BANK OF FINLAND
DISCUSSION PAPERS

18/95

Johnny Åkerholm – Timo Hämäläinen – Mika Kuismanen

Economics Department
20.6.1995

Employment and the Structure of the Finnish Economy

A Model for Evaluating Scenarios

SUOMEN PANKIN KESKUSTELUALOITTEITA • FINLANDS BANKS DISKUSSIONSUNDERLAG

Suomen Pankki
Bank of Finland
P.O.Box 160, SF-00101 HELSINKI, Finland
☎ + 358 0 1831

BANK OF FINLAND DISCUSSION PAPERS **18/95**

Johnny Åkerholm – Timo Hämäläinen – Mika Kuismanen

Economics Department
20.6.1995

Employment and the Structure of the Finnish Economy

A Model for Evaluating Scenarios

ISBN 951-686-460-0
ISSN 0785-3572

Suomen Pankin monistuskeskus
Helsinki 1995

Employment and the Structure of the Finnish Economy
A Model for Evaluating Scenarios

Bank of Finland Discussion Papers 18/95

Johnny Åkerholm – Timo Hämäläinen – Mika Kuismanen

Abstract

In this paper a simple and transparent macroeconomic model is developed for the evaluation of alternative macroeconomic scenarios. With the help of the model it is evaluated how fast economic growth and what kind of structure of demand and supply is needed in order to reduce unemployment to 200 000 persons by the year 2000 given both the government budget and external constraints. The model includes 138 variables: 5 behavioral equations, 75 identities, and 58 exogenous variables.

The model simulations suggest the following conclusions. The target to reduce unemployment rate to about 8 per cent can be reached only if annual economic growth is relatively fast, more than 6 per cent, and relies heavily on private services. It is not possible to reduce the indebtedness of the public sector very quickly, because public transfers or tax reliefs are needed to support private consumption. Wages can rise only modestly in order not to allow the current account to worsen too much. Nominal earnings per employee can rise only 5 per cent. With assumed 2 per cent inflation rate real wages can then increase 3 per cent. This is 0.5 percentage units less than the growth of labour productivity.

Tiivistelmä

Tässä raportissa esitellään yksinkertainen ja läpinäkyvä kokonaistaloudellinen ekonometrinen malli, jolla voidaan arvioida vaihtoehtoisia makrotaloudellisia skenaarioita. Mallin avulla on arvioitu, kuinka nopea taloudellinen kasvu ja millainen talouden rakenne vaaditaan, jotta työttömyys voitaisiin alentaa 200 000 henkilöön vuoteen 2000 mennessä. Mallissa on 138 muuttujaa: 5 käyttäytymisyhtälöä, 75 identiteettiä ja 58 eksogeenista muuttujaa.

Mallisimulointien mukaan työttömyys voidaan alentaa 8 prosenttiin eli noin 200 000 työttömään henkilöön vain jos talouden kasvu on verrattain nopeaa, yli 6 prosenttia vuodessa, ja se keskittyy yksityisiin palveluihin. Julkisen talouden alijäämää ei voi alentaa kovin nopeasti, koska tarvitaan tulonsiirtoja tai verohelpotuksia tukemaan yksityistä kulutusta. Nimellinen palkkataso työntekijää kohti voi nousta vain 5 prosenttia vuodessa. Kun inflaatiovauhdiksi oletetaan 2 prosenttia, reaalisesti palkat voivat nousta tällöin 3 prosenttia vuodessa. Tämä on 0.5 prosenttiyksikköä vähemmän kuin tuottavuuden nousu.

Contents

		page
Abstract		3
1	Introduction	7
2	The Model Outline	8
3	The Equations of the Model	11
3.1	The Balance Sheet of Supply and Demand and Prices and Wages	11
3.2	The Balance Sheet of Household Sector	21
3.3	The Balance Sheet of Public Sector	25
4	Simulation Experiment: 200 000 Unemployed Persons in Year 2000	31
4.1	Basic Scenario	31
4.2	Sensitivity Analysis	32
4.3	Conclusions	32
Appendix 1	Running the Model in Practice	34
Appendix 2	List of Variables	35
Appendix 3	The Equations of the Model	39
Appendix 4		51

1 Introduction[1]

In this paper a simple and transparent macroeconomic model is build for the evaluation of alternative macroeconomic scenarios. The aim has been to develop a model framework which in the first instance could be employed for the evaluation of how fast economic growth and what kind of structure of demand and supply is needed in order to reduce unemployment to 200 000 persons by the year 2000 given the constraints to balance government budget and to maintain external surplus.

In principle, there are two possibilities to approach this question. One could make use of the existing econometric models (for example the Bank of Finland quarterly econometric model BOF4) and by model iterations search for reasonable or at least seemingly realistic economic policy measures, which could produce the desired results.

The other possibility is to start from the desired outcome and restrictions, and to calculate backwards. When employment target and the budget and external constraints are given, one can arrive at the necessary scenarios.

Both approaches have certain advantages and disadvantages. The first approach takes better care of the dynamics in the economy than the second approach. The problem is, however, that there are numerous policy combinations, which could produce the desired results.

The advantage of the second approach is, that it produces a single outcome. Since the dynamics of the calculations are limited, the initial assumptions are easy to identify and the calculations as well as the results become highly transparent. On the other hand, the lack of dynamics and behavioral equations imply that the calculations do not tell anything about the realism and possibilities to achieve the results.

A model was attempted which

- identifies the critical restrictions of the economy like budget and external constraints,
- identifies the necessary technical relationships (in particular production functions),
- describes the path to the full employment over time.

The model is not designed for forecasting purposes. However, the model can be used as a technical framework for analyzing other structural questions, too. The model includes 138 variables: 58 exogenous, 5 behavioral and 75 identities and is written to SIMPC simulation programme.

[1] We thank Tuomas Saarenheimo for valuable comments in building this model.

2 The Model Outline

The starting point has been that Finland has to reduce her foreign indebtedness. Another main constraint is that public sector deficits and indebtedness should be reduced to, at least, satisfy the Maastricht convergence criteria.

The target set on the current account also sets the target for export developments. Imports is determined endogenously by domestic demand. When the terms of trade developments is assumed exogenously given and interest payment from foreign debt can be calculated with the help of the assumed current account developments, the necessary amount of export can be calculated on the basis of current account identity. The calculated export target, in turn, gives the targets for

- price competitiveness of exports (given foreign demand),
- export capacity (the capital stock of export industries), and
- employment in export industries.

For these empirical behaviourial equations are used. With the help of estimated export price elasticity and exogenously given foreign demand one can calculate the needed price competitiveness of exports. In order to calculate the necessary export capacity one have to include a production function into the model. This gives the estimates for the capital stock and employment in the export sector, ie. manufacturing industry. When the depreciation of the capital stock is taken into account, one can calculate the amount of gross investment necessary to keep up the needed capital stock.

After the resources required to satisfy the current account have been determined it can be calculated how employment in the other sectors of the economy must increase in order to fulfil the employment target. When employment in the public sector, in agriculture and in forestry are exogenously given, it can be estimated how much private services has to grow, given the assumed growth in the labour force. A production function for this sector must be utilized to determine the corresponding production and capital requirements.

At this stage, all items of the balance of supply and demand are known except public demand, inventory investment and private consumption. When public consumption is determined by public employment, public investments are exogenous target and inventory investment are assumed to form a constant a fraction of GDP, it can be determined how much resources are left for private consumption. Hence, private consumption is determined as a residual item from the balance sheet of supply and demand. Because exports depends on the amount of imports and the amount of imports depends on the demand structure, there is a simultaneous link in the model. Therefore one has to use iterative technic to solve the model.

In order to see what kind of fiscal policy is needed to produce the above described developments in the real economy and in order to take into account the public sector constraint, one has to include price developments in the model. This has been done by introducing the Bank of Finland inflation target, ie. that the underlying annual inflation rate is 2 per cent into the model and assuming constant relative prices. Nominal interest rate is defined as 2 per cent plus the real rate of interest, which in turn is set to equal the real growth of the economy.

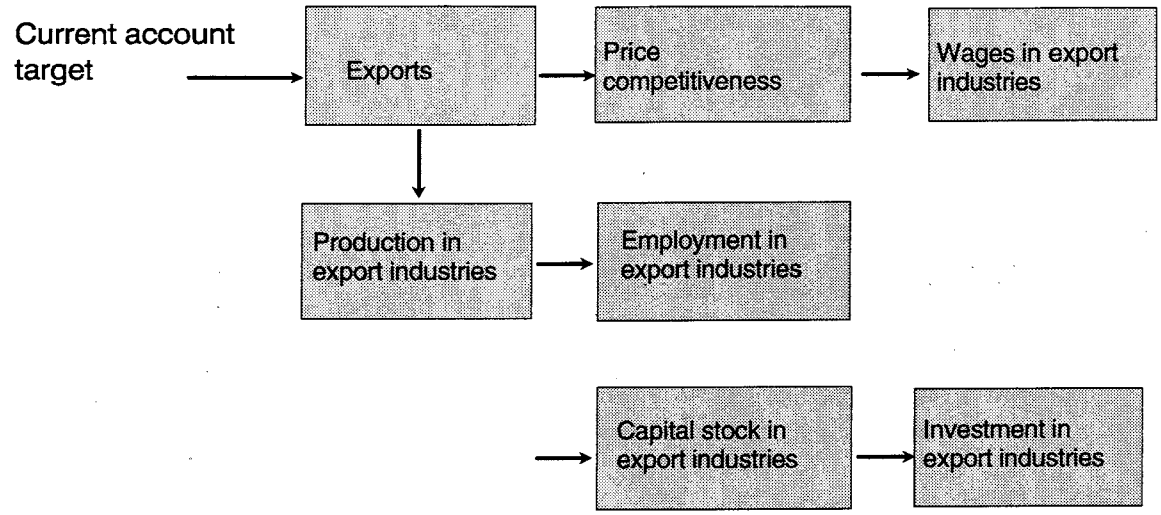
After prices are introduced into the model, one have to decide how income is distributed. Functional income distribution between labour and capital income in

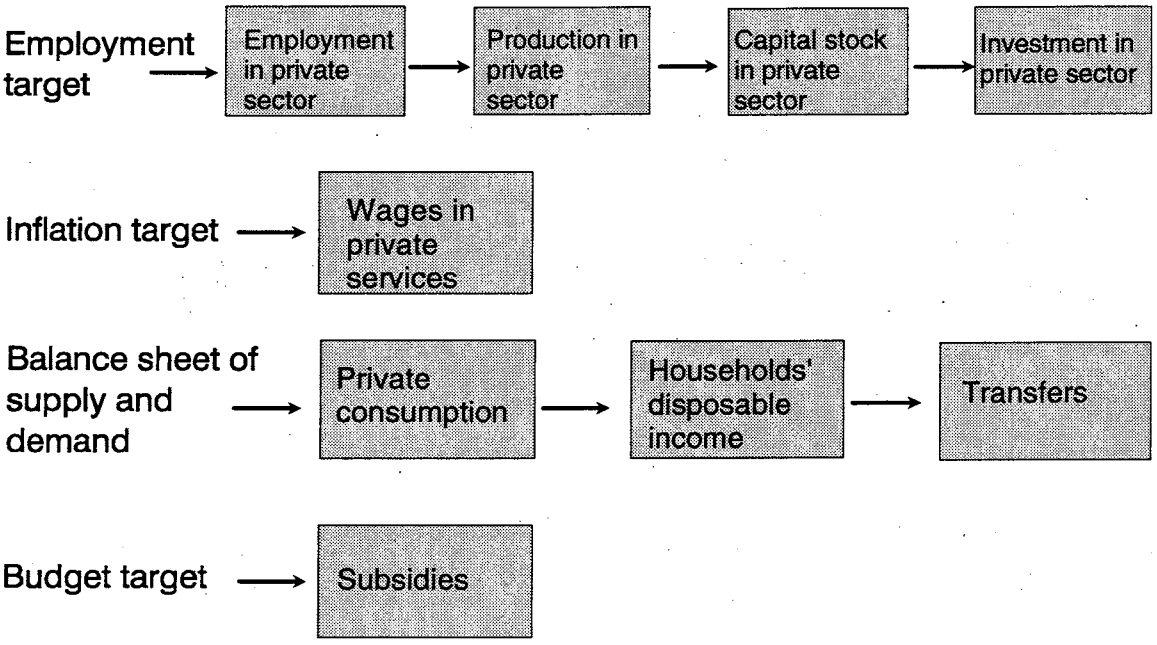
export industries (manufacturing) is determined by the needed competitiveness for current account target. For private services it is assumed that a fixed share of value added is devoted to wage and social security contributions. In public sector and agriculture wages are set more or less exogenously.

The outlined model construction is described also in the schematic chart below. The model should give answers what is required for full employment concerning

- the growth of GDP,
- the structure of supply by industries and the structure of demand,
- the growth of exports and price competitiveness,
- investment needs,
- the growth of consumption,
- functional distribution of income (relates directly to incomes policy),
- institutional distribution of income and savings in public sector expenditures (relates directly to fiscal policy).

Diagram **The recursive links in the model**





3 The Equations of the Model

The model can be divided into three recursive blocks. In the first block, supply and the use of resources as well as the developments of wages and prices are determined. The second block is the balance sheet of the household sector, and the third block the balance sheet of the public sector.

3.1 The Balance Sheet of Supply and Demand and Prices and Wages

In the first block, the total supply in the economy is defined with the help of production functions for manufacturing industry and private services. Production in agriculture and forestry and in the public sector are given exogenously outside the model.

The production functions are assumed to be of Cobb-Douglas type. The estimations were carried out by assuming fixed income shares; in manufacturing, the share of labour income was assumed to be 60 %, and in private services 55 %. According to the estimation results, the growth rate of total productivity in manufacturing is 3.4 % in period 1976–1994. In private services, the growth of productivity is 1.5 % in period 1976–1990, and 1.1 % when estimated for the period 1976–1994. The former result was chosen to be used in the model in order to avoid the effects of the past deep depression to affect simulation results.

Employment in manufacturing (production function):

Production function for manufacturing was estimated without a lag in the capital stock variable, while in the model a lag was used to reduce the simultaneity. The equations are expressed in inverted form as they appear in the model. Labour input in terms of number of employed persons is derived from the estimated production function for manufacturing. (T-statistics are given below the parameter estimates.)

```
L1ND = EXP((LOG(Q1QD) - 0.4 * LOG(NK1QD(-1)) - 0.034 * T + 1.91) /
                                                  (19.4)      (40.5)
       (0.6)) + YYL1ND;
```

R2 = .96 DW = 1.0 PERIOD = 1976–1994

L1ND	= employment in manufacturing (1000 persons)
NK1QD	= net capital stock, manufacturing
T	= time trend 1960 = 1
YYL1ND	= correction term for 1994

Production in private services (production function):

The output of private services is determined by the estimated production function. Labour input in private services is the residual item in the targeted total employment after employment in manufacturing is determined within the model and employment in public sector and agriculture and forestry is given. The capital stock has a lagged value in the output equation for private services as in the employment equation for manufacturing.

QYPS = EXP(0.45*LOG(NKYPM(−1) − YYNKYPML(− 1)) +

0.55 * LOG(LYPS) + 0.0158 * T + 2.00912) + YYQYPS + YYQ1QKA;
(18.2) (94.9)

R2 = .96 DW = 1.86 PERIOD = 1976–1990

QYPS	= Production at factor cost, private services, millions of 1990 FIM
NKYPM	= net stock of fixed capital, private services
YYNKYPML*	= unused capital stock, private services
LYPS	= employment (1000 persons), private services
T*	= time trend 1960 = 1
YYQYPS*	= correction term of QYPS
YYQ1QKA*	= production at factor cost, housing, millions of 1990 FIM

The demand for manufacturing output:

When employment in manufacturing is determined with the help of estimated production function, the amount of manufacturing output has to be determined on basis of demand, both foreign and domestic, for manufacturing output. The estimated equation states that 44 per cent of manufacturing is determined by foreign demand.

Q1QD = EXP(−1.57 + 0.44 * LOG(XTQ) + 0.61 * LOG(GDPQ + MTQ − XTQ))
(2.7) (11.0) (9.4)

+ YYQ1QD;

R2 = .98 DW =.87 PERIOD 1975–1994

Q1QD	= production at factor cost, manufacturing, millions of 1990 FIM
XTQ	= exports of goods and services
GDPQ	= gross domestic product
MTQ	= imports of goods and services
YYQ1QD	= correction term for 1994

Current account:

Exports of goods and services is determined by the targeted current account balance. In the current account, interest payments on foreign debt are calculated by multiplying the assumed foreign interest rate with the stock of outstanding debt.

XTV = B500 + MTV + B473 + XTVRES;

XTV	= exports of goods and services, FIM million
B500*	= current account
MTV	= imports of goods and services
B473	= interest payment on foreign debt
XTVRES*	= other current account expenditure

Imports of goods and services:

The imports equation allows for the fact that the propensities to import vary between the different demand components. The estimated propensities to import in the period 1976–1994 were .17 for consumption, .29 for exports, .27 for fixed investment, and .51 for inventory investment. Accordingly, the elasticity of imports with respect to GDP is 1.2. The input equation does not take into account either price elasticity of imports or capacity constraints in domestic production, because the model itself assumes enough production to satisfy exports and domestic demand.

$$MTQ = MTQ(-1) + \underset{(3.8)}{0.17} * (CQ - CQ(-1) + GQ - GQ(-1)) + \underset{(5.5)}{0.27}*(IQ-IQ(-1))$$

$$+ \underset{(5.6)}{0.29} * (XTQ - XTQ(-1)) + \underset{(9.0)}{0.51} * (IVZAQ - IVZAQ(-1)) + YYMTQ;$$

R2 = .95 DW = 1.58 PERIOD = 1976–1994

MTQ	= imports of goods and services, millions of 1990 FIM
CQ	= private consumption, millions of 1990 FIM
GQ	= public consumption, millions of 1990 FIM
IQ	= total fixed gross investment, millions of 1990 FIM
XTQ	= exports of goods and services, millions of 1990 FIM
IVZAQ*	= inventory investment and statistical discrepancy, millions of 1990 FIM
YYMTQ*	= correction term of MTQ

Unit labour cost in manufacturing: (Export function)

The competitive position required to achieve the targeted current account depends on elasticities in the exports equation, i.e. the elasticity with respect to the imports of the recipient countries and the price-elasticity. The higher price elasticities are,

the less is needed in terms of price competitiveness, and the more there is room for wage increases.

The long run elasticity of exports of goods and services with respect to the imports of Finland's most important export countries is low, only 0.4, and price elasticity −1.1, calculated from the unit labour costs in manufacturing in the period 1976–1994. The export elasticity with respect to imports of recipient countries varies depending on the estimation period and the used equation. For example, for period 1960–1992 the elasticity is 0.9 while it is only 0.6 in the period 1976–1993. Correspondingly, the price elasticities are in this case somewhat lower than in the equation used in the model simulations.

According to the export equation a continuous improvement in price competitiveness is needed, if the market share of Finland's exports are to be kept constant. This is partly due to fact that Finland's exports still consists to a large extent of primary products like pulp and paper, whose income elasticity is low. On the other hand, the income elasticity of Finnish exports have, probably, been reduced by the large share of bilateral eastern trade in the 1970s and 1980s. Also, strong domestic demand in the 1980s reduced export growth.

```
YTKT = (XUVIENTI * XNVIRALL) * EXP((2.91 + 0.11 * LOG(MFOR)
                                    (6.7)   (2.3)

     + 0.69 * LOG(XTQ(−1)) − LOG(XTQ))/0.34) + YYYTKT;
       (12.9)                    (6.8)
```

R2 = .99 DW = 2.21 PERIOD = 1976–1994

YTKT	= unit labour costs in manufacturing, 1990 = 1
XUVIENTI*	= foreign unit labour costs 1990 = 1
XNVIRALL*	= exchange rate index 1972 = 1
MFOR*	= foreign demand, imports of Finland's 14 export countries, 1990 = 1
XTQ	= exports of goods and services, millions of 1990 FIM
YYYTKT*	= correction term of YTKT

All the other equations of the supply and demand block and the rest of the model are identities or simple rules of calculation. Private consumption is calculated as a residual from the total supply and exports, private investment and government demand. GDP as market prices is calculated by adding to the GDP in producer prices indirect taxes less subsidies. The annual rate of increase of producer prices and prices of demand components is assumed to follow the 2 % inflation target set by the central bank. Hence no separate price block is needed.

Interest payments on foreign debt:

B473 B473 = YYB473 * KDN(−1);

B473	= interest payments on foreign debt, FIM million
YYB473*	= correction term of B473
KDN	= foreign net debt

Foreign debt:

KDN = XNVIRALL/XNVIRALL(−1) * KDN(−1) − B500 + YYKDN;

KDN	= foreign net debt, FIM million
XNVIRALL*	= exchange rate index 1972 = 1
B500*	= current account
YYKDN*	= correction term of KDN

Export prices:

PX = 1.02 * PX(−1) + YYPX;

PX	= export prices, goods and services, 1990 = 1
YYPX*	= correction term of PX

Exports of goods and services, volume:

XTQ = XTV/PX;

XTQ	= exports of goods and services, millions of 1990 FIM
XTV	= exports of goods and services, FIM million
PX	= export prices, goods and services, 1990 = 1

Import prices, goods and services:

PM = 1.02 * PM(−1) + YYPM;

PM	= import prices, goods and services, 1990 = 1
YYPM*	= correction term of PM

Imports of goods and services, value:

MTV = PM*MTQ;

MTV	= imports of goods and services, FIM million
PM	= import prices, goods and services, 1990 = 1
MTQ	= imports of goods and services, millions of 1990 FIM

Production at factor cost, total:

QQ = Q1QD + QYPS + Q1QA + Q2Q;

QQ	= production at factor cost, total,millions of 1990 FIM
Q1QD	= production at factor cost, manufacturing
QVYPS	= production at factor cost, private services,
Q1QA*	= production at factor cost, agriculture, forestry, fishing and hunting
Q2Q	= production at factor cost, public sector

Employment, private services:

LYPS = LN – L1NA – L1ND – L2N;

LYPS	= employment (1000 persons), private services
LN*	= employment (1000 persons), total
L1NA*	= employment (1000 persons), agriculture, forestry, fishing and hunting
L1ND	= employment (1000 persons), manufacturing
L2N*	= employment (1000 persons), public sector

Net stock of fixed capital, manufacturing:

Investment needs in the manufacturing and private service sector are derived from the production functions with the help of the estimated output/capital ratio. For manufacturing, the estimated output/capital trend is continued from the observed value in 1994. In the case of private services, account has been taken of the under utilization of resources in the 1990s. Consequently, the calculations have been carried out by assuming that part of the capital was destroyed during the deep recession.

By applying the estimated production function, it can be estimated that about 30 % of capital stock was idle by the end of 1993. In the simulations it was assumed that unused capital stock is gradually reemployed up to 1996 but that roughly half of the unused capital in 1993 is not reemployable. As a result part of the investment needs in the private services is met by employing existing capital.

NK1QD = YYNK1QDS * (Q1QD/YYNK1QD) + (1 – YYNK1QDS) * NK1QD(–1);

NK1QD	= net stock of fixed capital, manufacturing, millions of 1990 FIM
YYNK1QDS*	= adjustment term of output/capital ratio in capital stock equation, manufacturing
Q1QD	= production at factor cost, manufacturing
YYNK1QD*	= trend of output/capital ratio, manufacturing

Net stock of fixed capital, private services:

NKYPM = YYNKYPMS * (QYPS–YYQ1QKA)/YYNKYPM + (1–YYNKYPMS) * (NKYPM(–1) – YYNKYPML(–1)) + YYNKYPML;

NKYPM	= net stock of fixed capital, private services, millions of 1990 FIM
YYNKYPMS*	= adjustment term of output/capital ratio in capital equation, private services
QYPS	= production at factor cost, private services
YYQ1QKA*	= production at factor cost, housing
YYNKYPM*	= trend of output/capital ratio, private services
YYNKYPML*	= unused capital stock, private services

Net stock of fixed capital, agriculture, forestry, fishing and hunting:

NK1QA = NK1QA(−1) + I1QA − K1QA;

NK1QA = net stock of fixed capital, agriculture, forestry, fishing and hunting, millions of 1990 FIM
NK1QKA* = net stock of fixed capital, housing
I1QA* = fixed gross investment, agriculture, forestry and fishing
K1QA = depreciation of fixed capital, agriculture, forestry, fishing and hunting

Net stock of fixed capital, public sector:

NK2Q = NK2Q(−1) + I2FQ − K2Q;

NK2Q = net stock of fixed capital, public sector, millions of 1990 FIM
I2FQ = fixed gross investment, public sector
K2Q = depreciation of fixed capital, public sector

Net stock of fixed capital, total:

NKQ = NKYPM + NK1QA + NK1QD + NK2Q + NK1QKA;

NKQ = net stock of fixed capital, total, millions of 1990 FIM
NKYPM = net stock of fixed capital, private services
NK1QA = net stock of fixed capital, agriculture, forestry, fishing and hunting
NK1QD = net stock of fixed capital, manufacturing
NK2Q = net stock of fixed capital, public sector
NK1QKA* = net stock of fixed capital, housing

Fixed gross investment, manufacturing:

I1QD = NK1QD − NK1QD(−1) + K1QD +YYI1QD;

I1QD = fixed gross investment, manufacturing, millions of 1990 FIM
NK1QD = net stock of fixed capital, manufacturing
K1QD = depreciation of fixed capital, manufacturing
YYI1QD* = correction term for I1QD

Fixed gross investment, private services (excl. housing):

IYPM = NKYPM − NKYPM(−1) + KYPM + YYIYPM;

IYPM = fixed gross investment, private services (excl. housing), millions of 1990 FIM
NKYPM = net stock of fixed capital, private services
KYPM = depreciation of fixed capital, private services excl. housing
YYIYPM* = correction term for IYPM

Fixed private gross investment, total:

IPQ = I1QD + IYPM + I1QA + I1QKA;

IPQ = total fixed private gross investment, millions of 1990 FIM
I1QD = fixed gross investment, manufacturing
IYPM = fixed gross investment, private services excl. housing
I1QA* = fixed gross investment, agriculture, forestry and fishing
I1QKA* = fixed gross investment, housing

Total fixed gross investment:

IQ = IPQ + I2FQ;

IQ = total fixed gross investment, millions of 1990 FIM
IPQ = total fixed private gross investment
I2FQ = fixed gross investment, public sector

Depreciation of fixed capital, manufacturing:

K1QD = 0.075 * NK1QD(−1);

K1QD = depreciation of fixed capital, manufacturing, millions of 1990 FIM
NK1QD = net stock of fixed capital, manufacturing

Depreciation of fixed capital, agriculture, forestry:

K1QA = 0.086 * NK1QA(−1);

K1QA = depreciation of fixed capital, agriculture, forestry, fishing and hunting, millions of 1990 FIM
NK1QA = net stock of fixed capital, agriculture, forestry, fishing and hunting

Depreciation of fixed capital, public sector:

K2Q = 0.022 * NK2Q(−1);

K2Q = depreciation of fixed capital, public sector, millions of 1990 FIM
NK2Q = net stock of fixed capital, public sector

Depreciation of fixed capital, housing:

K1QKA = 0.032 * NK1QKA(−1);

K1QKA = depreciation of fixed capital, housing, millions of 1990 FIM
NK1QKA* = net stock of fixed capital, housing sector

Depreciation of fixed capital, private services excl. housing:

KYPM = 0.071 * NKYPM(−1);

KYPM = depreciation of fixed capital private services, excl. housing, millions of 1990 FIM
NKYPM = net stock of fixed capital, private services

Depreciation of fixed capital, total:

KQ = K1QD + KYPM + K1QA + K2Q + K1QKA;

KQ = depreciation of fixed capital, total, millions of 1990 FIM
K1QD = depreciation of fixed capital, manufacturing
KYPM = depreciation of fixed capital private services, excl. housing
K1QA = depreciation of fixed capital, agriculture, forestry, fishing and hunting
K2Q = depreciation of fixed capital, public sector
K1QKA = depreciation of fixed capital, housing sector

Producer prices, manufacturing:

PT = 1.02 * PT(−1);

PT = producer prices, manufacturing, 90 = 1

Production at factor cost, manufacturing, current prices:

Q1VD = PT * Q1QD;

Q1VD = production at factor cost, manufacturing, FIM million
PT = prices in manufacturing, 90 = 1
Q1QD = production at factor cost, manufacturing, millions of 1990 FIM

Wages and social security contributions in manufacturing:

Y1WSD = YTKT * Q1QD;

Y1WSD = wages and social security contributions, manufacturing, FIM million
YTKT = unit labour cost, manufacturing, 1990 = 1
Q1QD = production at factor cost, manufacturing, millions of 1990 FIM

Contributions to social security schemes, manufacturing:

Y1SD = 0.28 * Y1WD;

Y1SD = contributions to social security schemes, manufacturing, FIM million
YIWD = wages and salaries in manufacturing

Wages and salaries in manufacturing:

Y1WD = Y1WSD – Y1SD;

YIWD = wages and salaries in manufacturing, FIM million
Y1WSD = wages and social security contributions in manufacturing
Y1SD = contributions to social security schemes, manufacturing

Prices in private services:

PYPS = 1.02 * PYPS(–1);

PYPS = producer prices, private services, 90 = 1

Value added in private services, current prices:

QVYPS = PYPS * QYPS;

QVYPS = production at factor cost, private services, FIM million
PYPS = producer prices in private services, 90 = 1
QYPS = production at factor cost, private services, millions of 1990 FIM

Value added in agriculture and forestry, current prices:

Q1VA = P1A * Q1QA;

Q1VA = production at factor cost, agriculture, forestry, fishing and hunting, FIM million
P1A* = producer prices, agriculture, forestry, 1990 = 1
Q1QA* = production at factor cost, agriculture, forestry, fishing and hunting, millions of 1990 FIM

Production at factor cost, total, current prices:

QV = Q1VD + QVYPS + Q1VA + Q2V;

QV = production at factor cost, total, FIM million
Q1VD = production at factor cost, manufacturing
QVYPS = production at factor cost, private services
Q1VA = production at factor cost, agriculture, forestry, fishing and hunting
Q2V = production at factor cost, public sector

Gross domestic product in purchaser's values, current prices:

GDPV = QV + JU + SUB;

GDPV	= gross domestic product in purchaser's values, FIM million
QV	= production at factor cost, total
JU	= general government revenue from indirect taxes
SUB*	= commodity subsidies

GDP deflator:

PQ = 1.02 * PQ(−1);

PQ	= GDP deflator, 1990 = 1

Gross domestic product, volume:

GDPQ = GDPV/PQ

GDPQ	= gross domestic product, millions of 1990 FIM
GDPV	= gross domestic product, FIM million

Private consumption, volume:

CQ = GDPQ − GQ − IPQ − I2FQ − IVZAQ − XTQ + MTQ;

CQ	= private consumption, millions of 1990 FIM
GDPQ	= gross domestic product
GQ	= public consumption
IPQ	= total fixed private gross investment
I2FQ	= fixed gross investment, public sector
IVZAQ*	= inventory investment and statistical discrepancy
XTQ	= exports of goods and services
MTQ	= imports of goods and services

3.2 The Balance Sheet of Household Sector

Households' disposable income is arrived at by multiplying private consumption by the inverted savings ratio. Households' disposable income is divided into six components, of which transfers from public sector is the residual.

Wage income is the sum of sectoral wages, where wages in manufacturing and private services comes from production functions and wages of agriculture and forestry and public sector are exogenous.

Households' entrepreneurial income is the sum of exogenous entrepreneurial income in agriculture, the difference between value added and wages plus depreciation in private services, and the exogenous residual item.

Benefits from Social Insurance institutions is calculated on the basis of the number pensioners and the benefit level. In the pension index equal weights are given to consumer price and wage increases.

Direct taxes paid by household follow from an exogenous average tax level applied to the sum of wages and households' entrepreneurial income. The rate of households' social security contributions are also exogenous.

Finally, transfers from the public sector, mainly child and unemployment allowances, is the difference between the items above and disposable income. If savings ratio is changed, a corresponding change in transfer payments will occur.

Wages and social security contributions, private services:

YWSYPS = 0.55 * QVYPS + YYYWSYPS;

YWSYPS = wages and social security contributions, private services, FIM million
QVYPS = production at factor cost, private services
YYYWSYPS* = correction term of WSYPS

Wages and salaries, private services:

YWYPS = YWSYPS – YSYPS;

YWYPS = wages and salaries, private services, FIM million
YWSYPS = wages and social security contributions, private services
YSYPS = social security contributions, private services

Social security contributions, private services:

YSYPS = 0.313 * YWYPS;

YSYPS = social security contributions, private services, FIM million
YWYPS = wages and salaries, private services

Annual wage per worker, private services:

WYPS = (YWYPS/LYPS);

WYPS = annual wage per worker, private services, FIM thousands
YWYPS = wages and salaries, private services, FIM million
LYPS = employment (1000 persons), private services

Wages and salaries, total:

YW = Y1WD + YWYPS + Y1WA + Y2W;

YW	= wages and salaries, total, FIM million
YIWD	= wages and salaries, manufacturing
YWYPS	= wages and salaries, private services
Y1WA*	= wages and salaries, agriculture etc.
Y2W	= wages and salaries, public sector

Employers' social security contributions, total:

YS = Y1SD + YSYPS + Y1SA +Y2S;

YS	= employers' social security contributions, total, FIM million
Y1SD	= employers' social security contributions, manufacturing
YSYPS	= employers' social security contributions, private services
Y1SA*	= employers' social security contributions, agriculture, forestry, fishing and hunting
Y2S	= employers' social security contributions, public sector,

Operating surplus in agriculture, forestry:

Y1PA = Q1VA – Y1WA – Y1SA;

Y1PA	= operating surplus in agriculture, forestry, fishing and hunting, FIM million
Q1VA	= production at factor cost, agriculture, forestry, fishing and hunting
Y1WA*	= wages and salaries, agriculture, forestry, fishing and hunting
Y1SA*	= employers' social security contributions, agriculture, forestry, fishing and hunting

Operating surplus in household and non-profit sectors:

Y34AP = QVYPS – YWSYPS – PKYPS * (KYPM + K1QKA) +
Y1PA + Y34APRES;

Y34AP	= operating surplus in household and non-profit sectors, FIM million
QVYPS	= production at factor cost, private services
YWSYPS	= wages and social security contributions, private services
PKYPS*	= price deflator of private services depreciation, 1990 = 1
KYPM	= depreciation of fixed capital private services, excl. housing
K1QKA	= depreciation of fixed capital, housing
Y1PA	= operating surplus in agriculture, forestry, fishing and hunting
Y34APRES*	= residual of Y34AP

General government revenue, social security contributions from the insured persons:

J2A182 J2A182 = 0.11 * YW;

J2A182 = general government revenue, social security contributions from the insured persons
YW = wages and salaries

General government transfers to households, social allowance benefits:

J2B22 = YDV – YW – Y34AP – J2B19 + JTK + J2A182 – YDRES;

J2B22 = general government transfers to households, social allowance benefits, FIM million
YDV = households' disposable income
YW = wages and salaries
Y34AP = operating surplus in household and non-profit sectors
J2B19 = general government transfers to households, social security benefits
JTK = direct taxes paid by households
J2A182 = general government revenue, social security contributions from the insured persons
YDRES* = household disposable income, residual item in the model

Private consumption deflator:

PC = 1.02 * PC(–1) + YYPC;

PC = private consumption deflator, 1990 = 1
YYPC* = correction term of PC

Private consumption in current prices:

CV = PC * CQ;

CV = private consumption, FIM million
PC = private consumption deflator, 1990 = 1
CQ = private consumption, millions of 1990 FIM

Households' disposable income:

YDV = (CV/(100 – SA)) * 100;

YDV = households' disposable income, FIM million
CV = private consumption, FIM million
SA* = savings rate, per cent

Social security benefits per pensioner:

```
WEL = (0.5 * (YW/LN)/(YW(-1)/LN(-1)) + 0.5 * PC/PC(-1)) * WEL(-1)
                + YYWEL;
```

WEL	= social security benefits per pensioner, FIM thousand
YW	= wages and salaries, FIM million
LN*	= employment (1000 persons), total
PC	= private consumption deflator, 1990 = 1
YYWEL*	= correction term of WEL

General government transfers to households, social security benefits:

```
J2B19 = ELKM * WEL;
```

J2B19	= general government transfers to households, social security benefits, FIM million
ELKM*	= number of pensioners, 1000 persons
WEL	= social security benefit per pensioner, FIM thousand

3.3 The Balance Sheet of Public Sector

In the public sector balance sheet (general government = central government + local government + social security funds) net lending is exogenous. Most of the items are determined by assuming exogenous tax rates. Subsidies are defined as the residual item. The balance sheet items follow the setting in the national accounts of the Statistics Finland.

On the revenue side, direct taxes are the sum of taxes paid by the households and by corporate sector. Corporate taxes are exogenous in the model. Indirect taxes are determined as a fraction of private consumption. Social security contributions consist of employer's social security contributions in the four sectors of the model and households' own contributions. A residual item gathers the total revenue, Internal transfers in the public sector are not, however, included.

On the expenditure side, public consumption is modelled in the following way. The wage sum comes from the targeted number of employed persons in public service and the wage level. Wage increases follow those in private services sector. When employer's social security contributions and a residual item are added, the value of the public sector production can be calculated. When again a residual item is included, the value of public consumption can be calculated. Public investment is exogenous.

The public sector disposable income is the sum of public consumption, investment, depreciation of capital stock, and exogenously given net lending plus a residual item. Other items in public expenditure is the difference between public revenue and disposable income. The items are interest payments of public debt, government subsidies, transfers to households and social insurance benefits, of which the latter two items come from the household balance sheet. The rate of interest paid from government debt is assumed to be 1 percentage unit higher than

that of country's foreign debt. Finally, the residual item is subsidies, which sets the public sector revenue equal to expenditure.

General government revenue, social security contributions from the household sector:

J2A18 = YS + J2A182 + J2A18RES;

J2A18	= general government revenue, social security contributions from the household sector, FIM million
YS	= employers' social security contributions
J2A182	= general government revenue, social security contributions from the insured persons
J2A18RES*	= general government revenue, social security contributions, residual item in the model

General government revenue from indirect taxes:

JU JU = 0.3 * CV + YYJU;

JU	= general government revenue from indirect taxes, FIM million
CV	= private consumption, FIM million
YYJU*	= correction term for JU

Direct taxes paid by households:

JTK = 0.3175 * (YW + Y34AP);

JTK	= direct taxes paid by households, FIM million
YW	= wages and salaries, FIM million
Y34AP	= operating surplus in household and non-profit sectors, FIM million

General government revenue from direct taxes:

JT = JTK + Y15B16;

JT	= general government revenue from direct taxes, FIM million
JTK	= direct taxes paid by households, FIM million
Y15B16*	= direct taxes paid by firms and financial institutions, FIM million

General government revenue, total:

J2 = JT + JU + J2A18 + J2RES;

J2	= general government revenue, total, FIM million
JT	= general government revenue from direct taxes, FIM million
JU	= general government revenue from indirect taxes, FIM million
J2A18	= general government revenue, social security contributions from the household sector, FIM million
JSRES*	= general government transfer payments, residual item in the model

Interest payment on government debt:

J6B12 = (YYB473 + 0.01) * R6030(−1) + YYJ26B12;

J6B12	= interest payment on government debt, FIM million
YYB473*	= correction term of B473
R6030	= general government debt, FIM million
YYJ26B12*	= correction term for J26B12

General government transfer payments, commodity and industry subsidies:

JS = J2 − J2D − J6B12 − J2B22 − J2B19 − JSRES;

JS	= general government transfer payments, commodity and industry subsidies, FIM million
J2	= general government revenue, FIM million
J2D	= general government disposable income, FIM million
J6B12	= interest payment on government debt, FIM million
J2B22	= general government transfers to households, social allowance benefits, FIM million
J2B19	= general government transfers to households, social security benefits, FIM million
JSRES*	= general government transfer payments, residual item in the model

Investment deflator:

PI = 1.02 * PI(−1);

PI	= investment deflator, 1990 = 1

Fixed gross investment, public sector:

I2FQ = (I2FV/PI);

I2FQ = fixed gross investment, public sector, millions of 1990 FIM
I2FV* = fixed gross investment, public sector, FIM million
PI = investment deflator, 1990 = 1

Wages and salaries in public sector:

Y2W = L2N * W2;

Y2W = wages and salaries in public sector, FIM million
L2N* = employment (1000 persons), public sector
W2 = average annual wage in public sector per worker, FIM thousand

Contributions to social security schemes, public sector:

Y2S = 0.298 * Y2W;

Y2S = contributions to social security schemes, public sector, FIM million
Y2W = wages and salaries in public sector

Production at factor cost, public sector:

Q2V = Y2W + Y2S + YYQ2V;

Q2V = production at factor cost, public sector, FIM million
Y2W = wages and salaries in public sector
Y2S = employers' social security contributions, public sector
YYQ2V* = correction term for Q2V

Production at factor cost, public sector, volume:

Q2Q = Q2V/(W2/117.16);

Q2Q = production at factor cost, public sector, millions of 1990 FIM
Q2V = production at factor cost, public sector, FIM million
W2 = average annual wage in public sector per worker, FIM thousand

Public consumption:

GV = Q2V + GVRES;

GV = public consumption, FIM million
Q2V = production at factor cost, public sector, FIM million
GVRES* = public consumption, residual item in the model

Depreciation of fixed capital, public sector:

K2V = K2Q * PI;

K2V = depreciation of fixed capital, public sector, FIM million
K2Q = depreciation of fixed capital, public sector, millions of 1990 FIM
PI = investment deflator, 1990 = 1

Public consumption, volume:

GQ = (GV/(W2/117.16));

GQ = public consumption, millions of 1990 FIM
GV = public consumption, FIM million
W2 = average annual wage in public sector per worker, FIM thousand

General government disposable income:

J2D = R2B + GV – K2V + I2FV + J2DRES;

J2D = general government disposable income, FIM million
R2B = general government net lending
GV = public consumption
K2V = depreciation of fixed capital, public sector
I2FV* = fixed gross investment, public sector
J2DRES* = general government disposable income, residual item in the model

Government net lending:

R6B = R2B – R78B;

R6B = government net lending, FIM million
R2B = general government net lending
R78B* = local government and social security funds net lending

Central government net financial requirement:

VRTN = R6B + VFINS;

VRTN = central government net financial requirement, FIM million
R6B = government net lending
VFINS* = central government financial investment

General government gross debt:

R6030 = R6030(−1) − VRTN − V094 + R6030K;

R6030 = general government gross debt, FIM million
VRTN = central government net financial requirement
V094* = central government cash deficit
R6030K* = correction term of government debt

General government net lending:

R2B = JNL * (GDPV/100);

R2B = general government net lending
JNL* = general government net lending/GDPV
GDPV = gross domestic product, FIM million

Central government gross debt, per cent of GDP:

VALVS = (R6030/GDPV) * 100;

VALVS = central government gross debt, per cent of GDP
R6030 = general government gross debt, FIM million
GDPV = gross domestic product, FIM million

Average annual wage in public sector per worker:

W2 = WYPS/WYPS(−1) * W2(−1);

W2 = average annual wage in public sector per worker, FIM thousand
WYPS = average annual wage in private services per worker, FIM thousand

4 Simulation Experiment: 200 000 Unemployed Persons in Year 2000

4.1 Basic Scenario

The purpose of the simulation is to estimate how fast economic growth is needed in the Finnish economy in order to reduce the number of unemployed persons to only 200 000 by the year 2000 from the present 435 000 in the beginning of 1995, and what kind of structure of demand and supply this implies. When running the simulation foreign indebtedness is put to shrinker altogether by FIM 44 billion in 1995–2000 and general government deficit is put to disappear by the year 2000.

The simulation shows that in order to reduce unemployment by 235 000 persons by the year 2000 the average annual growth of the economy has be over 6 per cent (see Table 1 and Charts 1–5 in Appendix 4). The growth of the economy concentrates into the labour intensive service sector. The growth rate of manufacturing can be one percentage unit slower than in services in order to supply export goods for paying imports. Employment in services increases 5 per cent annually, altogether 300 000 persons by the year 2000. Employment in manufacturing increases 3 per cent annually, altogether 70 000 by persons. In the simulation employment in agriculture is assumed to decrease 4 per cent annually, and in public sector to stay at the present level.

Fast growing output presupposes plenty of fixed capital both in manufacturing and services. Investment in manufacturing has to increase annually by 15 per cent, and in services by as much as 25 per cent even though about a half of unused capital in services sector is assumed to be taken back into production. Altogether investment grow annually 15 per cent, since public investment is assumed not to increase at all and housing investment only 5 per cent annually.

The growth of output presupposes corresponding increase in demand. In spite of fast growing investment and the necessary imports the annual growth of exports can be only 5 per cent in order to balance the current account. This is partly due to the fact that the share of exports in total output is already as high as 34 per cent (in 1990 prices) in 1994. Although the growth of exports were slower than that of GDP, it share were further as high as 31 per cent. In the 1980's the share of exports was only 24 per cent. Secondly, the surplus in the current account reduces foreign debt and interest payments abroad. Thus, private consumption has to grow along with the production of private services in order to balance total supply and demand.

Structural changes are considerable. The assumption of non-growing public employment means that the share of public expenditure (consumption and investment) decreases from 24 per cent in the 1980's to 16 per cent in the year 2000. The share of private investment returns to the average in the 1980's, but the share of housing investment does not pick up being only 4 per cent of GDP in the year 2000. The role of foreign trade increases clearly compared to the 1980's, but changes with respect to the present situation are small. The share of private consumption increases by 4 percentage units to 56 per cent of GDP.

Finland's exports has grown at a lower pace than OECD imports. Even though the growth of exports set by current account balance in 1995–2000 is lower than that of OECD imports, price competitiveness has all the time to improve according

to the export equation used in the model. This sets a limit of less than 4 per cent in annual nominal increases of wages and social security contributions in manufacturing. The inflation target set by the Bank of Finland allows the annual rise of 4.5 per cent in total wage cost in the economy.

Public sector deficit is difficult to eliminate even though the growth of the economy is strong. This is due to the situation in the household sector. The annual growth of private consumption should be almost 10 per cent while the growth of wage and entrepreneurial income is only 7 per cent. Although savings rate of households would decrease considerable, the growth of consumption presupposes considerable support from public sector either as transfers or tax reliefs.

4.2 Sensitivity Analysis

The model was also run with alternative assumptions in order to see its sensitivity to them. For example, export performance could be better than the export equation implies. This could come from the very good competitiveness at present, or the changes in the commodity structure of exports. If the needed amount of exports for the targeted current account balance could come with annual wage increases of e.g. 7 per cent instead of 4 per cent, public sector balance would improve by FIM 10—15 billion.

If foreign and, accordingly, domestic interest rates were 2 percentage units higher, current account balance would require 1/4 percentage units higher export growth and correspondingly smaller increases in wages. The growth of consumption has be in this case 1/4 percentage units slower, and public sector balance tends to worsen.

If employment in public sector increases, production and employment in private services can be correspondingly smaller. Public sector financing is, however, more difficult. If public sector employment is increased annually by 2 per cent, other expenditure has to be reduced by FIM 5—10 billion without increasing the public deficit.

4.3 Conclusions

The model is build to evaluate how realistic is the employment target with 8 per cent unemployment rate and to identify the general prerequisites for economic policy. One can arrive to the following conclusions:

- The employment target to reduce unemployment rate to about 8 per cent can be reached only if economic growth is relatively fast and relies to a large extent on private services. External balance does not make the target unrealistic.
- It is not possible to reduce the indebtedness of the public sector very quickly, because public transfers or tax reliefs are needed to support private consumption.
- Wages can rise only modestly in order to keep the current account healthy. When the annual growth of nominal GDP is more than 8 per cent, wage income can increase almost as much. However, when annual increase in employment is 2.5 per cent, earnings per employee can rise

only 5 per cent. Real wages can then increase 3 per cent, which is 0.5 per cent less than the growth of labour productivity.

It is not totally impossible to get this fast economic growth, but it is very demanding. This would presuppose adaption of low inflation target to get lower real interest rates, not to allow the role of public sector in the economy to increase, a concrete and credible program to reduce public sector deficit, to reduce subsidies to corporate sector, to increase flexibility in labour market, and, most of all, changes in wage system to allow fast growth of employment without pressures to excessive wage increases.

Appendix 1 Running the Model in Practice

Technically the model was build up on Lotus 1-2-3 Windows tables and SIMPC-simulation program. Changes in the exogenous variable were made in Lotus-table consisting all data in alphabetical order, this data-input file was read into a SIMPC data file, the model was run, and the resulting data file was transferred back to a Lotus file. In the Lotus file page 1 was reserved for the resulting SIMPC file of the simulation run, which is also in alphabetical order. From the model results in page 1 of the Lotus file summary tables and charts were the made using relative references. Because the data was in alphabetical order, the same Lotus file with summary tables and charts could be used to analyze and report the different simulation runs. Altogether, almost 200 simulation runs were made during the different phases of the model construction. One run takes about 10 minutes to get the results in paper. The model itself runs only 4—5 iterations to solve for each year.

Appendix 2 List of Variables

Exogenous variables are denoted by *. The variable codes are the same as in the Bank of Finland database "TAKO", when they are taken directly from the database.

B473	Interest payment on foreign debt, FIM million
B500*	Current account, FIM million
CQ	Private consumption, millions of 1990 FIM
CV	Private consumption, FIM million
ELKM*	Number of pensioners, 1000 persons
GDPQ	Gross domestic product, millions of 1990 FIM
GDPV	Gross domestic product, FIM million
GQ	Public consumption, millions of 1990 FIM
GV	Public consumption, FIM million
GVRES*	Public consumption, residual item in the model
I1QA*	Fixed gross investment, agriculture, forestry and fishing, millions of 1990 FIM
I1QD	Fixed gross investment, manufacturing, millions of 1990 FIM
I1QKA*	Fixed gross investment, housing, millions of 1990 FIM
I2FQ	Fixed gross investment, public sector, millions of 1990 FIM
I2FV*	Fixed gross investment, public sector, FIM million
IPQ	Total fixed private gross investment, millions of 1990 FIM
IQ	Total fixed gross investment, millions of 1990 FIM
IVZAQ*	Inventory investment and statistical discrepancy, millions of 1990 FIM
IYPM	Fixed gross investment, private services (exl. housing), millions of 1990 FIM
J2	General government revenue, total, FIM million
J2A18	General government revenue, social security contributions from the household sector, FIM million
J2A182	General government revenue, social security contributions from the insured persons, FIM million
J2A18RES*	General government revenue, social security contributions, residual item in the model
J2B19	General government transfers to households, social security benefits, FIM million
J2B22	General government transfers to households, social allowance benefits, FIM million
J2D	General government disposable income, FIM million
J2DRES*	General government disposable income, residual item in the model
J2RES*	General government revenue, residual item in the model
J6B12	Interest payment on government debt
JNL*	General government net lending/gdp, %
JS	General government transfer payments, commodity and industry subsidies, FIM million
JSRES*	General government transfer payments, residual item in the model
JT	General government revenue from direct taxes, FIM million

JTK	Direct taxes paid by households
JU	General government revenue from indirect taxes, FIM million
K1QA	Depreciation of fixed capital, agriculture, forestry, fishing and hunting, millions of 1990 FIM
K1QD	Depreciation of fixed capital, manufacturing, millions of 1990 FIM
K1QKA	Depreciation of fixed capital, housing sector, millions of 1990 FIM
K2Q	Depreciation of fixed capital, public sector, millions of 1990 FIM
K2V	Depreciation of fixed capital, public sector, millions of 1990 FIM
KDN	Foreign net debt, FIM million
KQ	Depreciation of fixed capital, total, millions of 1990 FIM
KYPM	Depreciation of fixed capital private services, exl. housing
L1NA*	Employment (1000 persons), agriculture, forestry, fishing and hunting
L1ND	Employment (1000 persons), manufacturing
L2N*	Employment (1000 persons), public sector
LN*	Employment (1000 persons), total
LYPS	Employment (1000 persons), private services
MFOR*	Foreign demand, imports of Finland's 14 export countries, 90 = 100
MTQ	Imports of goods and services, millions of 1990 FIM
MTV	Imports of goods and services, FIM million
NK1QA	Net stock of fixed capital, agriculture, forestry, fishing and hunting, millions of 1990 FIM
NK1QD	Net stock of fixed capital, manufacturing, millions of 1990 FIM
NK1QKA*	Net stock of fixed capital, housing sector, millions of 1990 FIM
NK2Q	Net stock of fixed capital, public sector, millions of 1990 FIM
NKQ	Net stock of fixed capital, total, millions of 1990 FIM
NKYPM	Net stock of fixed capital, private services, millions of 1990 FIM
P1A*	Prices in agriculture and forestry, 90 = 100
PC	Private consumption prices, 90 = 100
PI	Investment prices, 90 = 100
PKYPS*	Prices of private services depreciation, 90 = 100
PM	Import prices, goods and services, 90 = 100
PQ	Gdp deflator, 90 = 100
PT	Prices in manufacturing, 90 = 100
PX	Export prices, goods and services, 90 = 100
PYPS	Prices in private services, 90 = 100
Q1QA*	Value added in agriculture, forestry, fishing and hunting, millions of 1990 FIM
Q1QD	Value added in manufacturing, millions of 1990 FIM
Q1VA	Value added in agriculture, forestry, fishing and hunting, FIM million
Q1VD	Value added in manufacturing, FIM million
Q2Q	Value added in public sector, millions of 1990 FIM
Q2V	Value added in public sector, FIM million
QQ	Value added, total, millions of 1990 FIM
QV	Value added, FIM million
QVYPS	Value added, private services, FIM million

QYPS	Value added, private services, millions of 1990 FIM
R2B	General government net lending, FIM million
R6030	General government debt, FIM million
R6030K*	Correction term of government debt
R6B	Governments net lending, FIM million
R78B*	Local government and social security funds net lending, FIM million
SA*	Savings rate
SUB*	Commodity subsidies
T*	Time trend 1960 = 1
V094*	Central government cash deficit
VALVS	Central government debt, % gdp
VFINS*	Central government financial investment
VRTN	Central government net financial requirement, FIM million
W2	Average annual wage in public sector per worker, 1000 FIM
WEL	Social security benefit per pensioner, 1000 FIM
WYPS	Annual wage in private services per worker, 1000 FIM
XNVIRALL*	Exchange rate index 1972 = 100
XTQ	Exports of goods and services, millions of 1990 FIM
XTV	Exports of goods and services, FIM million
XTVRES*	Other current account expenditure, net FIM million
XUVIENTI*	Foreign unit labour costs 90 = 100
Y15B16*	Direct taxes paid by firms and financial institutions
Y1PA	Operating surplus in agriculture, forestry, fishing and hunting, FIM million
Y1SA*	Contributions to social security schemes, agriculture, forestry, fishing and hunting, FIM million
Y1SD	Contributions to social security schemes, manufacturing, FIM million
Y1WA*	Wages and salaries in agriculture etc., FIM million
YIWD	Wages and salaries in manufacturing, FIM million
Y1WSD	Wages and social security contributions in manufacturing, FIM million
Y2S	Contributions to social security schemes, public sector, FIM million
Y2W	Wages and salaries in public sector, FIM million
Y34AP	Operating surplus in household and non-profit sectors, FIM million
Y34APRES*	Residual of Y34AP
YDRES*	Household disposable incomes, residual item in the model, FIM million
YDV	Households disposable income, FIM million
YS	Employers' social security contributions, FIM million
YSYPS	Private services, social security contributions, FIM million
YTKT	Unit labour costs in manufacturing
YW	Wages and salaries, FIM million
YWSYPS	Private services, wages and social security payments
YWYPS	Private services, wages and salaries
YYB473*	Correction term of B473
YYI1QD*	Correction term of I1QD

YYIYPM*	Correction term of IYPM
YYJ26B12*	Correction term of J26B12
YYJU*	Correction term of JU
YYKDN*	Correction term of KDN
YYL1ND*	Correction term of L1ND
YYMTQ*	Correction term of MTQ
YYNK1QD*	Trend of output/capital ratio, manufacturing
YYNK1QDS*	Adjustment term of output/capital ratio in capital stock equation, manufacturing
YYNKYPM*	Trend of output/capital ratio, private services
YYNKYPML*	Unused capital stock, private services, millions of 1990 FIM
YYNKYPMS*	Adjustment term of output/capital ratio in capital equation, private services
YYPC*	Correction term of PC
YYPM*	Correction term of PM
YYPX*	Correction term of PX
YYQ1QD*	Correction term of Q1QD
YYQ1QKA*	Value added, housing, FIM million
YYQ2V*	Correction term of Q2V
YYQYPS*	Correction term of QYPS
YYWEL*	Correction term of WEL
YYYTKT*	Correction term of YTKT
YYYWSYPS*	Correction term of WSYPS

Appendix 3 The Equations of the Model

$$Q1QD = EXP(-1.57 + 0.44 * LOG(XTQ) + 0.61 * LOG(GDPQ + MTQ - XTQ))$$
$$\qquad\qquad (2.7) \quad (11.0) \qquad\qquad (9.4)$$

$$+ YYQ1QD;$$

R2 = .98 DW =.87 PERIOD 1975–1994

Q1QD	= manufacturing output
XTQ	= exports of goods and services
GDPQ	= gross domestic product
MTQ	= imports of goods and services
YYQ1QD	= correction term for 1994

$$L1ND = EXP((LOG(Q1QD) - 0.4 * LOG(NK1QD(-1)) - 0.034 * T + 1.91) /$$
$$\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad (19.4) \qquad (40.5)$$

$$(0.6)) + YYL1ND;$$

R2 = .96 DW = 1.0 PERIOD = 1976–1994

L1ND	= employment in manufacturing (1000 persons)
NK1QD	= net capital stock in manufacturing
T	= time trend 1960 = 1
YYL1ND	= correction term for 1994

$$QYPS = EXP(0.45*LOG(NKYPM(-1) - YYNKYPML(- 1)) +$$

$$0.55 * LOG(LYPS) + 0.0158 * T + 2.00912) + YYQYPS + YYQ1QKA;$$
$$\qquad\qquad\qquad\qquad\qquad (18.2) \qquad (94.9)$$

R2 = .96 DW = 1.86 PERIOD = 1976–1990

QYPS	= value added, private services
NKYPM	= net stock of fixed capital, private services
YYNKYPML*	= unused capital stock, private services
LYPS	= employment (1000 persons), private services
T*	= time trend 1960 = 1
YYQYPS*	= correction term of QYPS
YYQ1QKA*	= value added, housing

$$MTQ = MTQ(-1) + 0.2 * (CQ - CQ(-1) + GQ - GQ(-1)) + 0.3*(IQ-IQ(-1)) +$$
$$\qquad\qquad\qquad (3.8) \qquad\qquad\qquad\qquad\qquad\qquad\qquad (5.5)$$

$$0.3 * (XTQ - XTQ(-1)) + 0.5 * (IVZAQ - IVZAQ(-1)) + YYMTQ;$$
$$(5.6) \qquad\qquad\qquad (9.0)$$

R2 = .95 DW = 1.58 PERIOD = 1976–1994

MTQ	= imports of goods and services
CQ	= private consumption
GQ	= public consumption
IQ	= total fixed gross investment
XTQ	= exports of goods and services
IVZAQ*	= inventory investment and statistical discrepancy
YYMTQ*	= correction term of MTQ

YTKT = (XUVIENTI * XNVIRALL) * EXP((2.91 + 0.11 * LOG(MFOR)
(6.7) (2.3)

+ 0.69 * LOG(XTQ(−1)) − LOG(XTQ))/0.34) + YYYTKT;
(12.9) (6.8)

R2 = .99 DW = 2.21 PERIOD = 1976–1994

YTKT	= unit labour costs in manufacturing
XUVIENTI*	= foreign unit labour costs 90 = 100
XNVIRALL*	= exchange rate index 1972 = 100
MFOR*	= Foreign demand, imports of Finland's 14 export countries, 90 = 100
XTQ	= exports of goods and services
YYYTKT*	= correction term of YTKT

XTV = B500 + MTV + B473 + XTVRES;

XTV	= exports of goods and services
B500*	= current account
MTV	= imports of goods and services
B473	= interest payment on foreign debt
XTVRES*	= other current account expenditure

B473 = YYB473 * KDN(−1);

B473	= interest payments on foreign debt
YYB473*	= correction term of B473
KDN	= foreign net debt

KDN = XNVIRALL/XNVIRALL(−1) * KDN(−1) − B500 + YYKDN;

KDN	= foreign net debt
XNVIRALL*	= exchange rate index 1972 = 100
B500*	= current account
YYKDN*	= correction term of KDN

PX = 1.02 * PX(−1) + YYPX;

PX	= export prices, goods and services, 90 = 100
YYPX*	= correction term of PX

XTQ = XTV/PX;

XTQ	= exports of goods and services
XTV	= exports of goods and services
PX	= export prices, goods and services, 90 = 100

PM = 1.02 * PM(−1) + YYPM;

PM	= import prices, goods and services, 90 = 100
YYPM*	= correction term of PM

MTV = PM*MTQ;

MTV	= imports of goods and services
PM	= import prices, goods and services, 90 = 100
MTQ	= imports of goods and services

QQ = Q1QD + QYPS + Q1QA + Q2Q;

QQ	= value added, total
Q1QD	= value added in manufacturing
QVYPS	= value added, private services
Q1QA*	= value added in agriculture, forestry, fishing and hunting
Q2Q	= value added in public sector

LYPS = LN − L1NA − L1ND − L2N;

LYPS	= employment (1000 persons), private services
LN*	= employment (1000 persons), total
L1NA*	= employment (1000 persons), agriculture, forestry, fishing and hunting
L1ND	= employment (1000 persons), manufacturing
L2N*	= employment (1000 persons), public sector

NK1QA = NK1QA(−1) + I1QA − K1QA;

NK1QA	= net stock of fixed capital, agriculture, forestry, fishing and hunting
NK1QKA*	= net stock of fixed capital, housing sector
I1QA*	= fixed gross investment, agriculture, forestry and fishing
K1QA	= depreciation of fixed capital, agriculture, forestry, fishing and hunting

```
NK1QD = YYNK1QDS * (Q1QD/YYNK1QD) + (1 - YYNK1QDS) *
        NK1QD(-1);
```

NK1QD	= net stock of fixed capital, manufacturing
YYNK1QDS*	= adjustment term of output/capital ratio in capital stock equation, manufacturing
Q1QD	= value added in manufacturing
YYNK1QD*	= trend of output/capital ratio, manufacturing

```
NK2Q = NK2Q(-1) + I2FQ - K2Q;
```

NK2Q	= net stock of fixed capital, public sector
I2FQ	= fixed gross investment, public sector
K2Q	= depreciation of fixed capital, public sector

```
NKYPM = YYNKYPMS * (QYPS-YYQ1QKA)/YYNKYPM +
        (1-YYNKYPMS) * (NKYPM(-1)-YYNKYPML(-1)) +
        YYNKYPML;
```

NKYPM	= net stock of fixed capital, private services
YYNKYPMS*	= adjustment term of output/capital ratio in capital equation, private services
QYPS	= value added, private services
YYQ1QKA*	= value added, housing
YYNKYPM*	= trend of output/capital ratio, private services
YYNKYPML*	= unused capital stock, private services

```
NKQ = NKYPM + NK1QA + NK1QD + NK2Q + NK1QKA;
```

NKQ	= net stock of fixed capital, total
NKYPM	= net stock of fixed capital, private services
NK1QA	= net stock of fixed capital, agriculture, forestry, fishing and hunting
NK1QD	= net stock of fixed capital, manufacturing
NK2Q	= net stock of fixed capital, public sector
NK1QKA*	= net stock of fixed capital, housing sector

```
I1QD = NK1QD - NK1QD(-1) + K1QD +YYI1QD;
```

I1QD	= fixed gross investment, manufacturing
NK1QD	= net stock of fixed capital, manufacturing
K1QD	= depreciation of fixed capital, manufacturing
YYI1QD*	= correction term of I1QD

```
IYPM = NKYPM - NKYPM(-1) + KYPM + YYIYPM;
```

IYPM	= fixed gross investment, private services (exl. housing)
NKYPM	= net stock of fixed capital, private services
KYPM	= depreciation of fixed capital private services, exl. housing
YYIYPM*	= correction term of IYPM

IPQ = I1QD + IYPM + I1QA + I1QKA;

IPQ	= total fixed private gross investment
I1QD	= fixed gross investment, manufacturing
IYPM	= fixed gross investment, private services (exl. housing)
I1QA*	= fixed gross investment, agriculture, forestry and fishing
I1QKA*	= fixed gross investment, housing

IQ = IPQ + I2FQ;

IQ	= total fixed gross investment
IPQ	= total fixed private gross investment
I2FQ	= fixed gross investment, public sector

K1QD = 0.075 * NK1QD(−1);

K1QD	= depreciation of fixed capital, manufacturing
NK1QD	= net stock of fixed capital, manufacturing

K1QA = 0.086 * NK1QA(−1);

K1QA	= depreciation of fixed capital, agriculture, forestry, fishing and hunting
NK1QA	= net stock of fixed capital, agriculture, forestry, fishing and hunting

K2Q = 0.022 * NK2Q(−1);

K2Q	= depreciation of fixed capital, public sector
NK2Q	= net stock of fixed capital, public sector

K1QKA = 0.032 * NK1QKA(−1);

K1QKA	= depreciation of fixed capital, housing sector
NK1QKA*	= net stock of fixed capital, housing sector

KYPM = 0.071 * NKYPM(−1);

KYPM	= depreciation of fixed capital private services, exl. housing
NKYPM	= net stock of fixed capital, private services

KQ = K1QD + KYPM + K1QA + K2Q + K1QKA;

KQ	= depreciation of fixed capital, total
K1QD	= depreciation of fixed capital, manufacturing
KYPM	= depreciation of fixed capital private services, exl. housing
K1QA	= depreciation of fixed capital, agriculture, forestry, fishing and hunting
K2Q	= depreciation of fixed capital, public sector
K1QKA	= depreciation of fixed capital, housing sector

PT = 1.02 * PT(−1);

PT = prices in manufacturing, 90 = 100

Q1VD = PT * Q1QD;

Q1VD = value added in manufacturing
PT = prices in manufacturing, 90 = 100
Q1QD = value added in manufacturing

Y1WSD = YTKT * Q1QD;

Y1WSD = wages and social security contributions in manufacturing
YTKT = unit labour costs in manufacturing
Q1QD = value added in manufacturing

Y1SD = 0.28 * Y1WD;

Y1SD = contributions to social security schemes, manufacturing
YIWD = wages and salaries in manufacturing

Y1WD = Y1WSD − Y1SD;

YIWD = wages and salaries in manufacturing
Y1WSD = wages and social security contributions in manufacturing
Y1SD = contributions to social security schemes, manufacturing

PYPS = 1.02 * PYPS(−1);

PYPS = prices in private services, 90 = 100

QVYPS = PYPS * QYPS;

QVYPS = value added, private services
PYPS = prices in private services, 90 = 100
QYPS = value added, private services

Q1VA = P1A * Q1QA;

Q1VA = value added in agriculture, forestry, fishing and hunting
P1A* = prices in agriculture and forestry, 90 = 100
Q1QA* = value added in agriculture, forestry, fishing and hunting

QV = Q1VD + QVYPS + Q1VA + Q2V;

QV = value added
Q1VD = value added in manufacturing
QVYPS = value added, private services
Q1VA = value added in agriculture, forestry, fishing and hunting
Q2V = value added in public sector

GDPV = QV + JU + SUB;

GDPV	= gross domestic product
QV	= value added
JU	= general government revenue from indirect taxes
SUB*	= commodity subsidies

PQ = 1.02 * PQ(−1);

PQ	= gdp deflator, 90 = 100

GDPQ = (GDPV/PQ);

GDPQ	= gross domestic product
GDPV	= gross domestic product

CQ = GDPQ − GQ − IPQ − I2FQ − IVZAQ − XTQ + MTQ;

CQ	= private consumption
GDPQ	= gross domestic product
GQ	= public consumption
IPQ	= total fixed private gross investment
I2FQ	= fixed gross investment, public sector
IVZAQ*	= inventory investment and statistical discrepancy
XTQ	= exports of goods and services
MTQ	= imports of goods and services

YWSYPS = 0.55 * QVYPS + YYYWSYPS;

YWSYPS	= private services, wages and social security payments
QVYPS	= value added, private services
YYYWSYPS*	= correction term of WSYPS

YWYPS = YWSYPS − YSYPS;

YWYPS	= private services, wages and salaries
YWSYPS	= private services, wages and social security payments
YSYPS	= private services, social security contributions

YSYPS = 0.313 * YWYPS;

YSYPS	= private services, social security contributions
YWYPS	= private services, wages and salaries

WYPS = (YWYPS/LYPS);

WYPS	= annual wage in private services per worker
YWYPS	= private services, wages and salaries
LYPS	= employment (1000 persons), private services

YW = Y1WD + YWYPS + Y1WA + Y2W;

YW	= wages and salaries
YIWD	= wages and salaries in manufacturing
YWYPS	= private services, wages and salaries
Y1WA*	= wages and salaries in agriculture etc.
Y2W	= wages and salaries in public sector

YS = Y1SD + YSYPS + Y1SA +Y2S;

YS	= employers' social security contributions
Y1SD	= contributions to social security schemes, manufacturing
YSYPS	= private services, social security contributions
Y1SA*	= contributions to social security schemes, agriculture, forestry, fishing and hunting
Y2S	= contributions to social security schemes, public sector,

Y1PA = Q1VA – Y1WA – Y1SA;

Y1PA	= operating surplus in agriculture, forestry, fishing and hunting
Q1VA	= value added in agriculture, forestry, fishing and hunting
Y1WA*	= wages and salaries in agriculture etc.
Y1SA*	= contributions to social security schemes, agriculture, forestry, fishing and hunting

Y34AP = QVYPS – YWSYPS – PKYPS * (KYPM + K1QKA) + Y1PA + Y34APRES;

Y34AP	= operating surplus in household and non-profit sectors
QVYPS	= value added, private services
YWSYPS	= private services, wages and social security payments
PKYPS*	= prices of private services depreciation, 90 = 100
KYPM	= depreciation of fixed capital private services, excl. housing
K1QKA	= depreciation of fixed capital, housing sector
Y1PA	= operating surplus in agriculture, forestry, fishing and hunting
Y34APRES*	= residual of Y34AP

J2A182 = 0.11 * YW;

J2A182	= general government revenue, social security contributions from the insured persons
YW	= wages and salaries

J2B22 = YDV – YW – Y34AP – J2B19 + JTK + J2A182 – YDRES;

J2B22	= general government transfers to households, social allowance benefits
YDV	= households disposable income
YW	= wages and salaries
Y34AP	= operating surplus in household and non-profit sectors

J2B19 = general government transfers to households, social security benefits
JTK = direct taxes paid by households
J2A182 = general government revenue, social security contributions from the insured persons
YDRES* = household disposable incomes, residual item in the model

PC = 1.02 * PC(−1) + YYPC;

PC = private consumption prices, 90 = 100
YYPC* = correction term of PC

CV = PC * CQ;

CV = private consumption
PC = private consumption prices, 90 = 100
CQ = private consumption

YDV = (CV/(100 − SA)) * 100;

YDV = households disposable income
CV = private consumption
SA* = savings rate

WEL = (0.5 * (YW/LN)/(YW(−1)/LN(−1)) + 0.5 * PC/PC(−1)) * WEL(−1)
+ YYWEL;

WEL = social security benefit per pensioner
YW = wages and salaries
LN* = employment (1000 persons), total
PC = private consumption prices, 90 = 100
YYWEL* = correction term of WEL

J2B19 = ELKM * WEL;

J2B19 = general government transfers to households, social security benefits
ELKM* = number of pensioners
WEL = social security benefit per pensioner

J2A18 = YS + J2A182 + J2A18RES;

J2A18 = general government revenue, social security contributions from the household sector
YS = employers' social security contributions
J2A182 = general government revenue, social security contributions from the insured persons
J2A18RES* = general government revenue, social security contributions, residual item in the model

JU = 0.3 * CV + YYJU;

JU	= general government revenue from indirect taxes
CV	= private consumption
YYJU*	= correction term of JU

JTK = 0.3175 * (YW + Y34AP);

JTK	= direct taxes paid by households
YW	= wages and salaries
Y34AP	= operating surplus in household and non-profit sectors

JT = JTK + Y15B16;

JT	= general government revenue from direct taxes
JTK	= direct taxes paid by households
Y15B16*	= direct taxes paid by firms and financial institutions

J2 = JT + JU + J2A18 + J2RES;

J2	= general government revenue, total
JT	= general government revenue from direct taxes
JU	= general government revenue from indirect taxes
J2A18	= general government revenue, social security contributions from the household sector
JSRES*	= general government transfer payments, residual item in the model

J6B12 = (YYB473 + 0.01) * R6030(-1) + YYJ26B12;

J6B12	= interest payment on government debt
YYB473*	= correction term of B473
R6030	= general government debt
YYJ26B12*	= correction term of J26B12

JS = J2 – J2D – J6B12 – J2B22 – J2B19 – JSRES;

JS	= general government transfer payments, commodity and industry subsidies
J2	= general government revenue
J2D	= general government disposable income
J6B12	= interest payment on government debt
J2B22	= general government transfers to households, social allowance benefits
J2B19	= general government transfers to households, social security benefits
JSRES*	= general government transfer payments, residual item in the model

PI = 1.02 * PI(−1);

PI = investment prices, 90 = 100

I2FQ = (I2FV/PI);

I2FQ = fixed gross investment, public sector
I2FV* = fixed gross investment, public sector
PI = investment prices, 90 = 100

Y2W = L2N * W2;

Y2W = wages and salaries in public sector
L2N* = employment (1000 persons), public sector
W2 = average annual wage in public sector per worker

Y2S = 0.298 * Y2W;

Y2S = contributions to social security schemes, public sector
Y2W = wages and salaries in public sector

Q2V = Y2W + Y2S + YYQ2V;

Q2V = value added in public sector
Y2W = wages and salaries in public sector
Y2S = contributions to social security schemes, public sector
YYQ2V* = correction term of Q2V

Q2Q = Q2V/(W2/117.16);

Q2Q = value added in public sector
Q2V = value added in public sector
W2 = average annual wage in public sector per worker

GV = Q2V + GVRES;

GV = public consumption
Q2V = value added in public sector
GVRES* = public consumption, residual item in the model

K2V = K2Q * PI;

K2V = depreciation of fixed capital, public sector
K2Q = depreciation of fixed capital, public sector
PI = investment prices, 90 = 100

GQ = (GV/(W2/117.16));

GQ	= public consumption
GV	= public consumption
W2	= average annual wage in public sector per worker

J2D = R2B + GV − K2V + I2FV + J2DRES;

J2D	= general government disposable income
R2B	= general government net lending
GV	= public consumption
K2V	= depreciation of fixed capital, public sector
I2FV*	= fixed gross investment, public sector
J2DRES*	= general government disposable income, residual item in the model

R6B = R2B − R78B;

R6B	= governments net lending
R2B	= general government net lending
R78B*	= local government and social security funds net lending

VRTN = R6B + VFINS;

VRTN	= central government net financial requirement
R6B	= governments net lending
VFINS*	= central government financial investment

R6030 = R6030(−1) − VRTN − V094 + R6030K;

R6030	= general government debt
VRTN	= central government net financial requirement
V094*	= central government cash deficit
R6030K*	= correction term of government debt

R2B = JNL * (GDPV/100);

R2B	= general government net lending
JNL*	= general government net lending/gdp
GDPV	= gross domestic product

VALVS = (R6030/GDPV) * 100;

VALVS	= central government debt
R6030	= general government debt
GDPV	= gross domestic product

W2 = WYPS/WYPS(−1) * W2(−1);

W2	= average annual wage in public sector per worker
WYPS	= annual wage in private services per worker

Appendix 4

Table 1. **Model simulation, 200 000 unemployed persons in 2000**

	ANNUAL %-CHANGE 1994 - 2000	1981-1990	% OF GDP IN 1990 PRICES 1994	2000
GDP	6.3	100.0	100.0	100.0
-industrial production	6.5	20.7	24.1	24.2
-private services	7.5	43.5	41.8	44.7
IMPORTS	7.8	22.5	26.1	28.4
EXPORTS	4.9	24.2	33.9	31.1
PUBLIC DEMAND	-0.7	24.5	23.8	15.8
PRIVATE INVESTMENT	16.2	22.7	13.2	22.6
-industry	15.4	4.2	3.1	5.1
-private services	25.4	9.1	4.7	12.6
PRIVATE CONSUMPTION	7.7	52.0	51.7	55.6
EMPLOYMENT	2.6			
-industry	2.7			
-private services	4.5			
WAGES (per employee)	4.2			
-industry	4.0			
-private services	4.6			

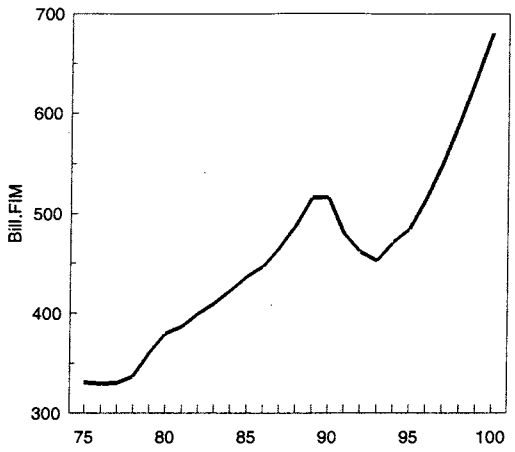
PUBLIC SECTOR	CHANGE 1994 - 2000 FIM bill.	% annually
INCOME	166	8.1
-direct taxes	48	7.6
-indirect taxes	64	10.3
-social security contributions	42	7.3
-other income	12	5.0
EXPENDITURE	139	6.4
-interest payments	9	5.2
-consumption	28	4.0
-investment	1	1.0
-transfers to households (1)	124	12.7
-other expenditure (2)	-23	
NET LENDING	27	
-central government	14	
-local gov. and soc. sec. funds	13	
-central gov. financial investment	-8	
CENTRAL GOV. DEBT	315	
% of GDP in 2000	77	

(1) : The residual of the household sector balance sheet, which tells how much public transfers or tax reliefs are needed in order to create income for consumption given the savings ratio.

(2): The residual of the public sector balance sheet given the public deficit.

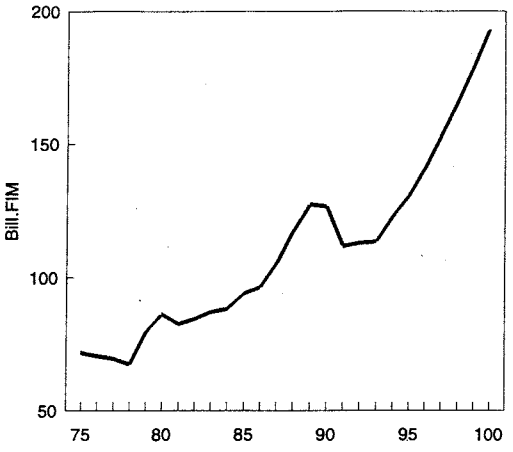
Chart 1. **Supply and demand and demand in the Finnish economy**

GDP



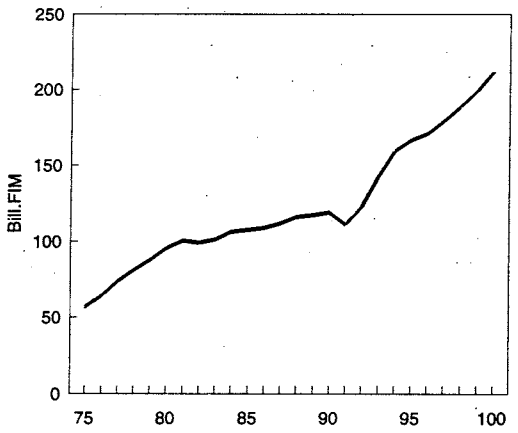
AVERAGE ANNUAL GROWTH	
1975-89	3.0
1975-94	1.8
1994-2000	6.3

IMPORTS



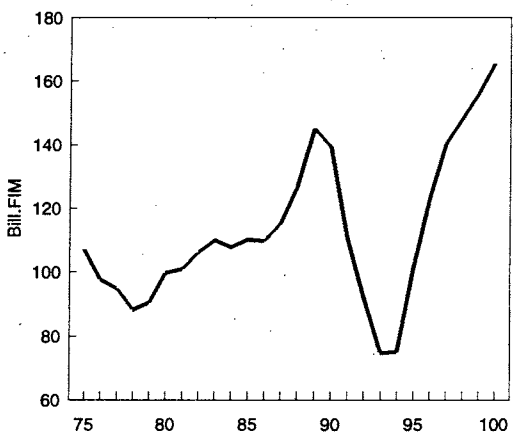
AVERAGE ANNUAL GROWTH	
1975-89	3.9
1975-94	2.7
1994-2000	7.8

EXPORTS



AVERAGE ANNUAL GROWTH	
1975-89	4.9
1975-94	5.3
1994-2000	4.9

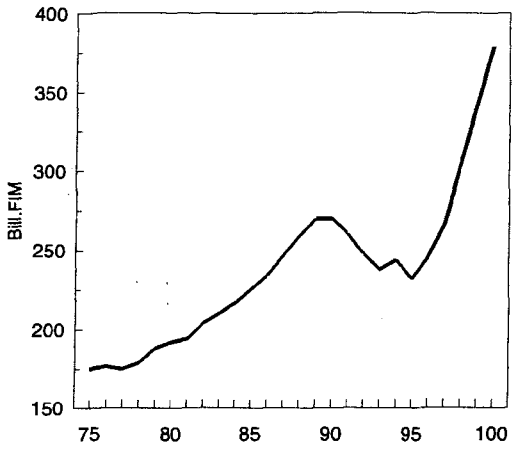
INVESTMENTS



AVERAGE ANNUAL GROWTH	
1975-89	2.1
1975-94	-1.8
1994-2000	14.1

Chart 2. **Supply and demand and demand in the Finnish economy**

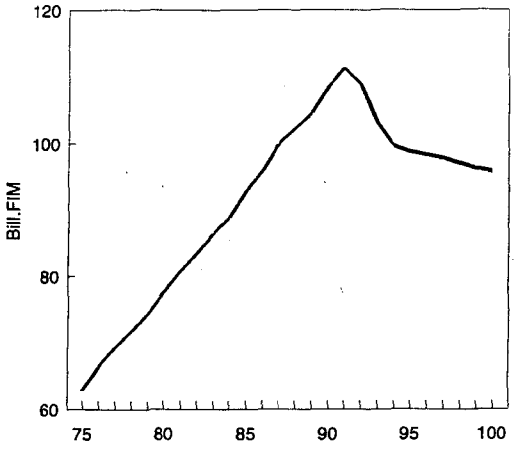
PRIVATE CONSUMPTION



AVERAGE ANNUAL GROWTH

1975-89	2.9
1975-94	1.7
1994-2000	7.4

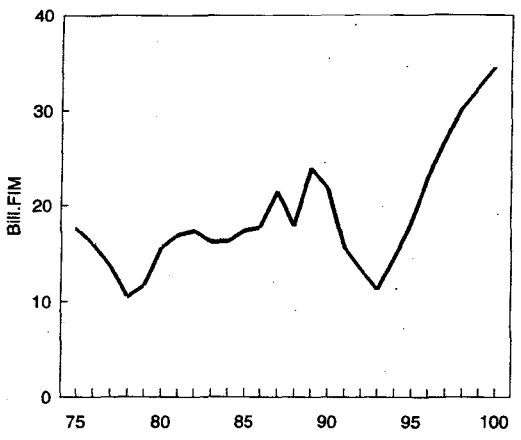
PUBLIC CONSUMPTION



AVERAGE ANNUAL GROWTH

1975-89	3.4
1975-94	2.3
1994-2000	-0.7

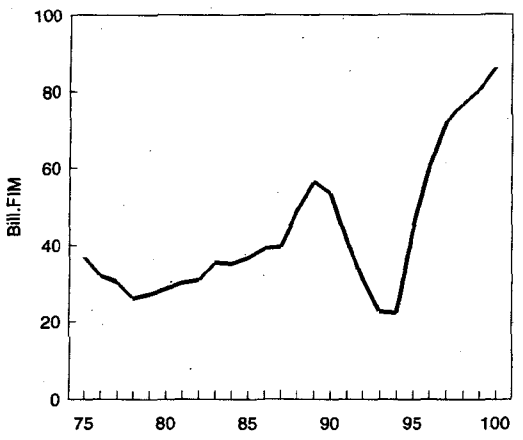
INVESTMENT:MANUFACTURING



AVERAGE ANNUAL GROWTH

1975-89	2.1
1975-94	-0.9
1994-2000	14.3

INVESTMENT: PRIVATE SERVICES



AVERAGE ANNUAL GROWTH

1975-89	2.8
1975-94	-2.5
1994-2000	22.6

Chart 3. **Production and employment**

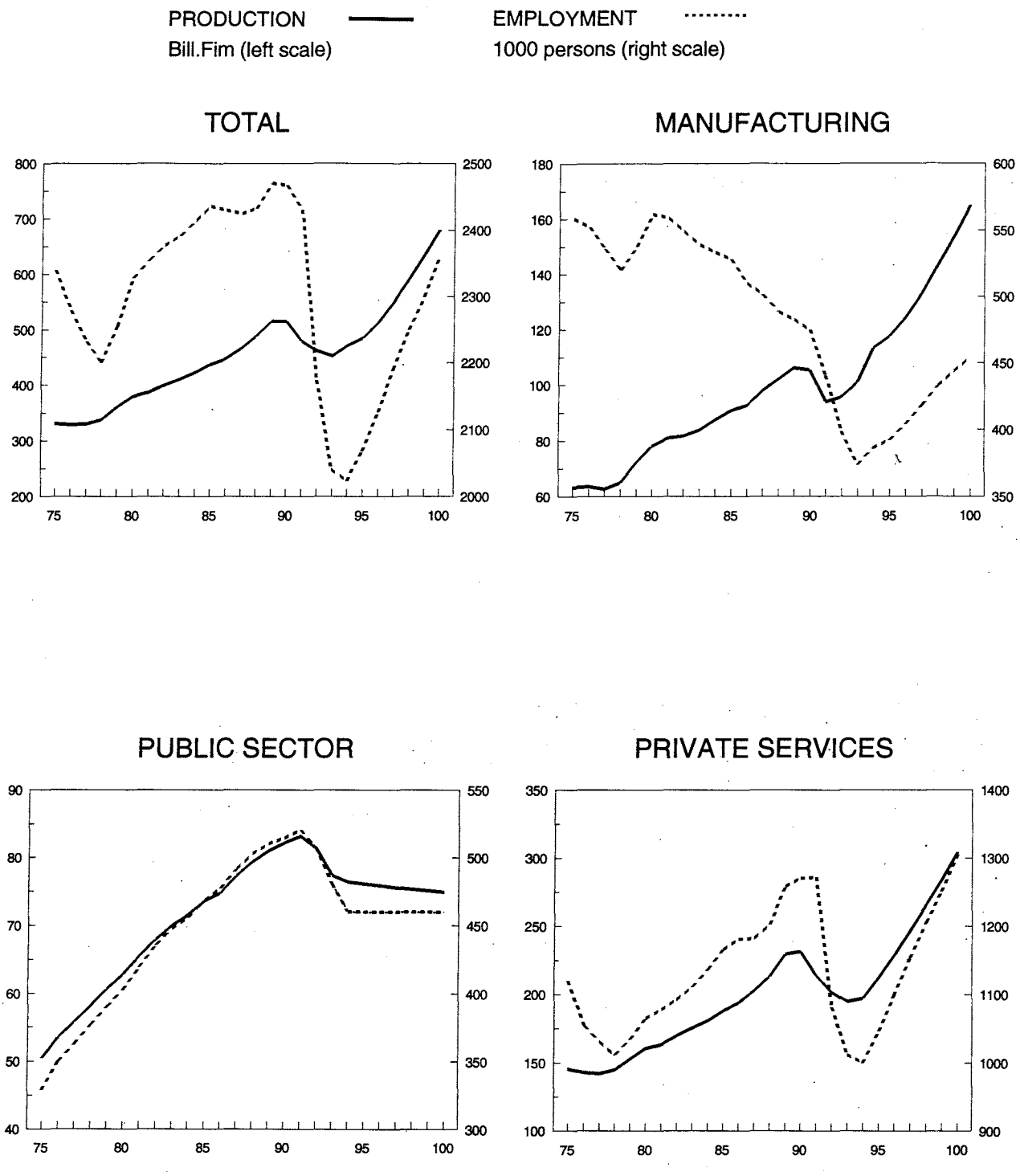
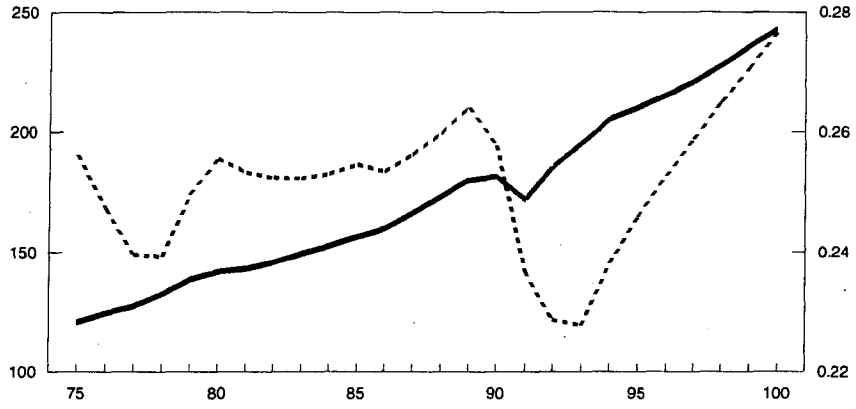


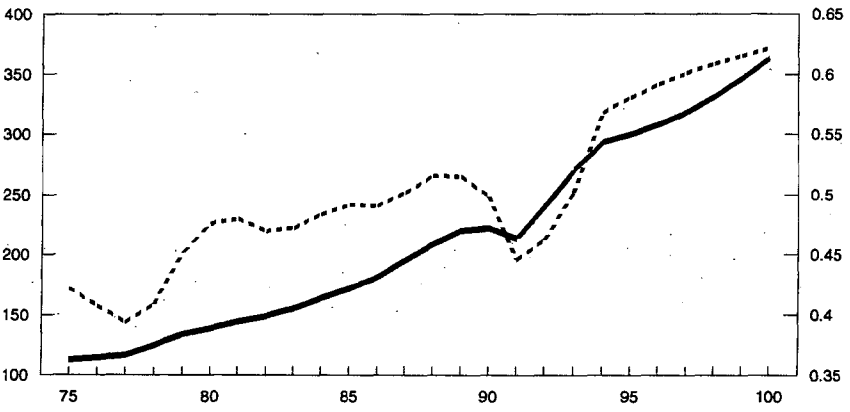
Chart 4. **Capital and labour productivity**

TOTAL



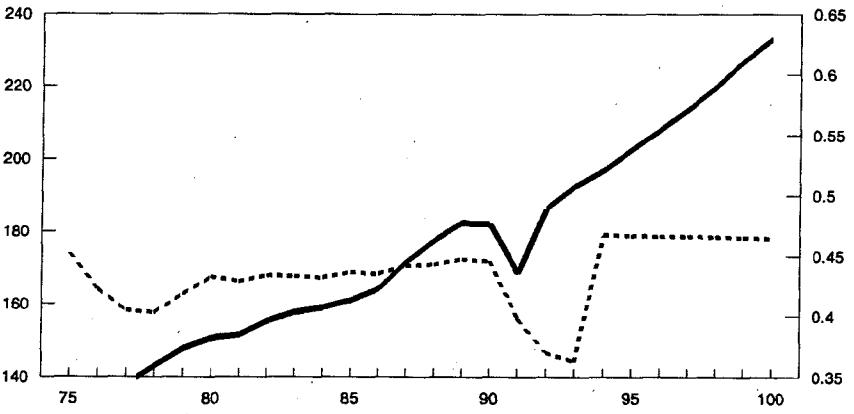
PRODUCTION/EMPLOYMENT (100 PERSONS) PRODUCTION/CAPITAL STOCK (right scale)

MANUFACTURING



PRODUCTION/EMPLOYMENT (1000 PERSONS) PRODUCTION/CAPITAL STOCK (right scale)

PRIVATE SERVICES EXCL. HOUSING



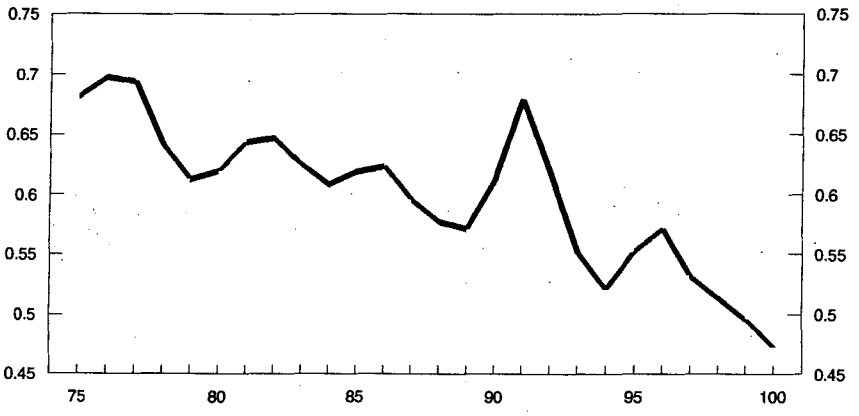
PRODUCTION/EMPLOYMENT (1000 PERSONS) PRODUCTION/CAPITAL STOCK (right scale)

Chart 5. **Functional distribution of income**

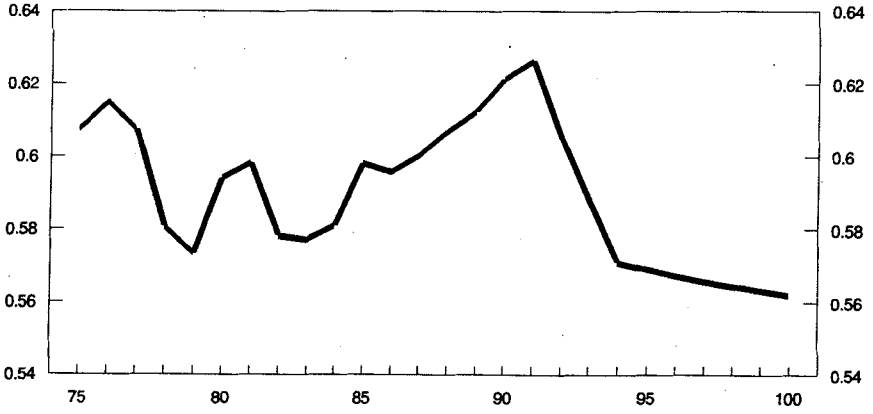
Wages and social security contributions / value added

TOTAL

MANUFACTURING



PRIVATE SERVICES



BANK OF FINLAND DISCUSSION PAPERS

ISSN 0785-3572

1/95 Olavi Rantala **Valuuttakurssimuutosten vaikutus yritysten kannattavuuteen** (Effects of Exchange Rate Changes on Corporate Profitability). 1995. 51 p. ISBN 951-686-439-2. (KT)

2/95 Liselotte Høj **Fundamental Equilibrium Exchange Rate — A Case Study of the Finnish Markka**. 1995. 30 p. ISBN 951-686-440-6. (TU)

3/95 Jean-Marie Viaene — Itzhak Zilcha **Multiple Uncertainty, Forward-Futures Markets and International Trade**. 1995. 23 p. ISBN 951-686-441-4. (TU)

4/95 Jorma Hilpinen **Analysis on the Errors and Omissions in the Finnish Balance of Payments: Restless Capital Movements, Floating Exchange Rate and Errors Since 1991**. 1995. 31 p. ISBN 951-686-442-2. (TP)

5/95 Juhana Hukkinen — Matti Virén **Assessing the Performance of a Macroeconomic Model**. 1995. 48 p. ISBN 951-686-443-0. (TU)

6/95 Tuomas Saarenheimo **Credit Crunch Caused Investment Slump? An Empirical Analysis Using Finnish Data**. 1995. 26 p. ISBN 951-686-444-9. (KT)

7/95 Sinimaaria Ranki **On the Role of the Single Currency ECU**. 1995. 37 p. ISBN 951-686-445-7. (TU)

8/95 Juhana Hukkinen — Erkki Koskela **Voidaanko Suomen pitkien korkojen tasoa selittää talouden perustekijöillä, vai onko kyse jostain muusta?** (Can the Level of Long-Term Interest Rates in Finland Be Explained by Economic Fundamentals, or Must an Explanation be Sought Somewhere Else? 1995. 27 p. ISBN 951-686-446-5. (KT)

9/95 Kari Takala — Matti Virén **Testing Nonlinear Dynamics, Long Memory and Chaotic Behaviour with Macroeconomic Data**. 1995. 55 p. ISBN 951-686-448-1. (TU)

10/95 Lauri Kajanoja **Aggregate Investment and Corporate Indebtedness: Some Empirical Evidence from Finland**. 1995. 28 p. ISBN 951-686-449-X. (KT)

11/95 Kari Takala **The Interest Rate Sensitivity of Output in Finland**. 1995. 49 p. ISBN 951-686-450-3. (KT)

12/95 Timo Tyrväinen **Wage Determination in the Long Run, Real Wage Resistance and Unemployment: Multivariate Analysis of Cointegrating Relations in 10 OECD Economies**. 1995. 94 p. ISBN 951-686-451-1. (KT)

13/95 Eddie George **Inflation Targeting in the UK Monetary Policy Framework**. 1995. 12 p. ISBN 951-686-452-X. (TIE)

14/95 Risto Murto **The Banking Crisis, Banking Policy Regimes and the Value of a Bank**. 1995. 27 p. ISBN 951-686-453-8. (TU)

15/95 Kari Takala **Permanent Income Hypothesis and Saving in Finland**. 1995. 53 p. ISBN 951-686-454-6. (KT)

16/95 Heikki Koskenkylä — Jaana Rantama **Pankkien korkomarginaalit ja korkokatteet Pohjoismaissa** (Banks' Interest Rate Margins and Net Interest Income in the Nordic Countries). 1995. 27 p. ISBN 951-686-455-5. (RM)

17/95 Mika Kuismanen **Exchange Rates and Import Prices in Finland: Estimation of Exchange Rate Pass-Through**. 1995. 33 p. ISBN 951-686-458-9. (KT)

18/95 Johnny Åkerholm – Timo Hämäläinen – Mika Kuismanen **Employment and the Structure of the Finnish Economy. A Model for Evaluating Scenarios**. 1995. 56 p. ISBN 951-686-460-0 (KT)