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THE FORECASTING SYSTEM IN ETLA\*)

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ABSTRACT: In this paper the forecasting system in ETLA is briefly described. The most important models and their use in practice are presented. For example, the annual and quarterly econometric models, the input-output model and the model for private consumption are discussed.

KEYWORDS: forecasting, models

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TIIVISTELMÄ: Esityksessä kuvataan lyhyesti ETLAn ennustejärjestelmää. Tärkeimpiä malleja ja niiden käyttöä ennustetyöskentelyssä esitellään suppeasti. Esimerkiksi vuosi- ja neljännesvuosimalleja, panos-tuotos-mallia ja yksityisen kulutuksen ennustemallia on kuvattu esityksessä.

ASIASANAT: ennustaminen, mallit



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## 1. THE FORECASTING SYSTEM OF THE INSTITUTE

This seminar will briefly introduce the software tools which have been developed to help our forecasting activities. The presentation is based on the corresponding work of Alho and Luukkonen (1986), which was also presented in Moscow. Many changes have occurred in ETLA's forecasting system since 1986, and that is the main reason to carry out a work similar to the previous one. The presentation has been expanded and updated to correspond to the current forecasting tools and their use.

The Research Institute of the Finnish Economy (ETLA) is an independent institute financed by the private sector in Finland. ETLA publishes three times a year a short-term forecast covering the current year and the next. A medium-term outlook covering the next five years is published once a year. In the institute forecasts are made by a forecasting group which consists of 11 members. In addition to the four books just mentioned, the forecasting group draws up monthly reports in which forecasts are checked and, if necessary, altered. The monthly reports also discuss economic questions of current interest. The size of each edition of the "Suhdanneconomic prospects" book, published four times a year, is about 3500.

Every forecast group member has his own area of responsibility. The macroeconomic forecast is divided into several sectors, which consist of, for example, international developments, investment, public finance and production. The macroeconomic view of the economy is gathered together from sectoral views with the assistance of an aggregative econometric model (a printout of the model is presented in appendix 1). Short-term forecasts of

ETLA are the most detailed macroeconomic forecasts published in Finland. The disaggregation level of the production forecasts is presented in table 2, and the corresponding level of demand disaggregation can be seen in table 3.

Table 1: Decomposition of production in ETLA's economic prospects

Agriculture and forestry

- Agriculture
- Forestry

Industries

- Forest industries
  - Wood industry
  - Paper industry
- Metal and engineering industries
  - Basic metal industries
  - Manufacture of fabricated metal products
  - Machinery and equipment
- Chemical industries
- Food manufacturing industries
- Textile, wearing apparel and leather industries
- Other manufacturing
- Total manufacturing
- Mining and quarrying
- Electricity, gas and water

Construction

- Construction of buildings
- Other constructions

Service industries

- Trade, restaurants and hotels
  - Wholesale trade
  - Retail trade
  - Restaurants and hotels

Transport, storage and communication

- Transport and storage
- Communication

Finance

Letting and operating of dwelling and use of owner-occupied dwellings

Real estate and business services

Producers of government services

To ease the burdensome routine tasks of forecasting ETLA has developed a large set of statistical models, calculating systems and other software tools. These have been made to help the formation of an integrated view of



the current economic situation. The most important forecasting tools are the annual macroeconomic model, quarterly macroeconomic model, input-output model for production, statistical model for disaggregated private consumption, flow-of-funds model, model for building construction and calculating systems for international developments, foreign trade and the public economy. One of the main principles has been to develop tools which can be used to help the forecasting group members to avoid time-consuming routine calculations.

Diagram 1: The technical forecasting system of ETLA

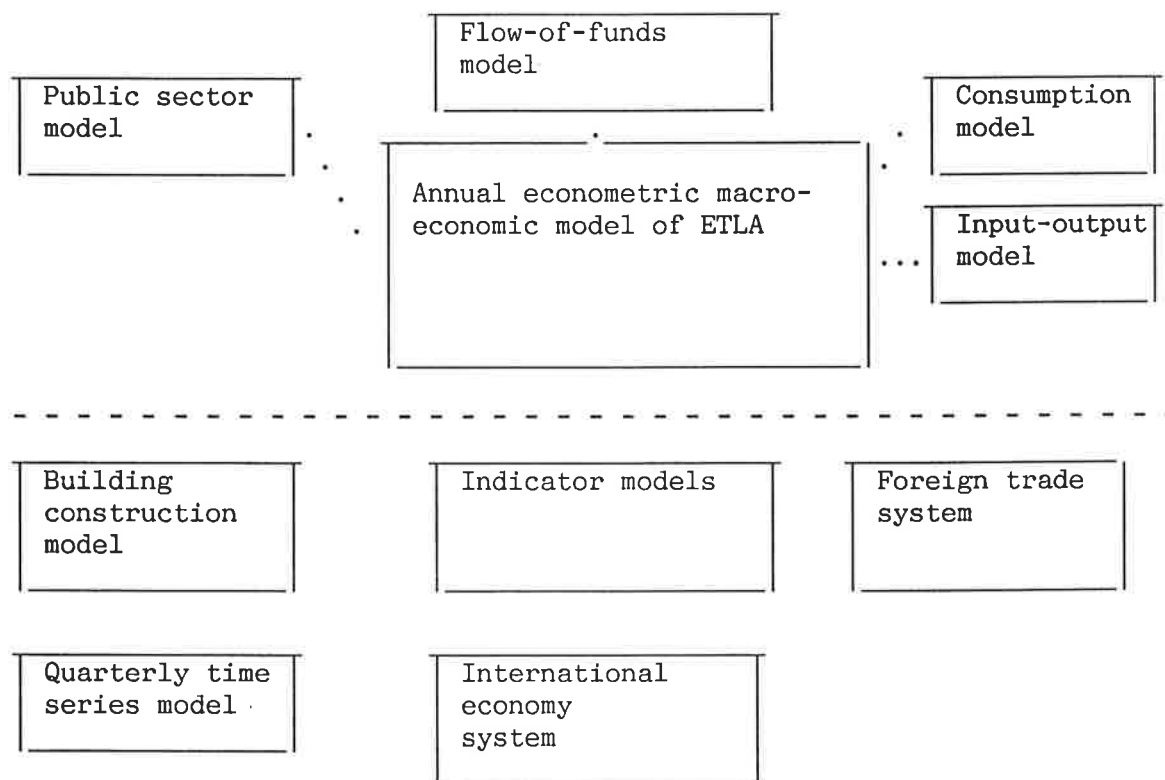


Table 2: Decomposition of total demand in ETLA's economic prospects  
in Finland

Export

- Agriculture, forestry and mining
- Wood industry
- Paper industry
- Basic metals industry
- Metal product and machine industries
- Other manufacturing industries
  - Food industry
  - Textile, wearing apparel and leather industries
  - Chemical industries
- Export of services

Investment

- Private investment
  - Agriculture and forestry
  - Electricity, gas and water
  - Ownership of dwellings
  - Services
- Government gross fixed capital formation

Private consumption

- Food, beverages and tobacco
- Clothing and footwear
- Housing
- Furniture
- Medical care
- Transport and communication
- Recreation, culture and education
- Other goods and services

Government consumption

Change in stocks

## 2. SECTORAL MODELS AND CALCULATING SYSTEMS

### 2.1 THE ANNUAL ECONOMETRIC MODEL

The model is based on the doctoral thesis work of Pentti Vartia (1974). It is an annual Keynesian aggregative macro model, where behavioural equations were updated in 1985 (Lassila, 1985). The main relationships of the model are presented in appendix 2. The variables of the model are mainly

represented as differences (rates of change). All together the solution of the model needs about 500 difference, level or result variables. There are 13 behavioural equations and 101 identities or technical relations in the model (behavioural equations and variable symbols are presented in appendix 3). The actual amount of variables needed is 167 (114 endogenous and 53 exogenous). The main exogenous variables are the economic developments in the Western countries (prices and output), the trade between Finland and the socialist countries and many policy parameters of the public sector, such as public consumption, transfers and taxation.

The model is used in forecasting as follows: the first thing is to accept the previous final model solution as a new basic solution. If changes have occurred in the historical data, calculations are made to see, how this alters the previous forecasts. After all forecast group members have seen the printout of the basic run and made their comments on it, every member gives his or her new views of the exogenous variables they are responsible for. After this the model is solved, and if the members of the group do not agree with the solution, the model results can be manipulated. In the model every behavioural equation can be exogenised in any value. Therefore it is easy to produce any possible model solution which is consistent with the model identities (for example demand has to equal supply). It is also possible to release the fixed model without changing the solution. This is done by changing the constant terms of the equations.

With the model program it is possible to calculate how much the fixed solution differs from the solution of the unfixed or free model. This is organised simply by solving the model twice: first a fixed and then a relea-

sed version. After that it is possible to compare different solutions and calculate the additional shifts needed to produce a released version of the solution which exactly corresponds to the fixed solution. This is a way to change the model solution without actually exogenising it. All this is, of course, done automatically by the model program. The only thing the model user has to do is to give the target value of the behavioural equation, and the program will alter the constant of the equation needed to reach the fixed solution. This technical feature of ETLA's model program is very useful in practice, because model solutions and group members' views seldom match exactly. Therefore it is important to be able to manipulate the released model solution so that dynamic and spill-over effects of the group member views can be studied.

It is also possible to change the constant terms of the equations directly without fixing the solution. This is, of course, useful in some situations, but usually there are at least some behavioural solutions which must be held unaltered. If the constant term of one equation is altered, the simultaneous solution of the model will change almost all behavioural solutions. In spite of this, the straight constant shift and the amount of change in the equation solution are not equal, because the dynamic solution produces feed-back effects which have an effect on the solution. Because of this it is often easier to fix the equation considered and then release it at the same value of the solution.

When a proper model solution is achieved, some of the central data are transmitted to the sectoral forecasting systems which run on ETLA's central computer. For example, the input-output model, financial model and

public sector system receive the main results from the core solution.

The present version of the annual macro model runs on a Hewlett Packard 9000 minicomputer. The solution, data manipulations and production of printouts are based on many different software packages, which have all been developed and coded in ETLA. The user of the model does not have to know the detailed principles of the programs, because all central issues and routines have been integrated into one menu-driven package. The model program of ETLA is written in C language and uses a Yacc meta-compiler.

## 2.2 THE QUARTERLY TIME SERIES MODEL

The quarterly macro model has been built to supplement the annual model. It has been developed by Juha Ahtola, and also Arto Elomaa has taken part in the model construction. The model is able to benefit from quarterly data, and this kind of model reacts to changes in the economy faster than the annual model. That is why its supplementary effect on the institute's forecasting system is crucial. In the model there are 10 behavioural equations which are estimated:

- volume and price of Western export
- volume and price of private consumption
- volume and price of private investment
- wages
- import
- demand for labour input
- unemployment

The main exogenous factors in the model are:

- volume of export to the socialistic countries
- volume of government demand
- import prices

The equations of the model are currently specified so that there are no lagged endogenous variables in the set of explanatory variables. This makes the model react faster to changes given to the model. This is a good feature for a model specifically planned for forecasting purposes, even though it may tend to make the simulation features of the model poorer.

### 2.3 THE INPUT-OUTPUT MODEL

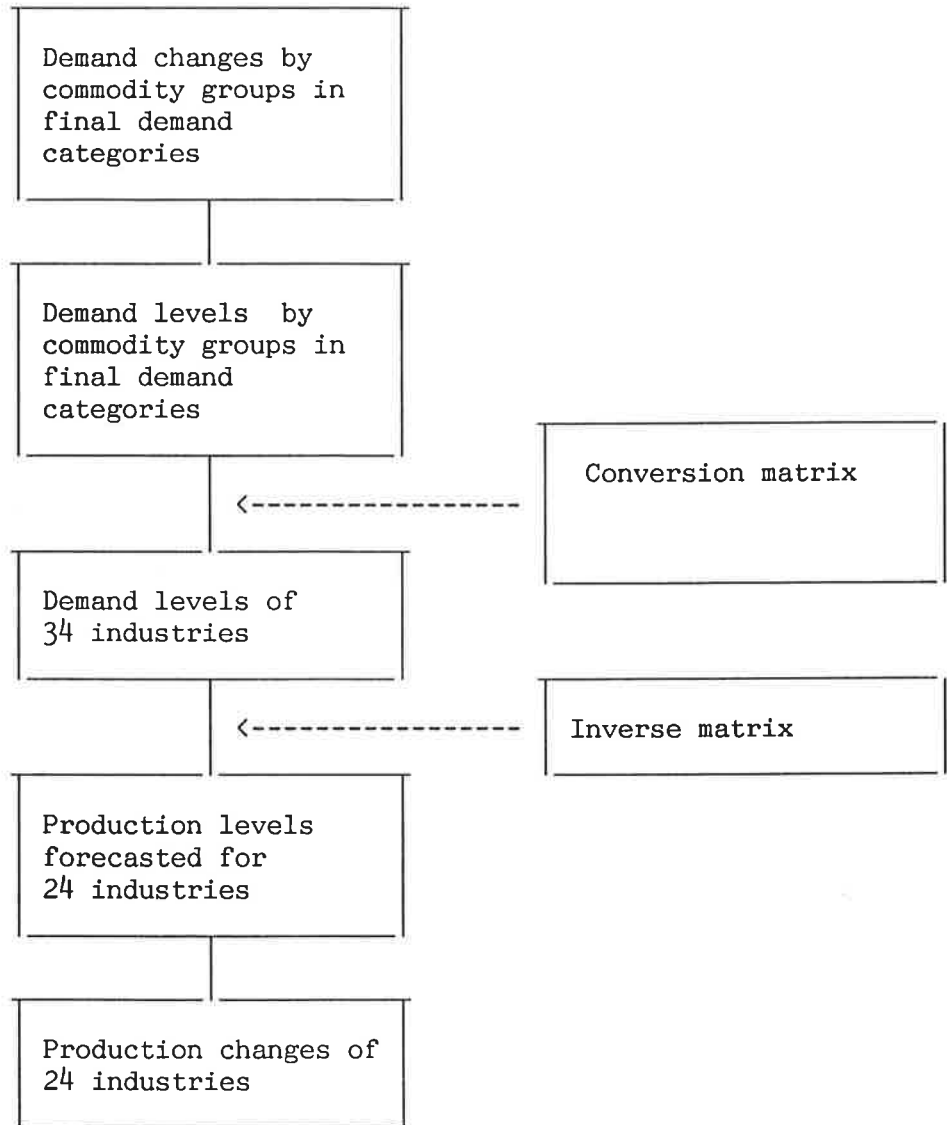
The annual core model produces only the aggregative production forecasts. If forecasts were based only on this view, the forecast for total production would not take into consideration the supply side factors. In this case the production forecast would be completely demand driven. Of course, if demand factor forecasts are trustworthy or exact, also the production forecast has to be dependable, because of the demand-supply identity. In the real world, however, the uncertainty of demand forecasts is naturally so remarkable that two different ways to approach the problem will improve the quality of the forecasts. Another reason to make disaggregated production forecasts is, of course, the need to have forecasts at the industry level. It is important to have knowledge about industry level prospects, because the production plans have to be made long before the actual time of production.

Production forecasting proceeds as follows: firstly group members give their detailed demand views to be fed into the input-output model. After that the disaggregated production forecasts will be calculated for 24 industries. If the aggregative total production produced by the input-output

model differs from the total production forecast produced by the core model, both the macro model and the input-output model inputs can be altered so that consistency between the production forecasts of both models can be achieved.

In practice the idea of the input-output model is that after the sectoral prospects for 26 demand and import factors have been given as differences they will be changed to the levels. After that the converse matrix produced by The Central Statistical Office is used to calculate demand levels for 24 industries. The base year of the matrix is 1985. Demand levels generated by the conversion matrix will be multiplied with the inverse matrix of the input-output matrix. This produces production forecasts for 24 industries. A simplified processing schedule is presented in diagram 2. In the present version of the model the calculation process has been shortened, and in practice industry level demands are not created, because they are not needed in forecasting. Demand components are actually integrated straight into the industry level production forecasts. The technical version of the input-output model is developed using a Mat matrix interpreter created at ETLA, which runs on the HP9000 mini computer. The model is planned by Pasi Ahde.

Diagram 2: The calculation process of the input-output model



#### 2.4 THE BUILDING CONSTRUCTION MODEL

The building construction model is created to forecast the quarterly volume of building construction. There are two blocks in the model: one is made to estimate building starts, and another is developed to describe the



interdependence between construction volume and building starts. The block for starts is based only on disaggregated ARIMA-models. Both blocks include 10 building classes which are grouped by the purpose of use. Because of this disaggregation the model provides a very detailed tool for construction investment forecasting. The model has been developed and estimated by Pekka Ilmakunnas and Jukka Lassila (1986).

## 2.5 THE MODEL FOR PRIVATE CONSUMPTION

The annual macro model doesn't deal with disaggregated private consumption, but private consumption is represented in the core model only at the aggregate level. Private consumption, though, plays a key role in the Finnish economy (45 % of total demand in 1987), and because of that making a good forecast presupposes disaggregated forecasts for private consumption. At the institute the private consumption forecasting model is based on the model developed by Markku Rahiala (1984), in which private consumption is divided into 47 main commodity groups.

The main idea of private consumption forecasting is that first the group member responsible for private consumption forms his or her preliminary view of total private consumption. This estimate is then used as a budget constraint for disaggregated consumption.

To make disaggregated consumption forecasts every commodity group needs a relative price (price index of that commodity group related to the price index of total private consumption), which is forecasted with a linear regression equation. The starting point for the price forecasting is the

semi-aggregated price forecasts, which are constructed for 8 main commodity groups. These price forecasts, made by the prices and costs person, are then divided into 47 price forecasts with the assistance of linear equations. The explanatory variables in these equations are, for example, real unit labour costs, real price of energy and households' disposable income.

Volume equations for every commodity group are expressed in logit form, where the budget share is regressed by, for example, relative price and current and lagged volume of total private consumption. The set of explanatory variables is not fixed, and in some commodity groups there are only few explanatory variables and in some groups the number of regressors has been increased (for example real savings, real disposable income and the change in households' credit stock are used as regressors in some equations).

The coefficients of commodity group equations are always re-estimated when the commodity group is forecasted. This is done to guarantee that the coefficients of the equations are always calculated with the current data.

The basic models for every commodity group are of the form:

$$\begin{aligned} \text{logit}(w_{jt}) &= \log \left[ \frac{w_{jt}}{1 - w_{jt}} \right] = \\ & b_{j0} + b_{j1} \log RP_{jt} + b_{j2} \log RP_{j,t-q} \\ & + b_{j3} \log Q_t + b_{j4} \log Q_{t-q} \\ & + b_{j4} \text{logit}(w_{j,t-q}) + e_{jt} \end{aligned}$$

$j = 1, \dots, n \quad t = 1, \dots, T$

$w_{jt}$	$RP_{jt} q_{jt}/Q_t = j$ the consumption expenditure share of category j.
$q_{jt}$	consumption of category j in 1985 prices.
$RP_{jt}$	the relative price of category j.
$Q_t$	total private consumption in 1985 prices.
$e_{jt}$	residuals.
$b_{j0} \dots b_{j5}$	parameters to be estimated.

First the model calculates forecasts for values of private consumption, and after that the values are converted to volumes with the assistance of relative prices. If total private consumption aggregated from the 47 subgroups differs from the total private consumption fixed in the core model, the difference is located to the group of other commodities and services. These residual differences are usually not remarkably large.

The present version of private consumption model is carried out with a Mat matrix interpreter, run on a HP9000 mini computer. The print out examples produced by the model are represented in appendix 4.

## 2.6 THE FLOW-OF-FUNDS MODEL

The flow-of-funds model deals with financial flows of 8 sectors. This model is used to draw up forecasts for different financial sectors and financial assets. The model includes 22 of the most important financial assets, whose annual flows are resolved in a chain with the aid of a large exogenous input and with the flow budget constraints (column sums). Equilibrium conditions for assets and liabilities are also constraining factors in the model (row sums); see Alho (1980). The model solution can be

printed out both in flows and stocks: a sample printout is presented in appendix 5.

## 2.7 THE PUBLIC SECTOR SYSTEM

Public sector forecasting and analysis demands manipulation of a large set of data. In the forecasting system of the institute the most important calculating routines concerning public sector economy are integrated into one calculating system, where the public sector is divided into the central government, the local government and the social security funds. In the system the person responsible for this sector is required to handle about 100 variables concerning the public economy. When the forecasts or historical data are altered, the system can easily be modified to calculate a consistent public sector forecast. The program is menu-driven and the user can choose different alternatives concerning, for example, forecasts, updating or automatic printout routines. The program also includes a block which aggregates the data given by The Central Statistical Office to a sensible level of forecasting. The program was planned by Esa-Jukka Käär, and the present version of it is run on ETLA's central computer.

## 2.8 THE FOREIGN TRADE SYSTEM

The foreign trade system is planned to make forecasts of Finland's exports and imports. The forecasts are made at the industry level. In the system there are about 280 variables concerning foreign trade of Finland. The present version of the program, run on ETLA's HP9000, is in practice out

of date, but it is soon replaced by a newer version.

## 2.9 THE INTERNATIONAL DEVELOPEMENTS SYSTEM

The person responsible for international economic forecasts has to handle data concerning 15 OECD-countries. This data is gathered to one calculating system. With an integrated system it is possible to reduce the routines of updating the data, because a great deal of the variables concerning, for example, the balance of resources and expenditure can be calculated from other variables. The system also guarantees that the data is always in a consistent form. Time-consuming checking routines are not needed. An example of a balance of resources and expenditure printout is presented in appendix 6.

With the program it is also possible to aggregate countries in many various ways. The combination of countries to be aggregated can be chosen freely. The present version of the program runs on ETLA's central computer.

## 2.10 THE INDICATOR MODELS

Many economic time series are published monthly or quarterly. When a forecast concerning a whole year is made, the information given by semi-annual variables has to be taken into consideration. For example, the volume of industrial production is a variable which can be forecasted by so-called leading indicators. They are variables which have preceded the volume of

industrial production in the past. In the institute there are 5 indicator models, which forecast, for example, the volume of industrial production with both monthly and quarterly data and volume of metal and forestry industries (see Teräsvirta 1984, 1986). The models are transfer functions models, where the equations are specified according to the relations between indicator variables and the dependent volume variables. A few of the explanatory variables are, for example:

- consumption of electricity
- index of advertisement in newspapers
- number of state railways freight cars
- number of vacancies
- number of unemployed
- volume of exports

The main idea of the indicator models is that variables which are available within a reasonably short time after the end of the month or a quarter are used as leading indicators. If the forecast period is long (for example 6 months), input or indicator variables have to be forecasted forward with the aid of ARIMA-models (graph concerning indicator models are presented in appendix 7).

### 3. THE ADP-SYSTEM OF ETLA

Most adp-routines used in ETLA are centered around ETLA's HP9000 mini computer, which has two central processing units, 450 MB disk storage, 7 MB RAM memory and about 50 terminals. The computing tools of the forecasting group have been created with the aid of many different programs. For example, the model is solved with ETLA's Mod-program, and some model data

manipulation routines are done with Mat matrix interpreter. Paper printouts are generated with a Rep-reporting program. There are many technical reasons why many different subprograms have been chosen instead of one integrated forecasting program. For example it is more efficient for the whole system to divide the processing into several independent units. Another reason is that program development has been much more flexible since the different blocks have been made independently. Naturally, very much attention has been paid to the communication between different programs, and it is easy to construct, if wanted, integrated systems with a menu-program. The user doesn't have to know the details of the various programs, but every stable routine can be collected into one menu-driven program, which can easily be developed with the tools already existing.

The Mat and Mod programs, the most important tools in the forecasting software toolbox, are very much alike, but Mat is larger than Mod, because it has a set of matrix manipulation commands. Mod is a little bit faster than Mat, because Mod's data processing is concentrated in uniform memory areas. With Mod it is also possible to estimate and solve linear rational expectation models, where forward-looking expectation variables are solved so that they are consistent with the forecasts produced by the model.

The input-output model and the model for the private consumption have been built with the Mat matrix interpreter, because several independent matrices are needed in the model solutions. When the processing of many independent matrices is concerned, it is more sensible to use Mat, because in Mod the set of basic commands is more restricted.

At the Institute the most important economic time series have been collected for a large Mimer data base, which includes about 10000 time series at the moment. The next aim in ETLA's technical forecasting system is to build communication links between the data base and the forecasting and reporting tools. Plans have also been made concerning a data bank for behavioural equations, which could be used to study, for example forecasting, the ability of different equations.



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## APPENDIX 1

## BALANCE OF RESOURCES AND EXPENDITURE, VOLUME

Volume, annual changes, % Preliminary figures since Forecasts since	1986 1987 1988 1989 1990 1991 1992 1993 89-93									
	%	%	%	%	%	%	%	%	%	av.%
GROSS DOMESTIC PRODUCT (mp)	2.3	3.8	4.6	3.2	2.4	0.9	1.2	2.3	2.0	
IMPORTS	3.1	9.0	10.1	6.1	3.9	0.8	1.1	2.3	2.8	
-goods	5.3	7.9	9.8	5.5	3.7	0.0	0.6	2.2	2.4	
-services	-9.7	16.2	12.4	10.0	5.0	5.0	4.0	3.0	5.4	
TOTAL SUPPLY	2.4	4.9	5.9	3.9	2.8	0.9	1.2	2.3	2.2	
EXPORTS	1.3	1.7	4.2	2.3	2.5	1.3	3.7	3.9	2.7	
-goods	3.2	1.3	3.9	2.5	2.5	1.2	3.9	3.9	2.8	
-to Western countries	5.7	6.7	6.7	5.1	3.0	2.3	4.5	4.5	3.9	
-to Eastern countries	-4.6	-17.4	-8.4	-11.2	-0.4	-6.3	-0.9	-0.9	-4.0	
-services	-8.4	3.8	6.0	1.0	2.5	2.0	3.0	4.0	2.5	
INVESTMENT	0.0	4.5	8.9	5.2	0.2	-3.0	-3.1	-0.8	-0.3	
-private	-0.4	4.0	9.9	5.6	-0.3	-3.8	-3.9	-1.2	-0.8	
-investment excl. res.b.	2.9	5.3	6.8	3.8	3.8	-1.5	-3.5	-0.9	0.3	
-residential buildings	-8.3	0.6	18.5	10.0	-10.0	-10.0	-5.0	-2.0	-3.7	
-government	2.7	7.4	2.9	2.4	3.6	2.0	2.0	1.5	2.3	
CONSUMPTION	3.8	4.9	4.5	3.2	2.8	1.7	1.4	2.4	2.3	
-private	4.1	5.1	5.0	3.3	2.8	1.2	0.8	2.2	2.0	
-government	3.1	4.4	3.3	3.0	2.7	3.0	3.0	3.0	2.9	
CHANGE IN STOCKS (1)	-0.1	0.9	0.7	0.6	0.6	0.2	0.1	0.2	0.3	
TOTAL DEMAND	2.4	4.9	5.9	3.9	2.8	0.9	1.2	2.3	2.2	
TOTAL DEMAND (excl. change in stocks and stat.discr.)	2.5	4.1	5.3	3.4	2.2	0.7	1.1	2.2	1.9	
DOMESTIC DEMAND (incl. stat. discrepancy)	2.8	5.9	6.3	4.3	2.8	0.8	0.5	1.9	2.0	
GOVERNMENT DEMAND	3.0	4.8	3.3	2.9	2.8	2.9	2.9	2.8	2.9	

(1) Contribution of changes in stocks and the statistical discrepancy to the growth of total demand, percentage points.

BALANCE OF RESOURCES AND EXPENDITURE, PRICES

Prices, annual changes, % Preliminary figures since Forecasts since	Price indices (1985=100)												
	1987 1988	1989	1990	1991	1992	1993	89-93 av. %	1988 ind.	1989 ind.	1990 ind.	1991 ind.	1992 ind.	1993 ind.
GROSS DOMESTIC PRODUCT (mp)	4.6	5.2	6.3	5.5	3.8	4.4	4.5	4.3	4.2	4.3	4.3	4.5	4.5
IMPORTS	-8.1	-0.3	1.8	3.4	3.1	3.7	3.6	3.6	3.6	3.6	3.5	3.5	3.5
-goods	-9.8	-1.0	1.4	3.5	3.0	3.5	3.5	3.5	3.5	3.5	3.4	3.4	3.4
-services	3.2	2.9	3.7	2.3	3.5	3.7	3.7	3.7	3.7	3.7	3.4	3.4	3.4
TOTAL SUPPLY	1.8	4.0	5.2	4.9	3.6	4.3	4.3	4.2	4.2	4.3	4.3	4.3	4.3
EXPORTS	-3.8	2.0	4.9	4.6	2.8	3.9	3.6	3.9	3.6	3.9	3.8	3.8	3.8
-goods	-4.7	1.7	5.2	4.6	2.6	3.9	3.6	4.0	3.6	4.0	3.7	3.7	3.7
-to Western countries	-5.1	2.7	4.0	4.7	2.7	3.9	3.7	4.0	3.7	4.0	3.8	3.8	3.8
-to Eastern countries	-3.5	-2.1	11.1	4.7	2.4	3.5	3.0	4.0	3.0	4.0	3.5	3.5	3.5
-services	1.3	3.1	3.1	4.5	3.9	3.9	3.9	3.8	3.9	3.8	4.0	4.0	4.0
INVESTMENT	4.3	5.9	7.1	5.2	4.1	4.6	4.8	5.0	4.8	5.0	4.7	4.7	4.7
-private	4.3	5.8	7.1	5.2	4.0	4.7	4.7	5.1	4.7	5.1	4.7	4.7	4.7
-investment excl. res. b.	-##.#	-##.#	-##.#	-##.#	-##.#	-##.#	-##.#	-##.#	-##.#	-##.#	-##.#	-##.#	-##.#
-residential buildings	-##.#	-##.#	-##.#	-##.#	-##.#	-##.#	-##.#	-##.#	-##.#	-##.#	-##.#	-##.#	-##.#
-government	4.1	6.3	6.9	5.3	4.4	4.4	4.8	4.9	4.8	4.9	4.7	4.7	4.7
CONSUMPTION	3.8	4.4	5.0	5.3	4.2	4.5	4.5	4.4	4.5	4.4	4.6	4.6	4.6
-private	3.2	4.1	4.4	5.0	4.2	4.0	4.0	4.0	4.0	4.0	4.2	4.2	4.2
-government	5.2	5.4	6.4	6.1	4.1	5.5	5.5	5.2	5.5	5.2	5.3	5.3	5.3
CHANGE IN STOCKS	...	...	...	...	...	...	...	...	...	...	...	...	...
TOTAL DEMAND	1.8	4.0	5.2	4.9	3.6	4.3	4.2	4.3	4.2	4.3	4.3	4.3	4.3
TOTAL DEMAND (excl. change in stocks and stat. discr.)	2.1	4.2	5.4	5.2	3.9	4.3	4.3	4.3	4.3	4.3	4.4	4.4	4.4
DOMESTIC DEMAND	3.4	4.4	5.2	5.0	3.8	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4
(incl. stat. discrepancy)	5.1	5.5	6.5	6.0	4.1	5.4	5.4	5.2	5.4	5.2	5.2	5.2	5.2
GOVERNMENT DEMAND	...	...	...	...	...	...	...	...	...	...	...	...	...
TOTAL SUPPLY	111.3	116.8	121.0	126.2	131.5	137.1	...	...	...	...	...	...	...
EXPORTS	102.8	107.5	110.6	114.9	119.0	123.7	...	...	...	...	...	...	...
-goods	102.0	106.7	109.5	113.7	117.8	122.5	...	...	...	...	...	...	...
-to Western countries	101.4	106.2	109.0	113.3	117.5	122.2	...	...	...	...	...	...	...
-to Eastern countries	105.0	109.9	112.5	116.5	119.9	124.7	...	...	...	...	...	...	...
-services	107.7	112.5	116.8	121.4	126.1	131.0	...	...	...	...	...	...	...
INVESTMENT	118.3	124.5	129.5	135.5	142.0	149.1	...	...	...	...	...	...	...
-private	118.3	124.5	129.4	135.5	141.9	149.1	...	...	...	...	...	...	...
-investment excl. res. b.	-##.#	-##.#	-##.#	-##.#	-##.#	-##.#	...	...	...	...	...	...	...
-residential buildings	-##.#	-##.#	-##.#	-##.#	-##.#	-##.#	...	...	...	...	...	...	...
-government	118.3	124.6	130.1	135.8	142.2	149.2	...	...	...	...	...	...	...
CONSUMPTION	113.7	119.7	124.7	130.3	136.1	142.1	...	...	...	...	...	...	...
-private	112.2	117.8	122.7	127.6	132.7	138.0	...	...	...	...	...	...	...
-government	118.0	125.2	130.3	137.5	145.2	152.7	...	...	...	...	...	...	...
CHANGE IN STOCKS	...	...	...	...	...	...	...	...	...	...	...	...	...
TOTAL DEMAND	111.3	116.8	121.0	126.2	131.5	137.1	...	...	...	...	...	...	...
TOTAL DEMAND (excl. change in stocks and stat. discr.)	112.2	118.0	122.6	127.9	133.3	139.1	...	...	...	...	...	...	...
DOMESTIC DEMAND	113.7	119.3	123.8	129.2	134.9	140.9	...	...	...	...	...	...	...
(incl. stat. discrepancy)	118.0	125.1	130.3	137.3	144.8	152.3	...	...	...	...	...	...	...
GOVERNMENT DEMAND	...	...	...	...	...	...	...	...	...	...	...	...	...

BALANCE OF RESOURCES AND EXPENDITURE, VALUE

Value, annual changes, % Preliminary figures since Forecasts since	Levels, current prices, bill.mk									
	1987 1989	1986	1987	1988	1989	1990	1991	1992	1993	89-93 av. %
GROSS DOMESTIC PRODUCT (mp)	7.0	9.2	11.2	8.8	6.3	5.3	5.5	6.9	6.6	6.6
IMPORTS	-5.3	8.7	12.1	9.8	7.1	4.5	4.8	5.9	6.4	6.4
-goods	-5.0	6.8	11.3	9.2	6.8	3.6	4.1	5.7	5.9	5.9
-services	-6.9	19.6	16.6	12.5	8.7	8.9	7.8	6.8	8.9	8.9
TOTAL SUPPLY	4.3	9.1	11.4	9.0	6.5	5.2	5.4	6.7	6.5	6.5
EXPORTS	-2.5	3.7	9.3	7.0	5.4	5.2	7.5	8.0	6.6	6.6
-goods	-1.7	3.1	9.3	7.2	5.2	5.1	7.6	8.0	6.6	6.6
-to Western countries	0.3	9.6	10.9	10.0	5.8	6.4	8.4	8.7	7.8	7.8
-to Eastern countries	-7.9	-19.1	1.8	-7.0	2.0	-3.0	2.0	3.0	-0.7	-0.7
-services	-7.2	7.1	9.3	5.5	6.5	6.0	7.0	8.0	6.6	6.6
INVESTMENT	4.3	10.6	16.7	10.6	4.3	1.5	1.5	4.2	4.4	4.4
-private	3.9	10.1	17.8	11.1	3.7	0.7	0.7	3.8	3.9	3.9
-investment excl. res.b.	-##.#	-##.#	-##.#	-##.#	-##.#	-##.#	-##.#	-##.#	-##.#	-##.#
-residential buildings	-##.#	-##.#	-##.#	-##.#	-##.#	-##.#	-##.#	-##.#	-##.#	-##.#
-government	6.9	14.2	10.0	7.8	8.2	6.5	6.8	6.5	7.1	7.1
CONSUMPTION	7.7	9.6	9.7	8.7	7.1	6.2	5.9	6.9	6.9	6.9
-private	7.4	9.4	9.7	8.5	7.1	5.2	4.8	6.3	6.4	6.4
-government	8.5	10.0	10.0	9.3	6.9	8.7	8.7	8.4	8.4	8.4
CHANGE IN STOCKS (1)	-0.4	0.6	0.5	0.4	0.4	0.2	0.1	0.2	0.3	0.3
TOTAL DEMAND	4.3	9.1	11.4	9.0	6.5	5.2	5.4	6.7	6.5	6.5
TOTAL DEMAND (excl. change in stocks and stat.discr.)	4.7	8.5	11.0	8.7	6.2	5.1	5.4	6.6	6.4	6.4
DOMESTIC DEMAND (incl. stat. discrepancy)	6.3	10.5	11.9	9.5	6.7	5.2	4.9	6.4	6.5	6.5
GOVERNMENT DEMAND	8.3	10.6	10.0	9.1	7.1	8.4	8.5	8.1	8.2	8.2

(1) Contribution of changes in stocks and the statistical discrepancy to the growth of total demand, percentage points.

N A T I O N A L I N C O M E

Current prices, mill.mk and annual changes, %

Preliminary figures since 1987

Forecasts since 1989

	1988	1989	1990	1991	1992	1993	89-93					
	mill.mk	% mill.mk	% mill.mk	% mill.mk	% mill.mk	mill.mk	av.%					
COMPENSATION OF EMPLOYEES	236259	8.3	255910	6.8	273438	5.9	289565	5.3	304955	5.9	322911	6.4
WAGES AND SALARIES	193240	7.7	208064	6.6	221872	5.8	234723	5.2	246951	5.8	261230	6.2
EMPLOYERS' SOCIAL SECURITY CONTRIBUTIONS	43019	11.2	47846	7.8	51566	6.4	54842	5.8	58004	6.3	61681	7.5
NET PROPERTY INCOME AND ENTREPRENEURIAL INCOME	72177	10.5	79723	1.6	81019	-1.6	79695	2.7	81870	9.6	89763	4.5
CORPORATE ENTERPRISES	27242	12.2	30554	-9.0	27812	-15.6	23469	-5.8	22105	19.2	26339	-0.7
GENERAL GOVERNMENT	-1016	...	-681	...	-560	...	-699	...	-743	...	-757	...
HOUSEHOLDS	45951	8.5	49849	7.9	53767	5.9	56925	6.3	60508	6.1	64180	6.9
ENTREPRENEURIAL INCOME	41807	7.6	44985	7.8	48501	4.7	50777	5.4	53507	6.0	56692	6.3
-from agriculture	4751	7.5	5107	6.0	5414	5.5	5712	5.0	5997	5.5	6327	5.9
-from forestry	6313	11.0	7007	5.0	7357	6.0	7799	6.5	8305	7.0	8887	7.1
-from others	30743	6.9	32870	8.7	35730	4.3	37267	5.2	39204	5.8	41478	6.2
PROPERTY INCOME	4144	17.4	4865	8.2	5266	16.8	6148	13.9	7001	7.0	7488	12.6
INDIRECT TAXES LESS SUBSIDIES	56390	7.7	60721	7.6	65357	6.3	69496	5.7	73460	7.6	79055	7.0
INDIRECT TAXES	67522	6.5	71919	6.6	76668	5.9	81203	5.4	85577	7.0	91595	6.3
SUBSIDIES	11132	0.6	11199	1.0	11311	3.5	11707	3.5	12116	3.5	12540	2.4
NATIONAL INCOME	364826	8.6	393353	5.9	419814	4.5	438757	4.9	460285	6.8	491728	6.2
NET DOMESTIC PRODUCT (mp)	373776	8.8	406653	6.2	431784	4.9	452857	5.3	476685	7.1	510528	6.4
NET FACTOR INCOME FROM THE REST OF THE WORLD	-8950	...	-10300	...	-11970	...	-14100	...	-16400	...	-18800	...
NATIONAL INCOME	364826	8.6	393353	5.9	419814	4.5	438757	4.9	460285	6.8	491728	6.2

TAXES AND INCOME TRANSFERS

	1988		1989		1990		1991		1992		1993		89-93
	mill.mk	%	mill.mk	%	mill.mk	%	mill.mk	%	mill.mk	%	mill.mk	%	av.%
Current prices, mill. mk and annual changes, %													
Preliminary figures since 1987													
Forecasts since 1989													
DIRECT TAXES ON HOUSEHOLDS	69264	7.1	74200	6.6	79114	7.1	84730	6.9	90537	6.6	96498	6.9	6.9
SOCIAL SECURITY CONTRIBUTIONS PAID BY HOUSEHOLDS	23660	4.2	24660	5.8	26086	6.4	27762	5.7	29355	6.3	31207	5.7	5.7
OTHER TRANSFERS TO GENERAL GOVERNMENT FROM HOUSEHOLDS	2790	14.9	3205	12.5	3605	6.0	3820	6.0	4050	6.2	4300	9.0	9.0
DIRECT TAXES ON ENTERPRISES	5254	2.8	5400	11.1	6000	8.3	6500	5.4	6850	6.6	7300	6.8	6.8
INDIRECT TAXES	67522	6.5	71919	6.6	76668	5.9	81203	5.4	85577	7.0	91595	6.3	6.3
OTHER TRANSFERS TO GENERAL GOVERNMENT FROM ENTERPRISES	1686	10.0	1855	10.0	2040	5.9	2160	6.5	2300	5.7	2430	7.6	7.6
GENERAL GOVERNMENT'S CASUALTY INSURANCE PREMIUMS AND CLAIMS, net	-9	...	-10	...	-10	...	-10	...	-10	...	-10	...	...
TRANSFERS FROM PRIVATE SECTOR	170167	6.5	181230	6.8	193503	6.5	206165	6.1	218659	6.7	233321	6.5	6.5
TRANSFERS TO HOUSEHOLDS FROM GENERAL GOVERNMENT	46847	8.0	50610	7.7	54500	5.0	57200	5.1	60100	5.0	63100	6.1	6.1
TRANSFERS TO ENTERPRISES FROM GENERAL GOVERNMENT	3044	6.8	3250	6.5	3460	6.1	3670	6.0	3890	5.9	4120	6.2	6.2
SUBSIDIES	11132	0.6	11199	1.0	11311	3.5	11707	3.5	12116	3.5	12540	2.4	2.4
TRANSFERS TO PRIVATE SECTOR	61023	6.6	65059	6.5	69271	4.8	72577	4.9	76106	4.8	79760	5.5	5.5
NET TRANSFERS TO GENERAL GOVERNMENT	109144	6.4	116171	6.9	124232	7.5	133589	6.7	142552	7.7	153561	7.1	7.1
GROSS DOMESTIC PRODUCT (mp)	437514	8.8	476128	6.3	506122	5.3	533141	5.5	562590	6.9	601158	6.6	6.6
TRANSFERS GROSS FROM PRIVATE SECTOR/GDP, %	38.9	...	38.1	...	38.2	...	38.7	...	38.9	...	38.8	38.5	38.5
TRANSFERS NET/GDP, %	24.9	...	24.4	...	24.5	...	25.1	...	25.3	...	25.5	25.0	25.0

FINANCING OF INVESTMENT

Current prices, mill. mk. and annual changes, %  
 Preliminary figures since 1987  
 Forecasts since 1989

	1988	1989	1990	1991	1992	1993	89-93					
	mill.mk	% mill.mk	mill.mk	% mill.mk	mill.mk	% mill.mk	av.%					
GROSS FIXED CAPITAL FORMATION	107827	10.6	119295	4.3	124375	1.5	126224	1.5	128176	4.2	133572	4.4
-private	93788	11.1	104157	3.7	108002	0.7	108793	0.7	109552	3.8	113743	3.9
-government	14039	7.8	15138	8.2	16373	6.5	17431	6.8	18624	6.5	19829	7.1
CHANGE IN STOCKS	7117	...	9277	...	11625	...	12872	...	13527	...	14907	...
GROSS CAPITAL FORMATION	114944	11.9	128572	5.8	136000	2.3	139096	1.9	141702	4.8	148479	5.3
SAVING	38605	8.3	41806	-3.8	40231	-11.6	35579	-6.7	33209	6.2	35253	-1.8
-households	-3170	13.5	-3599	-11.7	-3179	5.5	-3352	-9.0	-3052	90.6	-5818	*****
-enterprises	24764	19.0	29463	-11.3	26147	-17.0	21715	-7.3	20131	21.5	24452	-0.3
-government	17011	-6.3	15942	8.3	17262	-0.3	17216	-6.3	16130	3.0	16619	-0.5
DEPRECIATION	63738	9.0	69474	7.0	74338	8.0	80285	7.0	85905	5.5	90629	7.3
SURPLUS OF THE CURRENT ACCOUNT	-12600	...	-17290	...	-21430	...	-23231	...	-22588	...	-22596	...
FINANCING OF GROSS CAPITAL FORMATION	114943	11.9	128571	5.8	135999	2.3	139095	1.9	141701	4.8	148478	5.3

CHANGES IN MACRO-ECONOMIC DETERMINANTS OF PRICE AND COST LEVELS

Annual changes, % Preliminary figures since 1987 Forecasts since 1989	1986	1987	1988	1989	1990	1991	1992	1993	89-93 av. %
1. LEVEL OF EARNINGS	7.0	7.1	8.8	6.5	6.0	6.0	6.0	6.0	6.1
2. LABOUR INPUT	-1.5	0.1	3.0	0.7	0.0	-1.5	-1.5	-1.0	-0.7
-PAID LABOUR INPUT	-1.1	0.7	2.0	1.0	0.0	-1.5	-1.5	-1.0	
-SELF-EMPLOYED PERSONS	-0.8	-0.7	-1.1	-1.2	-0.9	-0.9	0.0	0.0	
3. LABOUR COSTS	7.3	8.7	9.9	8.3	6.8	5.9	5.3	5.9	6.4
-NATIONAL WAGE AND SALARY BILL	7.1	8.8	10.3	7.7	6.6	5.8	5.2	5.8	6.2
-OTHER LABOUR INCOME	8.1	8.5	8.0	11.2	7.8	6.4	5.8	6.3	7.5
4. PRODUCTION, VOLUME	2.3	3.8	4.6	3.2	2.4	0.9	1.2	2.3	2.0
5. UNIT LABOUR COST	4.9	4.7	5.1	5.0	4.4	5.0	4.1	3.5	4.4
6. IMPORT PRICES	-8.1	-0.3	1.8	3.4	3.1	3.7	3.6	3.6	3.5
7. INDIRECT TAXES LESS SUBSIDIES, SHARE IN TOTAL RESOURCES	5.5	2.2	10.3	-1.2	1.1	1.1	0.3	0.9	0.4
8. COST PRESSURE	1.7	3.2	4.8	4.0	3.7	4.2	3.6	3.3	3.8
9. DEMAND PRESSURE, EFFECT OF PRICE CONTROLS AND LAGGED COST EFFECTS	2.9	2.0	1.5	1.5	0.1	0.2	0.7	1.2	0.7
10. IMPLICIT PRICE INDEX OF PRODUCTION	4.6	5.2	6.3	5.5	3.8	4.4	4.3	4.5	4.5
11. CONSUMER PRICE INDEX	3.2	4.1	4.4	5.0	4.2	4.0	4.0	4.0	4.2
12. REAL EARNINGS	3.7	2.9	4.2	1.4	1.7	1.9	1.9	1.9	1.8
13. PRODUCTION PER LABOUR INPUT UNIT	3.8	3.7	1.6	2.5	2.4	2.4	2.7	3.3	2.7



## CURRENT ACCOUNT BALANCE

Current prices, mill. mk and annual changes, % Preliminary figures since 1987 Forecasts since 1989	1988		1989		1990		1991		1992		1993		89-93 av. %
	mill.mk	%	mill.mk	%	mill.mk	%	mill.mk	%	mill.mk	%	mill.mk	%	
EXPORTS OF GOODS	91400	7.2	98000	5.2	103133	5.1	108357	7.6	116557	8.0	125842	6.6	
IMPORTS OF GOODS	91200	9.2	99584	6.8	106366	3.6	110142	4.1	114703	5.7	121291	5.9	
BALANCE OF TRADE	200	...	-1584	...	-3233	...	-1785	...	1854	...	4551	...	
EXPORTS OF SERVICES	17050	5.5	17988	6.5	19157	6.0	20306	7.0	21728	8.0	23466	6.6	
IMPORTS OF SERVICES	18350	12.5	20649	8.7	22441	8.9	24434	7.8	26352	6.8	28147	8.9	
BALANCE OF SERVICES	-1300	...	-2662	...	-3284	...	-4128	...	-4624	...	-4681	...	
EXPORTS OF GOODS AND SERVICES	108450	7.0	115987	5.4	122290	5.2	128663	7.5	138284	8.0	149308	6.6	
IMPORTS OF GOODS AND SERVICES	109550	9.8	120233	7.1	128807	4.5	134577	4.8	141055	5.9	149438	6.4	
BALANCE OF TRADE AND SERVICES	-1100	...	-4245	...	-6516	...	-5913	...	-2771	...	-130	...	
BALANCE OF FACTOR INCOME AND TRANSFERS	-11500	...	-13045	...	-14914	...	-17318	...	-19817	...	-22466	...	
BALANCE OF CURRENT ACCOUNT	-12600	...	-17290	...	-21430	...	-23231	...	-22588	...	-22596	...	
GROSS DOMESTIC PRODUCT (mp)	437514	8.8	476128	6.3	506122	5.3	533141	5.5	562590	6.9	601158	6.6	
SURPLUS OF THE CURRENT ACCOUNT/GDP, %	-2.9	...	-3.6	...	-4.2	...	-4.4	...	-4.0	...	-3.8	-4.0	
SURPLUS OF THE CURRENT ACCOUNT/EXPORTS OF GOODS AND SERVICES, %	-11.6	...	-14.9	...	-17.5	...	-18.1	...	-16.3	...	-15.1	-16.4	

BALANCE OF MANPOWER RESOURCES

1000 persons	1986	1987	1988	1989	1990	1991	1992	1993	89-93 av.
Preliminary figures since 1987									
Forecasts since 1989									
1. POPULATION	4919	4939	4955	4968	4979	4989	4997	5004	0
2. WORKING AGE POPULATION (15-74)	3716	3720	3720	3726	3737	3751	3763	3773	0
3. WORKING AGE POPULATION NOT BELONGING TO LABOUR FORCE	1147	1164	1179	1181	1185	1193	1197	1204	0
4. LABOUR FORCE	2569	2556	2541	2545	2552	2558	2566	2569	0
5. UNEMPLOYED	138	130	117	109	107	122	142	163	7
6. EMPLOYED	2431	2425	2424	2435	2445	2436	2424	2406	-0
7. UNEMPLOYMENT RATE, %	5.4	5.1	4.6	4.3	4.2	4.8	5.5	6.3	5.0
8. LABOUR FORCE PARTICIPATION RATE, %	69.1	68.7	68.3	68.3	68.3	68.2	68.2	68.1	68.2

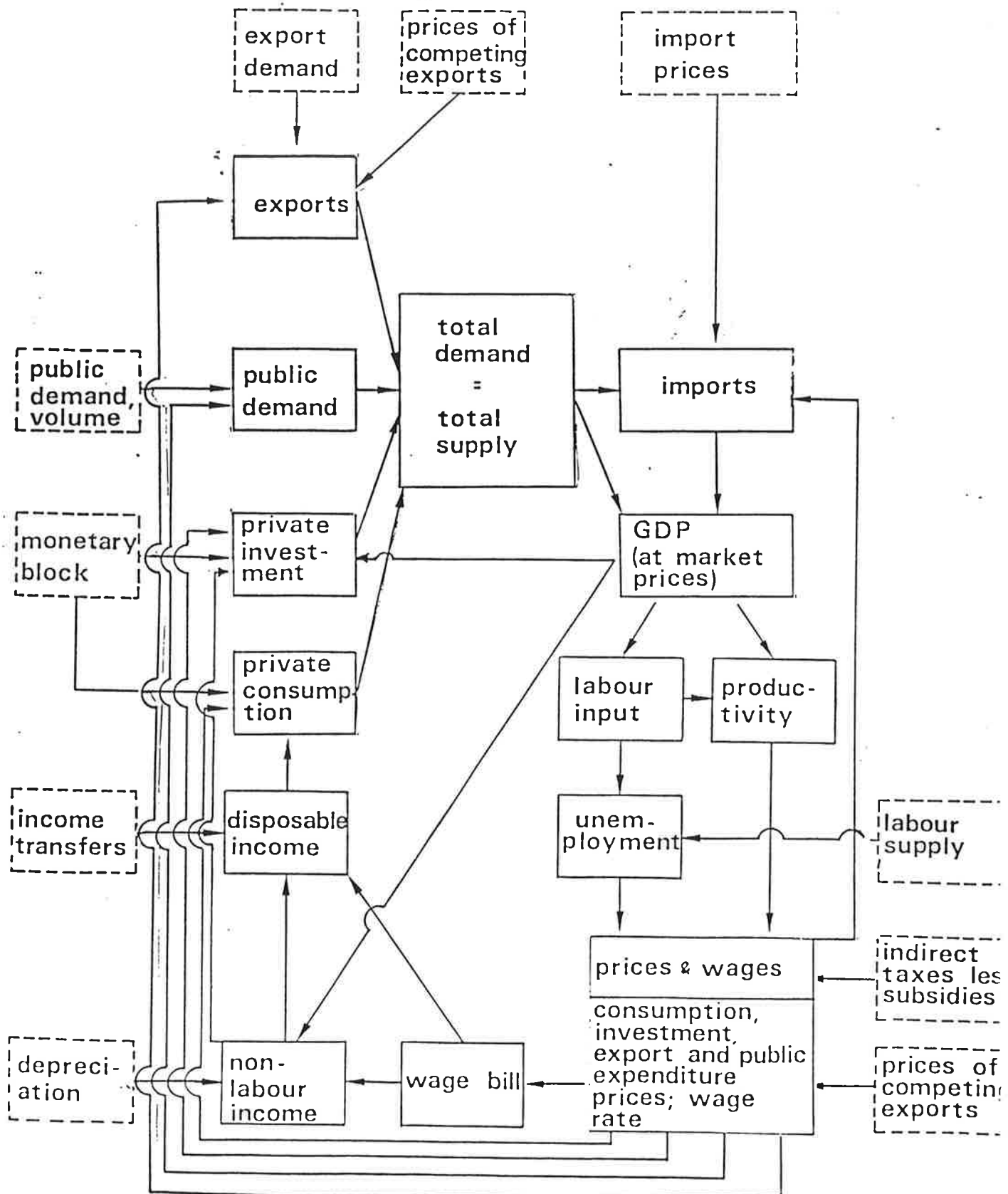
SAVINGS AND INVESTMENTS RATIOS, %

Shares in percentage Preliminary figures since 1987 Forecasts since 1989	1988	1989	1990	1991	1992	1993	89-93 av. %
<b>SAVINGS RATIOS</b>							
-whole economy	10.7	10.6	9.7	8.2	7.3	7.2	8.6
-households	-1.4	-1.4	-1.2	-1.2	-1.0	-1.9	-1.3
-government	16.0	14.0	14.2	13.1	11.5	11.0	12.8
<b>INVESTMENTS RATIOS</b>							
-gross capital formation/GDP	26.3	27.0	26.9	26.1	25.2	24.7	26.0
-gross fixed capital formation/GDP	24.6	25.1	24.6	23.7	22.8	22.2	23.7
Terms of trade (1985 = 100)	110.2	111.4	111.1	111.3	111.3	111.7	0.3

HOUSEHOLDS' DISPOSABLE INCOME  
(incl. non-profit institutions)

	1988	1989	1990	1991	1992	1993	89-93					
	mill.mk	% mill.mk	% mill.mk	% mill.mk	% mill.mk	mill.mk	av.%					
Current prices, mill. mk and annual changes,%												
Preliminary figures since 1987												
Forecasts since 1989												
1. WAGES AND SALARIES	193240	7.7	208064	6.6	221872	5.8	234723	5.2	246951	5.8	261230	6.2
2. EMPLOYERS' SOCIAL SECURITY CONTRIBUTIONS	43019	11.2	47846	7.8	51566	6.4	54842	5.8	58004	6.3	61681	7.5
3. ENTREPRENEURIAL INCOME AND PROPERTY INCOME, net	45951	8.5	49849	7.9	53767	5.9	56925	6.3	60508	6.1	64180	6.9
4. INCOME TRANSFERS	46037	5.1	48385	8.2	52350	4.7	54805	5.4	57756	4.6	60420	5.6
-from general government	46847	8.0	50610	7.7	54500	5.0	57200	5.1	60100	5.0	63100	6.1
-from others	-810	*****	-2225	-3.4	-2150	11.4	-2395	-2.1	-2344	14.3	-2680	*****
5. TOTAL INCOME (1+2+3+4)	328247	7.9	354144	7.2	379555	5.7	401295	5.5	423219	5.7	447511	6.4
6. INCOME TRANSFERS	97283	6.7	103790	6.7	110705	7.0	118413	6.6	126242	6.5	134506	6.7
-to general government	95714	6.6	102065	6.6	108805	6.9	116313	6.6	123942	6.5	132006	6.6
-to others	1569	9.9	1725	10.1	1900	10.5	2100	9.5	2300	8.7	2500	9.8
7. DISPOSABLE INCOME (5-6)	230964	8.4	250354	7.4	268850	5.2	282883	5.0	296977	5.4	313005	6.3
8. PRIVATE CONSUMPTION	234134	8.5	253953	7.1	272029	5.2	286235	4.8	300029	6.3	318823	6.4
9. SAVING (7-8)	-3170	13.5	-3599	-11.7	-3179	5.5	-3352	-9.0	-3052	90.6	-5818	*****
10. SAVINGS RATE, % (9/7)	-1.4	...	-1.4	...	-1.2	...	-1.2	...	-1.0	...	-1.9	...

BLOCK DIAGRAM OF THE MAIN INTERDEPENDENCIES OF THE MODEL



## Appendix 3: The behavioural equations of the annual macro model

$$\begin{aligned}
\text{pxgD} &= 0.761*\text{px}'\text{D} + 0.239*\text{px}'\text{D}(-1) + 0.428*\text{ULCer} - 0.372 \\
\text{xgw} &= -0.325*\text{pxgD} - 0.847 + 1.817*\text{mw} + 0.325*\text{px}'\text{D} \\
&\quad - 0.568*(\text{pxgD}(-1) - \text{px}'\text{D}(-1)) \\
&\quad - 0.382*(\text{pxgD}(-2) - \text{px}'\text{D}(-2)) \\
\text{N} &= \text{tN}/\text{tDN}*\text{DN} + 0.083*(\text{y}-\text{yn}(-2)) \\
&\quad + 0.056*(\text{pmg}-\text{pmg}(-1)) - 20.8*(\text{tN}(-1)/\text{tDN}(-1)) + 0.237 \\
\text{mg} &= 1.863*\text{dn} + 2.586*\text{N} + 0.247*(\text{py}-\text{pmg}) \\
&\quad - 0.245*(\text{dn}-\text{dn}(-1)) - 2.875 \\
\text{a} &= 0.367*\text{y} + 0.256*\text{K} - 1.898 + 0.435*\text{y}(-1) \\
\text{DU} &= -0.379*\text{a} + 0.686*\text{DTIK} + 0.289*\text{DFT2} + 0.539 \\
\text{w} &= 0.790*\text{pcpr} - 1.188*\text{DU} - 0.642*\text{tU}(-1) + 6.737 \\
\text{pcpr} &= 0.692*\text{H} + 0.159 + 0.195*\text{pmg} + 0.154*\text{Ti}'\text{DN} \\
\text{pipr} &= 0.291*\text{H} + 2.078 + 0.371*\text{pmg} + 0.120*\text{pipr}(-1) \\
\text{pcg} &= 0.742*\text{H} + 1.830 + 0.119*\text{pmg} + 0.028*\text{pcg}(-1) \\
\text{pig} &= 0.309*\text{H} + 1.687 + 0.365*\text{pmg} + 0.159*\text{pig}(-1) \\
\text{cpr} &= 0.690*(\text{WZD}-\text{pcpr}) + 0.967*(100*(1-(\text{tCpr}(-1)/\text{tWZD}(-1)))) \\
&\quad - 0.631*(\text{DU}-\text{DU}(\text{t}-1)) - 2.322*\text{DC1974} - 1.783 \\
\text{iasc} &= 0.256 * \text{iasc}(-1) + 1.728*\text{y} + 0.292*(\text{Z}(-1)-\text{pipr}(-1)) - 5.382
\end{aligned}$$

Variable symbols (mainly as differences)

pxgD	Export to Western countries in foreign currency, price
px'D	Price of competin export
ULCer	Unit labour costs in foreign currency
xgw	Export of goods to Western countries, volyme
mw	Export demand
N	Change in stocks
tN	- ' - , level
DN	Value of total demand minus value of stocks
tDN	- ' - , taso
dn	Volyme of total demand minus value of stocks
y	Total production, volyme
yn	Total production minu change in stocks, value
pmg	Import of goods, price
mg	Import of goods, volyme
py	Total production, price
a	Labour input
K	Enterprise earnings
DTIK	Working age population
DFT2	työhönosallistumisasteen trendipoikkeama
w	Level of earnings
pcpr	Private consumption, price
pipr	Private investment, price
Ti'DN	Indirect taxes minus subsidies
H	Level of earnings exceeding productivity
pig	Government investment, price
WZD	Household's disposable income
DU	Unemployment rate
iasc	Private other than building construction investment, volyme
Z	Other than labour income

Appendix 4  
09:58:27 19.8.1988

	1986	1987	1988	1989
%=vuosuutos	%	%	%	%
*****				
YKSITYISET KULUTUSMENOT				
Elintarvikkeet, juomat ja tupakka	4.9	1.6	2.4	1.6
Vaatetus ja jalkineet	-0.7	4.2	4.2	2.8
Asuminen	2.9	4.1	3.2	3.2
Kotitalouskalusto	4.0	9.8	8.2	4.3
Terveystenhoito	4.1	6.9	4.7	3.1
Liikenne	3.9	6.6	5.7	3.0
Virkistys, kulttuuri ja koulutus	5.7	5.3	5.2	4.0
Muut tavarat ja palvelukset	3.5	7.6	4.8	3.5
Kotitalouksien kulutusmenot Suomessa	3.9	4.9	4.3	2.9
Kotitalouksien kulutusmenot ulkomailta	8.1	19.8	9.2	7.2
Ulkom. kulutusmenot Suomessa	-6.2	11.6	5.2	5.2
Kotitalouksien kulutusmenot	4.2	5.3	4.5	3.0
Yksityisen voittatavoittelemattoman toiminnan kulutusmenot	2.4	1.8	2.5	2.5
Yksityiset kulutusmenot Suomessa	3.8	4.8	4.3	2.9
Yksityiset kulutusmenot	4.1	5.1	4.4	3.0
Voittoavoittelemattoman tuotannon arvonlisä	1.8	0.9	1.8	1.4
Kotiaputoiminnan arvonlisä	3.0	-0.3	1.2	0.8
Arvonlisä yhteensä	2.0	0.8	1.7	1.3
Väli tuotekäyttö	5.3	6.3	5.9	7.4
*****				
JULKISET KULUTUSMENOT				
Valtion kulutusmenot	1.1	4.5	2.7	2.5
Kuntien ja kuntainliitojen kulutusmenot	4.3	3.8	3.2	3.5
Sosiaaliturvarahastojen kulutusmenot	-1.7	1.8	2.7	2.5
Valtion ja sost.rahst. kulutusmenot	0.8	4.2	2.7	2.5
Julkisen toiminnan kulutusmenot	3.1	3.9	3.0	3.2
Valtion toiminnan arvonlisäys	-0.6	4.0	2.7	2.5
Kuntien toiminnan arvonlisäys	2.5	3.1	3.2	3.5
Julkisen toiminnan arvonlisäys	1.6	3.4	3.0	3.2
*****				
INVESTOINNIT				
Asuinrakennusinvestoinnit	-8.3	0.4	3.0	-1.0
Muut talonrakennusinvestoinnit	0.5	4.2	5.6	1.2
Maa- ja vesirakennusinvestoinnit	6.2	-3.1	1.6	0.2
Kone-, laite- ja kuljetusvälineinvest.	3.3	9.6	4.6	2.2
Investoinnit yhteensä	0.0	4.6	4.1	1.0
*****				

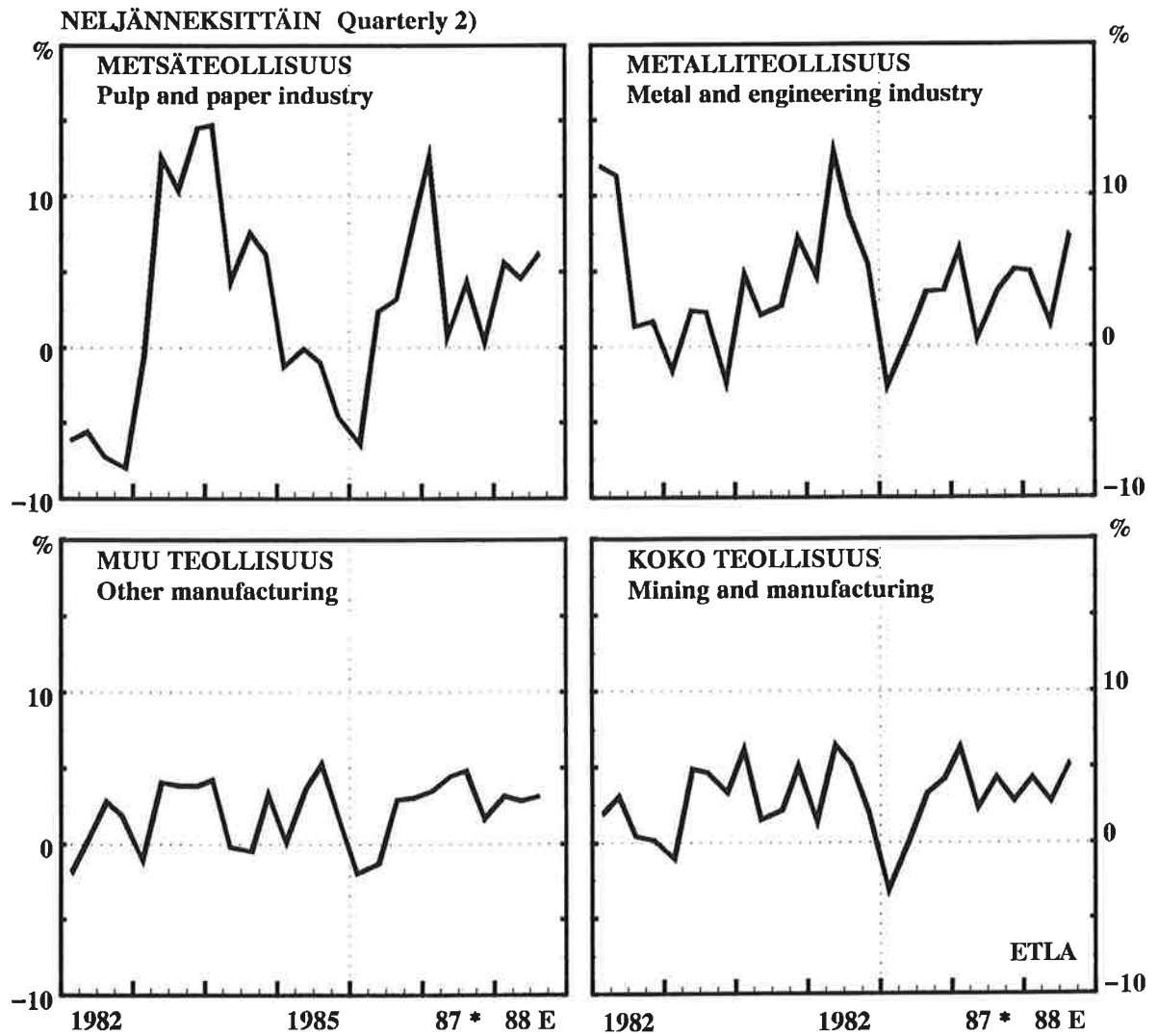
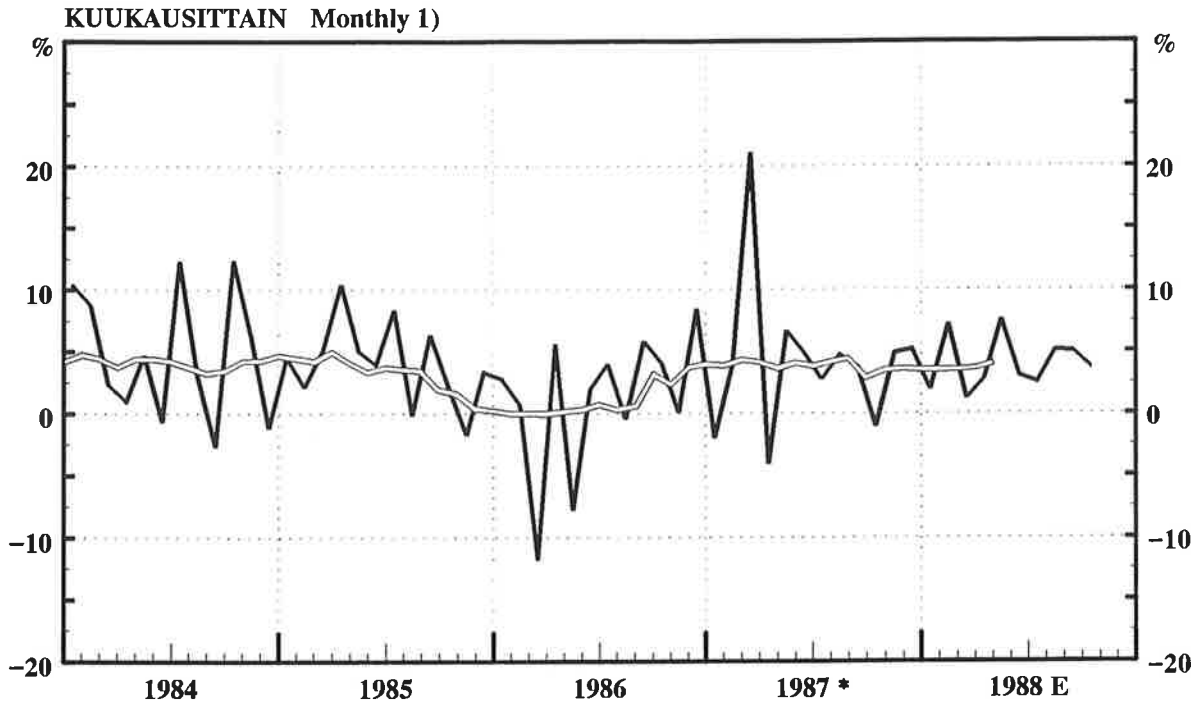
RAHOITUSVIRRAT V. 1987. MRD.MK									
RAHOITUSERÄT	KOTI-TAL.	YRIT.	PANKIT	VAK. LAIT.	MUUT RAH.L.	JULK. SEKT.	SUOMEN PANKKI	ULKO-MAAT	YHT.
* 01 Säätämäinen, netto	5.1	2.6	2.2	12.9	1.1	6.2	0.7	...	* 30.9 *
* 02 + Poistot	19.6	30.9	0.8	0.4	1.2	4.9	0.1	...	* 57.9 *
* 03 Bruttoosäästäminen	24.7	33.6	3.1	13.3	2.3	11.1	0.8	...	* 88.9 *
* 04 -Kiinteät investoinnit	-29.4	-45.4	-1.3	-0.9	-1.9	-13.2	-0.1	...	* -92.1 *
* 05 -Varastojen lisäys	1.1	-6.1	...	...	...	-0.3	...	...	* -5.3 *
* 06 Rahoitusjäämä	-3.6	-18.0	1.8	12.4	0.5	-2.3	0.7	8.5	* 0.0 *
* 07 +Saadut pääomansifrot, netto	1.3	-0.2	-0.1	-0.0	0.0	-1.0	0.0	0.0	* 0.0 *
* (1) NETTOLUOTONANTO	-2.2	-18.2	1.6	12.3	0.5	-3.3	0.7	8.5	* -0.0 *
RAHOITUSVAARTEIDEN MUUTOKSET									
* 09 Käteisraha	-0.6	-0.3	-0.4	...	...	0.0	1.3	...	* -0.0 *
* 10 Käteisrahalletukset	0.0	-1.4	1.6	0.0	0.0	-0.2	...	...	* 0.0 *
* 11 Varsinaiset talletukset	-20.0	0.0	19.1	...	...	0.9	...	...	* 0.0 *
* 12 Valuuttatalletukset	0.0	0.3	-0.3	0.0	0.0	...	...	...	* 0.0 *
* 13 Markkinäraha	0.0	-0.6	0.7	-0.2	...	...	...	...	* 0.0 *
* 14 Rah. lait. kotim. arvopaperit	-4.1	...	3.2	-3.5	4.0	0.0	0.0	...	* -0.3 *
* 15 Julk. sekt. kotim. arvopaperit	-4.3	...	0.0	-1.2	...	5.8	0.0	...	* 0.3 *
* 16 Talletukset Suomen Pankissa	...	0.0	-5.3	...	-1.7	1.1	5.9	...	* -0.0 *
* 17 Ulkom. lyhytaikaiset saamiset	...	1.1	5.7	...	...	0.0	-15.7	8.9	* -0.0 *
* 18 Ulkom. pitkäaikaiset saamiset	...	-4.3	-0.6	-1.7	0.0	-0.2	-2.0	8.8	* 0.0 *
* 19 Muut saamiset/valtion kassavarat	0.0	0.6	-0.6	0.0	0.0	0.0	0.0	0.0	* 0.0 *
* 20 Luotot pankeilta (markkanäär.)	22.1	5.1	-26.9	...	-1.2	0.8	...	...	* 0.0 *
* 21 Valuuttaluotot pankeilta	...	11.8	-11.8	...	...	...	...	...	* 0.0 *
* 22 Luotot vakuutuslaitoksilta	0.4	3.5	0.0	-4.1	...	0.2	...	...	* -0.0 *
* 23 Luotot muilta rah.laitoksilta	1.6	2.2	...	...	-5.1	1.4	...	...	* -0.0 *
* 24 Notariaattiluotot	...	-0.6	0.6	0.0	0.0	...	...	...	* 0.0 *
* 25 Yritysten kotim. arvopaperit	-4.4	6.4	-0.6	-1.5	0.0	0.0	...	...	* -0.1 *
* 26 Luotot julkiselta sektorilta	1.6	-0.2	0.0	...	0.0	-1.4	...	...	* 0.0 *
* 27 Luotot Suomen Pankilta	...	-1.2	-9.4	...	...	-0.1	10.6	...	* -0.0 *
* 28 Ulkom. lyhytaikaiset velat	...	0.5	16.3	...	...	0.0	0.0	-16.7	* 0.0 *
* 29 Ulkom. pitkäaikaiset velat	...	0.5	5.4	0.0	1.0	2.4	0.0	-9.4	* -0.1 *
* 30 Muut velat	0.0	1.0	0.0	0.0	0.0	-1.0	0.0	0.0	* 0.0 *
* 31 (2) RAHOITUKSEN LÄHTEET	25.7	33.0	52.7	0.0	5.0	12.6	17.9	17.6	* 164.5 *
(pl. bruttosäästäminen)									
* 32 (3) RAHOITUKSEN KÄYTTÖ	-33.4	-8.6	-56.0	-12.2	-8.0	-2.8	-17.7	-26.1	* -164.7 *
(pl. bruttopääomamuodostus)									
* (4)=(2)+(3) NETTOLUOTONOTTO	-7.7	24.5	-3.3	-12.2	-3.0	9.8	0.2	-8.5	* -0.2 *
* 34 (1)+(4) Residuaali	-9.9	6.3	-1.6	0.2	-2.5	6.5	0.9	0.0	* -0.2 *



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## FORECAST

	Y:1986	Y:1987	Y:1988	Y:1989	Y:1990	Y:1991
CP=	2744035	5.670	5.560	6.080	0.000	*****
CG?	0.000	0.000	0.000	-100	0.000	0.000
I?	0.000	0.000	0.000	-100	0.000	0.000
DFD?	2744035	*****	0.000	-100	*****	*****
IST?	0.000	0.000	0.000	-100	0.000	0.000
DSD?	5266622	*****	0.000	*****	*****	*****
DTD=	8010657	5.997	5.548	2.041	*****	*****
X=	289016	15.6	20.1	12.0	0.000	0.000
M=	425708	12.7	9.180	4.000	0.000	*****
DB?	-136692	0.000	0.000	0.000	0.000	0.000
Q=	7873965	5.989	5.922	2.377	*****	*****
CPQ*	2094575	1.900	1.500	2.000	0.000	0.000
CGQ*	584088	2.300	1.500	1.300	0.000	0.000
IQ*	668494	1.100	7.000	2.500	0.000	0.000
DFDQ=	3347157	1.810	2.591	1.982	0.000	0.000
ISTQc	7393	0.800	-0.400	-0.250	0.000	0.000
DSDQc	3593	0.270	0.000	0.000	0.000	*****
DTDQ=	3358143	2.799	2.185	1.730	0.000	*****
XQ*	251290	12.8	16.6	12.0	0.000	0.000
MQ*	486741	7.300	6.000	4.000	0.000	0.000
DBQc	-235452	-0.108	0.489	0.530	0.000	0.000
QQ=	3122691	2.902	2.837	2.377	0.000	*****
PCP=	1.310	3.700	4.000	4.000	0.000	*****
PDTD=	2.385	3.111	3.291	0.306	*****	*****
PX*	1.150	2.500	3.000	0.000	0.000	0.000
PM*	0.875	5.000	3.000	0.000	0.000	*****
PQ*	2.522	3.000	3.000	0.000	*****	*****
PCPI*	1.331	3.700	4.000	4.000	0.000	*****
AHWRI*	131	0.000	0.000	-100	0.000	0.000
UM*	0.954	5.900	4.250	2.750	0.000	0.000
LE?	0.000	0.000	0.000	0.000	0.000	0.000
LF?	0.000	0.000	0.000	0.000	0.000	0.000
LUR*	*****	0.000	-100	0.000	0.000	0.000
Q2T4I*	1.151	3.800	5.750	4.750	0.000	0.000
ZULC?	*****	0.000	0.000	0.000	0.000	0.000



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