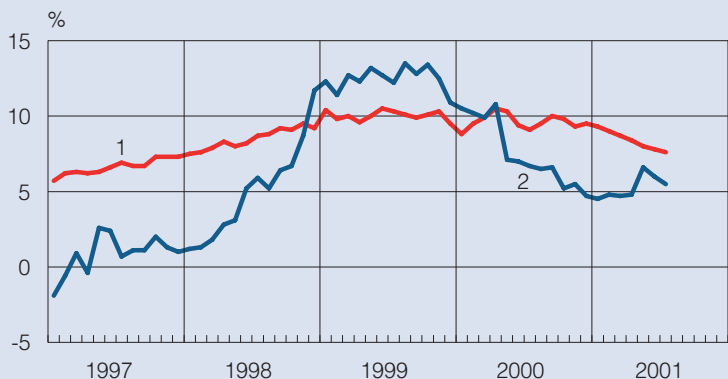


12-month percentage change

1. Deposits of euro area residents with euro area banks
2. Deposits of Finnish residents with Finnish banks

Sources:
European Central Bank and
Bank of Finland.

28. Euro area and Finnish banks: growth of lending

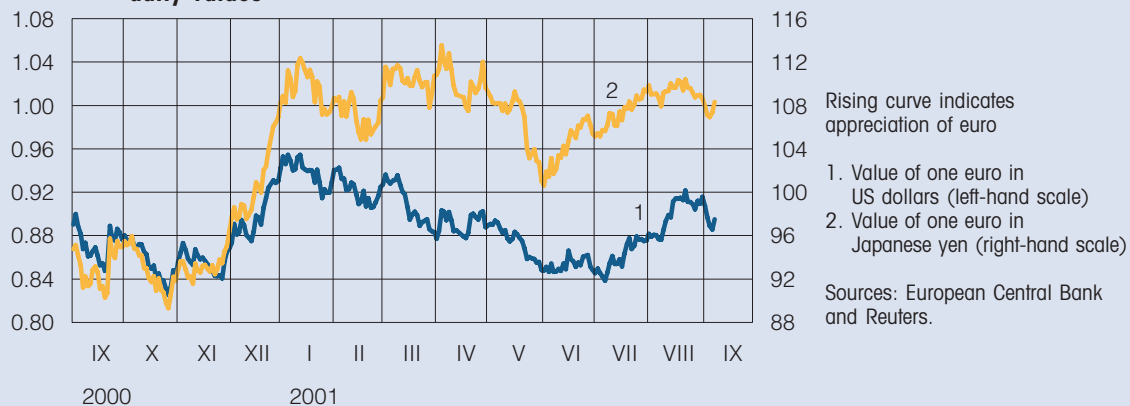


12-month percentage change

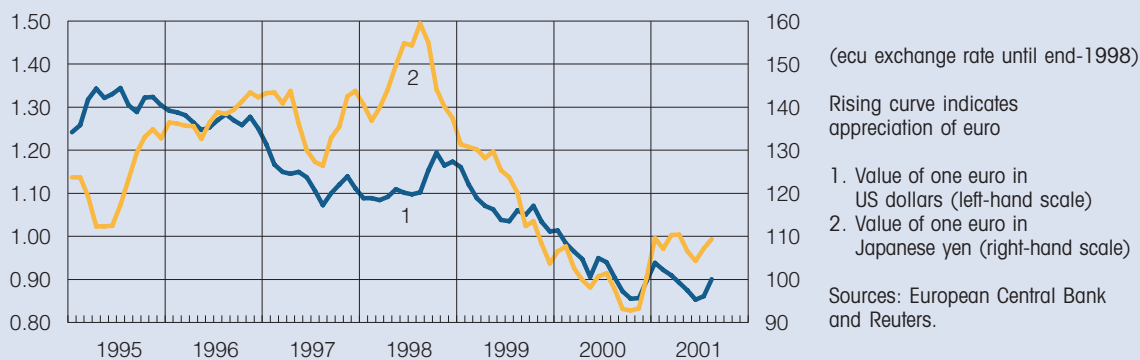
1. Lending by euro area banks to euro area residents
2. Lending by Finnish banks to Finnish residents

Sources:
European Central Bank and
Bank of Finland.

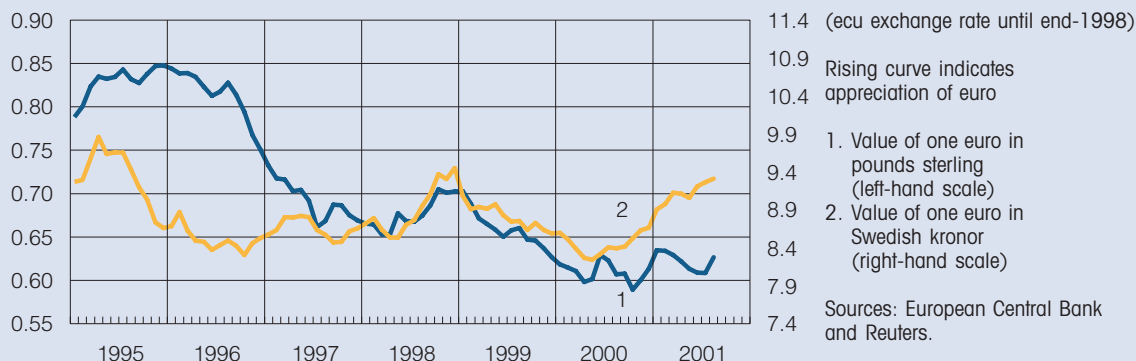
29. Euro exchange rates against the US dollar and the yen, daily values



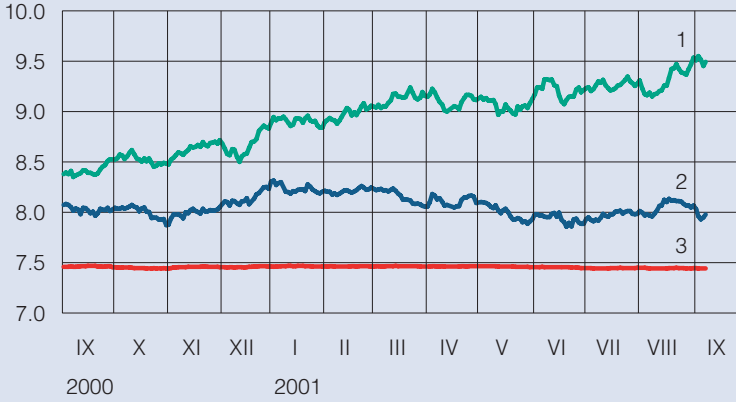
30. Euro exchange rates against the US dollar and the yen, monthly values



31. Euro exchange rates against the pound sterling and the Swedish krona



32. Euro exchange rates against the Scandinavian currencies

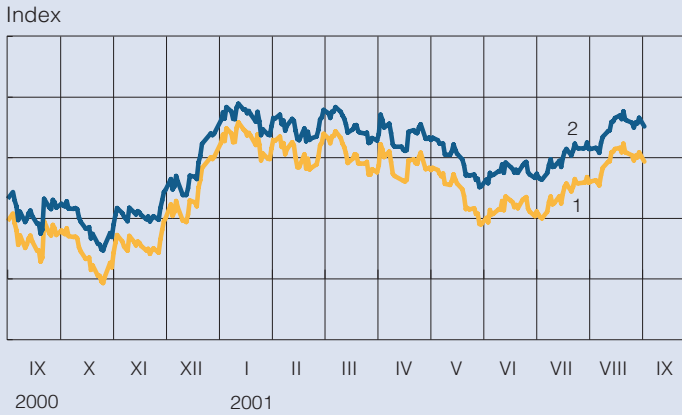


Rising curve indicates appreciation of euro

1. Value of one euro in Swedish kronor
2. Value of one euro in Norwegian kroner
3. Value of one euro in Danish kroner

Sources: European Central Bank and Reuters.

33. Euro's external value and Finland's competitiveness indicator

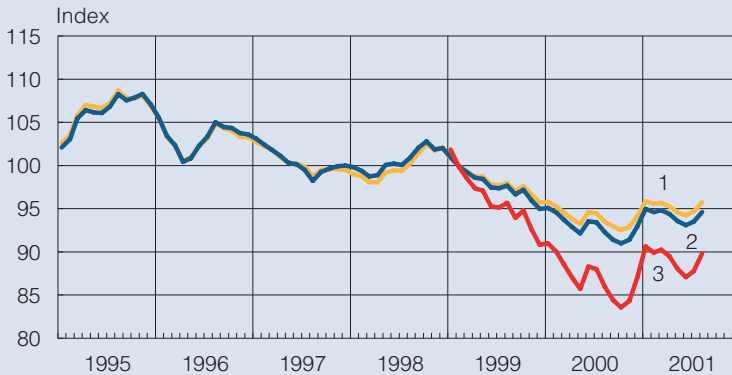


1999 Q1 = 100
An upward movement of the index represents an appreciation of the euro / a weakening in Finnish competitiveness

1. Euro's effective exchange rate
2. Finland's narrow competitiveness indicator

Sources: European Central Bank and Bank of Finland.

34. Competitiveness indicators for Finland

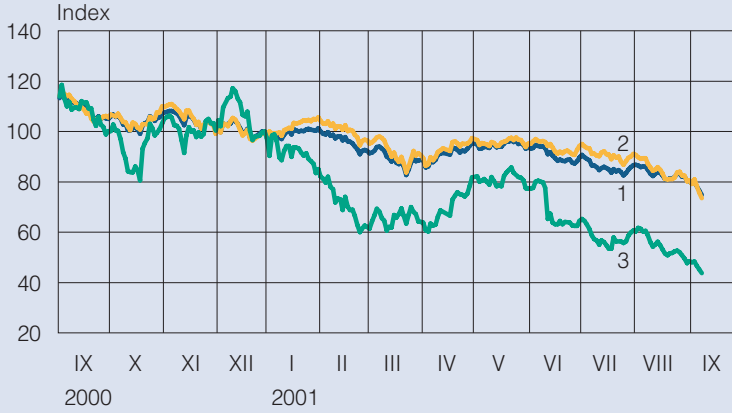


1999 Q1 = 100
An upward movement of the index represents a weakening in Finnish competitiveness

1. Bank of Finland's old currency index
2. Narrow plus euro area competitiveness indicator
3. Narrow competitiveness index

Source: Bank of Finland.

35. Selected stock price indices in the euro area, daily values

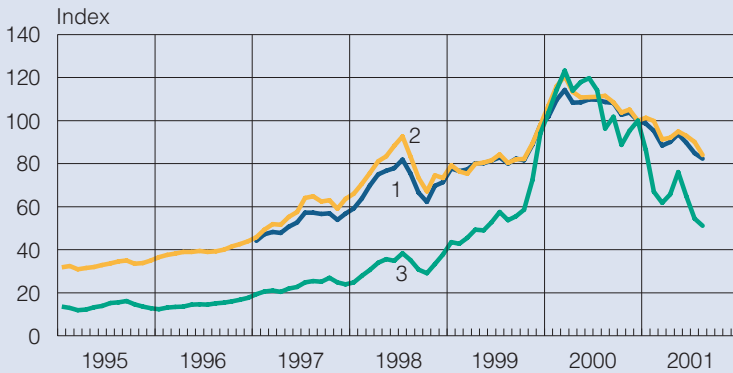


29 December 2000 = 100

1. Euro area:
Dow Jones Euro Stoxx index
2. Germany: DAX index
3. Finland: HEX all-share index

Sources: Bloomberg and
HEX Helsinki Exchanges.

36. Selected stock price indices in the euro area, monthly values

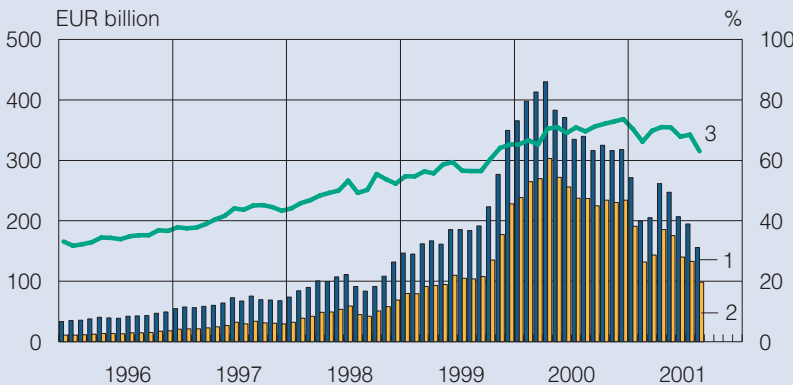


30 December 2000 = 100

1. Total euro area:
Dow Jones Euro Stoxx index
2. Germany: DAX index
3. Finland: HEX all-share index

Sources: Bloomberg and
HEX Helsinki Exchanges.

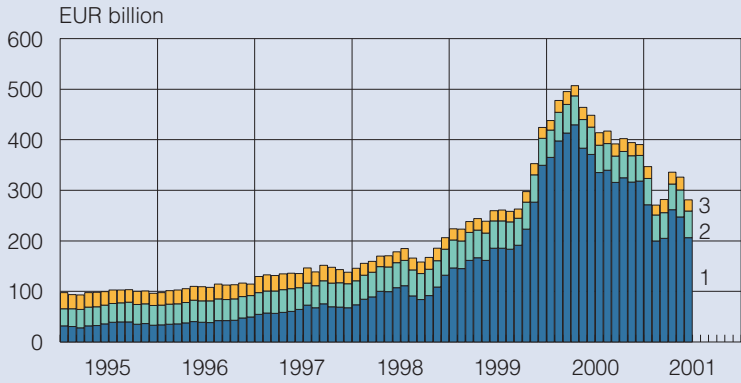
37. Listed shares in Finland: total market capitalization and non-residents' holdings



1. Market capitalization of all listed shares (left-hand scale)
2. Market capitalization of non-residents' holdings (left-hand scale)
3. Market capitalization of non-residents' holdings as a percentage of total market capitalization (right-hand scale)

Sources: HEX Helsinki Exchanges and Finnish Central Securities Depository (APK).

38. Securities issued in Finland

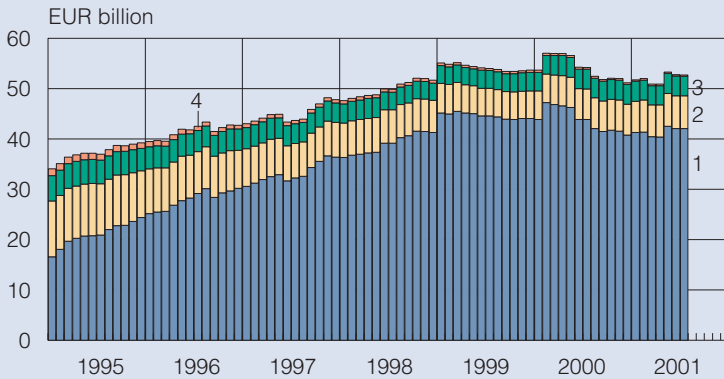


End-month stock

1. Market capitalization of shares
2. Stock of bonds, nominal value
3. Outstanding money market instruments

Sources:
HEX Helsinki Exchanges,
Bank of Finland,
Statistics Finland and
State Treasury.

39. Bonds issued in Finland

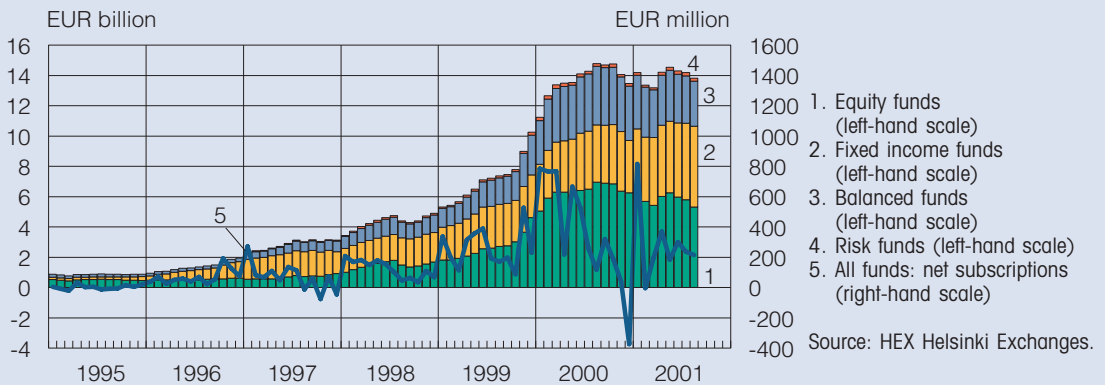


End-month stock

1. Central government
2. Financial institutions
3. Companies
4. Other

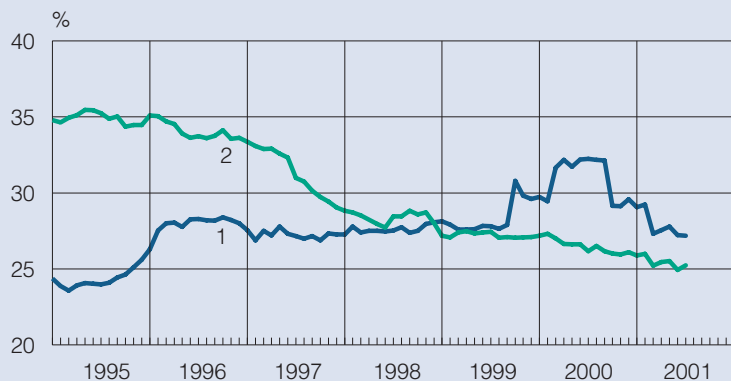
Source: Statistics Finland.

40. Mutual funds registered in Finland



Source: HEX Helsinki Exchanges.

41. Central government revenue and expenditure in Finland

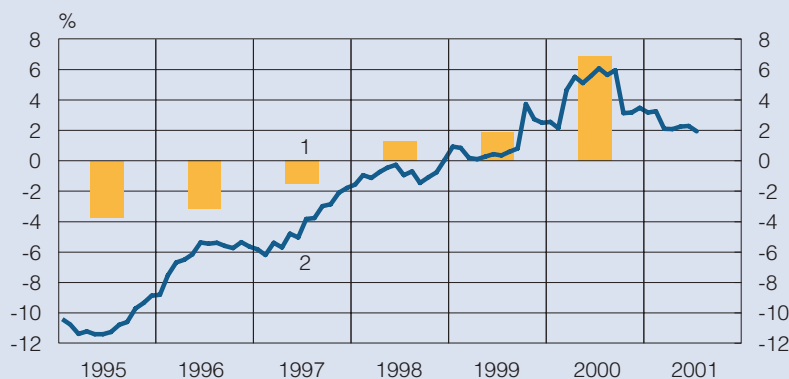


Excluding financial transactions
12-month moving totals, % of GDP

- 1. Revenue
- 2. Expenditure

Sources: State Treasury,
Statistics Finland and
Bank of Finland.

42. Public sector balances in Finland

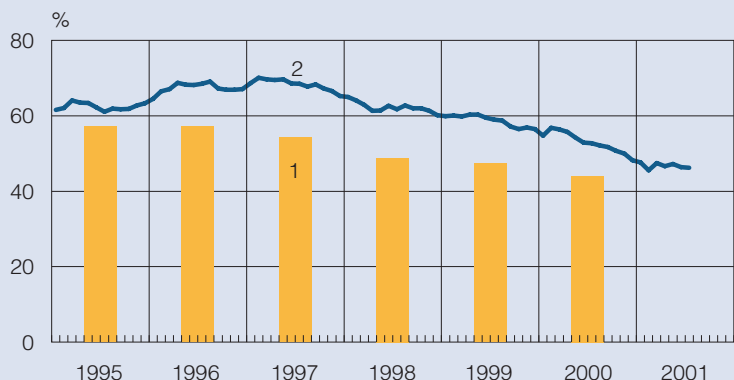


% of GDP

- 1. General government fiscal position
- 2. Central government revenue surplus,
12-month moving total

Sources: State Treasury,
Statistics Finland and
Bank of Finland.

43. Public debt in Finland

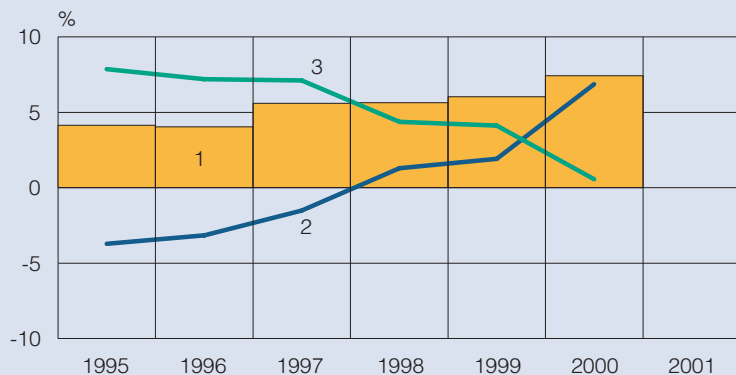


% of GDP

- 1. General government debt
- 2. Central government debt

Sources: Statistics Finland and
State Treasury.

44. Net lending in Finland by sector

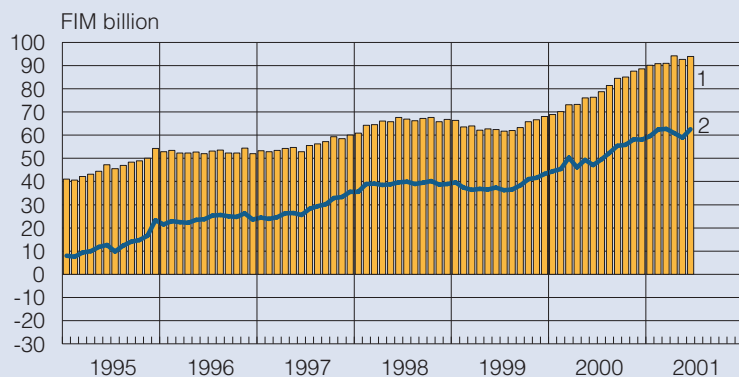


Main sectoral financial balances, % of GDP

1. Current account
2. General government sector
3. Private sector

Sources: Bank of Finland and Statistics Finland.

45. Finland: goods account and current account

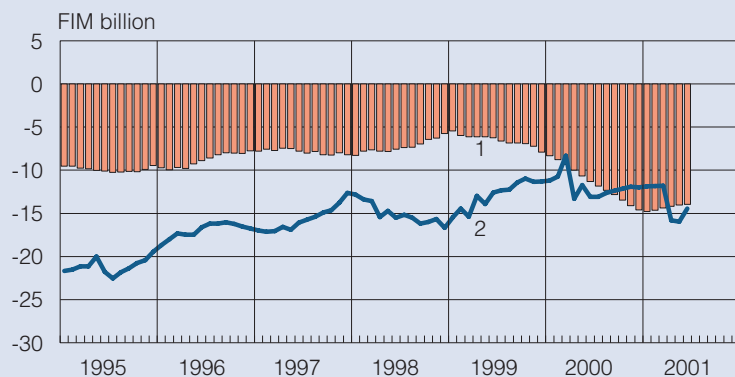


12-month moving totals

1. Goods account, fob
2. Current account

Source: Bank of Finland.

46. Finland: services account and income account

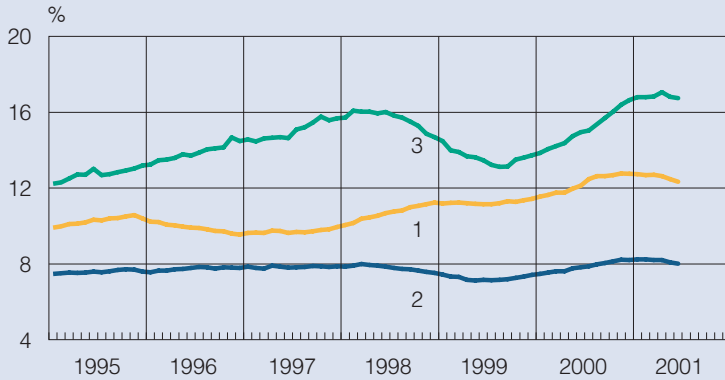


12-month moving totals

1. Services account (trade in goods, fob)
2. Income account

Source: Bank of Finland.

47. Regional distribution of Finnish exports

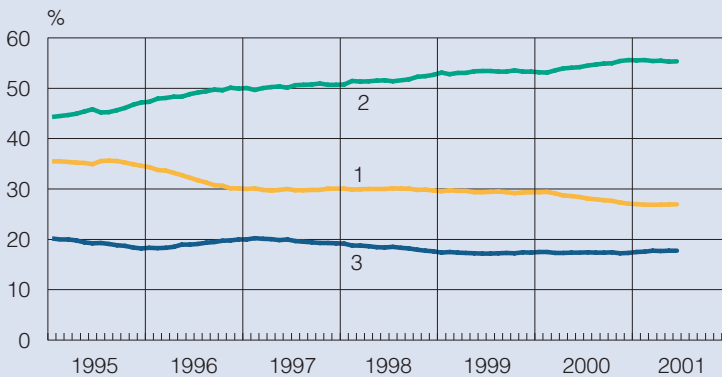


12-month moving totals,
% of GDP

1. Euro area
2. Other EU member states
3. Rest of world

Sources:
National Board of Customs
and Statistics Finland.

48. Finnish exports by industry

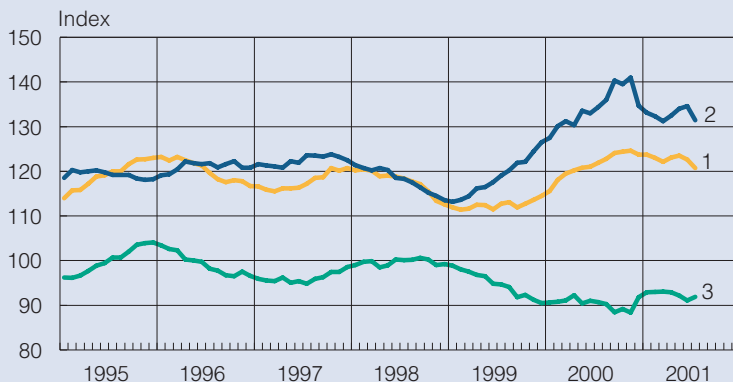


12-month moving totals,
percentage of total exports

1. Forest industries
2. Metal and engineering
industries (incl. electronics)
3. Other industry

Source:
National Board of Customs.

49. Finland's foreign trade: export prices, import prices and terms of trade

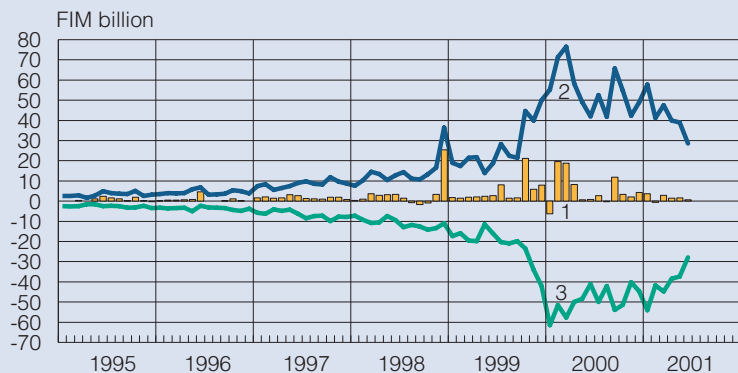


1990 = 100

1. Export prices
2. Import prices
3. Terms of trade

Source: Statistics Finland.

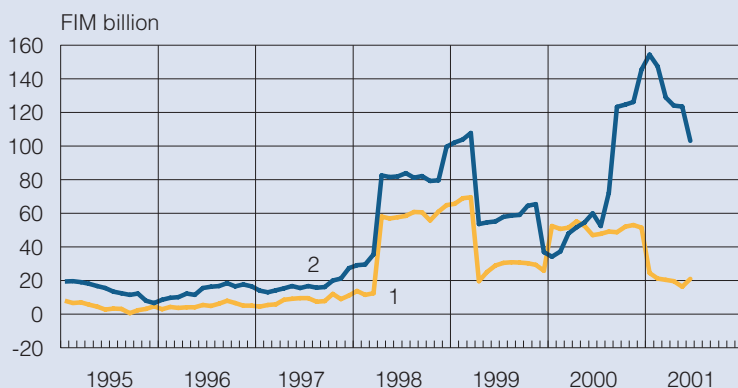
50. Non-residents' portfolio investment in Finnish shares



1. Net sales
2. Sales to non-residents
3. Repurchases from non-residents

Source: Bank of Finland.

51. Finland: direct investment

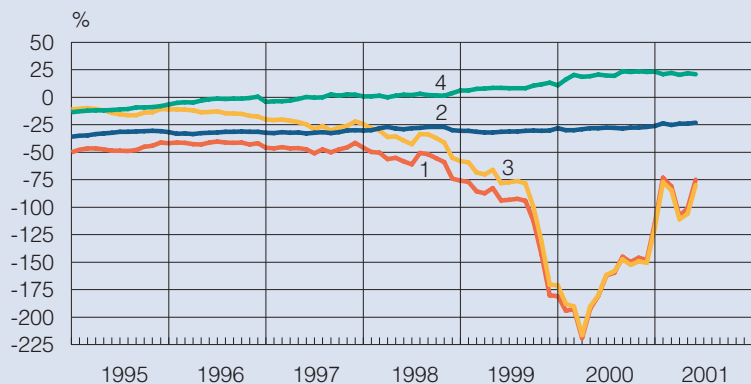


12-month moving totals

1. In Finland
2. Abroad

Source: Bank of Finland.

52. Finland's net international investment position

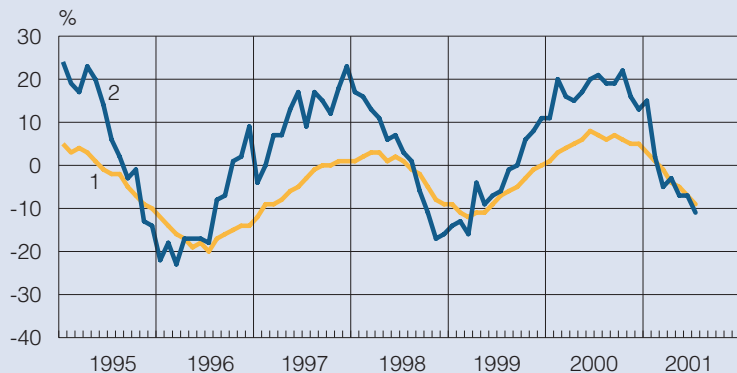


% of GDP

1. Net international investment position
2. Net international investment position of central government
3. Listed shares
4. Other items (excl. reserve assets)

Sources: Bank of Finland and Statistics Finland.

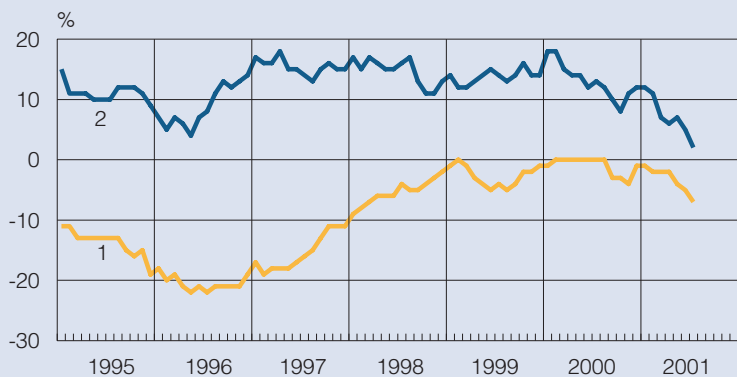
53. Industrial confidence indicator in the euro area and Finland



1. Euro area countries
2. Finland

Source: European Commission.

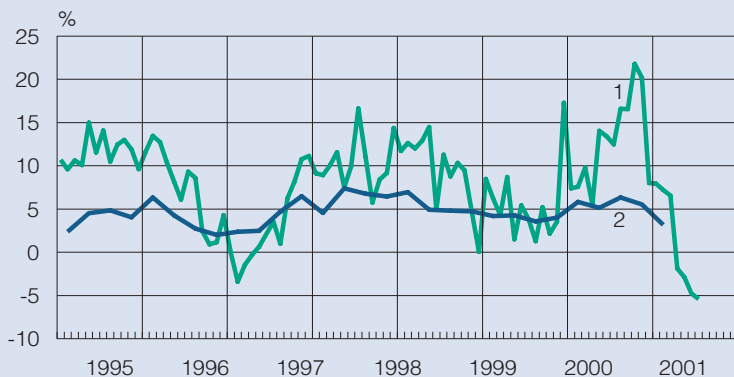
54. Consumer confidence indicator in the euro area and Finland



1. Euro area countries
2. Finland

Source: European Commission.

55. Finland: GDP and industrial production

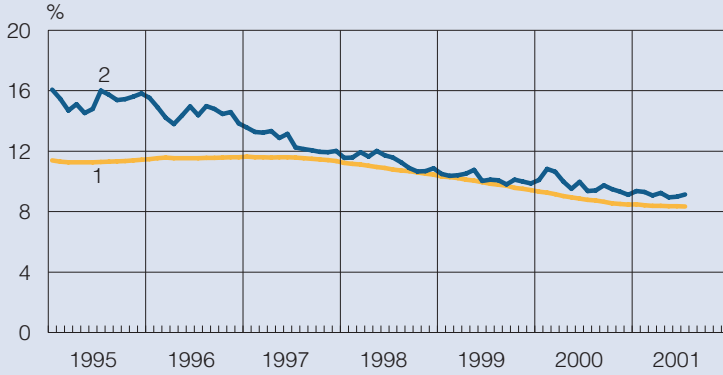


Percentage change from previous year

1. Industrial production
2. Gross domestic product

Source: Statistics Finland.

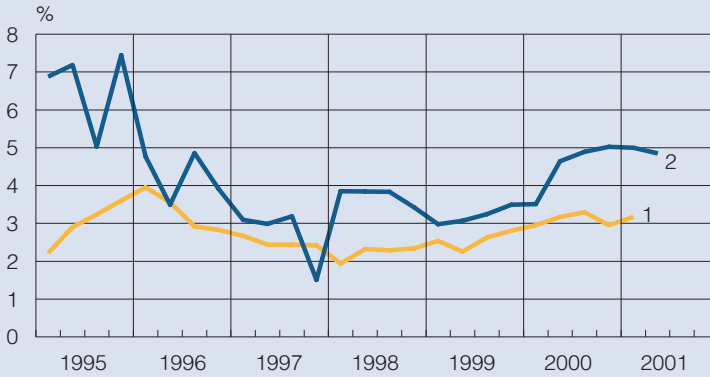
56. Unemployment rate in the euro area and Finland



- 1. Euro area countries
- 2. Finland

Sources: Eurostat, Statistics Finland and Bank of Finland.

57. Level of industrial earnings in the euro area and Finland

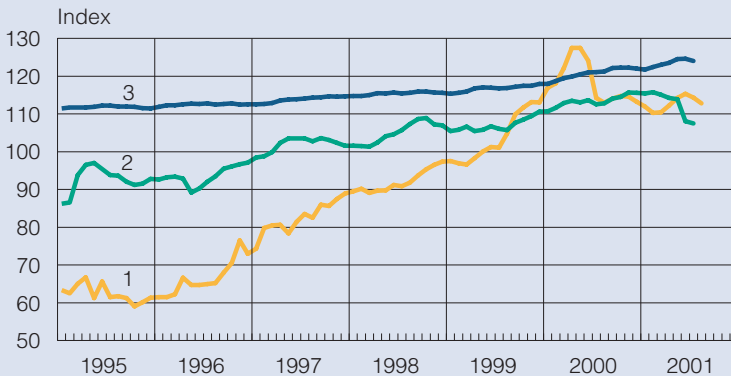


Percentage change from previous year

- 1. Euro area countries
- 2. Finland

Sources: Eurostat and Statistics Finland.

58. Selected asset prices in Finland



January 1990 = 100

- 1. Housing prices (old two-room flats; debt-free price per m²)
- 2. Stumpage prices
- 3. Consumer prices

Sources: Finnish Forest Research Institute, Huoneistokeskus, Statistics Finland and National Board of Customs.

Organization of the Bank of Finland

1 May 2001

Parliamentary Supervisory Council

**Ilkka Kanerva, Chairman, Virpa Puisto, Vice Chairman,
Olavi Ala-Nissilä, Ben Zyskowitz, Antero Kekkonen, Anneli Jääteenmäki,
Martti Tiuri, Kari Uotila, Mauri Pekkarinen**

Anton Mäkelä, Secretary to the Parliamentary Supervisory Council

The Board

Matti Vanhala
Governor

Matti Louekoski
Deputy Governor

Sinikka Salo
Member of the Board

Heikki T. Hämäläinen, Secretary to the Board

Departments and other units

Antti Suvanto
Economics

Heikki Koskenkylä
Financial Markets
Harry Leinonen*

Juha Tarkka
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The Financial Supervision Authority functions as an independent body in connection with the Bank of Finland; the Director General is Kaarlo Jännäri.

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