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**Working Paper**

## The KTKV model of the economics department of the Bank of Finland

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Bank of Finland Economics Department  
6.6.1988

10/88

THE KTKV MODEL OF THE ECONOMICS DEPARTMENT OF  
THE BANK OF FINLAND

A semiannual model for forecasting  
world economic prospects

Suomen Pankin monistuskeskus  
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## ABSTRACT

This is a report on an updated version of the KTKV-model of Bank of Finland's Economics Department. The model was originally designed in the early 80's for the forecasting of short-term international economic developments. It is basically a world trade flow model, in which the main components of world trade flows are generated using trade weight matrices. Until recently, the demand side of the model has been entirely exogenous. For this version consumption and investment equations have been estimated. All other equations have been re-estimated and some technical equations for exchange rate and interest rate structures are introduced.

## TIIVISTELMÄ

Tässä keskustelualoitteessa raportoidaan Suomen Pankin kansantalouden osaston KTKV-mallin päivitetty versio. Alunperin malli suunniteltiin 1980-luvun alussa kansainvälisen talouden lyhyen aikavälin ennustamiseen. Se on pohjimmiltaan maailmankaupan malli, jossa tärkeimmät kauppavirrat lasketaan maailmankaupan osuusmatriisien avulla. Aikaisemmin kysyntä oli mallissa täysin eksogeeninen. Tähän versioon on estimoitu investointi- ja kulutusyhtälöt. Kaikki muut yhtälöt on estimoitu uudelleen, ja malliin on lisätty muutamia teknisiä valuuttakurssi- ja korkorakenteita kuvaavia yhtälöitä.



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## BRIEF DESCRIPTION OF THE KTKV - MODEL

### Changes in the KTKV-model

This paper reports an updated version of the KTKV-model. The model has been estimated at the Economics Department of the Bank of Finland and was originally designed for short-term forecasting of world economic prospects. It is basically a world trade flow model, in which imports of each country are modelled and exports are calculated using trade flow matrices. As to foreign trade prices, export prices are modelled and import prices are then derived using trade flow weights.

The initial version of KTKV was developed in 1980 - 1982. At this stage the model was principally a computing framework and data management system. Since then the model, while being permanently in use, has been gradually refined and extended.

In spite of the extensions the basic structure of the KTKV-model has not been subsequently changed. Foreign trade equations still form the essential block of the model. The most recent additions include investment and consumption equations, as well as some preliminary interest rate relations. All other equations have been reconsidered during the winter of 1988. The estimation period has been extended to the early half of 1987.

The model comprises some 550 variables, 46 of which are strictly speaking exogenous. There are 357 equations, 54 of which are behavioural. The rest are largely either identities or equations with constant coefficients based on the world trade matrix.

Estimations have been carried out on the basis of semiannual data, using OLS as the estimation technique. As a rule, estimations start from 1971 and extend up to the first half of 1987. Availability of data may have altered the choice of estimation period in some cases.



The KTKV-model comprises the six countries most important for Finnish foreign trade, namely the USA, Japan, Germany, France, the United Kingdom and Sweden. In addition, there are four country groupings: OPEC, LDC's, other OECD and 'the rest of the world'.

The present version of the model can be divided into three large blocks. First, there is a price block comprising the equations for domestic demand deflators, foreign trade prices and GDP-deflators for the six countries above plus Finland. Interest rates, user costs and inflation expectations are generated in this block. In addition, this block contains equations for aggregate commodity prices, OECD-consumer prices and producer prices.

The second block generates foreign trade volumes for the six countries plus Finland and for the four country groupings. In addition, the change in world trade is computed as a weighted average.

The third block consists of equations and identities for volumes of domestic demand and GDP. Consequently, the volumes of total supply and demand for the seven countries are calculated in the model.

Each country's domestic demand deflator is mainly determined by domestic unit labour costs. Import prices contribute with a relatively short lag. A fairly sophisticated error correction term has been incorporated in these deflator equations. Taxes less subsidies are excluded from the dependent variable. The GDP deflator is computed using a purely technical transformation. The change in the terms of trade is added to the domestic deflator using the GDP-weight of foreign trade.

Export prices are based on competitors' export prices but are also influenced by domestic costs. Changes in exchange rates are taken into account as well. A somewhat simpler error correction mechanism has been included in these equations.

Import prices are derived from export prices using the weights of a world trade matrix. The base year for the constant weights is 1980.

The import volumes of the seven industrial countries mentioned above are determined by total domestic demand as well as by the price competitiveness of domestic producers. Countries' imports are allocated to export markets for each of the countries using the weights of the world trade matrix. In order to obtain the final export volumes the export markets given by fixed shares are adjusted to take into account the prevailing level of a country's price competitiveness. The imports of the four regional groupings also contribute to the growth of a country's export markets. The imports of two of the four groupings are exogenous, namely the imports of developing countries and 'the rest of the world'.

Of the components of domestic demand, inventory investments and government consumption in the seven countries are exogenous. The equations determining private consumption are simple error correction functions in which real interest rate changes and inflation are taken into consideration. GDP volumes approximate disposable incomes. Volumes of fixed investment are modelled according to neo-classical investment theory, with the prices of capital and labour as the main determinants. A proxy for the user cost of the capital is calculated. A demand variable is also included in the equations assuming imperfect competition in the markets. Having calculated foreign trade flows and the components of domestic demand, the model gives a country's GDP as a residual.

In the course of forecasting rounds, the consistency of the outcome is checked through careful analysis of projected current account developments. The effects on world trade of the four areas are also studied by analysing the prospects for their external balances. Financial restrictions are taken into account in this connection. As a rule, the world current balance discrepancy is assumed to remain broadly unchanged over the forecasting period.

Considerable efforts have been put in to estimating equations for commodity prices. So far, success has been limited. In the present version of the model the prices of four subgroups, food, tropical beverages, non-ferrous metals and minerals, and agricultural raw materials are exogeneously determined. Forecasts for the composite HWWA-index numbers are weighted averages of these subindexes.

Interest rates are determined by using normal interest rate parity conditions and estimating the empirical relation. The US short rates are given, and the German and UK rates are linked to it. Long rates are determined by term structure equations.

Exchange rates are exogenous. The rates for the main currencies as well as for developments in their cross rates are given exogenously. Exchange rates for minor currencies are linked to developments in the relevant main currency. These rates are needed in calculating the price competitiveness of Finnish exports. The FIM/USD rate is computed on the assumption that the FIM-index remains constant.

#### Main weaknesses and further development of the KTKV-model

Although, in the course of several forecasting rounds, the KTKV model has shown its applicability in structuring the forecasting process and reducing the efforts required to reach a consistent view of world economic prospects, there remain many areas for further development of the model.

One of the most fundamental issues concerns the trade flow equations. The price elasticities of the import and export equations are annoyingly low. This brings an element of instability into the model, since the Marshall-Lerner-condition does not hold. However, low price elasticities are a common outcome with aggregate data, simple functional forms and unsophisticated estimation techniques.

Another related problem arises when foreign trade price developments are forecast with aggregate price equations. Peculiar movements in prices of crude oil and other raw materials enhance the changes in aggregate time series. Consequently, the correct measure of the price competitiveness of manufactures exports is impossible to derive from aggregate price developments.

These two issues favour disaggregating the foreign trade block into at least two components, trade in manufactures and trade in raw materials or energy.

In the event that the Finnish block of the model should some time be taken seriously, an easy way to improve it would be to separate eastern and western trade. The model would give a first rough estimate for western exports based on growth of the markets.

There are many other suggestions for improving the KTKV-model, such as modelling unit labour costs, exchange rates, international financial flows and using more advanced estimation techniques, and it is hoped these will be covered in future reports.

### Simulation tests

The KTKV-model is not designed for policy simulations. However, even for forecasting purposes it is useful to know how the model behaves and how serious are the omissions of, for instance, price-wage-linkages.

The statistical and dynamic properties of the model were examined by means of dynamic ex-post simulations. The model was first run through the years 1978S1 - 1987S1, with the latter half of 1977 as a starting point, using model-generated values as lagged endogenous variables. The values of exogenous variables were the same as the actual ones. This simulation is referred to as the control solution. The first chart depicts the actual and control-simulation changes (at annual level) of the main aggregates for OECD-countries.

The sensitiveness of the dynamic solution to exogenous shocks was studied by means of four disturbance simulations as follows:

- I An increase in government consumption in all seven countries by one per cent
- II An increase in unit labour costs of one per cent
- III A devaluation in the exchange rate of the US dollar against the other main currencies (DEM, JPY, GBP and FRF) by 10 per cent
- IV An increase in the price of crude oil by 10 per cent.

All these shocks were implemented in the first half of 1978 and no recovery was assumed. Thus the levels of the disturbed variables stayed at the new level thereafter. The dynamic elasticities for the OECD-aggregates are shown in charts 2 to 6.

The first shock, an increase in government consumption, is quite straightforward. The GDP of OECD-countries eventually increases by the same percentage as the original shock. Foreign trade effects are larger, reflecting noticeably high income elasticities in the import equations. The price effects are negligible.

An increase in unit labour costs by one per cent in the seven countries leads in the short run to higher domestic and foreign trade prices and slower growth in the OECD-area. The negative effects diminish fairly rapidly, however, because changes in relative prices work in favour of increased imports which in turn generate exports and production. Since there is no feedback from foreign or domestic prices to unit labour costs, the effect of this disturbance experiment might be too optimistic. On the other hand, this model does not take into account the income effects of a wage rise, which would also induce increased domestic demand and foreign trade.

The third shock, the devaluation of the exchange rate of the USD, seems to be a favourable phenomenon from the point of view of OECD-countries. In spite of the deterioration in the terms of trade, the growth of US exports generates an improvement in the trade balance and GDP.

The results of the oil price shock may seem peculiar at first sight. The positive GDP effects come from an expansion of exports to OPEC-countries and a slight reduction in imports. Because of the low price elasticities in the foreign trade equations and the lack of wage equations, the deterioration in the terms of trade does not worsen the trade balance in the OECD-area.

CHART 1

OECD-COUNTRIES

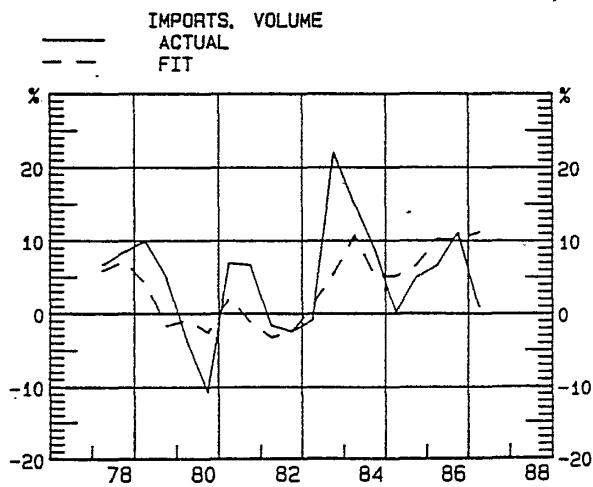
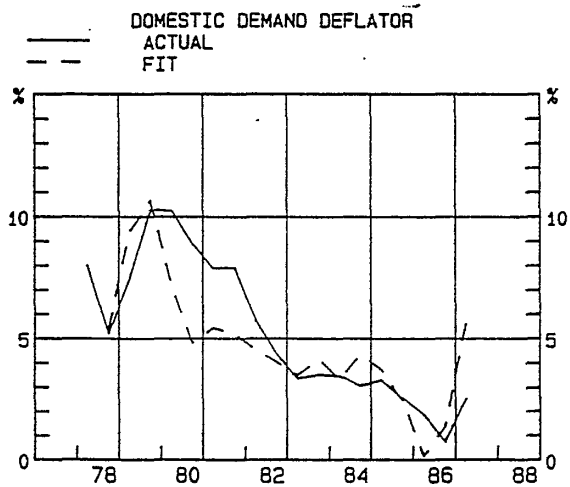
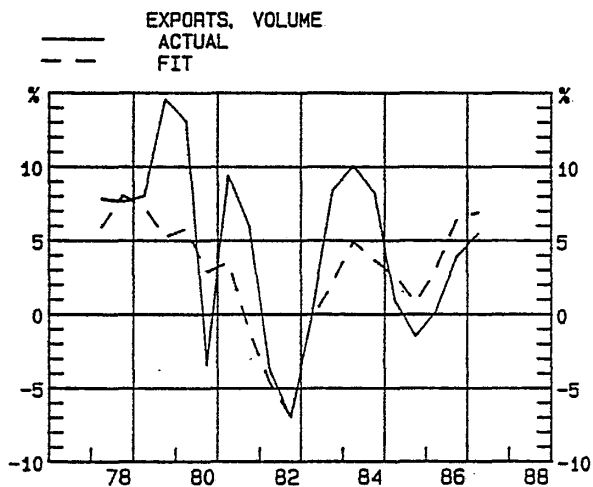
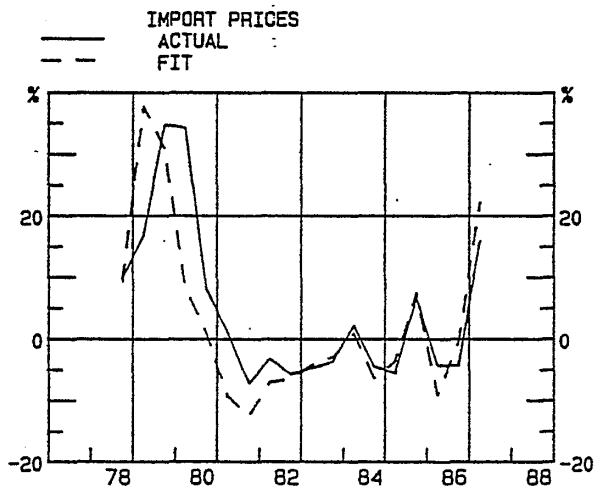
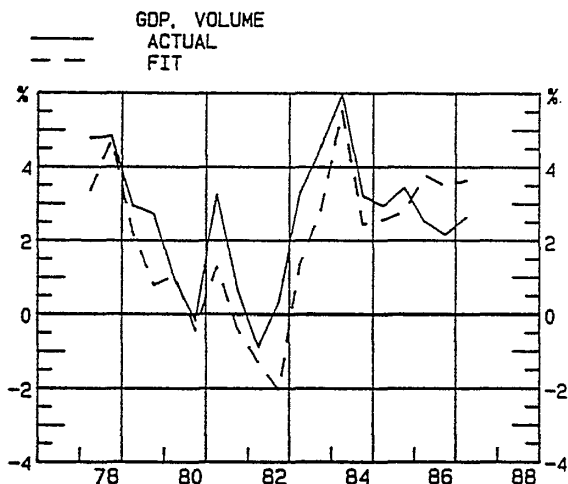
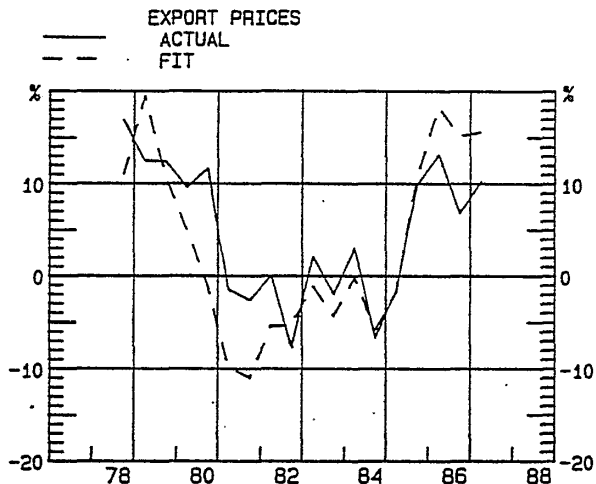
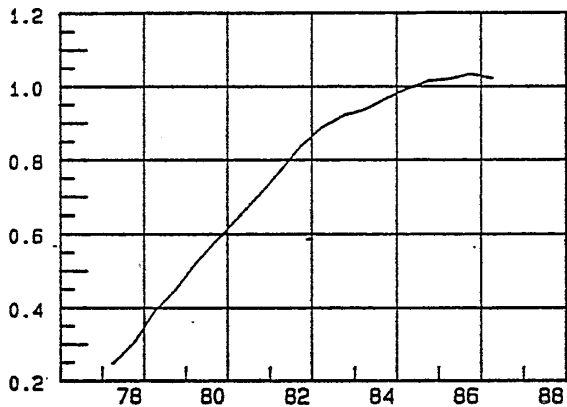


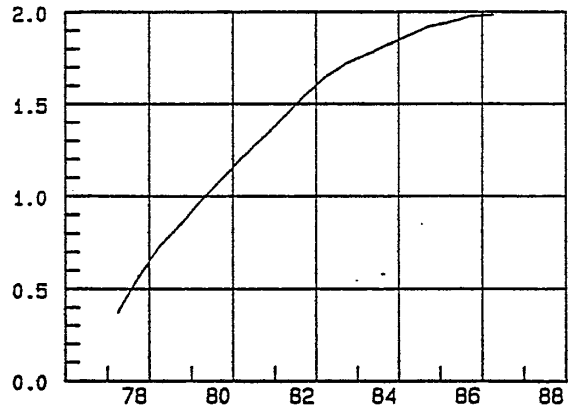
CHART 2

OECD-COUNTRIES  
AN INCREASE OF GOVERNMENT CONSUMPTION  
BY 1 PER CENT, DYNAMIC ELASTICITY

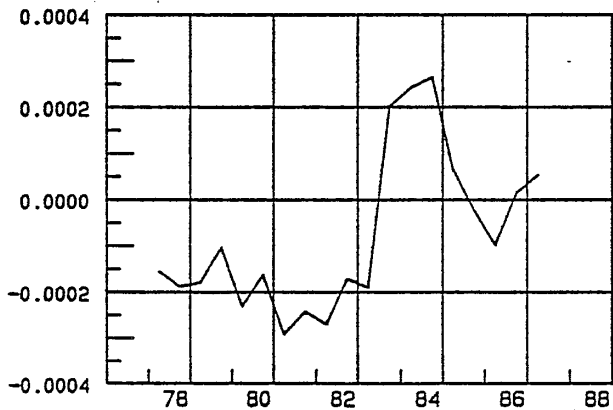
GDP



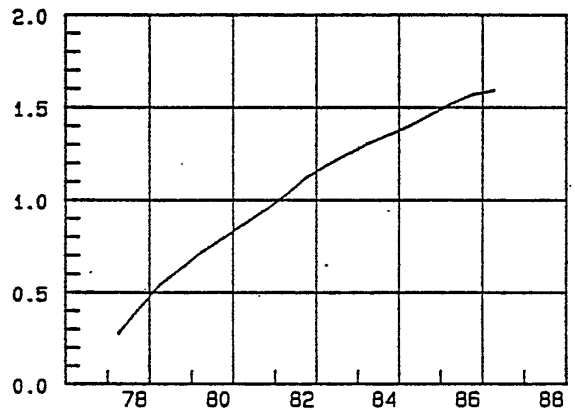
FINLAND'S EXPORT MARKETS



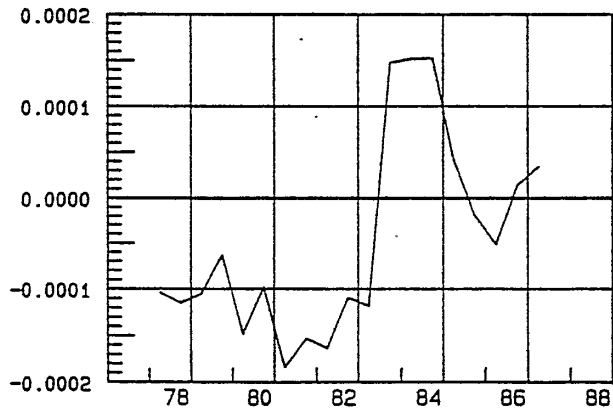
EXPORT PRICES



EXPORTS



IMPORT PRICES



IMPORTS

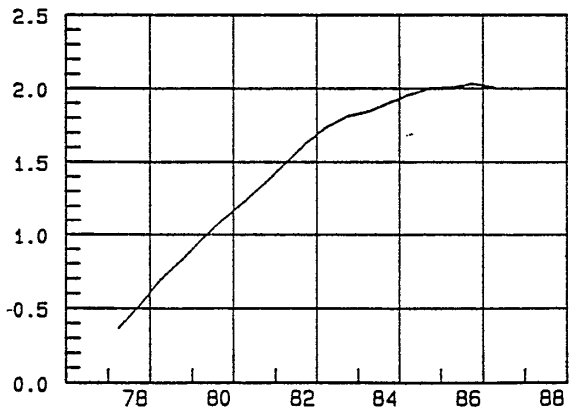


CHART 3

OECD-COUNTRIES  
AN INCREASE OF UNIT LABOUR COSTS  
BY 1 PER CENT, DYNAMIC ELASTICITY

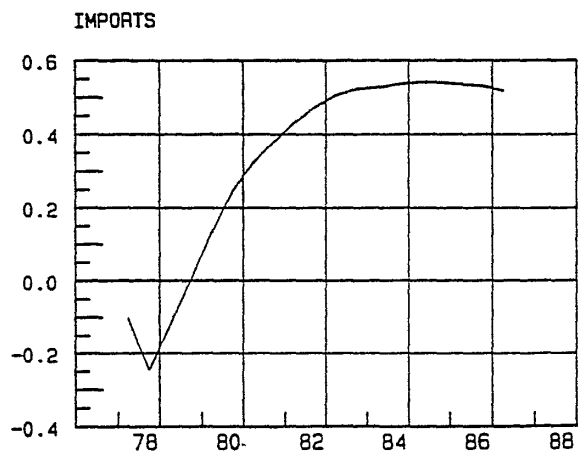
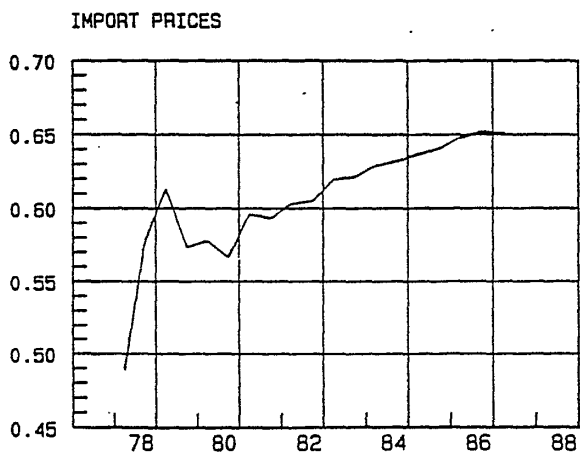
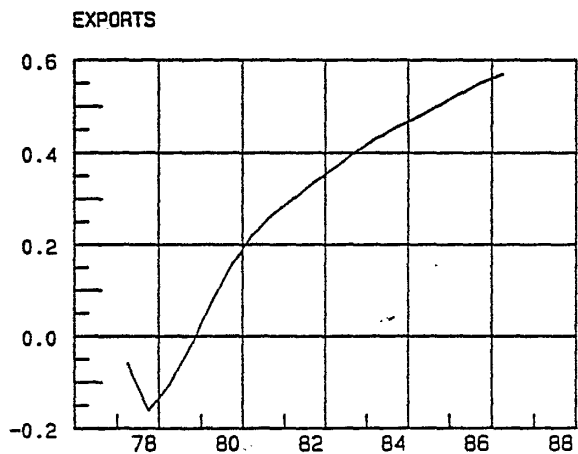
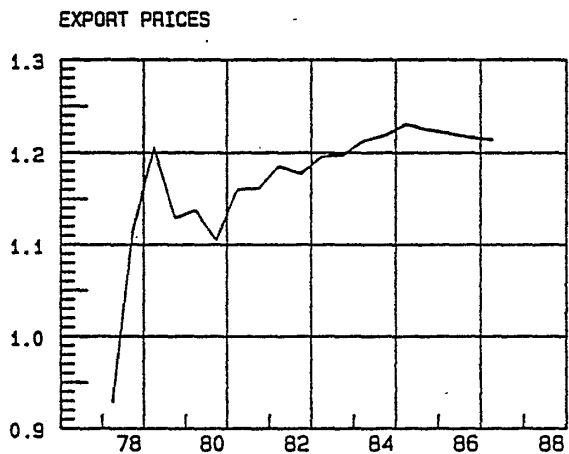
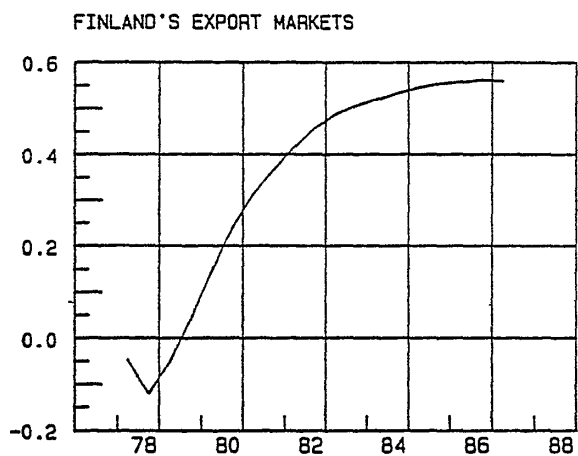
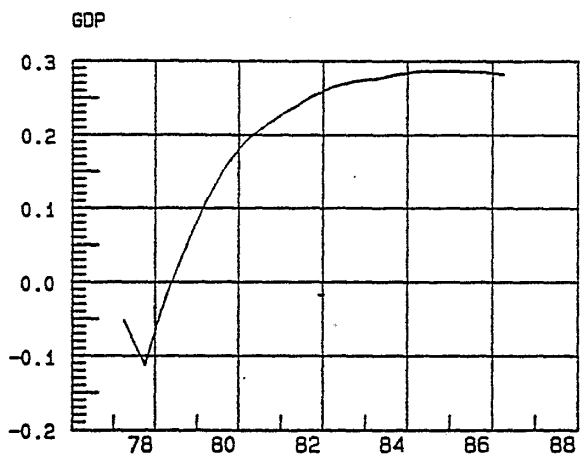




CHART 4

OECD-COUNTRIES  
AN DEVALUATION OF THE US DOLLAR  
BY 10 PER CENT, DYNAMIC ELASTICITY

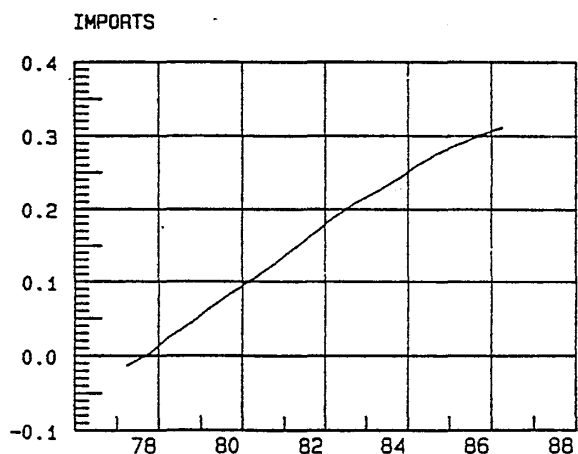
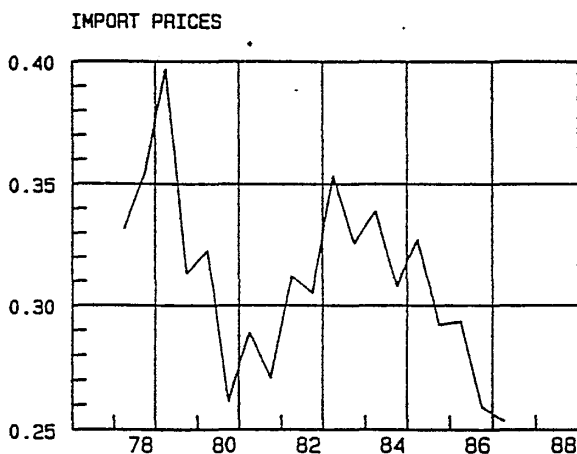
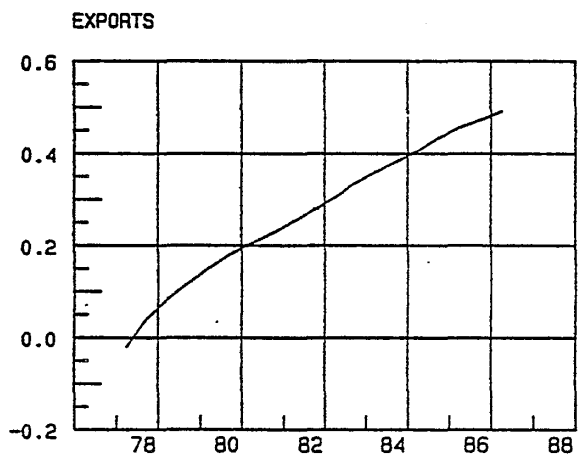
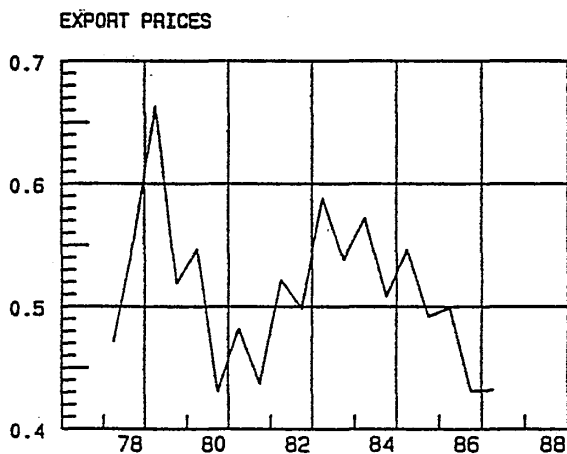
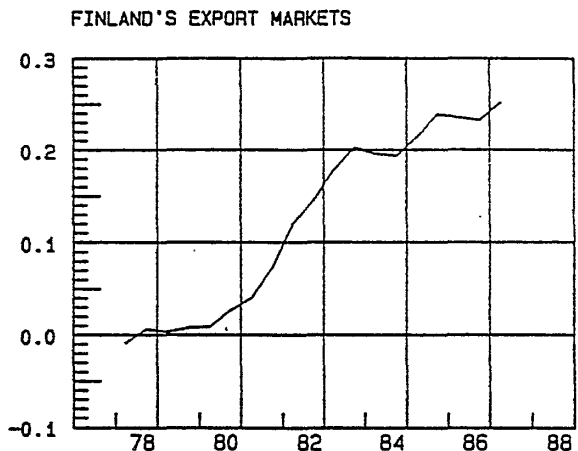
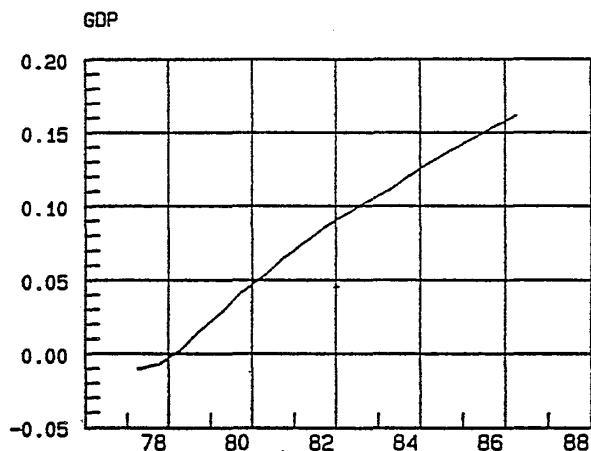
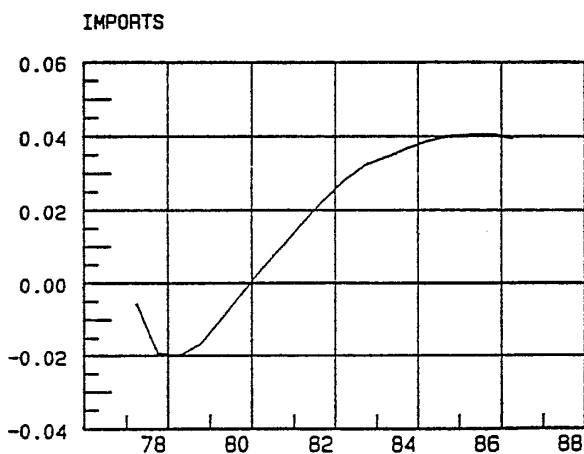
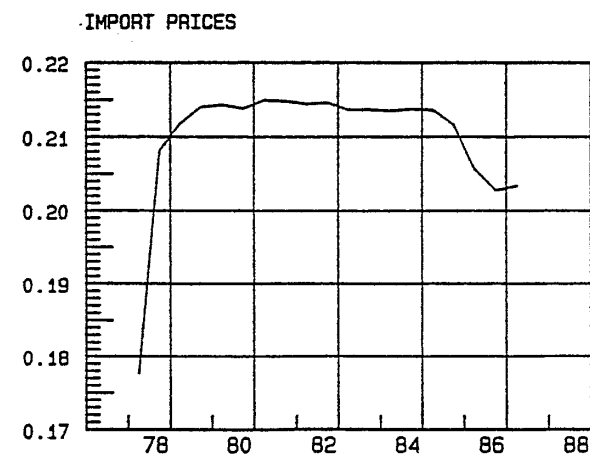
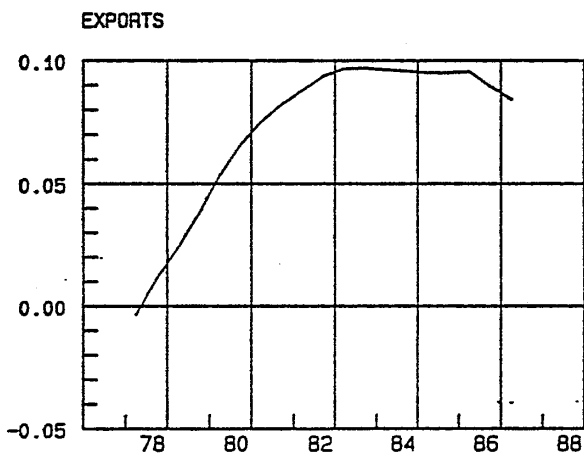
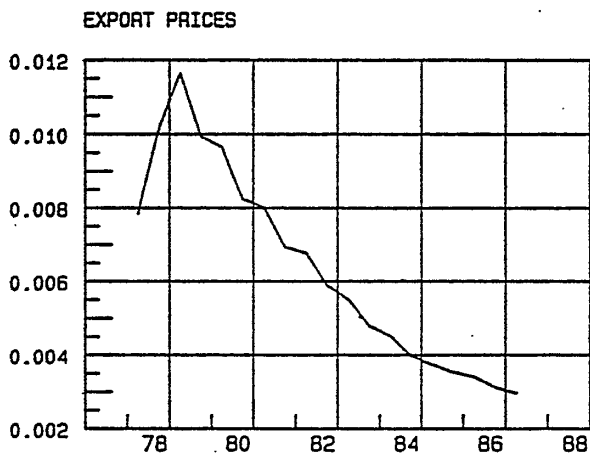
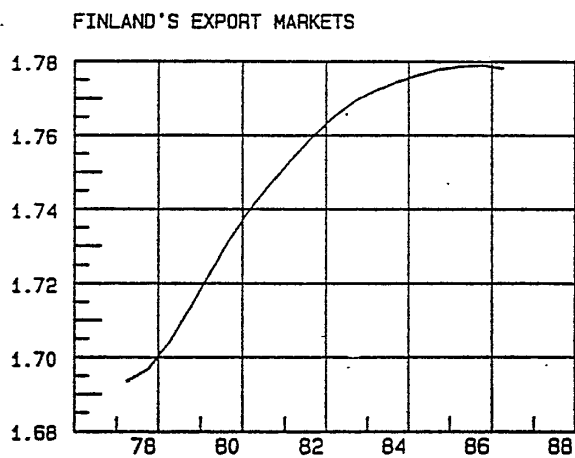
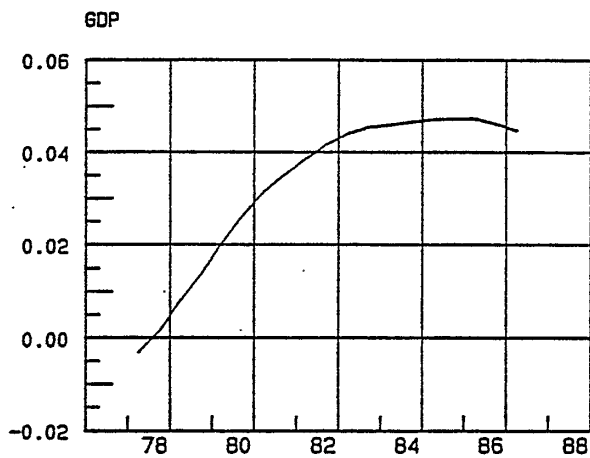


CHART 5

OECD-COUNTRIES-  
AN INCREASE OF THE PRICE OF CRUDE OIL  
BY 10 PER CENT, DYNAMIC ELASTICITY



## Outline of the report

On the next four pages, the KTKV-model is presented in implicit equation form in order to provide a general overview of the model. First, the so-called stochastic equations and the main identities for each country are presented. Second, there is a list of other estimated equations and identities concerning country groupings and commodity prices. A third group of equations consists of price and trade linkages. Variable names are presented in concise form after the equations. A full explanation of the variables of the model is found in the Appendix 4.

The Appendix 2 contains the estimation results for all stochastic equations, and the Appendix 3 presents the main identities and weights used.

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## APPENDIX 1

KTKV-model in implicit form

A LIST OF EQUATIONS FOR COUNTRY i:a) STOCHASTIC EQUATIONS:

1.  $M_i = f_1(PM_i, PDD_i, DD_i, M_{i-1})$  [ IMPORTS ]
2.  $I_i = f_2(PQ_i, ULC_i, UCR_i, Q_{i-1}, I_{i-1})$  [ FIXED INVESTMENT ]
3.  $C_i = f_3(\Delta PDD_i, R_i, PDDE_i, \Delta Q_i, Q_{i-1}, C_{i-1})$  [ PRIVATE CONSUMPTION ]
4.  $\Delta PDD_i = f_4(\Delta ULC_i, \Delta PM_i)$  [ DOMESTIC DEMAND DEFLATOR ]
5.  $\Delta PX_i = f_5(\Delta VINO, \Delta ULC_i, \Delta PXW_i, \Delta e_i)$  [ CH. OF EXPORT PRICES ]
6.  $X_i = f_6(PX_i, PXW_i, XW_i, XW_{i-1}, X_{i-1})$  [ EXPORTS ]
7.  $RS_i = f_7(PQ_i/PQ_{us}, RS_{us})$  [ SHORT TERM INTEREST RATE ]
8.  $R_i = f_8(RS_i, RS_{i-1}, R_{i-1})$  [ LONG TERM INTEREST RATE ]

b) IDENTITIES:

9.  $UCR_i = PDD_i(R_i - PDDE_i)/PQ_i$  [ USERCOSTS ]
10.  $PDDE_i = \sum_{i=1}^n \Delta PDD_{i-n}$  [ EXPECTED DOMESTIC INFLATION ]
11.  $PQ_i = PQ_{i-1} + \Delta PDD_i + \Delta[(M_i/Q_i)(PX_i - PM_i)]$  [ GDP DEFLATOR ]
12.  $Q_i = DD_i + e_i X_i - M_i$  [ GDP ]
13.  $DD_i = C_i + G_i + I_i + IV_i$  [ DOMESTIC DEMAND ]

$PM_i, PXW_i, XW_i$  are explained when the countries are linked together.

## B LIST OF OTHER EQUATIONS

a) OTHER STOCHASTIC EQUATIONS:

$$14. \text{ OPPX} = f_{14}(\text{OP}) \quad [\text{OPEC'S EXPORT PRICES}]$$

$$15. \text{ DCPX} = f_{15}(\text{VINO}) \quad [\text{D-COUNTRIES' EXPORT PRICES}]$$

$$16. \text{ OPM} = f_{16}(\text{OP}, \text{OEPDD}, \text{OPM}_{-1}) \quad [\text{OPEC'S IMPORTS}]$$

$$17. \text{ OOM} = f_{17}(\text{O Odd}, \text{OOM}_{-1}) \quad [\text{OTHER OECD-COUNTRIES' IMPORTS}]$$

b) OTHER IDENTITIES:

$$18. \text{ VINO} = \sum_{n=1}^4 \alpha_m \text{PR}_m \quad \sum \alpha_m = 1 \quad [\text{COMMODITY PRICES}]$$

$$19. \text{ OEQ} = \sum_{n=1}^N \beta_n \text{Q}_n \quad \sum \beta_n = 1 \quad [\text{OECD-COUNTRIES' GDP}]$$

$$20. \text{ OEPDD} = \sum_{n=1}^N \beta_m \text{PDD}_m \quad [\text{OECD-COUNTRIES DOM. DEM. DEFL.}]$$

c) PRICE AND TRADE LINKAGES:

$$21. \text{ PXW}_i = \sum_k (\sum_j q_{ij} W_{kj}) \text{PX}_k \quad k \neq 1 \quad [\text{WORLD EXPORT PRICES}]$$

$$\text{in which } q_{ij} = (x_{ij}/x_i) [1/(1 - W_{ij})]$$

$$22. \Delta \text{PM}_i = \sum_j W_{ij} \Delta \text{PX}_j \quad i \neq j \quad [\text{CH. IMPORT PRICES, USD}]$$

$$23. \text{ PM}_i = e_i \text{PM}_i \quad [\text{IMPORT PRICES}]$$

$$24. \text{ XW}_i = \sum_j W_{ij} \text{M}_j \quad i \neq j \quad [\text{EXPORT MARKET}]$$

$$25. \text{ SDR} = \sum_k b_k e_i \quad [\text{SDR IN USD}]$$

## EXOGENOUS VARIABLES:

$\text{ULC}_i, e_i, \text{RS}_i, \text{C}_i, \text{G}_i, \text{IV}_i, \text{OP}, \text{PR}_m$

C LIST OF VARIABLES OF THE KTKV-MODEL

N:O OF EQ	NAME	DESCRIPTION
1	$M_i$	IMPORTS OF GOODS & SERVICES, VOL, LC=LOCAL CURRENCY
1,23	$PM_i$	IMPORT PRICES
1,3,4,9,10	$PDD_i$	DEFLATOR OF TOTAL DOMESTIC DEMAND
3,9,10	PDDE	EXPECTED RATE OF INFLATION
1,12,13	$DD_i$	TOTAL DOMESTIC DEMAND, VOL, LC
2,13	$I_i$	GROSS FIXED INVESTMENT, VOL, LC
2,6,8	$PQ_i$	GDP DEFLATOR
2	$ULC_i$	UNIT LABOURS COSTS
2,9	UCR	USERCOST OF CAPITAL
2,3,12	$Q_i$	GDP, VOL, LC
3	$C_i$	PRIVATE CONSUMPTION, VOL, LC
6,21	$PX_i$	EXPORT PRICES
5,15,18	VINO	INDEX OF NON-OIL ECONOMY PRICES
5,21	$PXW_i$	COMPETITOR'S EXPORT PRICES
5,12,23	$e_i$	EXCHANGE RATE TO USD
6,12	$X_i$	EXPORT, VOL, USD
6,24	$XW_i$	EXPORT MARKET, VOL, USD
8	$R_i$	LONG-TERM INTEREST RATE
7	$RS_i$	SHORT-TERM INTEREST RATE
13	$IV_i$	INVENTORY INVESTMENT, VOL, LC
14	OPPX	EXPORT PRICES OF OPEC
14,16	OP	CRUDE OIL PRICE USD/b
15	DCPX	EXPORT PRICES OF DEVELOPING COUNTRIES

16	OPM	OPEC'S IMPORTS, VOLUME
16,20	OEPDD	DOMESTIC DEMAND DEFLATOR OF OECD COUNTRIES
17	OOM	IMPORTS VOL. OF OTHER OECD COUNTRIES
17	OODD	DOMESTIC DEMAND DEFLATOR OF OTHER OECD COUNTRIES
18	PR <sub>m</sub>	PRICE OF A COMMODITY GROUP m
13,17	OEQ	GDP OF OECD COUNTRIES, WEIGHTED AVERAGE
19,20,22	W <sub>ij</sub>	A SHARE OF THE COUNTRY i OF THE TOTAL IMPORTS OF THE COUNTRY j
19	X <sub>ij</sub>	A SHARE OF THE COUNTRY i OF THE TOTAL EXPORTS TO THE COUNTRY j
20	PM <sub>i</sub>	IMPORT PRICES IN USD

APPENDIX 2  
Estimated equations

Total Domestic Demand Deflators

---

USPDDTS UNITED STATES DOMESTIC DEMAND DEFLATOR

---

$$\begin{aligned} \text{USPDDTS} = & \\ & .18146 \Delta \log \text{USULC} + .17361 \Delta \log \text{USULC}_{-1} + \\ & (2.818) \qquad \qquad \qquad (3.200) \\ & .06998 \Delta \log \text{USPM} - .07675 \Delta \log (\text{A-B}) + .01833 \\ & (2.870) \qquad \qquad \qquad (3.117) \qquad \qquad \qquad (10.595) \end{aligned}$$

$$R^2 = .792$$

$$\text{SEE} = .007$$

$$\text{DW} = 1.928$$

Estimation period 71S1 - 87S1

---

USPDDTS  $\log (\text{USPDDI}/\text{USPDDI}_{-1}) + \log ((1-\text{USTINDLSS})/(1-\text{USTINDLSS}_{-1}))$

USULC unit labour costs

USPM imports unit value index

A  $\log (\text{USPDDI}_{-1} * (1-\text{USTINDLSS}_{-1}))$

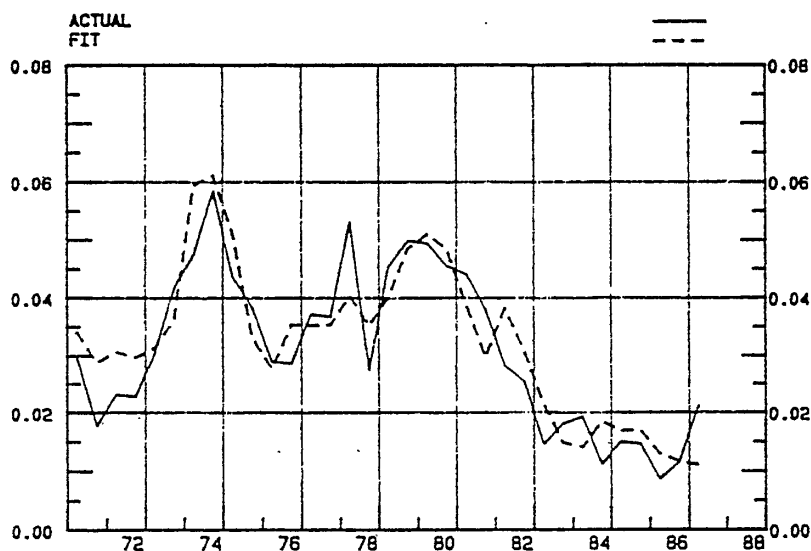
B  $\log (\text{USULC}_{-1} + \text{USM}_{-1}/\text{USQ}_{-1} * (\text{USPM}_{-1} - \text{USULC}_{-1}))$

USPDDI domestic demand deflator index (75=1)

USTINDLSS indirect taxes less subsidies

---

UNITED STATES DOMESTIC DEMAND DEFLATOR





## Total Domestic Demand Deflators

---

 JAPDDTS JAPAN DOMESTIC DEMAND DEFLATOR
 

---

JAPDDTS =

$$.25443 \Delta \log \text{JAULC} + .09614 \Delta \log \text{JAPM} -$$

(4.326) (5.602)

$$.07484 \Delta \log (\text{C-D}) + .03119$$

(3.649) (7.570)

R<sup>2</sup> = .781

SEE = .014

DW = 1.269

Estimation period 71S1 - 87S1

---

 JAPDDTS  $\log (\text{JAPDDI}/\text{JAPDDI}_{-1}) + \log ((1-\text{JATINDLSS})/(1-\text{JATINDLSS}_{-1}))$ 

JAULC unit labour costs

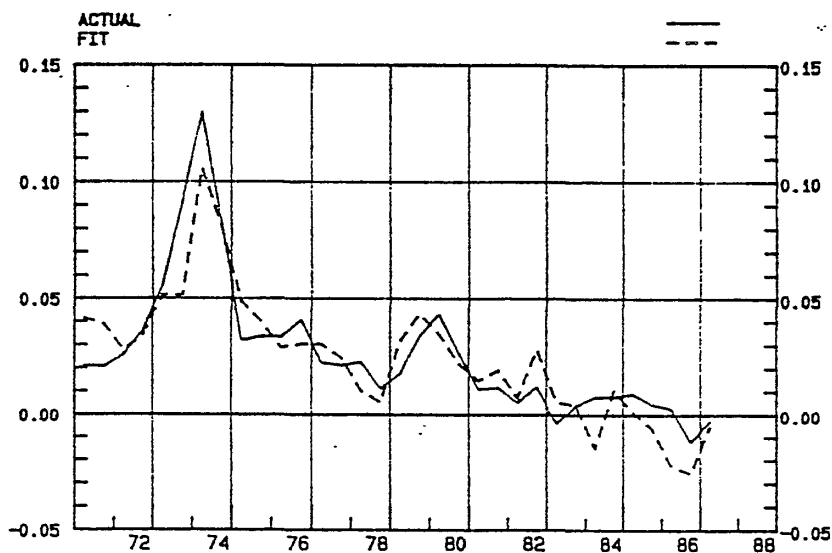
JAPM imports unit value index

C  $\log (\text{JAPDDI}_{-1} \times (1-\text{JATINDLSS}_{-1}))$ D  $\log (\text{JAULC}_{-1} + \text{JAM}_{-1}/\text{USQ}_{-1} \times (\text{JAPM}_{-1} - \text{JAULC}_{-1}))$ 

JAPDDI domestic demand deflator index (75=1)

JATINDLSS indirect taxes less subsidies

---

 JAPAN DOMESTIC DEMAND DEFLATOR


## Total Domestic Demand Deflators

## GEPDDTS GERMANY DOMESTIC DEMAND DEFLATOR

GEPDDTS =

$$.22963 \Delta \log \text{GEULC} + .13343 \Delta \log \text{GEULC}_{-1} + .15256 \Delta \log \text{GEPM} -$$

(2.966) (19.152) (5.107)

$$.01729 \text{GEDUM1} - .04013 \text{GEDUM2} + .01332$$

(1.881) (4.193) (5.620)

$$R^2 = .698$$

$$\text{SEE} = .009$$

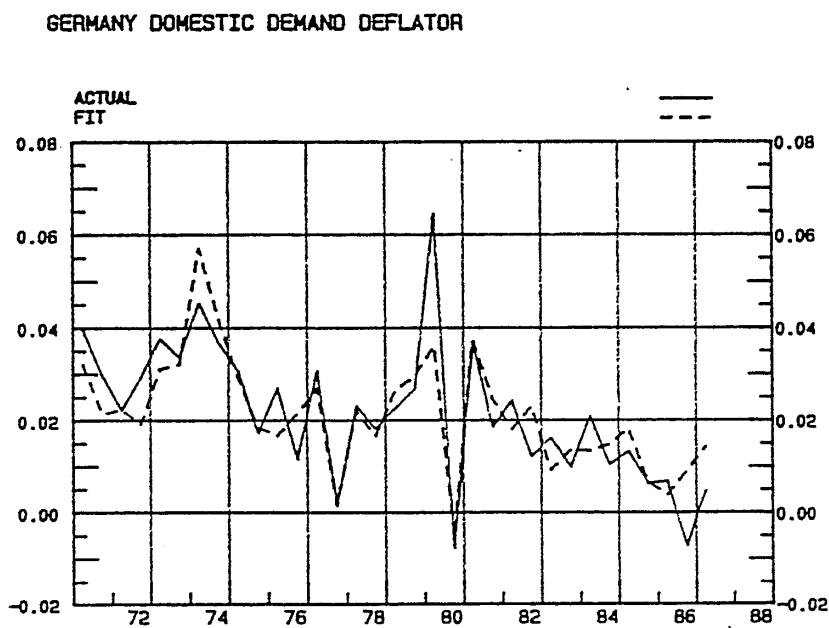
$$\text{DW} = 1.805$$

Estimation period 71S1 - 87S1

---

GEPDDTS  $\log (\text{GEPDDI}/\text{GEPDDI}_{-1}) + \log ((1-\text{GETINDLSS})/(1-\text{GETINDLSS}_{-1}))$   
 GEULC unit labour costs  
 GEPM imports unit value index  
 GEDUM1 dummy variable (77S2=1)  
 GEDUM2 dummy variable (80S2=1)  
 GEPDDI domestic demand deflator index (75=1)  
 GETINDLSS indirect taxes less subsidies

---



## Total Domestic Demand Deflators

FRPDDTS FRANCE DOMESTIC DEMAND DEFLATOR

$$\begin{aligned} \text{FRPDDTS} = & \\ & .15253 \Delta \log \text{FRULC} + .09762 \Delta \log \text{FRPM} + .08430 \Delta \log \text{FRPM}_{-1} - \\ & (2.018) \quad (4.170) \quad (2.820) \\ & .11707 (E-F) + .02380 \text{STOP} + .02196 \\ & (2.936) \quad (2.767) \quad (6.799) \end{aligned}$$

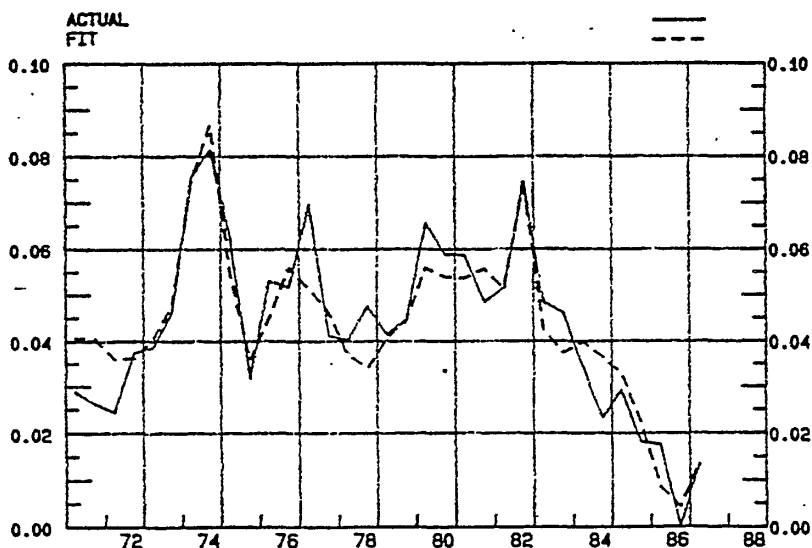
$R^2 = .8356$   
 $\text{SEE} = .008$   
 $\text{DW} = 1.653$   
 Estimation period 71S1 - 87S1

---

FRPDDTS  $\log (\text{FRPDDI}/\text{FRPDDI}_{-1}) + \log ((1-\text{FRTINDLSS})/(1-\text{FRTINDLSS}_{-1}))$   
 FRULC unit labour costs  
 FRPM imports unit value index  
 E  $\log (\text{FRPDDI}_{-1} * (1-\text{FRTINDLSS}_{-1}))$   
 F  $\log (\text{FRULC}_{-1} + \text{FRM FRQ}_{-1} * (\text{FRPM}_{-1} - \text{FRULC}_{-1}))$   
 STOP dummy variable 82S2=1)  
 FRPDDI domestic demand deflator index (75=1)  
 FRTINDLSS indirect taxes less subsidies

---

## FRANCE DOMESTIC DEMAND DEFLATOR



## Total Domestic Demand Deflators

---

 UKPDDTS UNITED KINGDOM DOMESTIC DEMAND DEFLATOR
 

---

UKPDDTS =

$$.28812 \Delta \log \text{UKULC} + .23093 \Delta \log \text{UKULC}_{-1} +$$

(3.480) (3.608)

$$.17054 \Delta \log \text{UKPM} + .06697 \Delta \log \text{UKPM}_{-1} + 0.01207$$

(4.462) (1.268) (3.669)

$$R^2 = .8857$$

$$\text{SEE} = .001$$

$$\text{DW} = 2.328$$

Estimation period 71S1 - 87S1

---

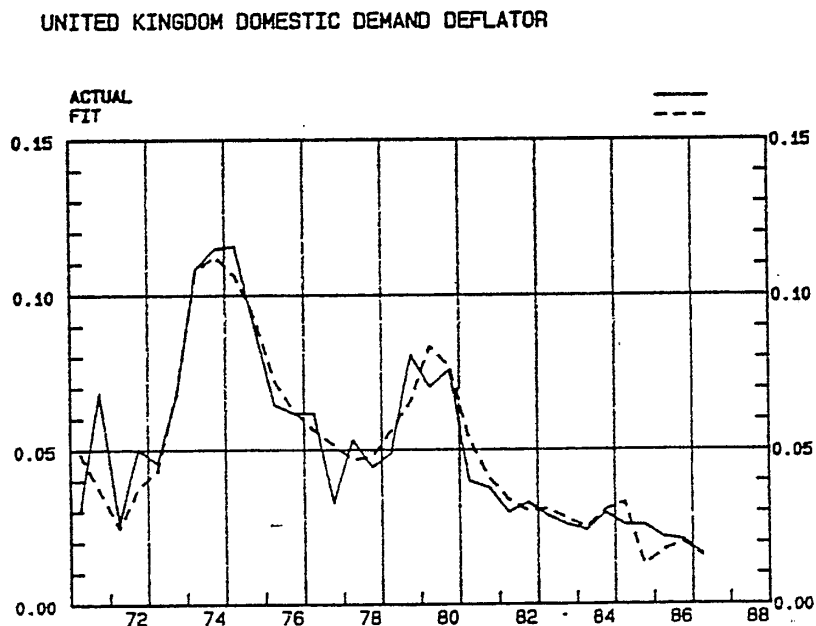
 UKPDDTS  $\log (\text{UKPDDI}/\text{UKPDDI}_{-1}) + \log ((1-\text{UKTINDLSS})/(1-\text{UKTINDLSS}_{-1}))$ 

UKULC unit labour costs

UKPM imports unit value index

UKPDDI domestic demand deflator index (75=1)

UKTINDLSS indirect taxes less subsidies



## Total Domestic Demand Deflators

---

 SWPDDI SWEDEN DOMESTIC DEMAND DEFLATOR
 

---

 $\Delta \log$  SWPDDI =

$$.20950 \Delta \log \text{SWULC} + .085963 \Delta \log \text{SWPM} + .05995 \Delta \log \text{SWPM}_1 +$$

(3.331) (0.8596) (1.497)

.02942  
(8.730)

R<sup>2</sup> = .486

SEE = .011

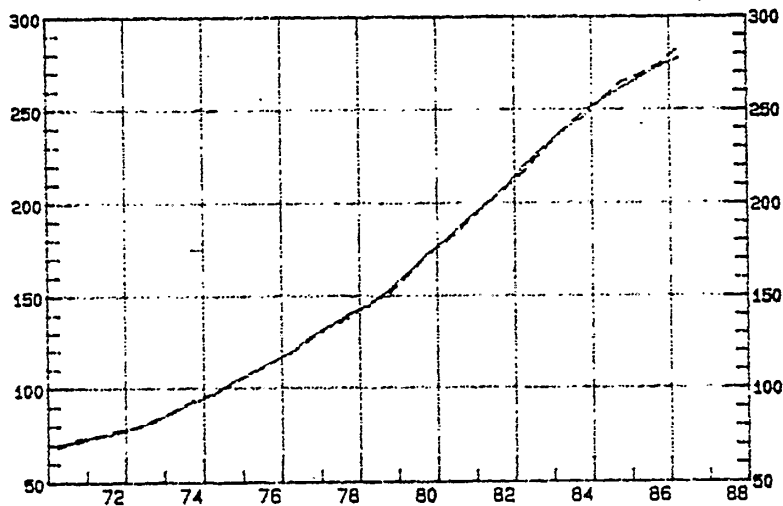
DW = 1.946

Estimation period 71S1 - 87S1

---

SWPDDI	domestic demand deflator index (75=1)
SWULC	unit labour costs
SWPM	imports unit value index

---

 SWEDEN DOMESTIC DEMAND DEFLATOR  
 ACTUAL  
 FIT


## Total Domestic Demand Deflators

---

FIPDDTS FINLAND DOMESTIC DEMAND DEFLATOR

---

FIPDDTS =

$$.28425 \Delta \log \text{FIULC}_{-1} + .37868 \Delta \log (\text{FIPM}) - .01858$$

(2.945) (6.105) (3.342)

$$R^2 = .701$$

$$\text{SEE} = .0189$$

$$\text{DW} = 2.784$$

Estimation period 73S1 - 87S1

---

FIPDDTS  $\log (\text{FIPDDI}/\text{FIPDDI}_{-1}) + \log ((1-\text{FITINDLSS})/(1-\text{FITINDLSS}_{-1}))$ 

FIULC unit labour costs

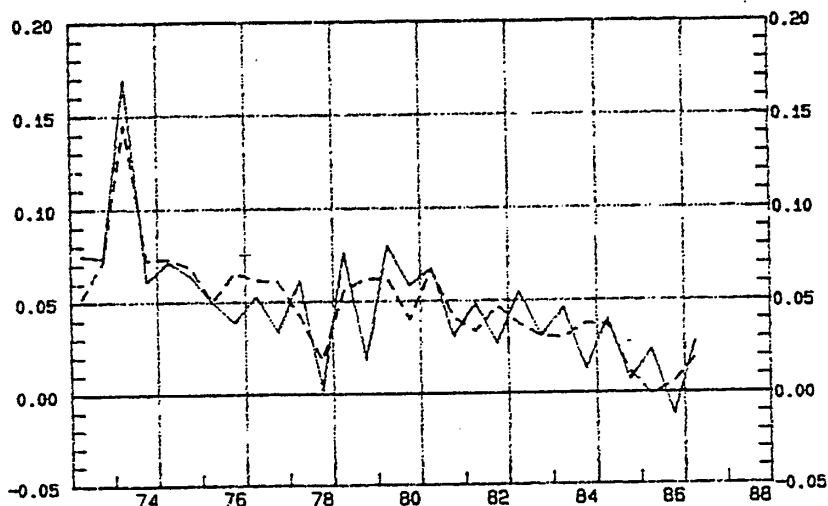
FIPM imports unit value index

FIPDDI domestic demand deflator index (75=1)

FITINDLSS indirect taxes less subsidies

## FINLAND DOMESTIC DEMAND DEFLATOR

ACTUAL  
FIT



## Export prices

---

 USPX UNITED STATES EXPORT PRICE DEFLATOR
 

---

$$\log (\text{USPX}/\text{USPX}_{-2}) =$$

$$.98808 \log (\text{USULC}/\text{USULC}_{-2}) + .27005 \log (\text{USWPX}_{-1}/\text{USWPX}_{-2}) +$$

(5.678) (2.851)

$$.50366 \text{USPX}_{-2}$$

(2.672)

$$R^2 = .699$$

$$\text{SEE} = .042$$

$$\text{DW} = .659$$

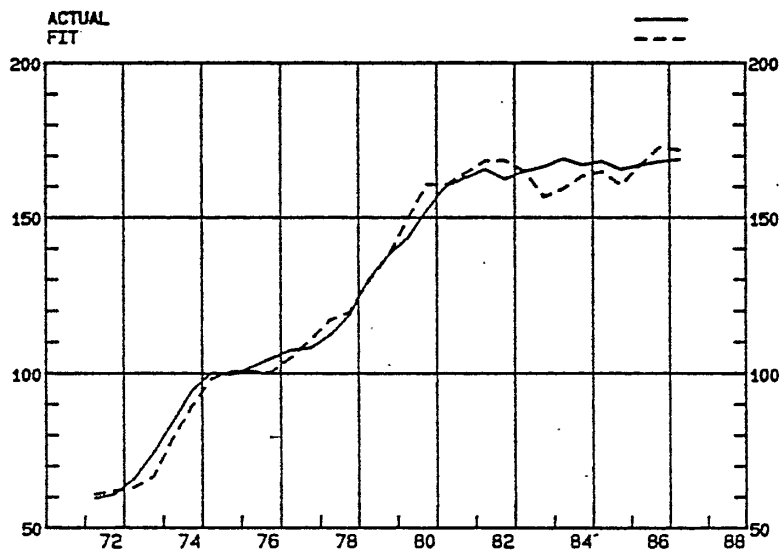
Estimation period 72S1 - 87S1

---

USPX export unit value index  
 USULC unit labour costs  
 USWPX competitors' export price index  
 USPXE error correction term = (.813 log USULC +  
 .422 log USWP - 1.135) - log USPX

---

## UNITED STATES EXPORT PRICE DEFLATOR



## Export prices

---

 JAPXDOL JAPAN EXPORT PRICE DEFLATOR
 

---

$$\log (\text{JAPXDOL} / \text{JAPXDOL}_{-2}) =$$

$$1.02927 \log (\text{JAWPX} / \text{JAWPX}_{-2}) - .92648 \text{JAPXE}_{-1} +$$

(20.726) (6.060)

$$1.6203 \text{JAPXE}_{-2}$$

(10.492)

$$R^2 = .931$$

$$\text{SEE} = .029$$

$$\text{DW} = 2.052$$

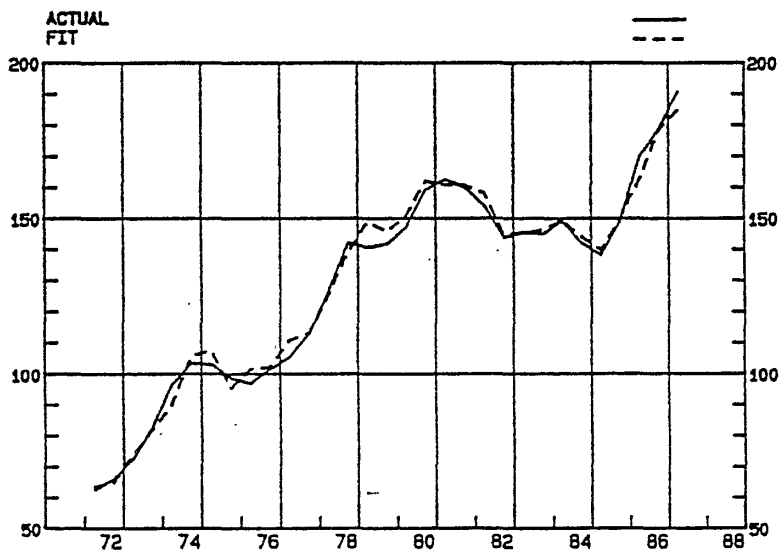
Estimation period 72S1 - 87S1

---

JAPXDOL export unit value index (in USD)  
 JAWPX competitors' export price index  
 JAPXE error correction term = (.952 log JAWPX +  
 .254) - log JAPXDOL

---

## JAPAN EXPORT PRICE DEFLATOR





## Export prices.....

---

 GEPXDOL      GERMANY EXPORT PRICE DEFLATOR
 

---

 $\Delta \log$  GEPXDOL =
$$.22541 \Delta \log \text{GEULC} + .60017 \Delta \log \text{GEWPX} + .60942 \Delta \log \text{DEM} +$$

(2.031)                      (8.300)                      (15.995)

$$.08584 \text{GEPXE}_{-1}$$

(3.173)

R<sup>2</sup> = .978

SEE = .012

DW = 1.732

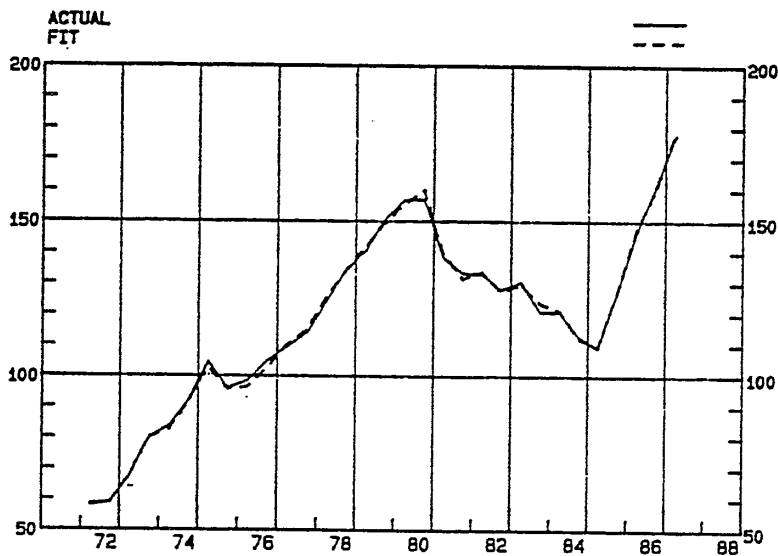
Estimation period 72S1 - 87S1

---

GEPXDOL	export unit value index
GEULC	unit labour costs
GEWPX	competitors' export price index
DEM	exchange rate to USD (75=1)
GEPXE	error correction term = (.906 log GEWPX + .387) - log GEPX

---

## GERMANY EXPORT PRICE DEFLATOR



## Export prices

---

FRPXDOL      FRANCE EXPORT PRICE DEFLATOR

---

 $\Delta \log \text{FRPXDOL} =$ 

$$.21958 \Delta \log \text{FRULC} + .78566 \Delta \log \text{FRWPX} + .41874 \Delta \log \text{FRF} +$$

(3.065)                      (11.453)                      (10.925)

$$.14072 \text{FRPXE}_{-1}$$

(3.665)

 $R^2 = .974$ 
 $\text{SEE} = .012$ 
 $\text{DW} = 1.944$ 

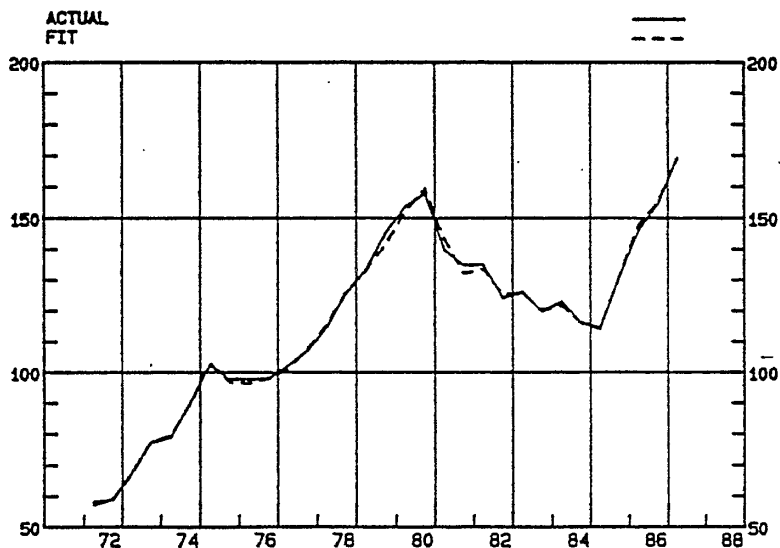
Estimation period 72S1 - 87S1

---

FRPXDOL      export unit value index  
FRULC          unit labour costs  
FRWPX          competitors' export price index  
FRF            exchange rate to USD (75=1)  
FRPXE          error correction term = (.915 log FRWPX +  
                  .326) - log FRPXDOL

---

## FRANCE EXPORT PRICE DEFLATOR



## Export prices

## UKPXDOL UNITED KINGDOM EXPORT PRICE DEFLATOR

 $\Delta \log \text{UKPXDOL} =$ 

$$.45708 \Delta \log \text{UKULC} + .40685 \Delta \log \text{UKWPX} + .53207 \Delta \log \text{GBP} +$$

(6.511) (4.635) (9.842)

$$.13244 \text{UKPXE}_{-1} + .03882 \Delta \log \text{OP}$$

(2.551) (3.071)

$R^2 = .939$

$\text{SEE} = .019$

$\text{DW} = 1.609$

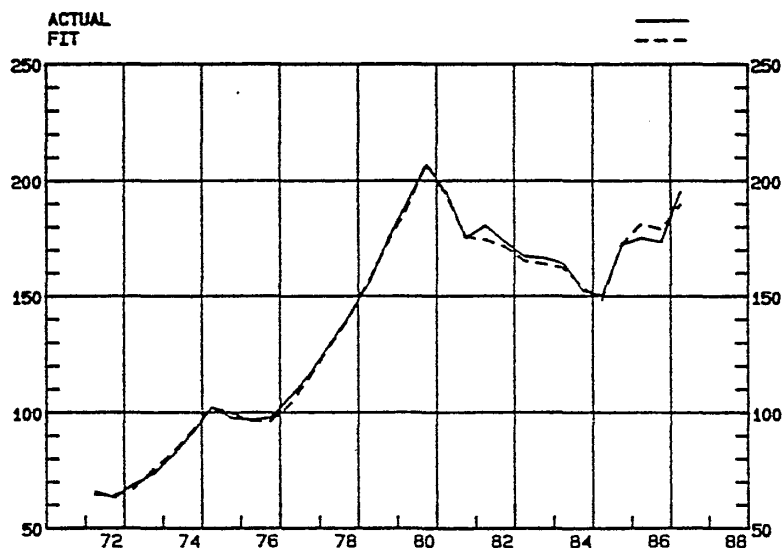
Estimation period 72S1 - 87S1

---

UKPXDOL export unit value index  
 UKULC unit labour costs  
 UKWPX competitors' export price index  
 GBP exchange rate to USD (75=1)  
 UKPXE error correction term =  $(.911 \log \text{UKWPX} - .230) - \log \text{UKPXDOL}$   
 OP spot price of crude oil

---

## UNITED KINGDOM EXPORT PRICE DEFLATOR



Export prices.....

---

SWPX DOL SWEDEN EXPORT PRICE DEFLATOR

---

$\log (\text{SWPX DOL} / \text{SWPX DOL}_{-2}) =$

$.29118 \log (\text{SWULC} / \text{SWULC}_{-2}) + .81190 \log (\text{SWWPX} / \text{SWWPX}_{-2}) +$   
 (1.788) (7.673)

$.50426 \log (\text{SEK} / \text{SEK}_{-2}) + .10728 \text{ SWPXE}_{-2}$   
 (5.708) (1.237)

$R^2 = .916$

SEE = .041

DW = .879

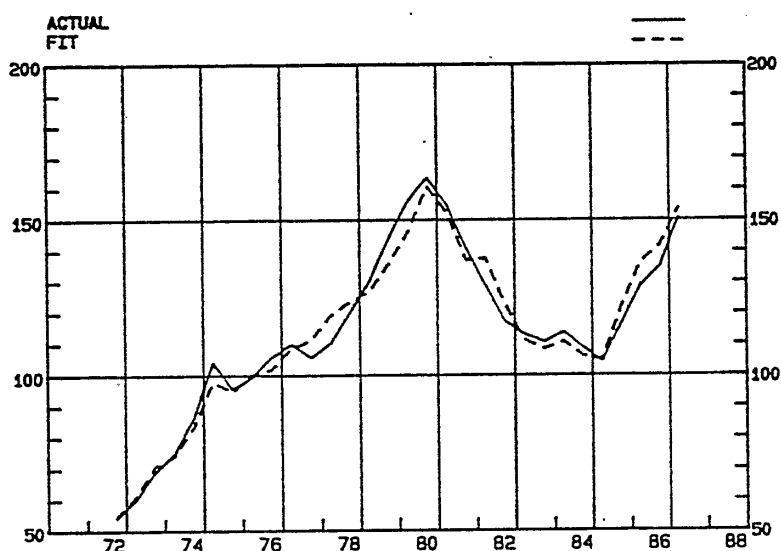
Estimation period 72S2 - 87S1

---

SWPX DOL export unit value index  
 SWULC unit labour costs  
 SWWPX competitors' export price index  
 SEK exchange rate to USD (75=1)  
 SWPXE error correction term =  $(.950 \log \text{SWWPX} + .121) - \log \text{SWPX DOL}$

---

SWEDEN EXPORT PRICE DEFLATOR



## Export prices

---

 FIPXDOL FINLAND EXPORT PRICE DEFLATOR
 

---

$$\log (FIPXDOL/FIPXDOL_{-2}) =$$

$$.40803 \log (FIUL/FIULC_{-2}) + .89556 \log (FIWPX/FIWPX_{-2}) +$$

(4.111) (7.968)

$$.24921 \log (FMK/FMK_{-2}) + .47310 FIPXE_{-2}$$

(70.783) (3.659)

$$R^2 = .937$$

$$SEE = .037$$

$$DW = .983$$

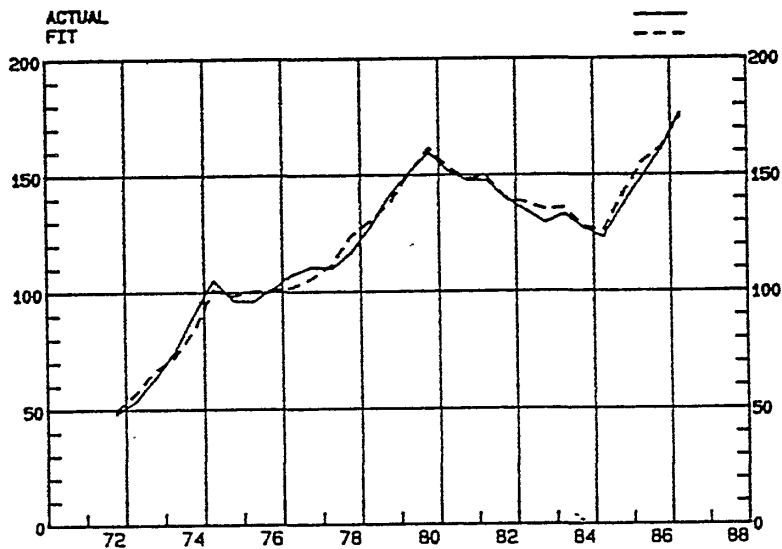
 Estimation period 72S2 - 87S1
 

---

FIPXDOL export unit value index  
 FIULC unit labour costs  
 FIWPX competitors' export price index  
 FMK exchange rate to USD (75=1)  
 FIPXE error correction term = (1.170 log FIWPX -  
 .889) - log FIPXDOL

---

## FINLAND EXPORT PRICE DEFLATOR



Export prices

---

 OPPX            OPEC COUNTRIES EXPORT PRICES
 

---

 $\Delta \log \text{OPPX} =$ 

$$0.74418 \Delta \log \text{OP} + .13039 \Delta \log \text{OP}_{-1}$$

(12.024)                    (2.017)

 $R^2 = .833$ 

SEE = .100

DW = 2.053

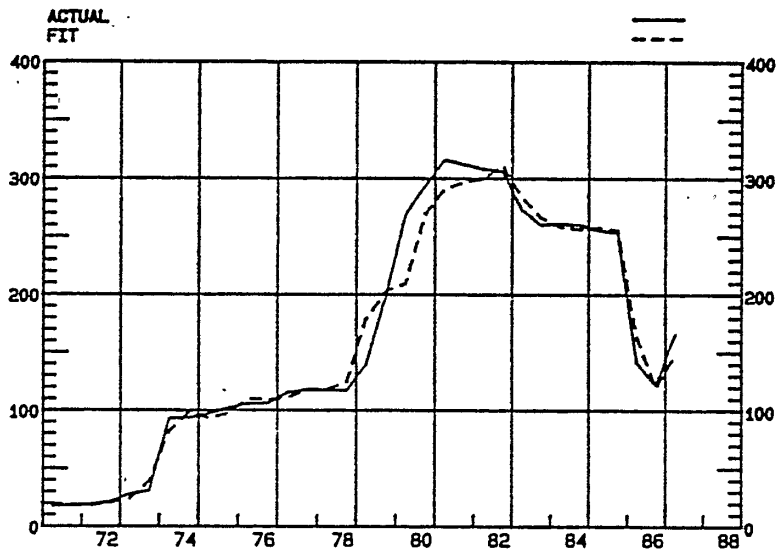
Estimation period 71S1 - 87S2

---

 OPPX            export unit value index  
 OP                crude oil price \$/bar
 

---

OPEC COUNTRIES EXPORT PRICES



## Export prices

---

DCPX            DEVELOPING COUNTRIES EXPORT PRICES

---

 $\Delta \log \text{DCPX} =$ 

$$.47928 \Delta \log \text{VINO} + .16089 \Delta \log \text{VINO}_{-1} + .18045 \Delta \log \text{VINO}_{-2}$$

(6.63)                      (1.93)                      (2.51)

 $R^2 = .759$ 
 $\text{SEE} = .037$ 
 $\text{DW} = 1.966$ 

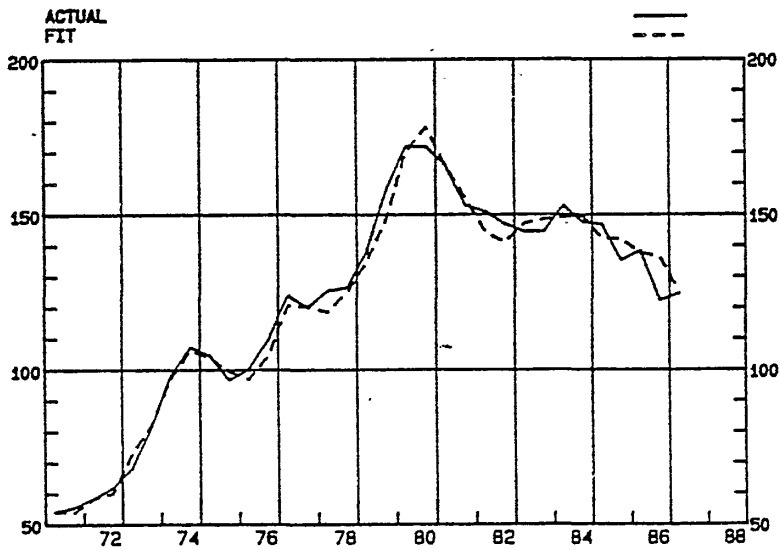
 Estimation period 71S1 - 87S2
 

---

DCPX            export unit value index  
 VINO            commodity price index (oil excl.)

---

## DEVELOPING COUNTRIES EXPORT PRICES



## Import volumes

---

 USM UNITED STATES IMPORTS, VOLUME (82-USD)
 

---

log USM =

$$-0.07542 \log(\text{USPM}/\text{USPDDI})_{-1} + 1.90576 \log \text{USDD}$$

(2.588) (5.585)

$$+ .06629 \log (\text{USM})_{-1} - 9.89963$$

(0.724) (10.599)

R<sup>2</sup> = .9960

SEE = .0270

DW = 1.9082

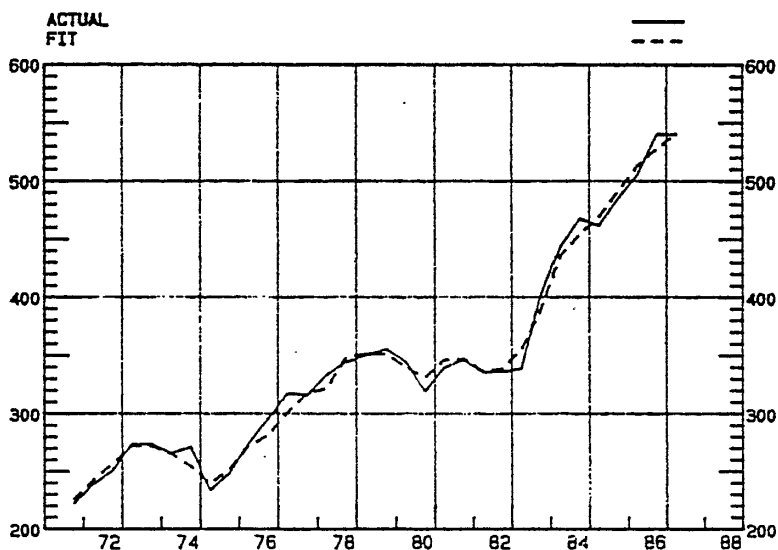
Estimation period 71S2 - 87S1

---

USM	imports, volume (82-USD)
USPM	imports, unit value index
USPDDI	(total) domestic demand price deflator
USDD	(total) domestic demand (82-USD)

---

## UNITED STATES IMPORTS, VOLUME (82-USD)





## Import volumes

---

JAM            JAPAN IMPORTS, VOLUME (80-JPY)

---

$$\begin{aligned} \log JAM = & \\ & -.07254 \log (JAPM/JAPDDI)_{-1} + .35248 \log JADD \\ & (2.030) \qquad\qquad\qquad (2.992) \\ & + .63135 \log (JAM)_{-1} - 0.47733 \\ & (5.865) \qquad\qquad\qquad (0.799) \end{aligned}$$

$$R^2 = .949$$

$$SEE = .039$$

$$DW = .989$$

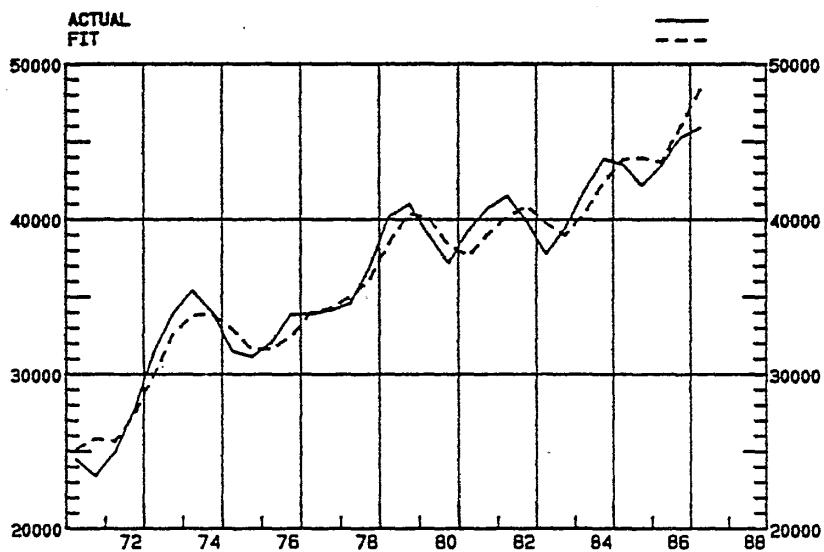
Estimation period 71S1 - 87S1

---

JAM            imports, volume (80-YEN)  
 JAPM           imports, unit value index  
 JAPDDI        (total) domestic demand price deflator  
 JADD           (total) domestic demand (80-YEN)

---

## JAPAN IMPORTS, VOLUME (80-YEN)



## Import volumes

---

GEM            GERMANY IMPORTS, VOLUME (80-DEM)

---

log GEM =

$$-.03335 \Delta \log (\text{GEPM}/\text{GEPX})_{-1} + .70068 \log (\text{GEDD}) + .65863 \text{LOG} (\text{GEM})_{-1}$$

(1.269)

(4.360)

(8.896)

$$- 2.78697$$

(4.102)

$$R^2 = .993$$

$$\text{SEE} = .017$$

$$\text{DW} = 1.767$$

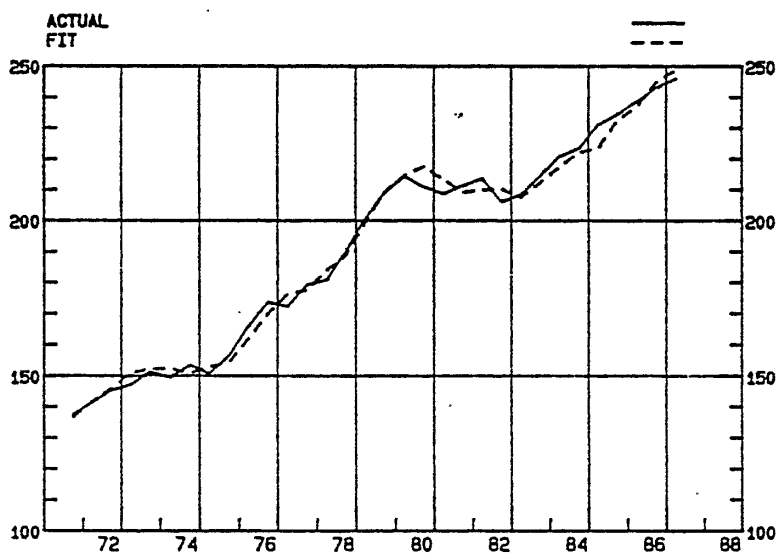
Estimation period 71S2 - 87S1

---

GEM            imports, volume (80-DEM)  
 GEPM          imports, unit value index  
 GEPX          exports, unit value index  
 GEDD          (total) domestic demand

---

GERMANY IMPORTS, VOLUME (80-DEM)



## Import volumes

---

FRM                  FRANCE IMPORTS, VOLUME (80-FRF)

---

log FRM =

-.20126 log (FRPM/FRPDDI)<sub>-1</sub> + 1.03194 log FRDD  
(3.198)                                    (5.402)

+ .43580 log (FRM)<sub>-1</sub> - 4.25062  
(4.641)                                    (4.889)

R<sup>2</sup>                   =            .987

SEE                  =            .024

DW                  =            1.255

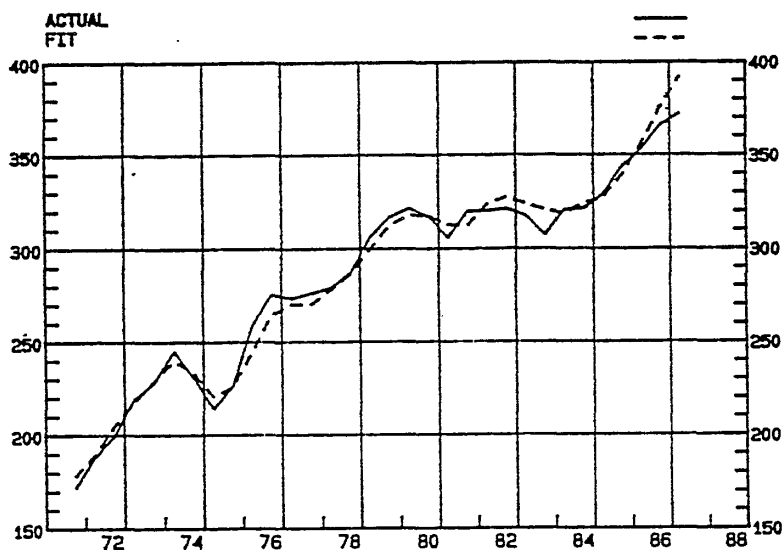
Estimation period 71S2 - 87S1

---

FRM                  imports, volume (80-FRF)  
FRPM                imports, unit value index  
FRPDDI              domestic demand price deflator  
FRDD                (total) domestic demand

---

FRANCE IMPORTS, VOLUME (80-FRF)



Import volumes

---

UKM UNITED KINGDOM IMPORTS, VOLUME (80 - GBP)

---

$\log \text{UKM} =$

$-.06438 \log(\text{UKPM}/\text{UKPDDI})_{-1} + 1.49798 \log \text{UKDD}$   
 (1.337) (8.124)

$+ .23762 \log (\text{UKM})_{-1} - 9.59295$   
 (2.470) (7.669)

$R^2 = .975$

SEE = .025

DW = 2.004

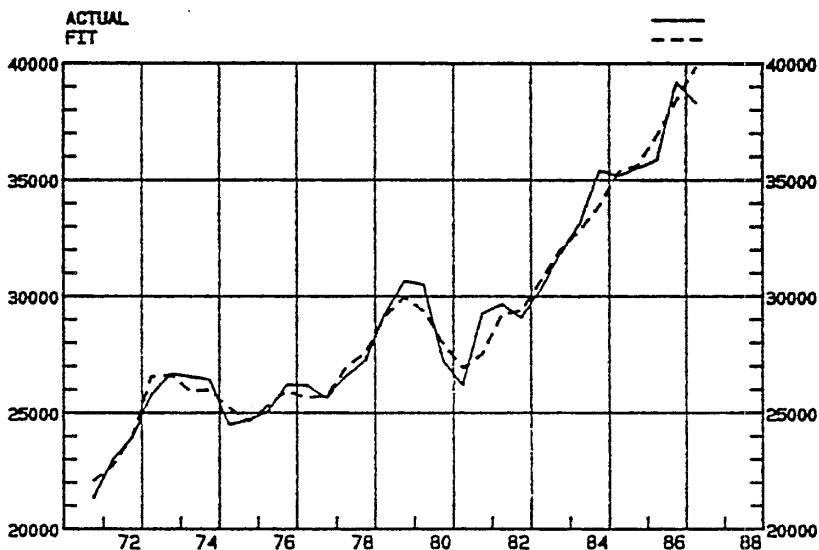
Estimation period 71S2 - 87S1

---

UKM imports, volume (80-GBP)  
 UKPM imports, unit value index  
 UKPDDI domestic demand price deflator  
 UKDD (total) domestic demand

---

UNITED KINGDOM IMPORTS, VOLUME (80-GBP)



## Import volumes

---

 SWM SWEDEN IMPORTS, VOLUME (80 - SKR)
 

---

log SWM =

$$-.13383 \log (\text{SWPM}/\text{SWPDDI})_{-1} + 1.31749 \log \text{SWDD}$$

(2.612) (6.392)

$$+ .26152 \log (\text{SWM})_{-1} - 8.07952$$

(2.045) (5.887)

R<sup>2</sup> = .954

SEE = .024

DW = 1.284

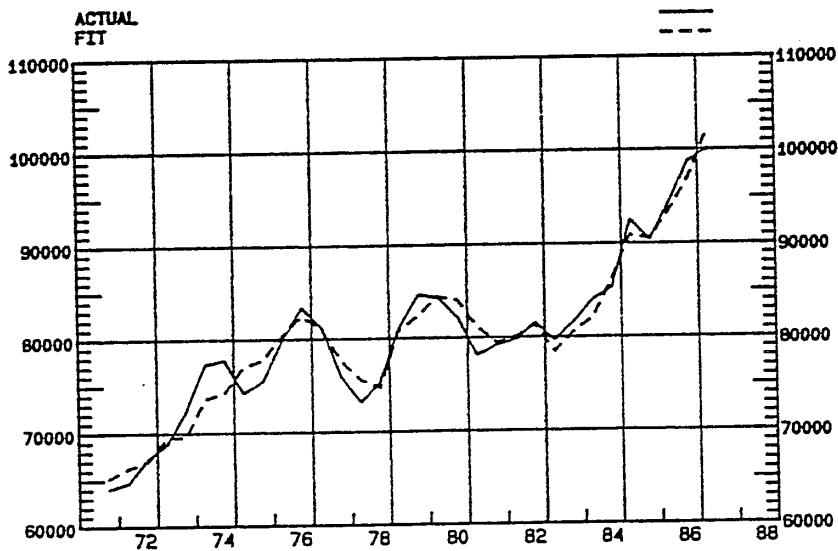
Estimation period 71S2 - 87S1

---

SWM	imports, volume (80-SKR)
SWPM	imports, unit value index
SWPDDI	domestic demand price deflator
SWDD	(total) domestic demand

---

SWEDEN IMPORTS, VOLUME (80-SKR)



Import volumes.....

---

FIM FINLAND IMPORTS, VOLUME (85-FIM)

---

log FIM =

$$-.06080 \log (\text{FIPM}/\text{FIPDDI})_{-1} + 1.02998 \log \text{FIDD} + .15130 \log \text{FIM}_{-1}$$

(.611)

(6.632)

(1.116)

$$- 3.22266$$

(4.580)

$$R^2 = .959$$

$$\text{SEE} = .033$$

$$\text{DW} = 1.148$$

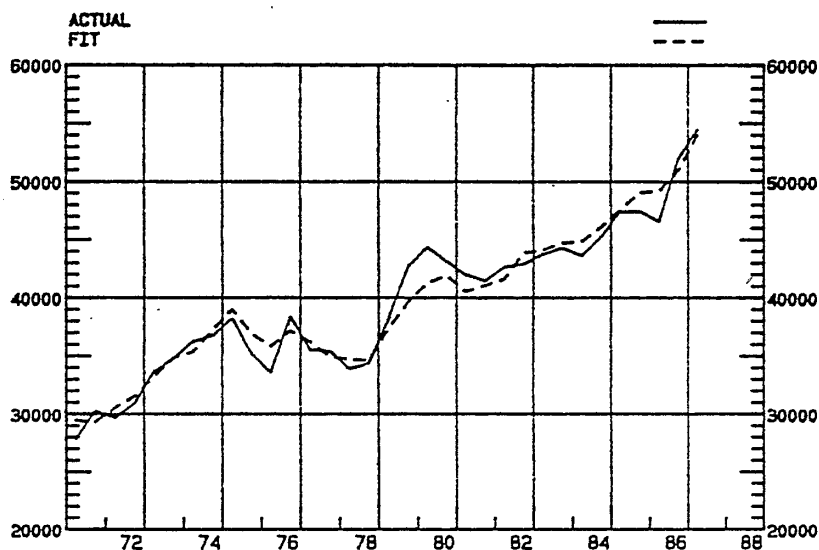
Estimation period 71S1 - 87S2

---

FIM imports, volume (85-FIM)  
 FIPM imports, unit value index  
 FIPDDI domestic demand price deflator  
 FIDD (total) domestic demand

---

FINLAND IMPORTS, VOLUME (85-FIM)



## Import volumes

---

OOMD            OTHER OECD COUNTRIES IMPORTS, VOLUME, %-CHANGE

---

OOMD =

$$2.17765 \text{ OODDD} + .28117 (\text{OOMD})_{-1} - 1.41845$$

(6.734)            (2.519)            (2.210)

$$R^2 = .719$$

$$\text{SEE} = 2.694$$

$$\text{DW} = 1.492$$

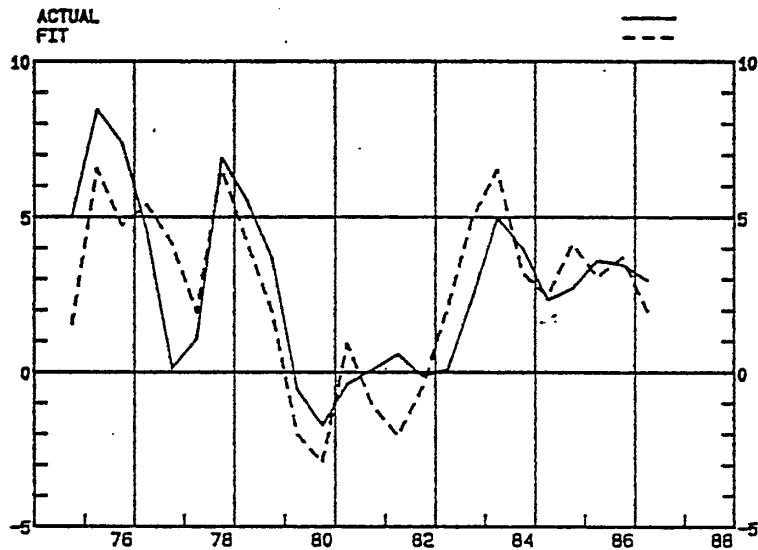
Estimation period 75S2 - 87S1

---

OOMD            imports, volume (USD), percentage change  
 OODDD           (total) domestic demand, percentage change

---

## OTHER OECD COUNTRIES IMPORTS, VOLUME, %-CHANGE



## Import volumes

---

 OPMI OPEC COUNTRIES IMPORTS, VOLUME (80=100)
 

---

log OPMI =

$$.61320 \log \text{OPMI}_{-1} + .21141 \log (\text{OP}/\text{OEPDDI})_{-1} +$$

(10.596)

(5.371)

2.77520

(6.612)

R<sup>2</sup> = .975

SEE = .071

DW = 1.195

Estimation period 72S1 - 87S1

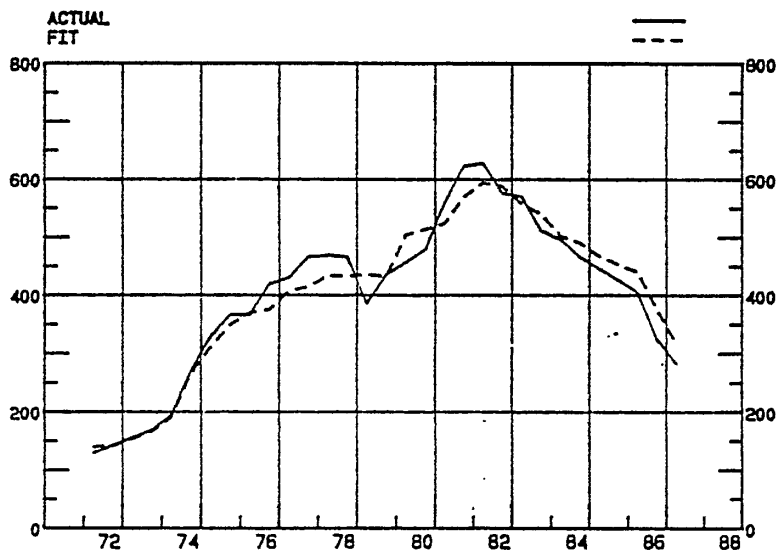
---

 OPMI OPEC-countries imports, volume index (80 = 100)

OP SPOT-price of crude oil

OEPDDI domestic demand deflator of OECD-countries

## OPEC COUNTRIES IMPORTS, VOLUME (80=100)





## Export volumes

---

 USXDOL UNITED STATES EXPORTS, VOLUME (82-USD)
 

---

 $\log(\text{USXDOL}/\text{USXDM}) =$ 

$$\begin{array}{r}
 -.17358 \log(\text{USPX}/\text{USWPX}) + .71168 \log(\text{USXDOL}/\text{USXDM})_{-1} - .02003 \\
 (3.659) \qquad \qquad \qquad -1 (7.455) \qquad \qquad \qquad (2.054)
 \end{array}$$

 $R^2 = .832$ 
 $\text{SEE} = .023$ 
 $\text{DW} = 1.592$ 

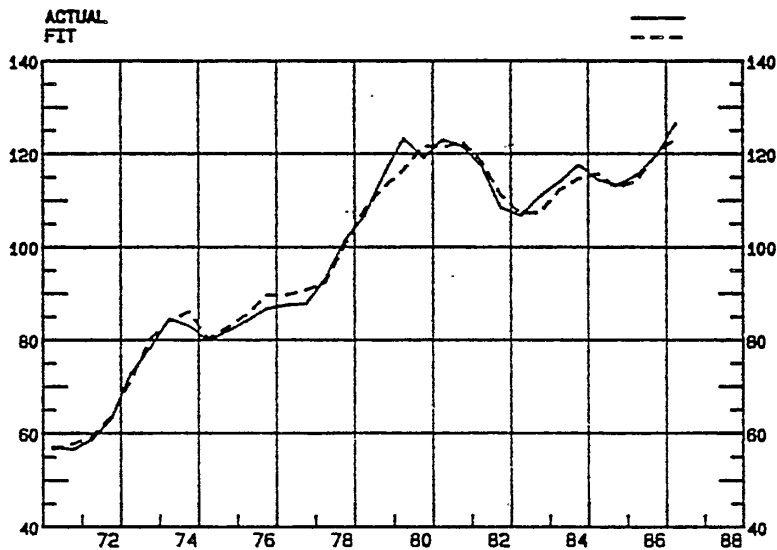
 Estimation period 71S1 - 87S2
 

---

USXDOL	exports, volume (82-USD)
USXDM	exports given by market growth
USPX	export price deflator
USWPX	competitors' export price deflator

---

UNITED STATES EXPORTS, VOLUME (82-USD)



Export volumes

---

 JAXDOL JAPAN EXPORTS, VOLUME (80-USD)
 

---

 $\log(\text{JAXDOL}/\text{JAXDM}) =$ 

$$-.63890 \log(\text{JAPXDOL}/\text{JAWPX}) + 1.00987 \log(\text{JAXDOL}/\text{JAXDM})_{-1} + .02108$$

(4.021) (25.184) (3.184)

$R^2 = .967$

$\text{SEE} = .031$

$\text{DW} = 1.748$

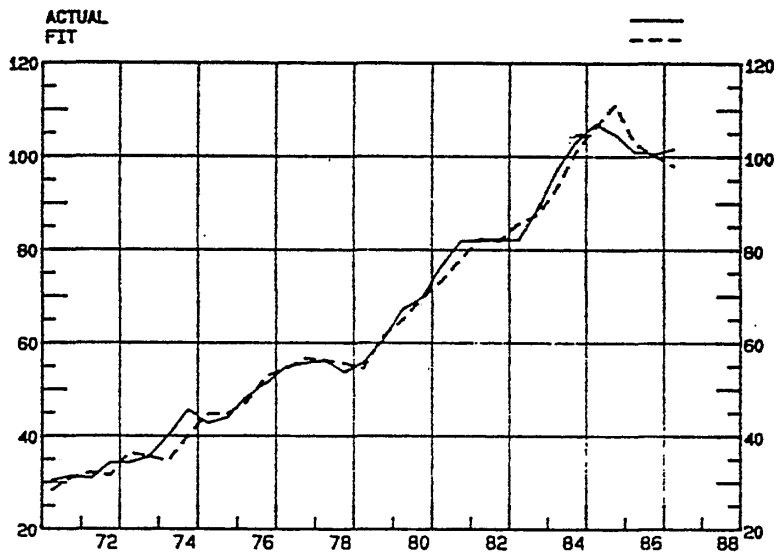
 Estimation period 71S1 - 87S1
 

---

JAXDOL exports, volume (80-USD)  
 JAXDM exports given by market growth  
 JAPXDOL export price deflator  
 JAWPX competitors' export price deflator

---

JAPAN EXPORTS, VOLUME (80-USD)



Export volumes.....

---

GEXDOL      GERMANY EXPORTS, VOLUME (80-USD)

---

$\log(\text{GEXDOL}/\text{GEXDM}) =$

$-.09435 \log(\text{GEPXDOL}/\text{GEWPX}) + .88348 \log(\text{GEXDOL}/\text{GEXDM})_{-1}$   
(2.405)                                  -2 (9.764)

- .00392  
(0.469)

$R^2 = .820$

SEE = .023

DW = 2.623

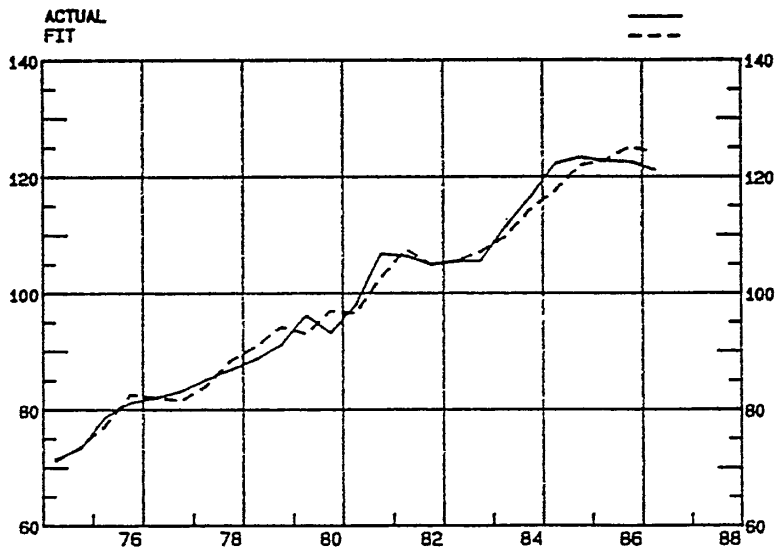
Estimation period 75S1 - 87S1

---

GEXDOL      exports, volume (80-USD)  
GEXDM        exports given by market growth  
GEPXDOL     export price deflator  
GEWPX        competitors' export price deflator

---

GERMANY EXPORTS, VOLUME (80-USD)



## Export volumes

---

FRXDOL FRANCE EXPORTS, VOLUME (80 - USD)

---

 $\log(\text{FRXDOL}/\text{FRXDM}) =$ 
 $-.19459 \log(\text{FRPXDOL}/\text{FRWPX}) + .43117 \log(\text{FRXDOL}/\text{FRXDM})_{-1}$   
(3.389) (3.774)

 $-.01322$   
(2.439)

 $R^2 = .661$ 
 $\text{SEE} = .018$ 
 $\text{DW} = 2.142$ 

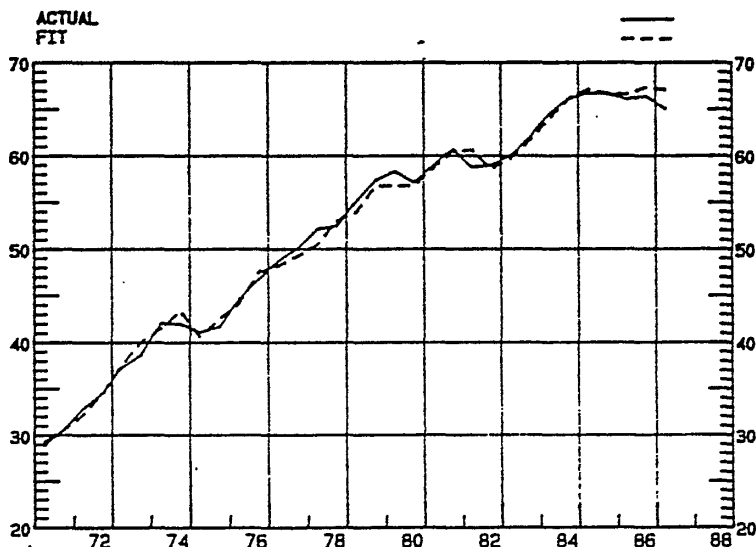
Estimation period 71S1 - 87S1

---

FRXDOL exports, volume (80-USD)  
FRXDM exports given by market growth  
FRPXDOL export price deflator  
FRWPX competitors' export price deflator

---

FRANCE EXPORTS, VOLUME (80-USD)



## Export volumes

---

 UKXDOL UNITED KINGDOM EXPORTS, VOLUME (80-USD)
 

---

 $\log(\text{UKXDOL}/\text{UKXDM}) =$ 

$$-.22348 \log(\text{UKPXDOL}/\text{UKWPX}) + .62142 \log(\text{UKXDOL}/\text{UKXDM})_{-1}$$

(4.281) (7.372)

$$+ .04082$$

(4.170)

 $R^2 = .918$ 
 $\text{SEE} = .016$ 
 $\text{DW} = 1.979$ 

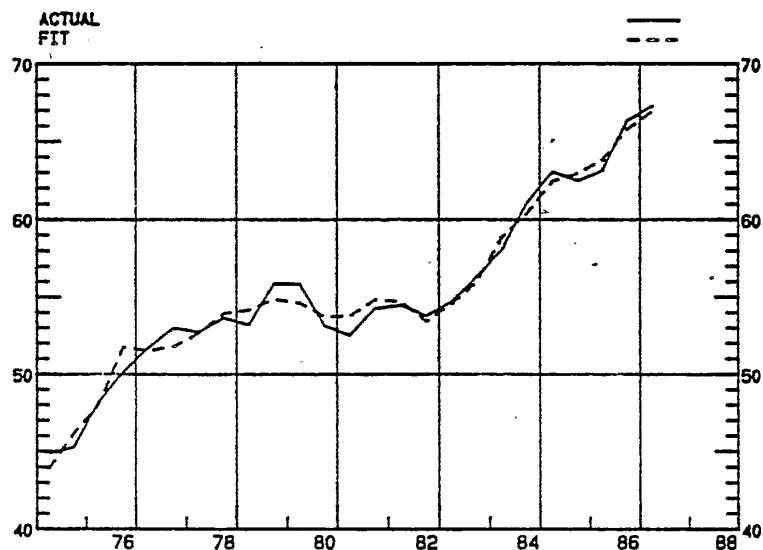
 Estimation period 75S1 - 87S1
 

---

UKXDOL	exports, volume (80-USD)
UKXDM	exports given by market growth
UKPXDOL	export price deflator
UKWPX	competitors' export price deflator

---

UNITED KINGDOM EXPORTS, VOLUME (80-USD)



Export volumes

---

 SWXDOL SWEDEN EXPORTS, VOLUME (80-USD)
 

---

 $\log(\text{SWXDOL}/\text{SWXDM}) =$ 

$$-.09138 \log(\text{SWPX DOL}/\text{SWWPX}) + .84285 \log(\text{SWXDOL}/\text{SWXDM})_{-1} +$$

(1.939) (18.263)

$$.04237 * \text{DUM82}$$

(2.153)

 $R^2 = .910$ 
 $\text{SEE} = .0242$ 
 $\text{DW} = 2.328$ 

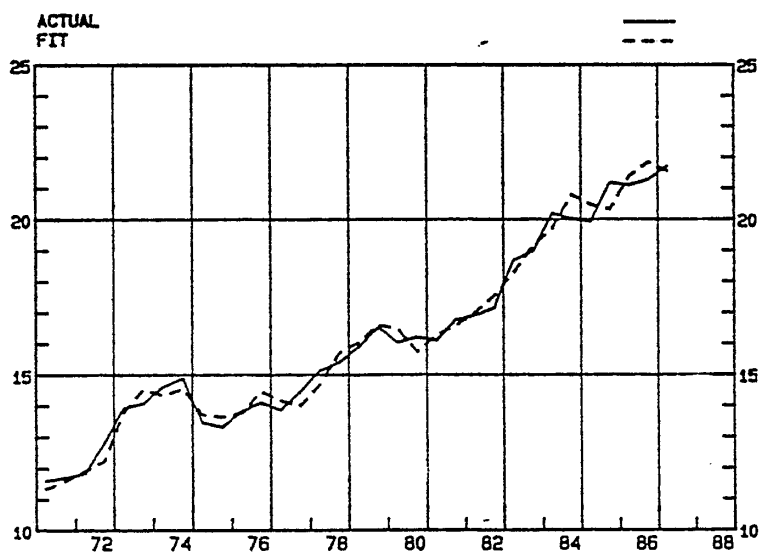
 Estimation period 71S1 - 87S1
 

---

SWXDOL	exports, volume (80-USD)
SWXDM	exports given by market growth
SWPX DOL	export price deflator
SWWPX	competitors' export price deflator
DUM82	devaluation dummy

---

SWEDEN EXPORTS, VOLUME (80-USD)



## Export volumes

---

FIXDOL      FINLAND EXPORTS, VOLUME (80-USD)

---

 $\log(\text{FIXDOL}/\text{FIXDM}) =$ 

$$-.04116 \log(\text{FIPXDOL}/\text{FIWPX}) + .92861 \log(\text{FIXDOL}/\text{FIXDM})_{-1}$$

( .662)    -1(10.326)

$$+ .01147$$

( .785)

$$R^2 = .874$$

$$\text{SEE} = .041$$

$$\text{DW} = 1.686$$

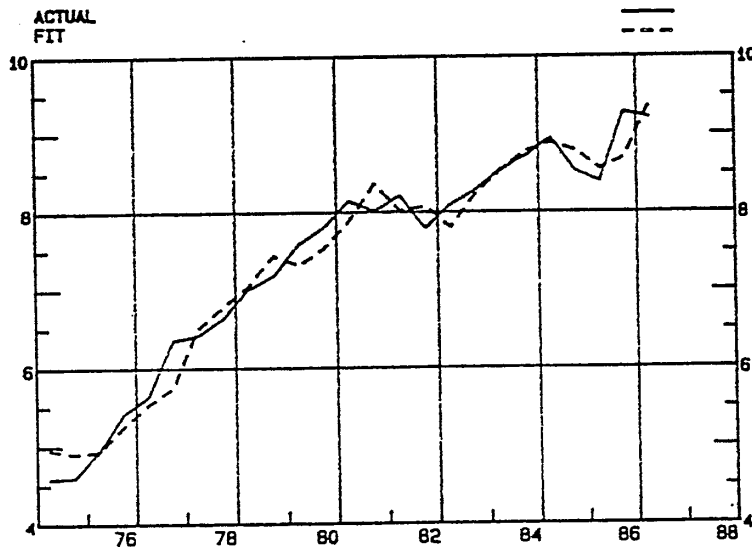
Estimation period 75S1 - 87S1

---

FIXDOL      exports, volume (80-USD)  
FIXDM      exports given by market growth  
FIPXDOL    export price deflator  
FIWPX      competitors' export price deflator

---

FINLAND EXPORTS, VOLUME (80-USD)



Private consumption volumes

USC UNITED STATES PRIVATE CONSUMPTION (82-USD)

$$\log(\text{USC}/\text{USC}_{-2}) =$$

$$-.64507 \log(\text{USDDI}/\text{USPDDI}_{-2}) - .00198(\text{PRIMES} * \text{USPDDIE})$$

(10.203) (3.808)

$$+ .62176 \log(\text{USQ}/\text{USQ}_{-2}) + .82004 \log(\text{USQ}_{-2}/\text{USC}_{-2})$$

(11.077) (7.222)

$$- .30586$$

(6.087)

$$R^2 = .936$$

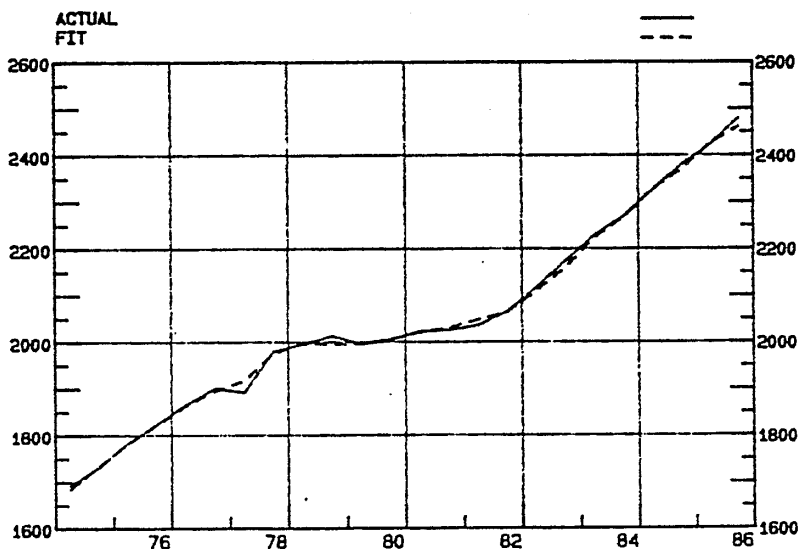
$$\text{SEE} = .005$$

$$\text{DW} = 1.988$$

Estimation period 75S1 - 86S2

USC private consumption, volume (82-USD)  
 USPDDI domestic demand deflator  
 PRIMES US-prime rate  
 USPDDIE expected change of domestic demand deflator  
 USQ GDP, VOLUME (82-USD)

UNITED STATES PRIVATE CONSUMPTION, VOLUME (82-USD)





## Private consumption volumes

---

JAC            JAPAN PRIVATE CONSUMPTION (80-JPY)

---

log JAC =

$$\begin{aligned}
 &.11547 \log \text{JAQ}_{-1} + .76493 \log \text{JAC}_{-1} - .00309 \text{JAPDDIE} \\
 &\quad (1.362) \qquad \qquad (6.913) \qquad \qquad (1.981) \\
 &- .00398 \text{JARI}_{-1} + 1.40971 \\
 &\quad (3.159) \qquad \qquad (4.060)
 \end{aligned}$$

$R^2$         =        .998

SEE        =        .006

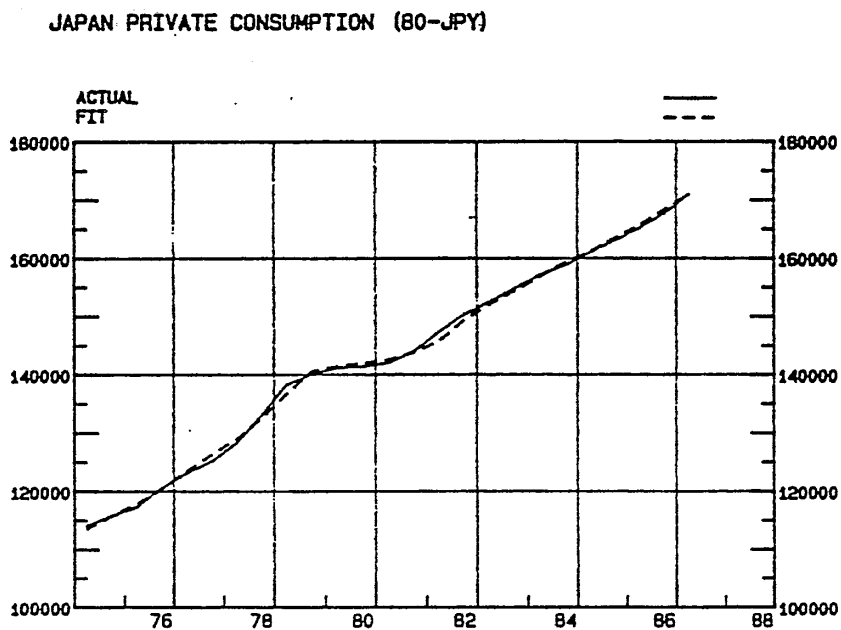
DW        =        1.25

Estimation period 75S1 - 87S1

---

JAC            private consumption, volume (82-JPY)  
 JAPDDIE        expected change of domestic demand deflator  
 JAQ            GDP, VOLUME (82-JPY)

---



Private consumption volumes

---

GEC GERMANY PRIVATE CONSUMPTION, VOLUME (80-DEM)

---

$\log(\text{GEC}/\text{GEC}_{-2}) =$

$-.00996(\text{GERI}-\text{GEPDDIE}) + .45731 \log(\text{GEQ}/\text{GEQ}_{-2})$   
 (4.032) (3.755)

$+ .46114 \log(\text{GEQ}_{-2}/\text{GEC}_{-2}) - .19450$   
 (3.429) (2.227)

$R^2 = .808$

SEE = .009

DW = .969

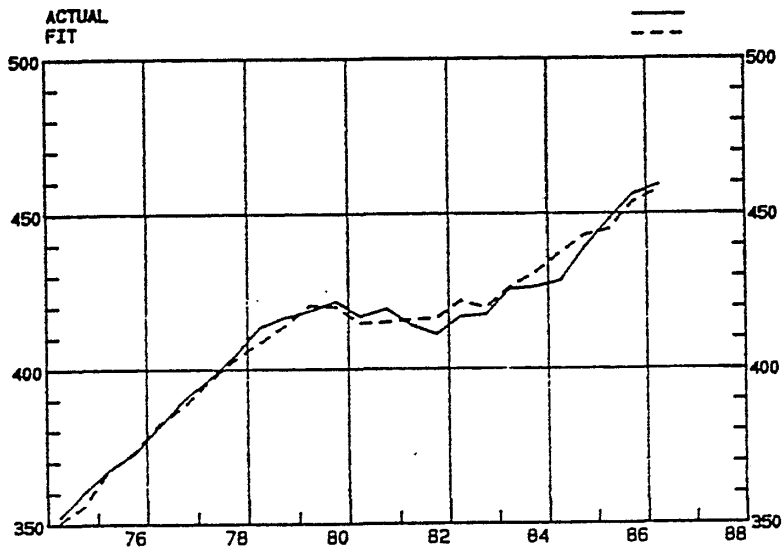
Estimation period 75S1 - 86S2

---

GEC private consumption, volume (80-DEM)  
 GERI yield on fully taxed industry bonds  
 GEPDDIE expected change of domestic demand deflator  
 GEQ GDP, VOLUME (80-DEM)

---

GERMANY PRIVATE CONSUMPTION, VOLUME (80-DEM)



## Private consumption volumes

---

 FRC           FRANCE PRIVATE CONSUMPTION, VOLUME (80-FRF)
 

---

 $\Delta \log \text{FRF} =$ 

$$.74060 \Delta \log \text{FRQ} = .00325 \Delta (\text{FRR1} - \text{FRPDDIE})$$

(5.744)                                   (2.664)

$$+ .22291 \log(\text{FRQ}_{-1} / \text{FRC}_{-1}) - .11138$$

(3.136)                                   (2.970)

 $R^2 = .662$ 
 $\text{SEE} = .005$ 
 $\text{DW} = 2.012$ 

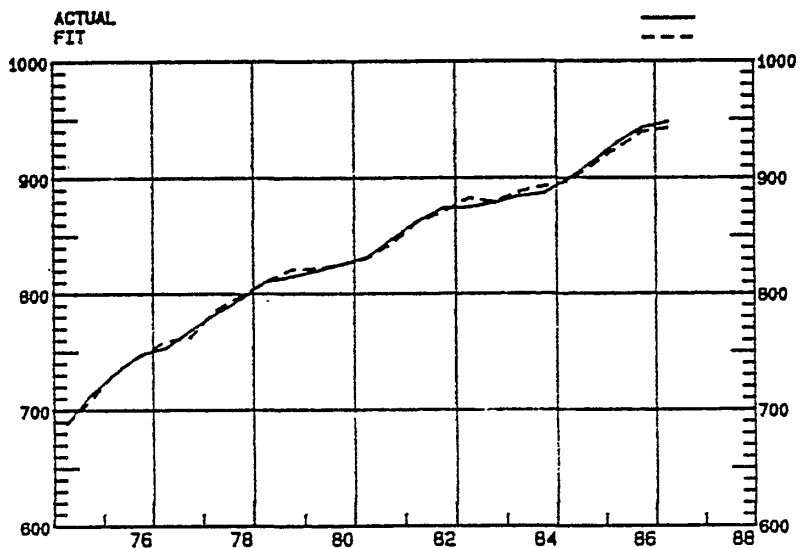
 Estimation period 75S1 - 87S1
 

---

FRC	private consumption, volume (80-FRF)
FRR1	yield on fully taxed industry bonds
FRPDDIE	expected change of domestic demand deflator
FRQ	GDP, VOLUME (80-FRF)

---

## FRANCE PRIVATE CONSUMPTION, VOLUME (80-FRF)



Private consumption volumes.

---

 UKC UNITED KINGDOM PRIVATE CONSUMPTION, VOLUME (80-GBP)
 

---

 $\log(\text{UKC}/\text{UKC}_{-2}) =$ 
 $-.00680 \text{ UKPDDIE} + .28561 \log(\text{UKQ}/\text{UKQ}_{-2})$   
 (5.231) (1.808)

 $+ .48672 \log(\text{UKQ}_{-2}/\text{UKC}_{-2}) - .20076$   
 (4.054) (3.341)

 $R^2 = .761$ 
 $\text{SEE} = .013$ 
 $\text{DW} = 1.284$ 

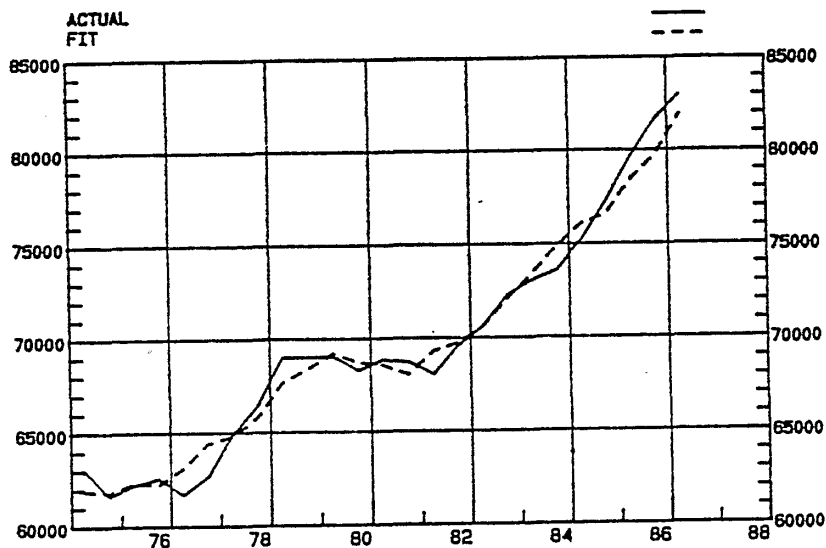
 Estimation period 75S1 - 86S2
 

---

 UKC private consumption, volume (80-GBP)  
 UKPDDIE expected change of domestic demand deflator  
 UKQ GDP, VOLUME (80-GBP)
 

---

UNITED KINGDOM PRIVATE CONSUMPTION, VOLUME (80-GBP)



## Private consumption volumes

---

 SWC SWEDEN PRIVATE CONSUMPTION, VOLUME (80-SKR)
 

---

logSKC =

$$.38007 \log SWQ_{-1} + .60303 \log SWC_{-1}$$

(4.153) (6.299)

$$- .00728 (\text{SWRI} - \text{SWPDDIE})$$

(3.418)

$$R^2 = .878$$

$$\text{SEE} = .012$$

$$\text{DW} = 1.983$$

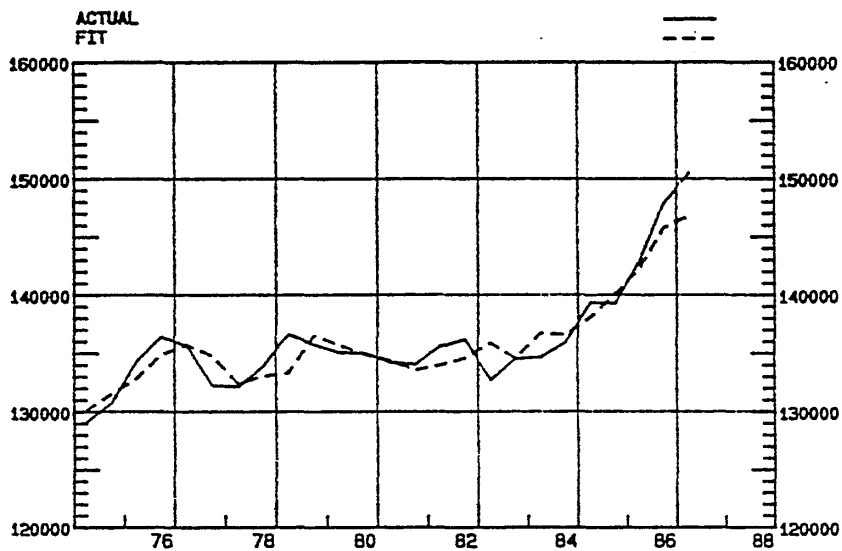
Estimation period 75S1 - 87S1

---

SWC	private consumption, volume (80-SKR)
SWRI	yield of long-term GVT-bonds, %
SWPDDIE	expected change of domestic demand deflator
SWQ	GDP, VOLUME (80-SKR)

---

## SWEDEN PRIVATE CONSUMPTION, VOLUME (80-SKR)



## Private consumption volumes

---

 FIC FINLAND PRIVATE CONSUMPTION, VOLUME (85-FIM)
 

---

 $\log(\text{FIC}/\text{FIC}_{-2}) =$ 
 $-.01080 \text{ FIPDDIE} - .01458(\text{FIRI}-\text{FIPDDIE})$   
 (3.149) (4.263)

 $+ .57691 \log(\text{FIQ}/\text{FIQ}_{-2}) + .47894 \log(\text{FIQ}_{-2}/\text{FIC}_{-2})$   
 (5.277) (4.548)

 $-.14103$   
 (2.207)

 $R^2 = .742$ 
 $\text{SEE} = .0113$ 
 $\text{DW} = 1.544$ 

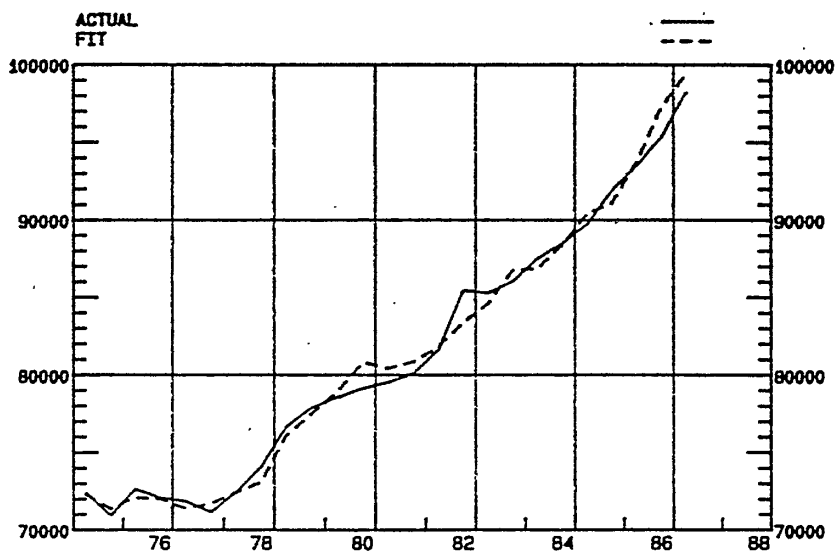
 Estimation period 75S1 - 87S2
 

---

FIC	private consumption, volume (85-FIM)
FIRI	yield of long-term GVT-bonds, %
FIPDDIE	expected change of domestic demand deflator
FIQ	GDP, VOLUME (85-FIM)

---

FINLAND PRIVATE CONSUMPTION, VOLUME (85-FIM)



## Investment volumes

---

 USI UNITED STATES FIXED INVESTMENTS, VOLUME (82-USD)
 

---

$$\begin{aligned}
 \text{USI} &= 2.84881 (100 * \text{USULC}/\text{USPQ})_{-2} \\
 &\quad (1.515) \\
 &- 8.25340 * \text{USERCOST}_{-1} + 0.21149 * \text{USQ}_{-1} \\
 &\quad (6.421) \quad (4.871) \\
 &+ 0.46277 * \text{USI}_{-1} - 591.00544 \\
 &\quad (3.924) \quad (2.258)
 \end{aligned}$$

$$R^2 = 0.970$$

$$\text{SEE} = 13.320$$

$$\text{DW} = 1.718$$

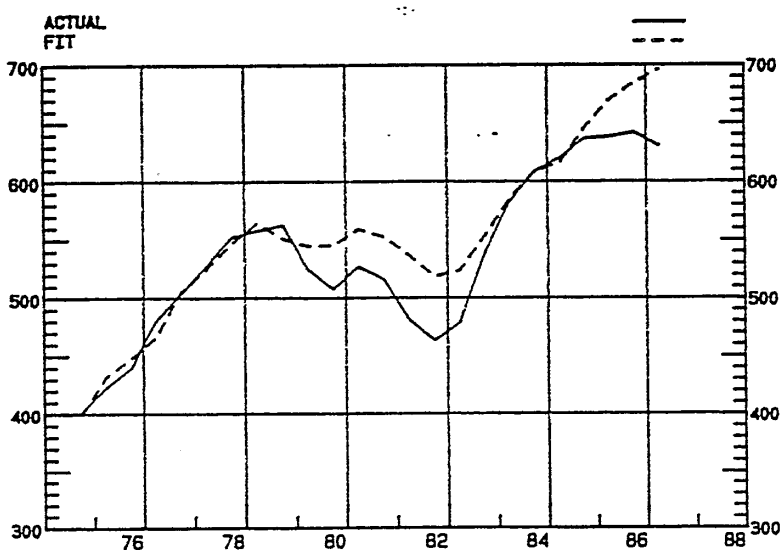
 Estimation period 75S2 - 86S1
 

---

USI	fixed investments, volume (82-USD)
USULC	unit labour costs
USPQ	GDP-deflator
USQ	GDP, volume (82-USD)
USERCOST	$(\text{USPDDI} * (\text{PRIMES} - \text{USPDDIE}))/\text{USPQ}$
USPDDI	domestic demand deflator
USPDDIE	expected change of domestic demand deflator
PRIMES	US prime rate

---

UNITED STATES FIXED INVESTMENTS, VOLUME (82-USD)



## Investment volumes

---

JAI JAPAN FIXED INVESTMENTS, VOLUME (80-JPY)

---

$$\begin{aligned}
 \text{JAI} &= 2.70064 * (100 * \text{JAULC}/\text{JAPQ})_{-2} \\
 &\quad (1.94) \\
 &\quad -6.75730 * \text{JAUCR}_{-2} + 0.18780 * (\text{JAQ}/100)_{-1} \\
 &\quad (1.96) \quad (3.48) \\
 &\quad + .61237 * (\text{JAI}/100)_{-1} - 319.03424 * 100 \\
 &\quad (3.64) \quad (1.65)
 \end{aligned}$$

$$R^2 = .982$$

$$\text{SEE} = 11.274$$

$$\text{DW} = 1.998$$

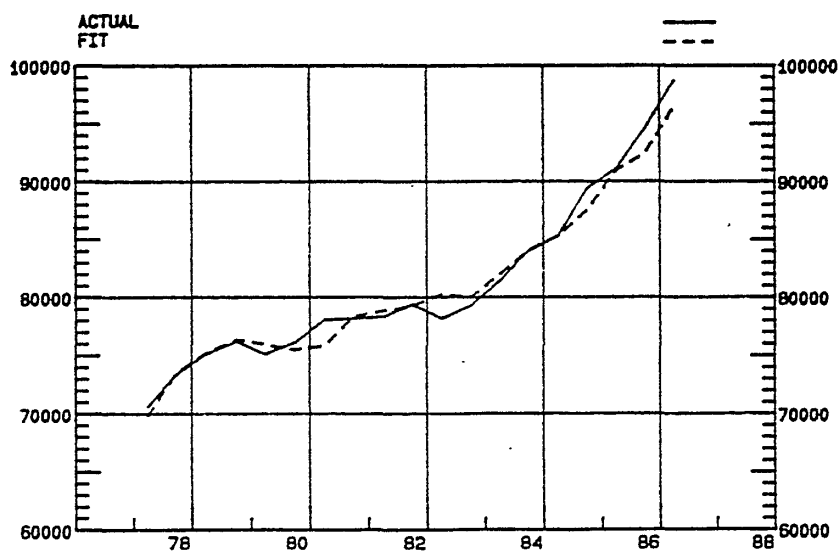
Estimation period 78S1-87S1

---

JAI fixed investments, volume (80-JPY)  
 JAULC unit labour costs  
 JAPQ GDP-deflator  
 JAQ GDP, volume (80-JPY)  
 JAUCR  $(\text{JAPDDI} * (\text{JARI} - \text{JAPDDIE}))/\text{JAPQ}$   
 JAPDDI domestic demand deflator  
 JAPDDIE expected change of domestic demand deflator  
 JARI bond yields central govt

---

JAPAN FIXED INVESTMENTS, VOLUME (80-JPY)





## Investment volumes

---

 GEI GERMANY FIXED INVESTMENTS, VOLUME (80-DEM)
 

---

$$\begin{aligned}
 \text{GEI} &= 0.67897 * \text{GEI}_{-1} + 0.07822 * \text{GEQ}_{-1} \\
 &\quad (4.109) \qquad\qquad (1.719) \\
 &\quad -3.32877 * \text{GEUCR}_{-1} + 0.79500 * \\
 &\quad\quad (2.889) \qquad\qquad (1.530) \\
 &\quad (100 * \text{GEULC}/\text{GEPQ})_{-2} - 64.23761 \\
 &\qquad\qquad\qquad\qquad (1.036)
 \end{aligned}$$

$$\begin{aligned}
 R^2 &= 0.832 \\
 \text{SEE} &= 4.1029 \\
 \text{DW} &= 2.9116
 \end{aligned}$$

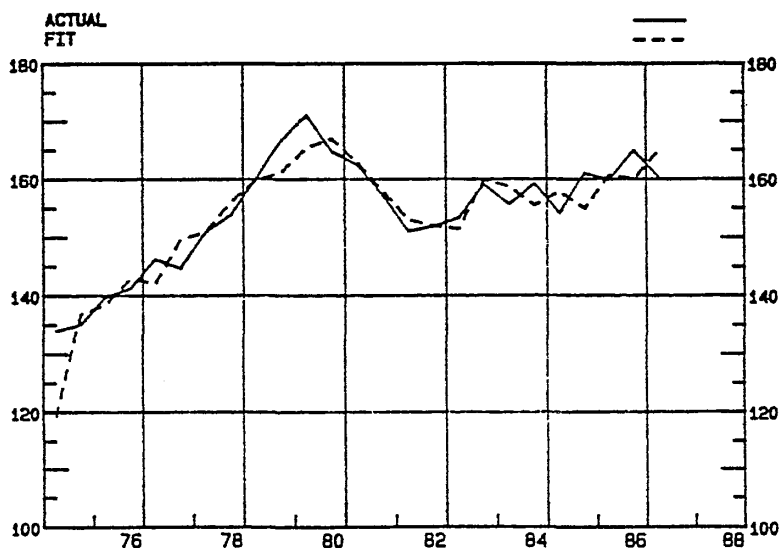
 Estimation period 75S2 - 86S1
 

---

GEI	fixed investments, volume (80-DEM)
GEULC	unit labour costs
GEPQ	GDP-deflator
GEQ	GDP, volume (80-DEM)
GEUCR	$(\text{GEPDDI} * (\text{GERI} - \text{GEPDDIE})) / \text{GEPQ}$
GEPDDI	domestic demand deflator
GEPDDIE	expected change of domestic demand deflator
GERI	yield on fully taxed fixed interest industry bonds

---

GERMANY FIXED INVESTMENTS, VOLUME (80-DEM)



## Investment volumes

---

 FRI            FRANCE FIXED INVESTMENTS, VOLUME (80-FRF)
 

---

$$\begin{aligned}
 \text{FRI} &= .09958 * (100 * \text{FRULC}/\text{FRPQ})_{-1} - 1.78200 * \\
 &\quad (.113) \qquad\qquad\qquad (1.706) \\
 &\quad \text{FRUCR}_{-1} + .02208 * \text{FRQ}_{-1} + \\
 &\quad\qquad\qquad (.443) \\
 &\quad .89643 * \text{FRI}_{-1} - 5.97688 \\
 &\quad (9.236) \qquad\qquad\qquad (1.391)
 \end{aligned}$$

$$\begin{aligned}
 R^2 &= .828 \\
 \text{SEE} &= 4.147 \\
 \text{DW} &= 1.496
 \end{aligned}$$

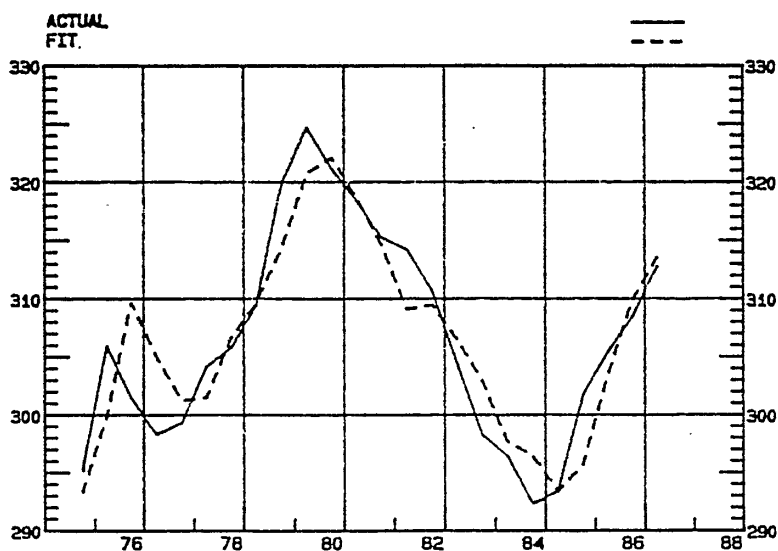
 Estimation period 75S2 - 87S1
 

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FRI            fixed investments, volume (70-FRF)  
 FRULC        unit labour costs  
 FRPQ        GDP-deflator  
 FRQ        GDP, volume (70-FRF)  
 FRUCR       (FRPDDI \* (FRI - FRPDDIE))/FRPQ  
 FRPDDI      domestic demand deflator  
 FRPDDIE     expected change of domestic demand deflator  
 FRI        bond yields guaranteed by govt

---

FRANCE FIXED INVESTMENTS, VOLUME (80-FRF)



## Investment volumes

---

 UKI UNITED KINGDOM FIXED INVESTMENTS, VOLUME (80-GBP)
 

---

$$\begin{aligned}
 \text{UKI} &= (-0.03417 * (100 * \text{UKPI} * \text{UKRI}/\text{UKPQ}) \\
 &\quad (2.405) \\
 &+ 0.17494 * (\text{UKQ}/100)_{-1} - 0.21364 * \\
 &\quad (1.316) \quad (1.853) \\
 &\quad (\text{UKQ}/100)_{-2} + 0.72624 * (\text{UKI}/100)_{-1} \\
 &\quad (4.596) \\
 &+ 138.13965 * 100 \\
 &\quad (1.889)
 \end{aligned}$$

$$\begin{aligned}
 R^2 &= 0.861 \\
 \text{SEE} &= 6.767 \\
 \text{DW} &= 1.980
 \end{aligned}$$

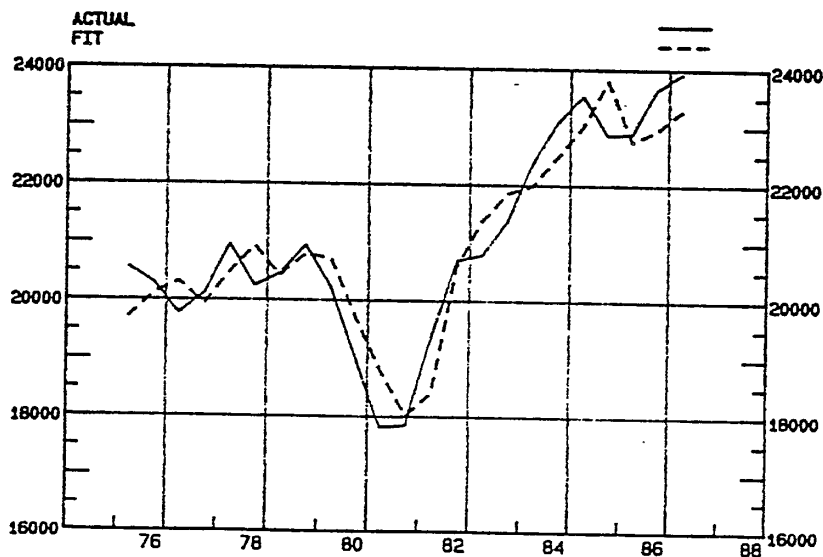
 Estimation period 76S1 - 86S1
 

---

UKI	fixed investments, volume (80-GBP)
UKPI	investment price index
UKRI	yield of long-term govt bonds
UKPQ	GDP-deflator
UKQ	GDP, volume (80-GBP)

---

UNITED KINGDOM FIXED INVESTMENTS, VOLUME (80-GBP)



## Investment volumes

---

 SWI SWEDEN FIXED INVESTMENTS, VOLUME (80-SEK)
 

---

log SWI =

$$\begin{aligned}
 & .44957 \log (\text{SWQ}/\text{SWQ}_{-2}) \\
 & \quad (1.162) \\
 & + .15349 \log \text{SWQ}_{-1} + .82352 * \log \text{SWI}_{-1} \\
 & \quad (1.252) \quad (5.867) \\
 & - .08709 \log (\text{SWUCR}_{-1}/\text{SWUCR}_{-2}) \\
 & \quad (1.479)
 \end{aligned}$$

R<sup>2</sup> = .742

SEE = .029

DW = 1.995

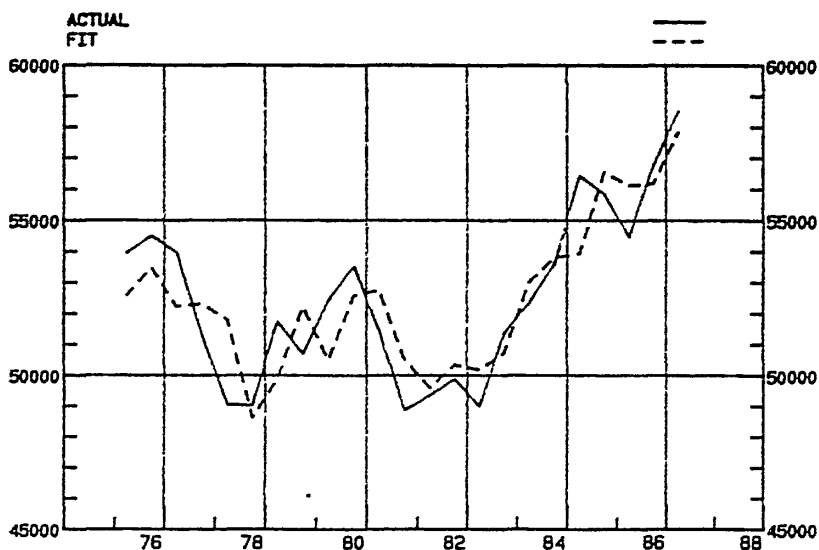
Estimation period 76S1 - 86S1

---

SWI	fixed investments, volume (80-SEK)
SWUCR	(SWPDDI) * (SWRI - SWPDDIE)
SWPDDI	domestic demand deflator
SWPDDIE	expected change of domestic demand deflator
SWRI	yield of long-term govt bonds
SWQ	GDP, volume (80-SEK)

---

SWEDEN FIXED INVESTMENTS, VOLUME (80-SEK)



## Investment volumes

---

 FII FINLAND FIXED INVESTMENTS, VOLUME (85-FIM)
 

---

$$\begin{aligned} \log FII &= 1.87999 * \log FIQ_{-1} - .07734 * \log FIUCR_{-1} \\ &\quad (10.27) \quad (4.25) \\ &+ 1.14337 * \log (FIULC/FIPQ)_{-1} - 11.55888 \\ &\quad (5.70) \quad (5.39) \end{aligned}$$

$$\begin{aligned} R^2 &= .940 \\ SEE &= .022 \\ DW &= 1.897 \end{aligned}$$

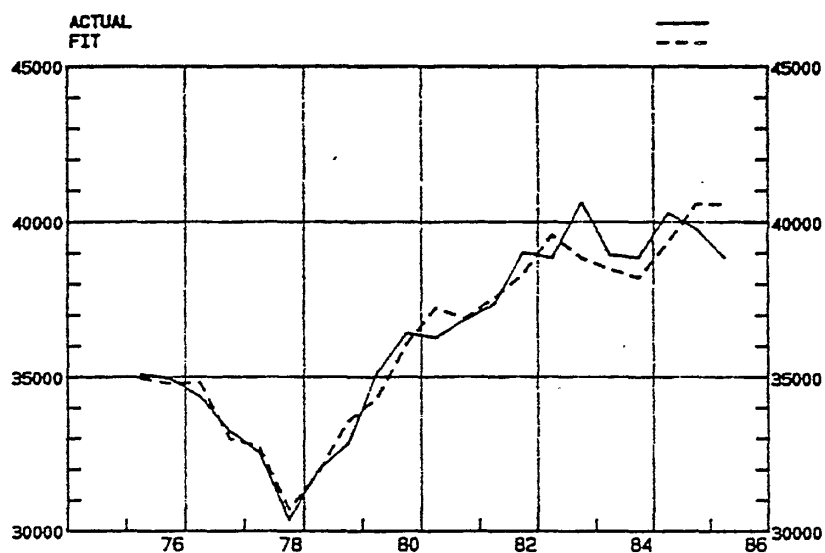
 Estimation period 76S1 - 86S1
 

---

FII fixed investments, volume (85-FIM)  
 FIQ GDP, volume (85-FIM)  
 FIUCR (FIPDDI) \* (FIRI - FIPDDIE))FIPQ  
 FIPDDI domestic demand deflator  
 FIPDDIE expected change of domestic demand deflator  
 FIRI yield of long-term govt bonds  
 FIPQ GDP-deflator  
 FIULC unit labour costs

---

FINLAND FIXED INVESTMENTS, VOLUME (85-FIM)



## Interest Rates

---

 PRIMES      USA PRIME RATE
 

---

PRIMES =

$$.85655 \text{ E100} + .224542 \text{ PRIMES}_{-1}$$

(15.81)      (4.61)

R<sup>2</sup> = .975

SEE = .576

DW = 2.045

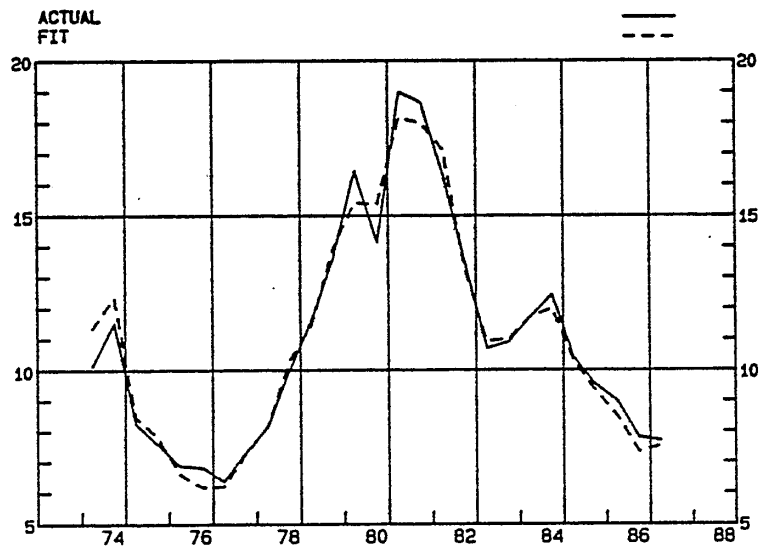
Estimation period 74S1 - 87S1

---

 PRIMES      USA, PRIME RATE, %  
 E100      EURODOLLAR, 3 MONTH RATE
 

---

## USA PRIME RATE



## Interest Rates

---

JARI            JAPAN CENTRAL GOVERNMENT BOND YIELD, %

---

JARI =

$$.3069 \cdot \text{JASRI} - .35288 \cdot \text{JASRI}_{-1} + 1.03188 \cdot \text{JARI}_{-1}$$

(3.05)            (3.18)            (8.06)

$R^2$         =    .917  
 SEE        =    .452  
 DW         =    1.592

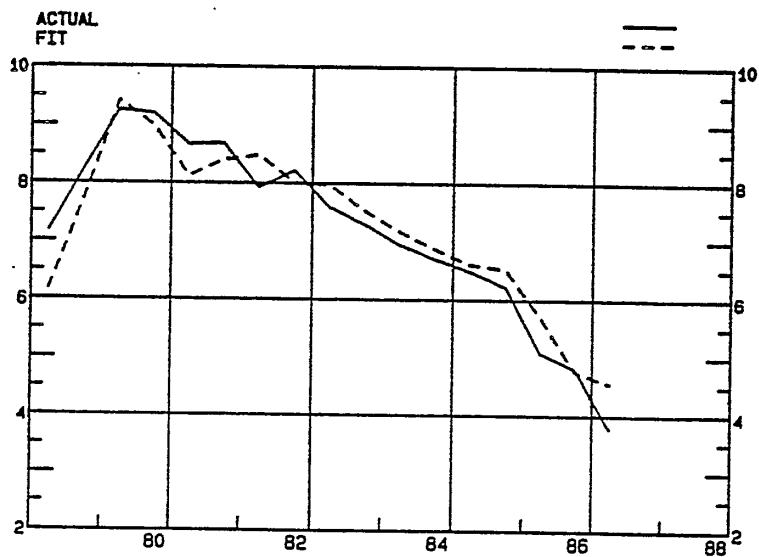
Estimation period 79S1 - 87S1

---

JARI            CENTRAL GOVERNMENT BOND YIELD  
 JASRI          "GENSAKI RATE" (3 MONTHS)

---

JAPAN CENTRAL GOVERNMENT BOND YIELD, %



## Interest Rates

---

GERI            GERMANY YIELD OF FULLY TAXED FIXED INTEREST INDUSTRY BONDS

---

GERI =

$$\begin{array}{r} .49704 \text{ GESRI} - .29700 * \text{GESRI}_{-1} + .68209 * \text{GERI}_{-1} + 1.23020 \\ (7.74) \quad \quad (3.05) \quad \quad (5.33) \quad \quad (1.74) \end{array}$$

$R^2$         =    .935  
 SEE        =    .377  
 DW         =    2.142

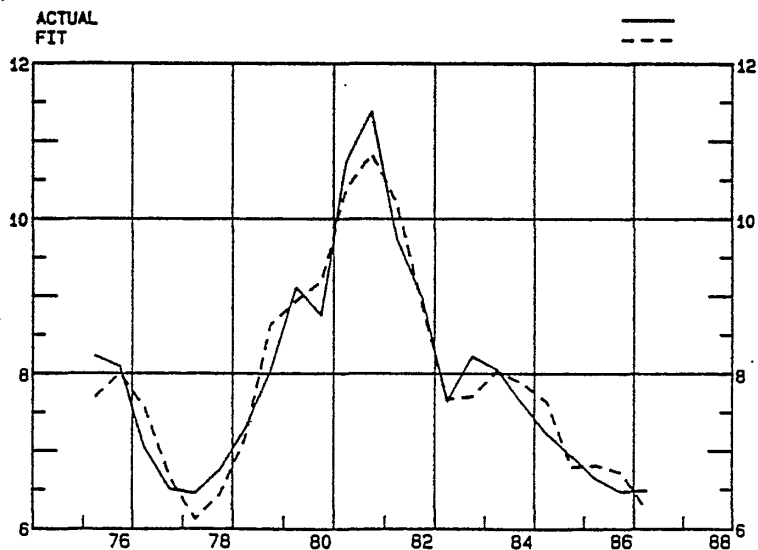
Estimation period 76S1 - 87S1

---

GERI	YIELD OF FULLY TAXED FIXED INTREST INDUSTRY BONDS
GESRI	EUROPOUND 3 MONTH RATE (GEPQ/USPQ)*E100
GEPQ	GERMANY, GDP DEFLATOR
USPQ	USA, GDP DEFLATOR
E100	EURODOLLAR, 3 MONTH RATE

---

GERMANY YIELD OF FULLY TAXED FIXED INTEREST  
 INDUSTRY BONDS





## Interest Rates

---

 UKRI UNITED KINGDOM YIELD OF LONG-TERM GOVT BONDS
 

---

UKRI =

$$.27942 \text{ UKSRI} - .23875 * \text{UKSRI}_{-1} + .96630 * \text{UKRI}_{-1}$$

(2.54)                      (2.23)                      (20.97)

$$R^2 = .735$$

$$\text{SEE} = 1.004$$

$$\text{DW} = 1.290$$

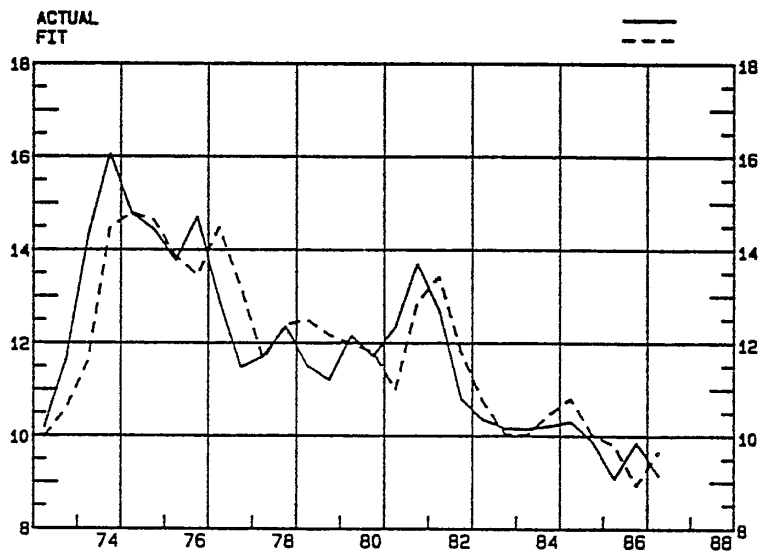
Estimation period 73S1 - 87S1

---

UKRI	YIELD OF LONG-TERM GOVT BONDS
UKSRI	EUROPOUND 3 MONTH RATE (UKPQ/USPQ)*E100
UKPQ	UNITED KINGDOM, GDP DEFLATOR
USPQ	USA, GDP DEFLATOR
E100	EURODOLLAR, 3 MONTH RATE

---

UNITED KINGDOM YIELD OF LONG-TERM GOVT BONDS



## Some Price Equations

---

F161            OECD CONSUMER PRICES, IND. 1980=100

---

$\Delta \log F161 =$

$1.15118 * \Delta \log OEPDDI$   
(34.41)

$R^2 = .935$   
SEE = .377  
DW = 2.142

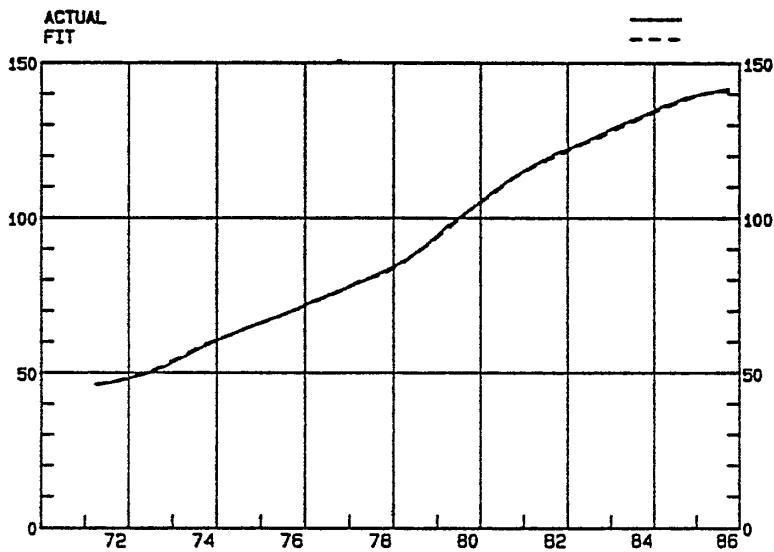
Estimation period 72S1 - 86S2

---

FIG1            OECD, CONSUMER PRICES, IND 1980=100  
OEPDDI        OECD, DOMESTIC DEMAND DEFLATOR

---

OECD CONSUMER PRICES, INDEX 1980=100



## Some Price Equations

---

 F163 OECD EUROPE, CONSUMER PRICES, 1980=100
 

---

 $\Delta \log F163 =$ 
 $1.22975 \Delta \log EUPDDI$   
 (33.98)

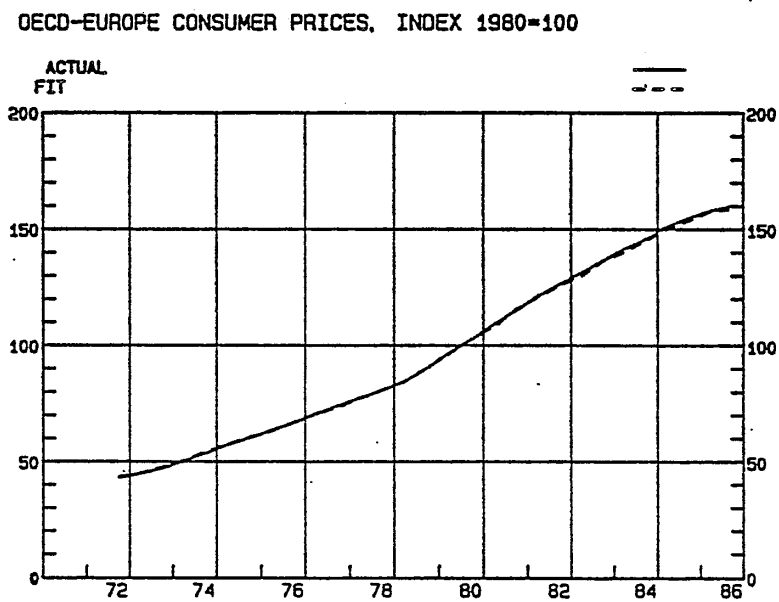
 $R^2 = .856$   
 $SEE = .008$   
 $DW = 1.356$ 

Estimation period 72S2 - 86S2

---

 FIG3 OECD EUROPE, CONSUMER PRICES, IND 1980=100  
 EUPDDI OECD-EUROPE, COMESTIC DEMAND DEFLATOR
 

---



## Some Price Equations

---

 PPFC            PRODUCER PRICE FOR MANUFACTURING IN FINNISH EXPORT MARKETS
 

---

 $\Delta \log \text{PPFC} =$ 

$$.74172 \Delta \log \text{SUP} * \text{FIM} + .01031$$

(17.34)                      (4.67)

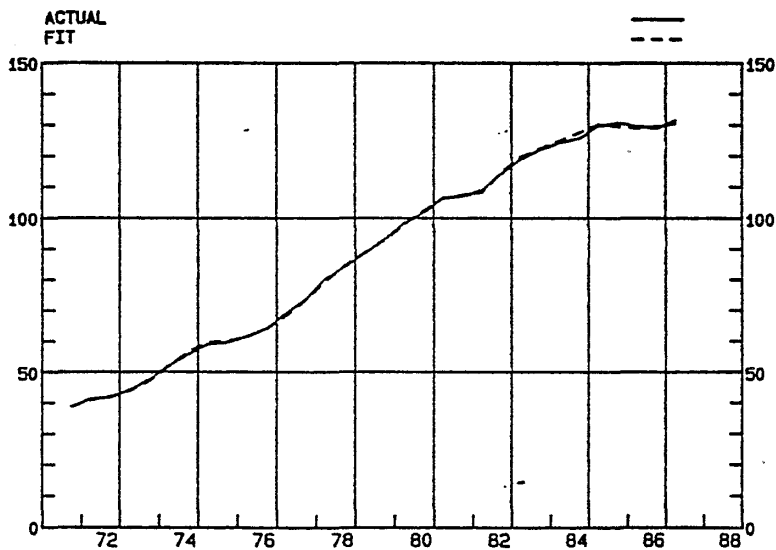
$R^2 = .909$   
 SEE = .008  
 DW = 1.452

Estimation period 71S2 - 87S1

---

 PPFC            PRODUCER PRICES FOR MANUFACTURING IN FINNISH  
 SVPXFIM        EXPORT PRICES OF THE COUNTRIES MOST IMPORTANT TO  
                   FINNISH EXPORTS
 

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 PRODUCER PRICE FOR MANUFACTURING IN FINNISH  
 EXPORT MARKETS


APPENDIX 3  
Most important identities

---

EXPORTS MARKETS GIVEN BY MARKET GROWTH

---

USXDM =

.174 • JAMDOL + .0754 • GEMDOL +  
 .0796 • FRMDOL + .1176 • UKMDOL +  
 .0729 • SWMDOL + .0581 • FIMDOL +  
 .1552 • OOMDOL + .0542 • COMDOL +  
 .1357 • OPMDOL + .1885 • DCMDOL                    1.1112

JAXDM =

.1303 • USMDOL + .0305 • GEMDOL +  
 .0205 • FRMDOL + .0331 • UKMDOL +  
 .0285 • SWMDOL + .0325 • FIMDOL +  
 .0316 • OOMDOL + .0615 • COMDOL +  
 .1503 • OPMDOL + .1248 • DCMDOL                    .6436

GEXDM =

.0489 • USMDOL + .0177 • JAMDOL +  
 .1619 • FRMDOL + .1103 • UKMDOL +  
 .1675 • SWMDOL + .1264 • FIMDOL +  
 .1640 • OOMDOL + .1366 • COMDOL +  
 .1018 • OPMDOL + .0610 • DCMDOL                    1.0961

FRXDM =

.0219 • USMDOL + .0092 • JAMDOL +  
 .1072 • GEMDOL + .0755 • UKMDOL +  
 .0432 • SWMDOL + .0305 • FIMDOL +  
 .0834 • OOMDOL + .0698 • COMDOL +  
 .0761 • OPMDOL + .0493 • DCMDOL +                    0.5661

---

---

 EXPORTS GIVEN BY MARKET GROWTH
 

---

UKXDM =

.0403	•	USMDOL	+	.0139	•	JAMDOL	+	
.0669	•	GEMDOL	+	.0540	•	FRMDOL	+	
.1184	•	SWMDOL	+	.0860	•	FIMDOL	+	
.0751	•	OOMDOL	+	.0385	•	COMDOL	+	
.0847	•	OPMDOL	+	.0483	•	DCMDOL		.6261

SWXDM =

.0067	•	USMDOL	+	.0033	•	JAMDOL	+	
.0211	•	GEMDOL	+	.0153	•	FRMDOL	+	
.0286	•	SWMDOL	+	.1207	•	FIMDOL	+	
.0236	•	OOMDOL	+	.0186	•	COMDOL	+	
.0129	•	OPMDOL	+	.0089	•	DCMDOL		.2597

FIXDM =

.0019	•	USMDOL	+	.0008	•	JAMDOL	+	
.0087	•	GEMDOL	+	.0053	•	FRMDOL	+	
.0153	•	SWMDOL	+	.0682	•	FIMDOL	+	
.0070	•	OOMDOL	+	.0402	•	COMDOL	+	
.0050	•	OPMDOL	+	.0025	•	DCMDOL		.1549

---

XDM = Exports given by market growth, in US dollars  
 MDOL = imports in US dollars

Weights are each country's shares of the total imports  
 of other countries

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---

 EXPORT MARKETS
 

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 FITRAD = FINLAND'S EXPORT MARKETS, %-CHANGES
 

---

FITRAD =

.192 • SWMAD + .156 • UKMAD +  
 .131 • GEMAD + .056 • FRMAD +  
 .051 • USMAD + .013 • JAMAD +  
 .286 • OOMAD + .043 • OPMAD +  
 .076 • DCMAD

---

 WOTRAD = WORLD TRADE , %-CHANGES
 

---

WOTRAD =

.016 • SWMAD + .061 • UKMAD +  
 .094 • GEMAD + .063 • FRMAD +  
 .142 • USMAD + .062 • JAMAD +  
 .263 • OOMAD + .080 • OPMAD +  
 .050 • COMAD + .163 • DCMAD

---

USMAD	CHANGE IN TOTAL IMPORTS OF
JAMAD	USA, JAPAN, GERMANY, FRANCE, UNITED KINGDOM,
GEMAD	SWEDEN, OTHER OECD COUNTRIES, OPEC COUNTRIES AND
FRMAD	DEVELOPING COUNTRIES RESPECTIVELY,
UKMAD	%-CHANGES
SWMAD	
OOMAD	
OPMAD	
DCMAD	

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---

 IMPORT PRICES
 

---

 $\Delta \log \text{USPM} =$ 

.1303 •  $\Delta \log \text{JAPXDOL}$  + .0489 •  $\Delta \log \text{GEPXDOL}$  +  
 .0218 •  $\Delta \log \text{FRPXDOL}$  + .0403 •  $\Delta \log \text{UKPCDOL}$  +  
 .0067 •  $\Delta \log \text{SWPXDOL}$  + .0019 •  $\Delta \log \text{FIPXDOL}$  +  
 .2525 •  $\Delta \log \text{OOPX}$  + .2152 •  $\Delta \log \text{OPPX}$  +  
 .2827 •  $\Delta \log \text{DCPX}$

---

 $\Delta \log \text{JAPMDOL} =$ 

.1738 •  $\Delta \log \text{USPX}$  + .0177 •  $\Delta \log \text{GEPXDOL}$  +  
 .0092 •  $\Delta \log \text{FRPXDOL}$  + .0138 •  $\Delta \log \text{SWPXDOL}$  +  
 .0008 •  $\Delta \log \text{FIPXDOL}$  + .1188 •  $\Delta \log \text{OOPX}$  +  
 .4180 •  $\Delta \log \text{OPPX}$  + .2451 •  $\Delta \log \text{DCPX}$

---

 $\Delta \log \text{GEPMDOL} =$ 

.0754 •  $\Delta \log \text{USPX}$  + .0305 •  $\Delta \log \text{JAPXDOL}$  +  
 .1072 •  $\Delta \log \text{FRPXDOL}$  + .0669 •  $\Delta \log \text{UKPXDOL}$  +  
 .0211 •  $\Delta \log \text{SWPXDOL}$  + .0087 •  $\Delta \log \text{FIPXDOL}$  +  
 .4177 •  $\Delta \log \text{OOPX}$  + .1156 •  $\Delta \log \text{OPPX}$  +  
 .1477 •  $\Delta \log \text{DCPX}$

---

 $\Delta \log \text{FRPMDOL} =$ 

.0795 •  $\Delta \log \text{USPX}$  + .0205 •  $\Delta \log \text{JAPXDOL}$  +  
 .1619 •  $\Delta \log \text{GEPXDOL}$  + .0540 •  $\Delta \log \text{UKPXDOL}$  +  
 .0153 •  $\Delta \log \text{SWPXDOL}$  + .0053 •  $\Delta \log \text{FIPXDOL}$  +  
 .3315 •  $\Delta \log \text{OOPX}$  + .1947 •  $\Delta \log \text{OPPX}$  +  
 .1273 •  $\Delta \log \text{DCPX}$

---

 $\Delta \log \text{UKPMDOL} =$ 

.1176 •  $\Delta \log \text{USPX}$  + .0331 •  $\Delta \log \text{JAPXDOL}$  +  
 .1103 •  $\Delta \log \text{GEPXDOL}$  + .0775 •  $\Delta \log \text{FRPXDOL}$  +  
 .0286 •  $\Delta \log \text{SWPXDOL}$  + .0153 •  $\Delta \log \text{FIPCDOL}$  +  
 .3746 •  $\Delta \log \text{OOPX}$  + .0910 •  $\Delta \log \text{OPPX}$  +  
 .1540 •  $\Delta \log \text{DCPX}$

---

 $\Delta \log \text{SWPMDOL} =$ 

.0729 •  $\Delta \log \text{USPX}$  + .0285 •  $\Delta \log \text{JAPXDOL}$  +  
 .1675 •  $\Delta \log \text{GEPXDOL}$  + .0432 •  $\Delta \log \text{FRPXDOL}$  +  
 .1184 •  $\Delta \log \text{UKPXDOL}$  + .0682 •  $\Delta \log \text{FIPXDOL}$  +  
 .2781 •  $\Delta \log \text{OOPX}$  + .1246 •  $\Delta \log \text{OPPX}$  +  
 .0985 •  $\Delta \log \text{DCPX}$

---



---

IMPORT PRICES

---

$\Delta \log$  FIPMDOL =

.0581 •  $\Delta \log$  USPX + .0325 •  $\Delta \log$  JADXDOL +  
.1264 •  $\Delta \log$  GEPXDOL + .0305 •  $\Delta \log$  FRPXDOL +  
.0860 •  $\Delta \log$  UKPXDOL + .1207 •  $\Delta \log$  SWPXDOL +  
.1660 •  $\Delta \log$  OOPX + .1619 •  $\Delta \log$  OPPX +  
.2179 •  $\Delta \log$  DCPX

---

USPM IMPORT PRICES IN USD OF USA, GERMANY, FRANCE,  
JAPMDOL UNITED KINGDOM, SWEDEN, FINLAND RESPECTIVELY  
GEPMDOL  
FRPMDOL  
UKPMDOL  
SWPMDOL  
FIPMDOL

USPX EXPORT PRICES IN USD FOR THE SAME COUNTRIES AS ABOVE  
JAPXDOL  
GEPXDOL  
FRPXDOL  
UKPXDOL  
SWPXDOL  
FIPXDOL

---

---

 GDP DEFLATORS
 

---

$$\begin{aligned} \Delta\text{USPQ} &= \Delta\text{USPDDI} + (\text{USM}/\text{USQ}) \cdot [\Delta(\text{USPX} - \text{USPM})] \\ \Delta\text{JAPQ} &= \Delta\text{JAPDDI} + (\text{JAM}/\text{JAQ}) \cdot [\Delta(\text{JAPX} - \text{JAPM})] \\ \Delta\text{GEPQ} &= \Delta\text{GEPDDI} + (\text{GEM}/\text{GEQ}) \cdot [\Delta(\text{GEPX} - \text{GEPM})] \\ \Delta\text{GFRPQ} &= \Delta\text{FRPDDI} + (\text{FRM}/\text{FRQ}) \cdot [\Delta(\text{FRPX} - \text{FRPM})] \\ \Delta\text{UKPQ} &= \Delta\text{UKPDDI} + (\text{UKM}/\text{UKQ}) \cdot [\Delta(\text{UKPX} - \text{UKPM})] \\ \Delta\text{SWPQ} &= \Delta\text{SWPDDI} + (\text{SWM}/\text{SWQ}) \cdot [\Delta(\text{SWPX} - \text{SWPM})] \\ \Delta\text{FIPQ} &= \Delta\text{FIPDDI} + (\text{FIM}/\text{FIQ}) \cdot [\Delta(\text{FIPX} - \text{FIPM})] \end{aligned}$$


---

USPQ            GDP DEFLATORS OF USA, JAPAN, GERMANY, FRANCE,  
 JAPQ            UK, SWEDEN AND FINLAND RESPECTIVELY  
 GEPQ  
 FRPQ  
 UKPQ  
 SWPQ  
 FIPQ

. PDDI        = DOMESTIC DEMAND DEFLATOR  
 . M            = VOLUME OF IMPORTS  
 . Q            = GDP, VOLUME  
 . PX          = EXPORT PRICES  
 . PM          = IMPORT PRICES

---

---

 OTHER IDENTITIES
 

---

$$\text{VINO} = .2826 * \text{FD} + .1495 * \text{TBEV} + .2772 * \text{NFM} + .2907 * \text{ARM}$$

---

VINO	=	COMMODITY PRICES, HWWA INDEX (EXCL. ENERGY)
FD	=	" " , FOOD
TBEV	=	" " , TROPICAL GOODS & BEVERAGES
NFM	=	" " , NON-FERROUS METALS & MINERALS
ARM	=	" " , AGRICULTURAL RAW MATERIALS

---

$$\text{OEQAD} = .458 * \text{USQAD} + .214 * \text{JAQAD} + .139 * \text{GEQAD} + .102 * \text{FRQAD} + .068 * \text{UKQAD} + .019 * \text{SWQAD}$$

$$\text{EUQAD} = .424 * \text{GEQAD} + .311 * \text{FRQAD} + .207 * \text{UKQAD} + .058 * \text{SWQAD}$$

---

OEQAD = GDP GROWTH IN OECD COUNTRIES, %-CHANGE

EUGAD = GDP GROWTH IN EUROPE, %-CHANGE

USQAD      GDP GROWTH IN USA, JAPAN, GERMANY, FRANCE, UK  
 JAQAD      AND SWEDEN, RESPECTIVELY, %-CHANGE  
 GEQAD  
 FRQAD  
 UKQAD  
 SWQAD

---

OTHER COMPONENTS OF DEMAND AND SUPPLY FOR "TOTAL OECD" AS WELL AS FOR "EUROPE" ARE CALCULATED USING THE WEIGHTS ABOVE.

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APPENDIX 4  
Variables of the KTKV-model (1)

VARIABLES OF THE KTKV MODEL (1)

SUPPLY AND DEMAND	US	JAP	GER	FR	UK	SWE	FIN
<b>GDP</b>							
volume in nat. currency	USQ	JAQ	GEQ	FRQ	UKQ	SWQ	FIQ
%-change at annual rate	USQAD	JAQAD	GEQAD	FRQAD	UKQAD	SWQAD	FIQAD
deflator	USPQ	JAPQ	GEPQ	FRPQ	UKPQ	SWPQ	FIPQ
%-change at annual rate	USPQAD	JAPQAD	GEPQAD	FRPQAD	UKPQAD	SWPQAD	FIPQAD
<b>IMPORTS</b>							
volume in nat. currency	USM	JAM	GEM	FRM	UKM	SWM	FIM
%-change from prev. period	USMD	JAMD	GEMD	FRMD	UKMD	SWMD	FIMD
%-change at annual rate	USMAD	JAMAD	GEMAD	FRMAD	UKMAD	SWMAD	FIMAD
volume in 80-USD	USMDOL	JAMDOL	GEMDOL	FRMDOL	UKMDOL	SWMDOL	FIMDOL
unit value	USPM	JAPM	GEPM	FRPM	UKPM	SWPM	FIPM
unit value in USD		JAMDOL	GEMDOL	FRMDOL	UKMDOL	SWMDOL	FIMDOL
<b>TOTAL SUPPLY</b>							
volume in nat. currency	USTS	JATS	GETS	FRTS	UKTS	SWTS	FITS
%-change at annual rate	USTSAD	JATSAD	GETSAD	FRTSAD	UKTSAD	SWTSAD	FITSAD
<b>EXPORTS</b>							
volume in nat. currency	USX	JAX	GEX	FRX	UKX	SWX	FIX
%-change at annual rate	USXAD	JAXAD	GEXAD	FRXAD	UKXAD	SWXAD	FIXAD
volume in 80-USD	USXDOL	JAXDOL	GEXDOL	FRXDOL	UKXDOL	SWXDOL	FIXDOL
unit value	USPX	JAPX	GEPX	FRPX	UKPX	SWPX	FIPX
unit value in USD		JAPXDOL	GEPXDOL	FRPXDOL	UKPXDOL	SWPXDOL	FIPXDOL
competitors' export prices	USWPX	JAWPX	GEWPX	FRWPX	UKWPX	SWWPX	FIPWPX
growth of export markets	USXDM	JAXDM	GEXDM	FRXDM	UKXDM	SWXDM	FIXDM
<b>PRIVATE CONSUMPTION</b>							
volume in nat. currency	USC	JAC	GEC	FRC	UKC	SWC	FIC
%-change at annual rate	USCAD	JACAD	GECAD	FRCAD	UKCAD	SWCAD	FICAD
<b>GOVERNMENT CONSUMPTION</b>							
volume in nat. currency	USG	JAG	GEG	FRG	UKG	SWG	FIG
%-change at annual rate	USGAD	JAGAD	GEGAD	FRGAD	UKGAD	SWGAD	FIGAD
<b>FIXED INVESTMENT</b>							
volume in nat. currency	USI	JAI	GEI	FRI	UKI	SWI	FII
%-change at annual rate	USIAD	JAIAD	GEIAD	FRIAD	UKIAD	SWIAD	FIIAD
<b>INVENTORY INVESTMENT</b>							
volume in nat. currency	USS	JAS	GES	FRS	UKS	SWS	FIS
GDP-contribution at ann. rate	USSK	JASK	GESK	FRSK	UKSK	SWSK	FISK
<b>TOTAL DEMAND</b>							
Volume in nat. currency	USTD	JATD	GETD	FRTD	UKTD	SWTD	FITD
%-change at annual rate	USTDAD	JATDAD	GETDAD	FRTDAD	UKTDAD	SWTDAD	FITDAD
<b>TOTAL DOMESTIC DEMAND</b>							
Volume in nat. currency	USDD	JADD	GEDD	FRDD	UKDD	SWDD	FIDD
%-change at annual rate	USDDAD	JADDAD	GEDDAD	FRDDAD	UKDDAD	SWDDAD	FIDDAD
deflator	USPDDI	JAPDDI	GEPDDI	FRPDDI	UKPDDI	SWPDDI	FIPDDI
%-change at annual rate	USPDDIAD	JAPDDIAD	GEPDDIAD	FRPDDIAD	UKPDDIAD	SWPDDIAD	FIPDDIAD
<b>FINAL DOMESTIC DEMAND</b>							
Volume in nat. currency	USFD	JAFD	GEFD	FRFD	UKFD	SWFD	FIFD
%-change at annual rate	USFDAD	JAFDAD	GEFDAD	FRFDAD	UKFDAD	SWFDAD	FIFDAD

## VARIABLES OF THE KTKV MODEL (2)

DEMAND AND SUPPLY (CONTINUED)	OECD	EUROPE	COUNTR. IMPOR- TANT TO FINNISH EXPORTS	OTHER OECD	OECD	OPEC	LDC	REST OF THE WORLD
<b>GDP</b>								
vol., % - change at annual rate	OEQAD	EUQAD	SVQAD		OEQAD			
deflator, % - change at ann. rate	OEPQAD	EUPQAD	SVPQAD		OEPQAD			
<b>IMPORTS</b>								
volume, index				OOMI		OPMI	DCMI	COMI
vol., % - change from prev. period				OOMD		OPMD	DCMD	COMD
vol., % - change at annual rate	OEMAD	EUMAD	SYMAD	OOMAD	OEMAD	OPMAD	DCMAD	COMAD
volume in 80-USD				OOMDOL				
unit value in USD			SVPM DOL			OPMDOL	DCMDOL	COMDOL
unit value in FIM			SVPM FIM					
<b>EXPORTS</b>								
volume, index				OOXI		OPXI	DCXI	COXI
vol., % - change from prev. period				OOXD		OPXD	DCXD	COXD
vol., % - change at annual rate	OEXAD	EUXAD	SVXAD		OEXAD			
unit value in USD			SVPXDOL	OOPX		OPPX	DCPX	
unit value in FIM			SVPXFIM					
<b>PRIVATE CONSUMPTION</b>								
vol., % - change at annual rate	OECAD	EUCAD			OECAD			
<b>GOVERNMENT CONSUMPTION</b>								
vol., % - change at annual rate	OEGAD	EUGAD			OEGAD			
<b>FIXED INVESTMENTS</b>								
vol., % - change at annual rate	OEIAD	EUIAD			OEIAD			
<b>INVENTORY INVESTMENTS</b>								
GDP-contribution at annual rate	OESK	EUSK			OESK			
<b>TOTAL DOMESTIC DEMAND</b>								
vol., % - change from prev. period				OODDD				
vol., % - change at annual rate	EDDAD	UDDAD	SVDDAD		EDDAD			
deflator, % - change at ann. rate	EPDDIAD	UPDDIAD	SVPDDIAD		EPDDIAD			
<b>FINAL DOMESTIC DEMAND</b>								
vol., % - change at annual rate	EFDAD	UFDAD			EFDAD			

## VARIABLES OF THE KTKV MODEL (3)

OTHER VARIABLES	US	JAP	GER	FR	UK	SWE	FIN
unemployment rate, %	USUN	JAUN	GEUN	FRUN	UKUN	SWUN	FIUN
exchange rates in USD		JPY	DEM	FRF	GBP	SEK	FIM
exchange rates in FIM	USDF	JPYF	DEMF	FRFF	GBPF	SEKF	
unit labour costs in national currency	USULC	JAU LC	GEULC	FRULC	UKULC	SWULC	FIULC
3 month euromarket rate	E100	JASRI	GESRI		UKSRI		
long term interest rate	USR1	JARI	GERI	FRR1	UKR1	SWR1	FIR1
<hr/>							
Relative unit labour costs in FIM (14 countries/Finland, 1963-82=100)					COMP1.A.E.		
Relative unit labour costs in national currency (14 countries/Finland, 1963-82=100)					COMP2.A.E.		
Unit labour costs in national currency (14 countries, 1863-82=100)					COMP3.A.E.		
Unit labour costs (Finland, 1963-82=100)					COMP4.A.E.		
Consumer prices, OECD				F161			
Consumer prices, OECD EUROPE				F163			
Producer price for manufacturing				PPFC			
Spot-prices of crude oil, USD/b				OP			
Oil price Index (1975=100)				OP1			
Commodity prices excl. energy %-change at annual rate				VINO VINOAD			
- tropical goods & coverages				TBEV			
- food				FD			
- non-ferrous metals & minerals				NFM			
- agricultural raw materials				ARM			
world trade, %-change at annual rate				WOTRAD			
Finlands export markets				FITRAD			
3 MONTHS EURODOLLAR RATE				E100			



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