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Labour supply, wages and prices in the BOF4 quarterly model of the Finnish economy

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LABOUR SUPPLY, WAGES AND PRICES IN THE BOF4 QUARTERLY
MODEL OF THE FINNISH ECONOMY

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ABSTRACT

This paper describes the supply of labour and the determination of wages and prices in the BOF4 model.

Labour supply is modelled as a function of real wage, income and discouraged worker effects.

Wages are a function of the unemployment rate. Besides that they respond to the deviation of actual wages from equilibrium wages dictated by nominal marginal productivity. Expected inflation and taxation are entered through the separate treatment of negotiated wages. Manufacturing is assumed to be the wage leader in the economy so that developments in other sectors are affected by the wage drift in manufacturing and are tied to manufacturing wages also in the long-run.

In sectors open to foreign competition the prices of the products as well as the marginal costs are taken to be determined solely by competitors' prices in the long-run. In the short-run, however, Finnish firms are assumed to possess certain monopoly power over their prices. Pricing in the closed sectors is supposed to be more monopolistic, so that prices are based only on domestic costs including the prices of imported inputs. The cost structure of the different sectors as well as prices of the final demand components are evaluated by the help of input-output tables.

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1 INTRODUCTION

The BOF4 model of the Finnish economy is a quarterly econometric model developed at the Bank of Finland for forecasting and policy analysis.¹ The present paper appears as the third issue in a series intended to cover all sectors of the present version of BOF4.²

Throughout the text, reference is made to the list of equations of the model. The latest complete list has been published in BOF4 (1987), but the relevant labour force, wage and price equations are included in the present report as appendix 1.

This chapter turns to the "behavioural" aspects of supply side modelling. The exposition follows the approximate order of causation in the model structure. First the labour supply is described as one of the determinants of the labour market situation. This is an important factor in the determination of wages and prices, along with productivity import prices, and competitors' prices in the export markets. These determine wages and domestic prices in three phases.

First, wages are determined on the basis of the labour market situation, productivity, relative prices and inflation expectations. The wages block of the model resembles the Scandinavian inflation model in that the open sector (manufacturing) is the wage leader, and that income distribution (sometimes called the real wage gap)

¹The earlier version of the model, BOF3, is documented in Tarkka and Willman (1985).

²The earlier reports are:

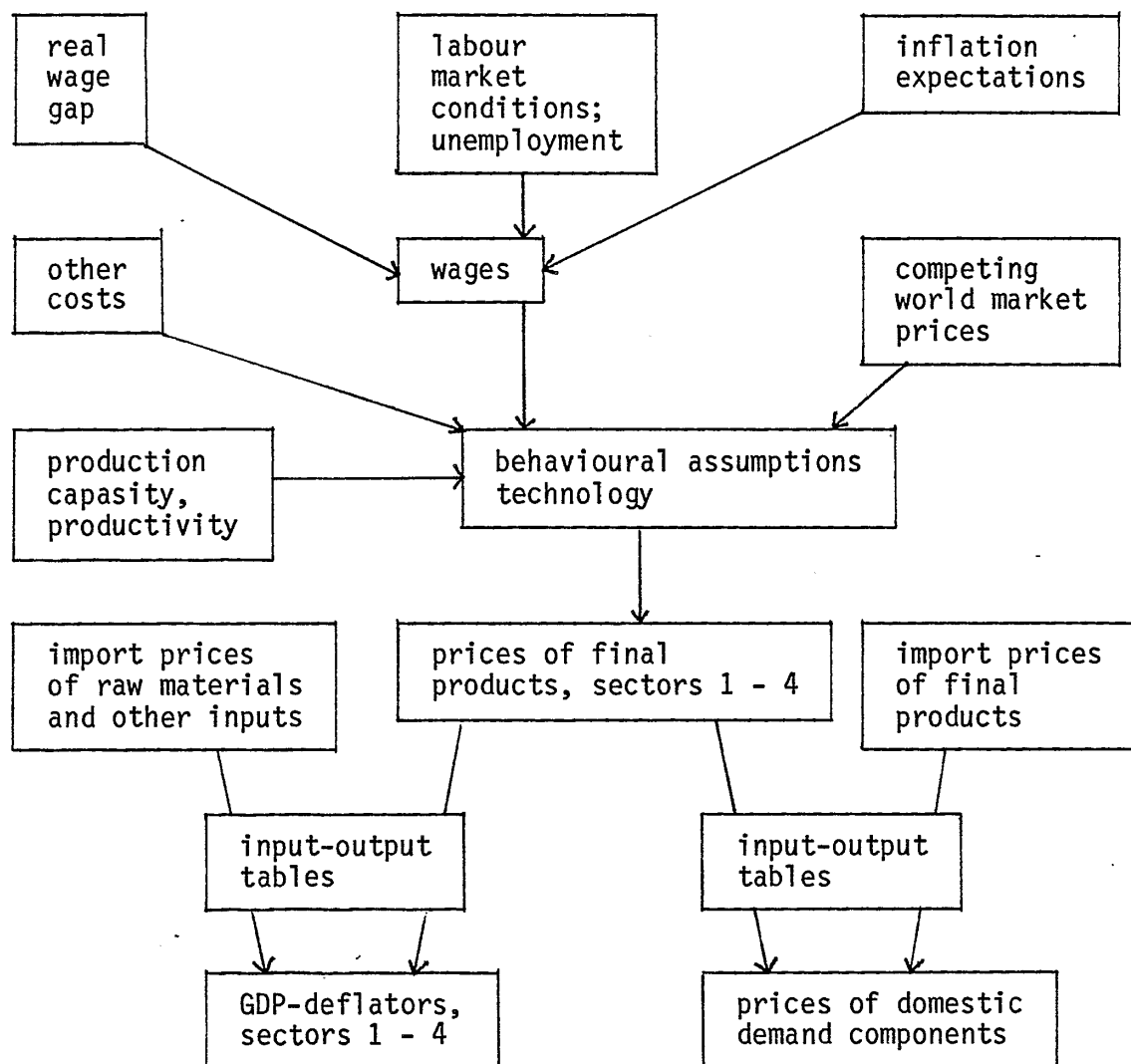
- 1) Tarkka & Willman (1988): Exports and Imports in the BOF4 Quarterly Model of the Finnish Economy, Bank of Finland Discussion Papers 3/88.
- 2) Tarkka, Willman and Rasi (1988): Production and Employment in the BOF4 Quarterly Model of the Finnish Economy, Bank of Finland Discussion Papers 14/88.

influences wages also directly, not only through the unemployment rate as in the basic Phillips curve model.

In the second phase, prices of final output of the different production sectors are determined on the basis of marginal costs of production and the prices prevailing on foreign markets. In this phase the technology assumptions of the model play a key role.

In the third phase of the price determination, the model uses input-output coefficients to solve for sectoral value added deflators and the deflators of the different demand components. These are based on the prices of output of the different sectors. Most of the impact of indirect taxes on prices occurs in this phase, although some price effects of commodity taxes and subsidies are imputed in the previous phase of price determination, too.

FIGURE 1. The structure of the wage-price block



2 LABOUR SUPPLY

The labour force equation in BOF4 explains the changes in the participation rate. The participation equation has not changed much from the BOF3 version of the model (see Tarkka & Willman, 1985 pp. 205 - 212). The equation is based on the idea that consumption of goods and leisure¹ are substitutes in households' utility functions.² Thus, the after-tax real wage rate, which is the relative price of leisure, is one of the main determinants of the labour force participation decision.

Another relevant factor is the overall level of consumption and ultimately real income: if leisure is a normal good, labour supply is negatively affected by an increase in consumption. Conversely, if leisure is an inferior good, then an increase in consumption should, *ceteris paribus*, increase the labour supply.

A third factor is the "discouraged worker effect" which is caused by the fixed costs of entering the labour force such as costs of searching a job, getting a suitable training and making other necessary arrangements. In the presence of such costs, the demand for labour has a positive effect on the supply of labour, since the higher is the probability of actually getting a job after the participation decision has been made, the less do the mentioned fixed costs hinder labour force participation (see Abbot & Ashenfelter (1976) and Eaton & Quandt (1983)).

In addition to these arguments, a trend is included in the determinants of labour supply equation captured by the constant term

¹Actually the substitution is between consumption of goods on the other hand and leisure combined with homework on the other when the participation decision is made.

²See e.g. Deaton and Muellbauer (1980) ch. 4 and 11 for a review of the microeconomics of labour supply equations.

in the estimated difference form. This measures the secular effects of increased education, better pensions and other institutional factors.

According to the estimated equation (see L.13 in appendix 1), leisure is a indeed normal good, so that a general rise in real incomes and consumption will decrease labour supply albeit the elasticity with respect to consumption is very small. The compensated real wage elasticity of labour supply (holding real consumption constant) is positive but even smaller in absolute terms, so that if the rise in real incomes happens as a result of an increase in after-tax wages, the total effect of an increase in real wages on labour supply is a small negative figure, as shown in the following table of labour supply elasticities:

Table 1. Elasticities of the supply of labour (labour force)

variable	elasticity
working-age population	0.382
employment	0.648
consumption	-0.030
real wage rate (the substitution effect)	0.005
real wage rate (the income and substitution effect)	-0.005

The total real wage effect, i.e. the uncompensated real wage elasticity is computed from the 1985 share of net wage income in households' disposable income and assuming that the marginal elasticity of consumption with respect to real disposable income is unity. It is seen that the labour supply curve, if drawn on the basis of these estimates, is slightly backward-bending.

The properties of the equation are such that if working-age population is increased while holding per capita consumption and the unemployment rate constant, then the elasticity of labour supply

with respect to working-age population is unity and the participation rate also stays constant.

It must be pointed out that because labour supply is estimated in the form of the participation rate, it does not measure that part of changes in the supply of labour which is due to movements from full-time work to part-time work and vice versa.

From the point of view of the full macroeconomics model, the significance of the labour force participation equation is that it constitutes one of the determinants of the unemployment rate. Unemployment rate in turn affects wage rates through the wage equations. As aggregate demand is price elastic in the model, the labour force participation equation is thus an important link in the neoclassical adjustment mechanisms which work to balance the goods and labour markets in the long run.

3 WAGES

3.1 Union Behaviour, Negotiated Wage Rates and Expected Inflation

Finnish labour markets are characterized by a high degree of unionization and, also, a high degree of synchronization in making the economy-wide wage contracts which result from collective bargaining between labour unions and organizations of employers. The unionization rate in Finland was 86 per cent in 1985.

The equation for the negotiated wage rate (in fact for the private sector), shown as W.6 in appendix 1, is based on the idea that trade unions are concerned with real disposable (after tax) wages even if bargaining in practice is over nominal wages. The estimated function is of the form

$$(1) \quad \hat{w}n = (1-\lambda)a + \lambda \hat{w}n_{-1} + (1-\lambda)c \pi^e + b[\log(1-\hat{\text{tax}}) - \lambda \log(1-\hat{\text{tax}}_{-1})]$$

where w_n is the log of negotiated wages, π^e is the expected increase of consumer prices over four quarters (inflogs) and tax is the average personal tax rate. $\hat{}$ over a variable refers to differences over four quarters. The steady state equilibrium implied by (1) is

$$(2) \quad \hat{w}n = a + c\pi^e + b\log(1-\hat{\text{tax}})$$

In the long-run the price expectations are not completely passed on into negotiated wages the parameter c being 0.67 (calculated from equation W.6). If parameter c were restricted to unity it would imply that price increases were overcompensated in the final behavioral wage equation (see equation W.4 in appendix 1). Because this was not desirable the parameter of the expected inflation was freely estimated as in equation W.6.

Expected inflation (see eq. W.7) is operationalized not only by recent price increases and the constant term, but also a relative price variable, measuring deviations from purchasing power parity between domestic and foreign currencies. This is reasonable since the policy of a pegged exchange rate creates a tendency of the domestic price level to converge over time towards a level dictated by the "law of one price", at least in tradeable goods. If, for example, there is a sudden change in foreign prices domestic prices are also expected to rise. This effect works directly through the relative price variable in W.7 as well through lagged changes in PCP and P4.

Inflation expectations affect wage behaviour only through their effect on negotiated wages which are left permanently on a higher level after a temporary rise in expected inflation. In the very long-run the effect on actual wages through negotiated wages fades out altogether via the equilibrating mechanism of the wage drift. This can be seen from tables 2 and 3a - 3c. Increasing the average personal tax rate by one percentage point raises negotiated wages immediately by 1.1 per cent and is passed on into actual wages as governed by the specifications of the equations (see the next paragraph and tables 3a - 3c).

Negotiated wages influence the rest of the model only through their influence on actual wages. For forecasting purposes the negotiated wage rate can be exogenised for the near future when the outcome of the wage bargaining is known. In the long-run "market forces" dominate also centralized wage settlements as part of the process of determining actually paid wages.

Table 2. Elasticities of actual wages with respect to negotiated wages in the BOF4 model

	immediate elasticity	one-year elasticity	five-year elasticity	ten-year elasticity
agriculture	1	0.91	0.34	0.08
priv. services etc.	1	1.98	0.42	0.10
forestry	1	0.93	0.36	0.09
manufacturing	1	0.91	0.35	0.08
government	1	1.00	0.71	0.34
wage rate, total	1	0.96	0.46	0.15

3.2 Actual Wage Rates

Actually applied wage rates are not completely dictated by collective agreements. A so-called "wage drift" exists between the negotiated wage rate increases and those actually recorded in different industries. In the BOF4 model, the actual wage rates depend on the negotiated wage rates, on the one hand, and on other "economic factors", on the other. The changes in the wages block of the model since the BOF3 version reported in Tarkka & Willman (1985) are not very great.

The economic aspects of wage determination are mainly included in the wage equation for manufacturing. Other sectors are assumed to be "wage followers" adjusting rather passively to the development of wages in the manufacturing sector. This is in accordance with the so-called scandinavian model of inflation (see e.g. Edgren, Faxen & Odhner, 1969). The equality - or proportionality - of wages in the long run would follow by necessity if labour were homogenous and perfectly mobile.

The most important wage equation of the model, that for manufacturing wages, is shown as W.4 in the list. The equation was first estimated with private sector negotiated wages as an unrestricted explanatory variable allowing the coefficient of negotiated wages to change in 1975, because of a definitional change

in statistics. This gave a parameter close to 1 to negotiated wages in the latter period. After this the equation was estimated in the restricted form so that an increase in negotiated wages is fully passed on into actual wages.

The second explanator is the rate of unemployment. This Phillips curve effect is not very strong in the model and it is also rather slow due to the fact that the rate of unemployment affects the wage drift only after a one-year lag. For example, an increase in the rate of unemployment from 5 to 6 per cent would decelerate the annual increase of wages by about one half percentage point. This effect would be somewhat stronger on lower levels of unemployment. The effect is also strengthened by the wage/price linkages of the full BOF4 model as lower wages work through the price mechanism which again feed back on wages etc.

Perhaps the most unconventional part of the specification is the direct effect of "equilibrium wages" on actually paid wages. The deviation of equilibrium wages from actual wages measures the excess demand for labour. Equilibrium wages are operationalized by the nominal marginal product of labour in manufacturing, which in turn depends on the physical marginal product of labour and on the value added deflator. The effect of equilibrium wages is entered through two terms in the equation: the log-change of the value added deflator less indirect labour costs, and an error correction term measuring the "real wage gap", that is the lagged deviation of actually paid wages and indirect labour costs from the marginal productivity of labour.

The presence of marginal productivity in the wage equation might be given an expectations-based interpretation. However, we prefer to think that inflation expectations enter mainly through the negotiated wage rate and that the convergence of wages towards equilibrium wages operationalized by the marginal product of labour are an indication of the influence of excess demand for labour on the price of labour. As argued by Dreze (1987), wage equations should take into account the simultaneous existence of unemployment

and excess demand for labour. It should be noted, moreover, that the marginal productivity hypothesis is the mechanism of wage determination in manufacturing also according to the Scandinavian model of inflation.

The coefficient of the "real wage gap" is 0.058 implying that about 25 per cent of the "real wage gap" tends to be eliminated through wage adjustments within one year. In addition to these variables some seasonal dummies and a dummy measuring a change in the size of the constant term were included in the manufacturing wage equation.

In the equations determining wages in other sectors (see equations W.1, W.2, W.3 and W.5) the private sector negotiated wage rate enters with coefficient one just as in manufacturing. The wage drift in manufacturing drives up wages in other sectors the effect being strongest in agriculture but not identifiable in private services. There both the two-period lag of the level and of the change of unemployment showed up as significant explanators. In the government sector the wage drift variable is lagged by four periods which possibly reflects the fact that public sector wages are often adjusted to observed wage drift in manufacturing after a delay. An error correction mechanism constrains the long-run elasticities of the wages of the other sectors with respect to manufacturing to unity. This adjustment process is slowest in the government sector. The relations between the variables in the wage block can be summarized in tables 3a - 3c.

Tables 3a - 3c. Partial elasticities of the wage block with respect to the main explanatory variables
Inflation expectations are exogenous in columns 1 - 6.

explanatory variable endogenous variable	1 unemployment UR	2 real wage gap GDP4	3 employers social sec. contrib. rate SOCCR4	4 average personal tax rate ATAX	5 inflation expectations ¹ INF	6 prices PGDP4	7 prices when inflation expectations are endogenous PGDP4, PCP
<u>3a. one-year elasticity</u>							
negotiated wages	0.00	0.00	0.00	1.13	0.56	0.00	0.47
agriculture	0.00	0.10	-0.23	1.02	0.52	0.27	0.70
priv. services etc.	-0.82	0.02	-0.08	1.10	0.55	0.10	0.56
forestry	0.00	0.08	-0.19	1.04	0.53	0.23	0.67
manufacturing	0.00	0.10	-0.21	1.03	0.52	0.26	0.69
government	-0.74	0.00	-0.01	1.12	0.56	0.01	0.48
wage rate, total	-0.54	0.04	-0.11	1.08	0.54	0.13	0.59
<u>3b. five-year elasticity</u>							
negotiated wages	0.00	0.00	0.00	1.09	0.67	0.00	0.56
agriculture	-2.18	0.76	-0.58	0.36	0.24	0.73	0.93
priv. services etc.	-2.43	0.66	-0.53	0.45	0.30	0.66	0.90
forestry	-2.14	0.73	-0.57	0.38	0.25	0.71	0.92
manufacturing	-2.14	0.74	-0.57	0.37	0.25	0.72	0.92
government	-2.98	0.33	-0.29	0.76	0.48	0.35	0.76
wage rate, total	-2.46	0.61	-0.49	0.50	0.32	0.61	0.88
<u>3c. ten-year elasticity</u>							
negotiated wages	0.00	0.00	0.00	1.10	0.67	0.00	0.56
agriculture	-2.80	1.05	-0.75	0.10	0.05	0.94	0.98
priv. services etc.	-3.17	1.03	-0.74	0.12	0.07	0.92	0.98
forestry	-2.79	1.05	-0.75	0.11	0.06	0.93	0.98
manufacturing	-2.79	1.05	-0.75	0.10	0.06	0.93	0.98
government	-4.80	0.75	-0.56	0.38	0.23	0.69	0.89
wage rate, total	-3.45	0.97	-0.70	0.18	0.11	0.87	0.96

¹Inflation expectations increased by one per cent during the first year.

4 PRICES

4.1 Marginal Costs and the Pricing of Output

Of the five sectors included in the BOF4 model, four produce goods which are sold in the market. Actually, manufactured goods are sold in three different markets, i.e. domestically, as western exports and as eastern (bilateral) exports. Government sector produces public goods for which no market prices exist. (There is, however, a definitional unity between the government sector value added deflator and the producer price of the government sector output.)

Theoretical foundations of the estimated pricing equations of the model are based on the solution of the following profit maximization problem of the firm:

$$\begin{aligned}
 (1) \quad & \max_Y \sum_{t=0}^{\infty} \theta^t \cdot \text{PROFIT}_t \\
 & \text{PROFIT} = P \cdot Y - w \cdot L - P^m \cdot M - P^k \cdot K \\
 & \text{s.t.} \\
 & Y = (P^C/P)^\alpha \cdot D \cdot (Y_{-1}/D_{-1})^\mu \quad (\text{firm-level demand for output}) \\
 & L = \text{CES}^{-1}[(1-\alpha) \cdot Y, K, \text{TIME}] \quad (\text{inverted CES-production function}) \\
 & M = a \cdot Y \quad (\text{demand for material inputs})
 \end{aligned}$$

where Y is output, P is the price of output, w is the nominal wage rate, L is the required labour input, P^m is the price and M the volume of material inputs, P^k is the implicit rent of capital, K the stock of capital, P^C is the price of competing products, D is the demand shift variable, θ is a discount factor, α governs the price

elasticity of demand and μ is used to specify the dynamics of the firm-level demand function. Variables w , p^m , p^k and K are here treated as predetermined.

The specification of dynamics in the demand function is quite general. With the parameter value $\mu = 0$ it collapses to the conventional static demand function $Y = (P^C/P)^{\alpha}D$ and with $\mu = 1$ to the function of infinite long-run price elasticity à la Phelps & Winter (1970)

$$(2) \quad Y/Y_{-1} = (P^C/P)^{\alpha}(D/D_{-1}).$$

In this latter case firms possess monopoly power over their products only in the short-run. If they permanently keep the price level of their products above that of their competitors, they will lose all of their customers.

Maximization of profits implies the following first order condition for any period t (The Euler equation):

$$(3) \quad [1-1/\alpha]P_t - SMC_t = -(\phi_{\mu}/\alpha)(P_{t+1}Y_{t+1}/Y_t)$$

where

$$SMC = a \cdot p^m + (1-a)w \cdot (MPL) \quad (\text{short-run marginal costs of production})$$

MPL is marginal product of labour $\delta L/\delta Y$. One can easily see that in the case of a static demand curve ($\mu = 0$) the right hand term in equation (3) equals zero implying the following conventional mark-up price equation:

$$(4) \quad P_t = [\alpha/(\alpha-1)] * SMC_t$$

Estimated equations in the closed sectors 1 and 2 of the model are based on relation (4) interpreted, however, as a definition of only the long-run dependence of prices on marginal costs.

In the open sectors of the economy, however, the firms are assumed to possess monopoly power only in the short run, i.e. $\mu = 1$ and, hence, the demand function (2) is faced by the firms. In this case the equilibrium price relation is determined by the transversality condition,¹ corresponding to equation (3):

$$(5) \quad \lim_{T \rightarrow \infty} \phi^T [P_T(1-1/\alpha) - SMC_T + (\phi/\alpha)P_T] = 0$$

Equations (2) and (5) imply the following long-run relationships between prices, marginal costs and competing foreign prices

$$(6a) \quad P = [\alpha/(\phi-1+\alpha)] * SMC$$

$$(6b) \quad P = PC$$

The mark-up factor in (6a) is the closer to unity the smaller is the rate of time preference (i.e. the closer to 1 is ϕ).

What equations (6a) and (6b) actually state is that it is the price of the competing products, which in the long run determines the development of the price of output as well as the development of the marginal cost variable SMC. This is an argument, which entitles us to use the price of competing foreign products as an explanatory variable, along with the variable SMC, in the price equations of the open sectors and exports to the western markets. The derivation of the exact form of the estimated export price equations is presented in Tarkka and Willman (1988) p. 8 - 9.

Estimated behavioral equations for the prices of gross outputs in sectors 1 - 3 and for the prices of manufactured goods sold in the domestic market and in the western export market, respectively, are

¹The transversality condition of the infinite horizon problem is obtained as a limit of the Euler equation solved for the last period T of the corresponding finite horizon problem, when T approaches infinity. (See Sargent (1979) p. 195 - 197.)

presented by equations P.1, P.4, P.7, P.10 and X.5. The corresponding marginal cost variables, the SMC:s are given in equations P.2, P.5, P.8, P.11 and X.6. They are based on the sectoral production functions presented in Tarkka, Willman and Rasi ((1988), p. 11) The marginal cost variables include also indirect taxes contained in production of goods (see definitional equations P.3, P.6, P.9 and P.13).

Table 4. Partial elasticities of output prices
with respect to short-run marginal costs of production

Prices in	immediate elasticity	one-year elasticity	long-run elasticity
Agriculture	0.04	0.49	0.97
Priv. services etc.	0.29	0.65	0.99
Forestry	0.12 ¹	0.10	0.00
Manufactured goods sold in domestic market	0.24	0.43	1.00
Exports to the western market	0.29	0.49	1.00

¹The effect with the lag of one quarter.

Partial, single equation simulations in table 4 show that, in the long-run, an increase in the short-run marginal costs raises the corresponding prices approximately proportionately in all sectors except forestry. There the marginal costs have an direct effect on prices only in the short-run. As can be seen from table 5 only in forestry the link from competing foreign prices to the equilibrium output price works directly through the price equation. The long-run elasticity of prices in forestry with respect to world-market prices of wood products is unity even if marginal costs were treated as exogenous.

Table 5. Partial elasticities of output prices and with respect to foreign competitors' price

Prices in	immediate elasticity	one-year elasticity	long-run elasticity
Agriculture	-	-	-
Priv. services etc.	-	-	-
Forestry	0.13	0.31	1.00
Manufactured goods sold in domestic market	0.18 ¹	0.10	0.00
Exports to the western market	0.60	0.39	0.00

¹The effect with the lag of one period.

Due to the exogeneity of marginal costs the partial long-run elasticities in table 5 do not give the full picture of the dependencies of the model. Simulated with the whole model an increase of one per cent in competitors' prices is passed on into the prices and marginal costs of exports and domestically sold manufactured goods within 5 - 6 years. In forestry there is an overshooting of marginal costs but in the very long-run the parity of eq. (6) is approached. (See figures 2 and 3).

In the long-run the prices in the open sector depend only on the competing foreign prices. (See also figure 2). This implies a horizontal demand curve in the long-run. This is in accordance with the infinite price elasticity of the multilateral exports equation given in Tarkka and Willman (1988) table 2.

Equation P.12 determines the aggregate price index of output in manufacturing. It is solved from the identity (expressed at current prices) defining that the output in manufacturing equals the sum of exports and domestic absorption of domestically produced manufactured goods.

The prices of bilateral exports are determined by equation X.4. It is based on the assumption that bilateral trade contracts are concluded at the same price at which industrial products are sold in the domestic market. A geometric lag from the domestic manufacturing

FIGURE 2 Dynamic elasticities of prices of manufactured goods with respect to one percent increase in competitors' prices.

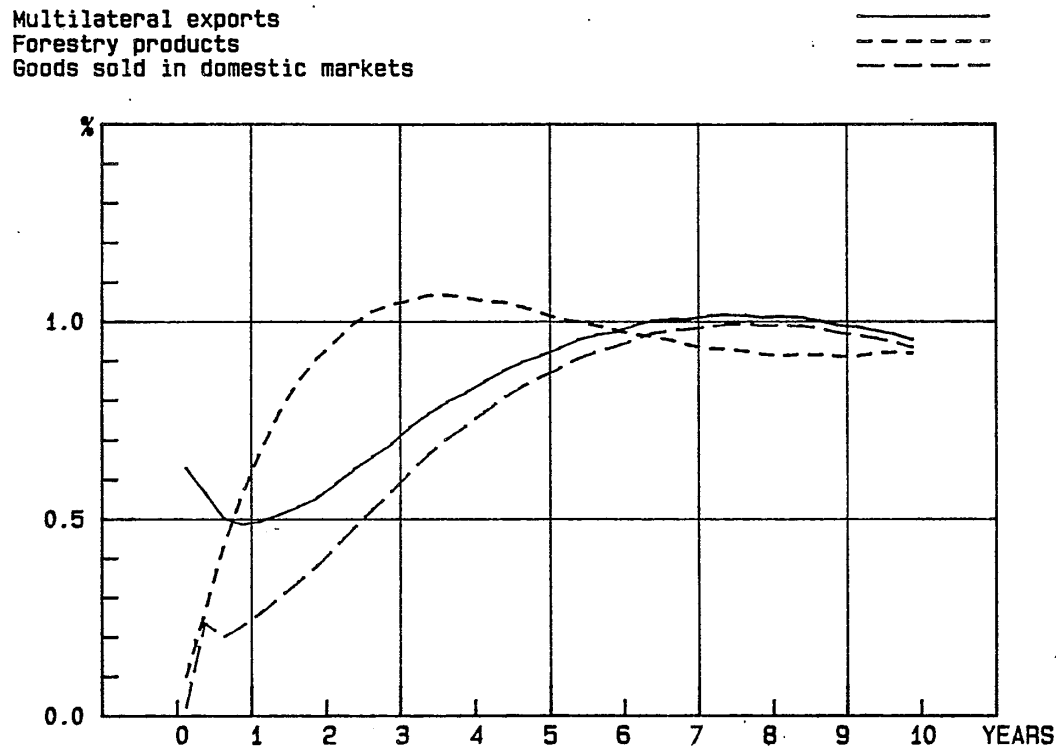
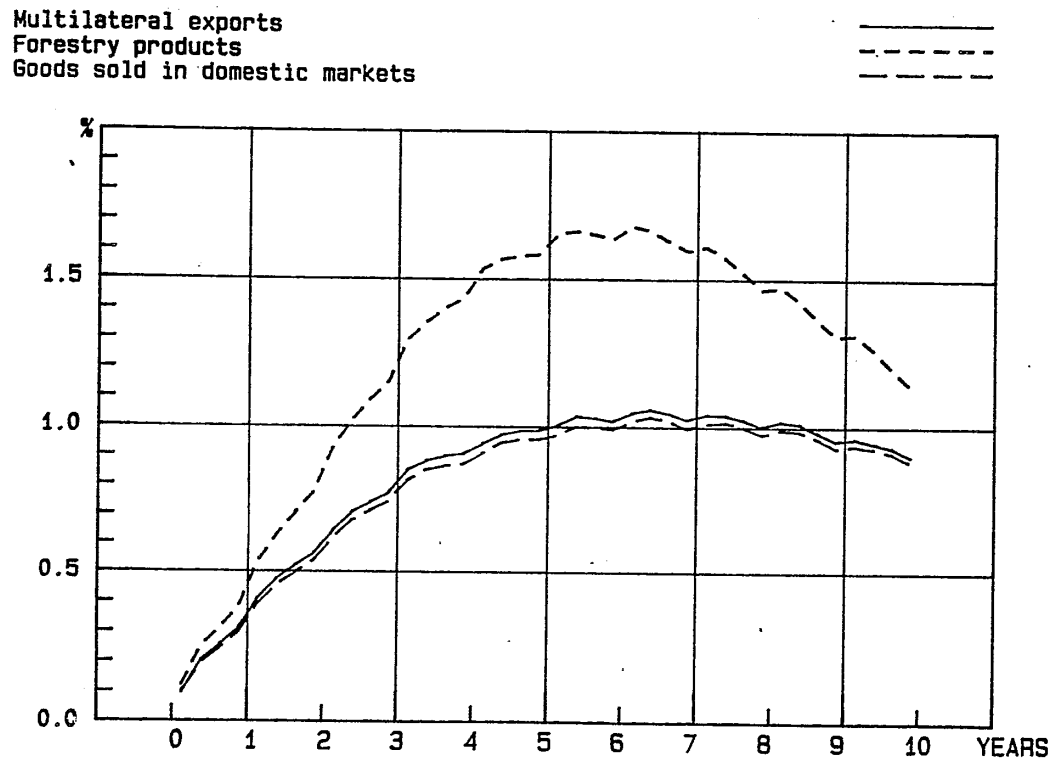


FIGURE 3 Dynamic elasticities of short-run marginal costs of manufactured goods with respect to one per cent increase in competitors' prices.



price to the price of bilateral exports measures the time span between contracts and deliveries. As export contracts are usually made in clearing rubles, changes in the FIM rate of the rouble during the lag has also been taken into account.

4.2 Value Added Deflators

The GDP deflators for the four private sectors of the model is obtained in two stages. In the first stage input-output estimates for the GDP deflators are solved from the sectoral cost functions (see equation 11 in Tarkka, Willman and Rasi (1988)). These estimates are determined by equations P.14 - P.17. In the second stage identifies between the GDP deflators and corresponding input-output deflators are used (see equations P.23 - P.26).

In the government service sector the GDP deflator is determined as a mark-up over labour costs and indirect taxes (see equation P.27).

4.3 Deflators of Demand Components

Besides exports and inventories, the demand in BOF4-model is disaggregated into twelve sub-components for which also price equations are needed. The similar two-stage approach as in the case of the GDP deflator was used. At the first stage input-output estimates are obtained as weighted averages of the prices of sectoral outputs and import prices (these are equations P.18 - P.22 in the list). At the second stage actual prices are explained by corresponding input-output price estimates and effective indirect tax rates. For example the price of durables in private consumption is given as the result of two equations:

$$(P.18) \quad \log PCD10 = .3183 \cdot \log P2 + .4007 \cdot \log PD4 + .2810 \cdot \log PMC$$

and

$$(P.31) \quad \Delta \log PCD = \Delta \log (1 + TIRCD) + \Delta \log PCDIO$$

In the list of equations the prices of demand components and effective indirect tax rates are determined by equations P.29 - P.50. Price indexes of aggregate demand components and the price of GDP deflator at factor cost are solved from identities P.51 - P.56.

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APPENDIX 1

LIST OF EQUATIONS

List of equations connected to the present report of the BOF4 quarterly model of the Finnish economy, July 1988 version. Sections W and P, and parts of sections X and L. The whole X-section is published in Tarkka & Willman (1988) and the whole L-section in Tarkka, Willman & Rasi (1988).

Notation used:

Values of parameter estimates are ordinary least squares estimates.

Standard errors of parameter estimates are in parentheses below the coefficients.

When standard error is not shown, the parameter in question is fixed a priori e.g. on the basis of input-output studies.

Weights of Almon lags are denoted by a_i , b_i , etc.

Variables with a subscript are lagged. Subscripts refer to number of lags in quarters.

Δ is the difference operator.
 Δ^n denotes difference over n quarters.
 \log denotes natural logarithms.

Units:

Values are in millions of FIM.

Volumes are in millions of FIM at 1985 prices.

Price indices take the value 100 in 1985.

Interest rates are in per cent.

Energy is in 1000 toe.

Labour force figures are in 1000 persons.

\bar{R}^2 = corrected coefficient of determination
 DW = Durbin - Watson statistic
 SE = standard error of estimate
 rho = coefficient of first-order autocorrelation correction

The estimation period is given after the summary statistics

WNRP Negotiated wage rate, private sector, 1985 = 100
 WR1 Wage rate, agriculture, 1985 = 100
 WR4 Wage rate, manufacturing, 1985 = 100
 TREND74 Linear trend: 60.1 = 15, 60.2 = 14.75, ..., 74.4 = .25

W. PALKAT
 WAGES

W.1 Ansiotasoindeksi, maatalous
 Wage Rate, Agriculture

$$\Delta \log(WR1/WNRP) = - 0.00018$$

(0.0033)

$$+ 1.05674 \cdot \Delta \log(WR4/WNRP)$$

(0.1620)

$$+ 0.11443 \cdot \log(WR4_{-1}/WR1_{-1})$$

(0.0391)

$$- 0.00447 \cdot TREND74$$

(0.0017)

$$\bar{R}^2 = 0.404$$

$$DW = 2.478$$

$$SE = 0.0201$$

$$65.1 - 85.4$$

WNRP³ Negotiated wage rate, private sector, 1985 = 100
 WR2 Wage rate, services and other, 1985 = 100
 WR3 Wage rate, forestry, 1985 = 100
 WR4 Wage rate, manufacturing, 1985 = 100
 TREND74 Linear trend: 60.1 = 15, 60.2 = 14.75, ..., 74.4 = .25
 UR Unemployment rate, per cent

W.2 Ansiotasoindeksi, palvelukset ym.

Wage Rate, Services etc.

$$\Delta \log(WR2/WNRP) = + 0.01289 \\ (0.0033)$$

$$+ 0.34396 \cdot \log(WR4_{-1}/WR2_{-1}) \\ (0.0627)$$

$$- 0.01338 \cdot \Delta^2 \log UR \\ (0.0073)$$

$$- 0.0083 \cdot \log UR_{-2} \\ (0.0028)$$

$$\bar{R}^2 = 0.264 \quad DW = 2.092 \quad SE = 0.01197 \quad 65.1 - 85.4$$

W.3 Ansiotasoindeksi, metsätalous

Wage Rate, Forestry

$$\Delta \log(WR3/WNRP) = + 0.02949 \\ (0.0086)$$

$$+ 0.74445 \cdot \Delta \log(WR4/WNRP) \\ (0.3436)$$

$$+ 0.50486 \cdot \log(WR4_{-1}/WR3_{-1}) \\ (0.0961)$$

$$- 0.01234 \cdot TREND74 \\ (0.0029)$$

$$\bar{R}^2 = 0.292 \quad DW = 2.139 \quad SE = 0.04262 \quad 65.1 - 85.4$$

GDP4 Production at factor cost, manufacturing, millions of
1985 FIM

LH4 Performed working hours, manufacturing, millions of hours

PGDP4 Value added deflator in manufacturing, 1985 = 100

SOCCR4 Employers' social security contribution rate, manufacturing

TREND Linear trend: 60.1 = .25, 60.2 = .50 etc.

UR Unemployment rate, per cent

WNRP Negotiated wage rate, private sector, 1985 = 100

WR4 Wage rate, manufacturing, 1985 = 100

D75 Dummy: 60.1 - 74.4 = 1, 75.1 - = 0

DQ1 Seasonal dummy, the first quarter

DQ3 Seasonal dummy, the third quarter

W.4 Ansiotasoindeksi, teollisuus
Wage Rate, Manufacturing

$$\Delta \log (WR4/WNRP) = - 0.24900$$

$$(0.0631)$$

$$- 0.61823 \cdot D75 \cdot \Delta \log WNRP$$

$$(0.0589)$$

$$- 0.01019 \cdot \log UR_{-4}$$

$$(0.0029)$$

$$+ 0.19045 \cdot \Delta \log (PGDP4 / (1 + SOCCR4))$$

$$(0.0491)$$

$$+ 0.05823 \cdot var1$$

$$(0.0141)$$

$$+ 0.01377 \cdot D75$$

$$(0.0029)$$

$$- 0.00450 \cdot DQ1$$

$$(0.0023)$$

$$- 0.00520 \cdot DQ3$$

$$(0.0023)$$

$$jossa var1 = \log [PGDP4_{-1} / \{WR4_{-1} \cdot (1 + SOCCR4_{-1})\}]$$

$$+ (1/.87496) \cdot \log (GDP4_{-1} / LH4_{-1}) - 0.004377 \cdot TREND$$

$$\bar{R}^2 = 0.618 \quad DW = 2.110 \quad SE = 0.0085 \quad 65.1 - 85.4$$

UR Unemployment rate, per cent
 WNRP Negotiated wage rate, private sector, 1985 = 100
 WR4 Wage rate, manufacturing, 1985 = 100
 WRG Wage rate, general government, 1985 = 100

W.5 Ansiotasoindeksi, julkinen toiminta
 Wage Rate, Central and Local Government

$$\begin{aligned} \Delta \log(WRG/WNRP) = & + 0.01575 \\ & (0.0052) \\ & + 0.23479 \cdot \Delta \log(WR_4/WNRP_4) \\ & (0.0898) \\ & + 0.03686 \cdot \log(WR4_1/WRG_1) \\ & (0.0169) \\ & - 0.00714 \cdot \log UR \\ & (0.0032) \end{aligned}$$

$\bar{R}^2 = 0.120$ DW = 1.896 SE = 0.0112 65.1 - 85.4

ATAX Personal tax rate, estimate
 LW Paid labour input, total, millions of 1985 FIM
 P4 Prices in manufacturing, 1985 = 100
 PCP Private consumer prices, 1985 = 100
 PFOR Import prices of Finland's major export countries, FIM,
 1985 = 100
 WNRP Negotiated wage rate, private sector, 1985 = 100
 WR Wage rate, total, 1985 = 100
 YW Wages and salaries, total, FIM million
 INF Expected inflation for private consumption prices
 one year ahead

W.6 Sopimuspalkkaindeksi
 Negotiated Wage Rate

$$\begin{aligned}
 \Delta^4 \log \text{WNRP} = & + 0.00575 \\
 & (0.0047) \\
 & + 0.41236 \cdot \Delta^4 \log(\text{WNRP}_{-1}) \\
 & (0.0750) \\
 & + 0.39346 \cdot \text{INF} \\
 & (0.0642) \\
 & - 0.73575 \cdot \Delta^4 [\log(1-\text{ATAX}) - .41 \cdot \log(1-\text{ATAX}_{-1})] \\
 & (0.1463)
 \end{aligned}$$

$$\bar{R}^2 = 0.765 \quad \text{DW} = 1.907 \quad \text{SE} = 0.0134 \quad 66.1 - 85.4$$

W.7 Inflaatio-odotus
 Expected inflation

$$\begin{aligned}
 \text{INF} = & + 0.00217 \\
 & (0.01150) \\
 & + 0.83559 \cdot \Delta^4 \log(\text{PCP}) \\
 & (0.09116) \\
 & + 0.23150 \cdot \log(\text{PFXG}/\text{P4}) \\
 & (0.07353)
 \end{aligned}$$

Regressand INF in estimation was $\log(\text{PCP}_{+4}/\text{PCP})$

$$\bar{R}^2 = 0.557 \quad \text{DW} = 0.3711 \quad \text{SE} = 0.0276 \quad 69.1 - 85.4$$

W.8 Ansiotasoindeksi
 Wage Rate, Total

$$\text{WR} = 100 \cdot \text{YW}/\text{LW}$$

D5863 Dummy replacing sales tax rate in 1958 - 1963
 GDP1 Production at factor cost, agriculture, millions of 1985 FIM
 GDPFV GDP at factor cost, FIM million
 GDPV1 Production at factor cost, agriculture, FIM million
 GDPVG Production at factor cost, FIM million
 KF1 Net stock of fixed capital, agriculture, millions of 1985 FIM
 LH1 Performed working hours, agriculture, millions of hours
 P1 Prices in agriculture, 1985 = 100
 P2 Prices in services etc., 1985 = 100
 P3 Prices in forestry, 1985 = 100
 PD4 Price index of manufacturing goods sold on the domestic market, 1985 = 100
 PMFL Import prices of fuels and lubricants, 1985 = 100
 PMR Import prices of raw materials, 1985 = 100
 SMCD4 Marginal costs of manufacturing goods sold on the domestic market
 SMC1 Marginal costs in agriculture
 SOCCR1 Employers' social security contribution rate, agriculture
 SOCGR Employers' child allowance contribution rate
 SOCSR Employers' national pensions and sickness insurance contribution rate
 SUB Commodity subsidies, FIM million
 SUBT Subsidies, total, FIM million
 TIR1 Indirect tax rate on production, agriculture
 TIV Central government revenue from commodity taxes, FIM million
 TSCG Central government revenue from sales tax, FIM million
 TSR Sales tax rate
 WR1 Wage rate, agriculture, 1985 = 100

P. HINNAT JA KUSTANNUKSET
 PRICES AND COSTS

P.1 Tuotannon hinta, maatalous
 Prices in Agriculture

$$\begin{aligned}\Delta(P1 - SMC1) &= 0.27921 \cdot \Delta(SMC1_{-1} - SMC1) \\ &\quad (0.04752) \\ &\quad + 0.41178 \cdot \Delta(SMC1_{-2} - SMC1) \\ &\quad (0.04475) \\ &\quad + 0.17635 \cdot \Delta(SMC1_{-3} - SMC1) \\ &\quad (0.05266) \\ &\quad + 0.09186 \cdot \Delta(SMC1_{-4} - SMC1) \\ &\quad (0.05887)\end{aligned}$$

$$\bar{R}^2 = 0.8185 \quad DW = 1.9449 \quad SE = 0.8648 \quad 62.1 - 85.4$$

P.2 Tuotannon rajakustannus, maatalous
 Marginal Costs in Agriculture

$$\begin{aligned}SMC1 &= 1.03027 \cdot (1 + TIR1) \cdot \\ &\quad \{.535 \cdot 45.1661 \cdot (1 + SOCCR1 - .87 \cdot (SOCGR + SOCSR)) \cdot WR1 / \\ &\quad ((.6663 \cdot (KF1/LH1) - .02813 + .3337) - 1 / (.02813 - 1)) + \\ &\quad .465 \cdot (.2603 \cdot P2 + .0182 \cdot P3 + .6172 \cdot PD4 + .0825 \cdot PMR + .0218 \cdot PMFL)\}\end{aligned}$$

P.3 Välillisten verojen osuus tuotannosta, maatalous
 Indirect Tax Rate on Production, Agriculture

$$\begin{aligned}TIR1 &= [1 + 0.1737 \cdot TSR \cdot D5863/100 + 0.1040 \cdot (TIV - TSCG) / \\ &\quad (GDPFV - GDPVG) - 0.0161 \cdot SUB / (GDPFV - GDPVG) - \\ &\quad 0.2726 \cdot (SUBT - SUB) / GDPV1] - 1\end{aligned}$$

D5863 Dummy replacing sales tax rate in 1958 - 1963
 GDP2 Production at factor cost, services etc., millions of 1985 FIM
 GDPFV GDP at factor cost, FIM million
 GDPV2 Production at factor cost, services and other, FIM million
 GDPVG Production at factor cost, general government, FIM million
 KF2 Net stock of fixed capital, services etc., millions of 1985 FIM
 LH2 Performed working hours, services etc., millions of hours
 LW2 Paid labour input, services etc., millions of 1985 FIM
 P1 Prices in agriculture, 1985 = 100
 P2 Prices in services etc., 1985 = 100
 P3 Prices in forestry, 1985 = 100
 PD4 Price index of manufacturing goods sold on the domestic market, 1985 = 100
 PMFL Import prices of fuels and lubricants, 1985 = 100
 PMR Import prices of raw materials, 1985 = 100
 SMC2 Marginal costs in services etc.
 SOCCR2 Employers' social security contribution rate, services etc.
 SUB Commodity subsidies, FIM million
 SUBT Subsidies, total, FIM million
 TIOCG Central government revenue from other indirect taxes, FIM million
 TIR2 Indirect tax rate on production, services
 TIV Central government revenue from commodity taxes, FIM million
 TREND Linear trend: 60.1 = .25, 60.2 = .50 etc.
 TSCG Central government revenue from sales tax, FIM million
 TSR Sales tax rate
 WR2 Wage rate, services and other, 1985 = 100

P.4 Tuotannon hinta, palvelukset ym.
 Prices in Services etc.

$$\Delta(P2 - SMC2) = + 0.22987 \cdot \Delta(SMC2_{-1} - SMC2) \\ (0.1085)$$

$$+ 0.24906 \cdot \Delta(SMC2_{-2} - SMC2) \\ (0.1106)$$

$$+ 0.2504 \cdot \Delta(SMC2_{-3} - SMC2) \\ (0.1007)$$

$$\bar{R}^2 = 0.398 \quad RHO = -0.37 \quad SE = 0.913 \quad 62.1 - 85.4$$

P.5 Tuotannon rajakustannus, palvelukset ym.
 Marginal Costs in Services etc.

$$SMC2 = .95248 \cdot (1 + TIR2) \cdot \\ \{ .719 \cdot 1084.187 \cdot (1 + SOCCR2) \cdot YW2 / \\ [LH2 \cdot \exp(.0316 \cdot TREND)] \cdot \\ (.88821 \cdot (KF2/LH2) - .60502 + .11179) - 1 / .60605 - 1 \} + \\ .281 \cdot (.0067 \cdot P1 + .0062 \cdot P3 + .6783 \cdot PD4 + .2376 \cdot PMR + .0711 \cdot PMFL) \}$$

P.6 Välillisten verojen osuus tuotannosta, palvelukset ym.
 Indirect Tax Rate on Production, Services etc.

$$TIR2 = [1 + 0.1439 \cdot TSR \cdot D5863/100 + 0.2103 \cdot (TIV - TSCG) / \\ (GDPFV - GDPVG) - 0.0298 \cdot SUB / (GDPFV - GDPVG) + \\ 0.9125 \cdot TIOCG/GDPV2 - 0.2224 \cdot (SUBT - SUB) / GDPV2] - 1$$

D5863 Dummy replacing sales tax rate in 1958 - 1963
FXSUSD Exchange rate, FIM/USD
GDP3 Production at factor cost, forestry, millions of 1985 FIM
GDP4 Production at factor cost, manufacturing, millions of 1985 FIM
GDPFV GDP at factor cost, FIM million
GDPV3 Production at factor cost, forestry, FIM million
GDPVG Production at factor cost, general government, FIM million
KF3 Net stock of fixed capital, forestry, millions of 1985 FIM
LH3 Performed working hours, forestry, millions of hours
LW3 Paid labour input, forestry, millions of 1985 FIM
P1 Prices in agriculture, 1985 = 100
P2 Prices in services etc., 1985 = 100
P3 Prices in forestry, 1985 = 100
PD4 Price index of manufacturing goods sold on the domestic market, 1985 = 100
PMFL Import prices of fuels and lubricants, 1985 = 100
PMR Import prices of raw materials, 1985 = 100
PWW World-market prices of wood products (HWWA), 1985 = 100
SMCD4 Marginal costs of manufacturing goods sold on the domestic market
SMC3 Marginal costs in forestry
SOCCR3 Employers' social security contribution rate, forestry
SUB Commodity subsidies, FIM millions
SUBT Subsidies, total, FIM million
TIR3 Indirect tax rate on production, forestry
TIV Central government revenue from commodity taxes, FIM million
TREND Linear trend: 60.1 = .25, 60.2 = .50 etc.
TSCG Central government revenue from sales tax, FIM million
TSR Sales tax rate
WR3 Wage rate, forestry, 1985 = 100

P.7 Tuotannon hinta, metsätalous
Prices in Forestry

$$\begin{aligned} \Delta \log P3 = & -0.20016 \\ & (0.0515) \\ & + 0.31891 \cdot \Delta \log P3_{-1} \\ & (0.0863) \\ & + 0.12945 \cdot \Delta \log (PWW \cdot FXSUSD) \\ & (0.0589) \\ & + 0.12149 \cdot \Delta \log SMC3_{-1} \\ & (0.0668) \\ & + 0.10201 \cdot \log (PWW_{-1} \cdot FXSUSD_{-1} / P3_{-1}) \\ & (0.0261) \\ & + 0.21642 \cdot \Delta \log GDP4_{-1} \\ & (0.1474) \end{aligned}$$

$$\bar{R}^2 = 0.353 \quad DW = 1.939 \quad SE = 0.036 \quad 62.1 - 85.4$$

P.8 Tuotannon rajakustannus, metsätalous
Marginal Costs in Forestry

$$\begin{aligned} SMC3 = & .99664 \cdot (1 + TIR3) \cdot \\ & \{ .925 \cdot 19.22742 \cdot (1 + SOCCR3) \cdot YW3 / \\ & [LH3 \cdot \exp(.00285 \cdot TREND)] \cdot \\ & (.16109 \cdot (KF3/LH3) \cdot 32612 + 83891)^{1/2} \cdot 32612 - 1 \} + \\ & .075 \cdot (.1289 \cdot P1 + .4121 \cdot P2 + .2993 \cdot PD4 + .0993 \cdot PMR + .0604 \cdot PMFL) \} \end{aligned}$$

P.9 Välillisten verojen osuus tuotannosta, metsätalous
Indirect Tax Rate on Production, Forestry

$$\begin{aligned} TIR3 = & [1 + 0.013 \cdot TSR \cdot D5863/100 + 0.0266 \cdot (TIV - TSCG) / \\ & (GDPFV - GDPVG) - 0.0026 \cdot SUB / (GDPFV - GDPVG) - \\ & 0.0029 \cdot (SUBT - SUB) / GDPV3] - 1 \end{aligned}$$

DP75 Dummy for change in manufacturing pricing in 1975
 GDP4 Production at factor cost, manufacturing, millions of 1985 FIM
 KF4 Net stock of fixed capital, manufacturing, millions of 1985 FIM
 LH4 Performed working hours, manufacturing, millions of hours
 LW4 Paid labour input, manufacturing, millions of 1985 FIM
 P1 Prices in agriculture, 1985 = 100
 P2 Prices in services etc., 1985 = 100
 P3 Prices in forestry, 1985 = 100
 PD4 Price index of manufacturing goods sold on the domestic market, 1985 = 100
 PFXG Index of competing foreign prices, 1985 = 100
 PMFL Import prices of fuels and lubricants, 1985 = 100
 PMR Import prices of raw materials, 1985 = 100
 SMCD4 Marginal costs of manufacturing goods sold on the domestic market
 SOCCR4 Employers' social security contribution rate, manufacturing
 TIR4 Indirect tax rate on production, manufacturing
 TREND Linear trend: 60.1 = .25, 60.2 = .50 etc.
 WR4 Wage rate, manufacturing, 1985 = 100

P.10 Kotimarkkinoilla myydyn tuotannon hinta, teollisuus
 Price Index of Manufactured Goods Sold on the Domestic Market

$$\begin{aligned} \log(PD4/PD4_{-1}) = & + 0.01074 \\ & (0.0069) \\ & + 0.18256 \cdot \Delta \log(PFXG_{-1}/PD4_{-1}) \\ & (0.0436) \\ & + 0.23535 \cdot \log(SMCD4/PD4_{-1}) \\ & (0.0704) \\ & - 0.04556 \cdot DP75 \\ & (0.0146) \\ & + 0.03823 \cdot DP75_{-1} \\ & (0.0161) \\ & + 0.02256 \cdot DP75_{-2} \\ & (0.0143) \end{aligned}$$

$$\bar{R}^2 = 0.42 \quad RHO = 0.67 \quad SE = 0.01482 \quad 64.1 - 85.4$$

P.11 Teollisuuden kotimarkkinatuotannon rajakustannus
 Marginal Costs of Manufactured Goods sold on the Domestic Market

$$\begin{aligned} SMCD4 = & 1.01434 \cdot (1+TIR4) \cdot \\ & \{ .437 \cdot 102.83176 \cdot (1+SOCCR4) \cdot YW4/ \\ & [LH4 \cdot \exp(.03063 \cdot TREND) \cdot \\ & (.55349 \cdot (KF4/LH4)^{-1.14291+4.4651})^{-1/1.14291-1}] + \\ & .563 \cdot (.1654 \cdot P1 + .2745 \cdot P2 + .0997 \cdot P3 + .2829 \cdot PMR + .1775 \cdot PMFL) \} \end{aligned}$$

D5863 Dummy replacing sales tax rate in 1958 - 1963
 GDP4 Production at factor cost, manufacturing, millions of 1985 FIM
 GDPFV GDP at factor cost, FIM million
 GDPV4 Production at factor cost, manufacturing, FIM million
 GDPVG Production at factor cost, general government, FIM million
 P4 Prices in manufacturing, 1985 = 100
 PD4 Price index of manufacturing goods sold on the domestic market, 1985 = 100
 PXG Export prices of goods, 1985 = 100
 SUB Commodity subsidies, FIM millions
 SUBT Subsidies, total, FIM million
 TIR4 Indirect tax rate on production, manufacturing
 TIV Central government revenue from commodity taxes, FIM million
 TSCG Central government revenue from sales tax, FIM million
 TSR Sales tax rate
 XG Exports of goods, millions of 1985 FIM

P.12 Tuotannon hinta, teollisuus
 Prices in Manufacturing

$$P4 = PD4 + 0.307 \cdot (PXG - PD4) \cdot XG/GDP4$$

P.13 Väliilisten verojen osuus tuotannosta, teollisuus
 Indirect Tax Rate on Production, Industry

$$TIR4 = [1 - 0.0634 \cdot TSR \cdot D5863/100 + 0.0589 \cdot (TIV - TSCG) / (GDPFV - GDPVG) - 0.2886 \cdot SUB / (GDPFV - GDPVG) - 0.0115 \cdot (SUBT - SUB) / GDPV4] - 1$$

P.14 - P.17

	P1/ (1+TIR1)	P2/ (1+TIR2)	P3/ (1+TIR3)	P4/ (1+TIR4)	P1	P2	P3	PD4	PMR	PMFL
PGDP1IO	2.0777	0	0	0	0	-.2338	-.0163	-.5543	-.0741	-.0196
PGDP2IO	0	1.4641	0	0	-.0026	0	-.0024	-.2649	-.0927	-.0277
PGDP3IO	0	0	1.0867	0	-.0104	-.0334	0	-.0243	-.0080	-.0049
PGDP4IO	0	0	0	2.2021	-.2041	-.3387	-.1230	0	-.3490	-.2191

PGDP1IO = Panos-tuotosestimaatti hinnalle PGDP1

Input-Output Estimate for PGDP1

PGDP2IO = Panos-tuotosestimaatti hinnalle PGDP2

Input-Output Estimate for PGDP2

PGDP3IO = Panos-tuotosestimaatti hinnalle PGDP3

Input-Output Estimate for PGDP3

PGDP4IO = Panos-tuotosestimaatti hinnalle PGDP4

Input-Output Estimate for PGDP4

P1	Prices in agriculture, 1985 = 100
P2	Prices in services etc., 1985 = 100
P3	Prices in forestry, 1985 = 100
P4	Prices in manufacturing, 1985 = 100
PD4	Price index of manufacturing goods sold on the domestic market, 1985 = 100
PMFL	Import prices of fuels and lubricants, 1985 = 100
PMR	Import prices of raw materials, 1985 = 100
TIR1	Indirect tax rate on production, agriculture
TIR2	Indirect tax rate on production, services
TIR3	Indirect tax rate on production, forestry
TIR4	Indirect tax rate on production, manufacturing

P.18 - P.22

	log P1	Log P2	log P3	log PD4	log PGDPG	log PMC	log PMI	Σ
log PCDIO	0	0.3183	0	0.4007	0	0.2810	0	1
log PCNDIO	0.0562	0.3749	0.0144	0.4518	0	0.1027	0	1
log PCSIO	0.0002	0.9913	0.0003	0.0057	0	0.0025	0	1
log PCGIO	0.0009	0.1340	0.0023	0.0878	0.7422	0.0328	0	1
log PIFIO	0	0.5956	0.0099	0.1340	0	0	0.2605	1

PCDIO = Panos-tuotosestimaatti hinnalle PCD

Input-Output Estimate for PCD

PCNDIO = Panos-tuotosestimaatti hinnalle PCND

Input-Output Estimate for PCND

PCSIO = Panos-tuotosestimaatti hinnalle PCS

Input-Output Estimate for PCS

PCGIO = Panos-tuotosestimaatti hinnoille PCLG ja PCCG

Input-Output Estimate for PCLG and PCCG

PIFIO = Panos-tuotosestimaatti hinnoille PIF1, PIF2, PIF3, PIF4, PICG ja PILG

Input-Output Estimate for PIF1, PIF2, PIF3, PICG and PILG

P1	Prices in agriculture, 1985 = 100
P2	Prices in services etc., 1985 = 100
P3	Prices in forestry, 1985 = 100
PD4	Price index of manufacturing goods sold on the domestic market, 1985 = 100
PGDPG	Value added deflator in general government, 1985 = 100
PMC	Import prices of consumer goods, 1985 = 100
PMI	Import prices of investment goods, 1985 = 100

PGDP1 Value added deflator in agriculture, 1985 = 100
 PGDP1I0 Value added deflator in agriculture, input-output
 estimate, 1985 = 100
 PGDP2 Value added deflator in services etc., 1985 = 100
 PGDP2I0 Value added deflator in services etc., input-output
 estimate, 1985 = 100
 PGDP3 Value added deflator in forestry, 1985 = 100
 PGDP3I0 Value added deflator in forestry, input-output estimate,
 1985 = 100
 PGDP4 Value added deflator in manufacturing, 1985 = 100
 PGDP4I0 Value added deflator in manufacturing, input-output
 estimate, 1985 = 100

P.23 Arvonlisäyksen deflaattori, maatalous
 Value Added Deflator in Agriculture

$$\Delta \log \text{PGDP1} = \Delta \log \text{PGDP1I0}$$

P.24 Arvonlisäyksen deflaattori, palvelukset ym.
 Value Added Deflator in Services etc.

$$\text{PGDP2} = \text{PGDP2I0}$$

P.25 Arvonlisäyksen deflaattori, metsätalous
 Value Added Deflator in Forestry

$$\Delta \log \text{PGDP3} = \Delta \log \text{PGDP3I0}$$

P.26 Arvonlisäyksen deflaattori, teollisuus
 Value Added Deflator in Manufacturing

$$\Delta \log \text{PGDP4} = \Delta \log \text{PGDP4I0}$$

D5863 Dummy replacing sales tax rate in 1958 - 1963
 GDPG Production at factor cost, general government, millions of 1985 FIM
 GDPFV GDP at factor cost, FIM million
 GDPVG Production at factor cost, general government, FIM million
 MGV Imports of goods, total, FIM million
 PCND Private consumption prices, non-durables and semi-durables, 1985 = 100
 PCNDIO Private consumption prices, non-durables and semi-durables, input-output estimate, 1985 = 100
 PGDPG Value added deflator in general government, 1985 = 100
 SOCCRG Employers' social security contribution rate, general government, FIM million
 SUB Commodity subsidies, FIM million
 Subsidies, millions of 1985 FIM
 TIOCG Central government revenue from other indirect taxes, FIM million
 TIRCND Indirect tax rate on consumption, non-durables and semi-durables
 TIRG Indirect tax rate on production, general government
 TIV Central government revenue from commodity taxes, FIM million
 TSCG Central government revenue from sales tax, FIM million
 TSR Sales tax rate
 YWG Wages and salaries, general government, FIM million

P.27 Arvonlisäyksen deflaattori, julkinen toiminta
 Value Added Deflator in General Government

$$\begin{aligned}\Delta \log[PGDPG/(1 + TIRG)] &= + 3.32444 \\ &\quad (0.46605) \\ &\quad + 0.46480 \cdot \Delta \log[(1 + SOCCRG) \cdot YWG/GDPG] \\ &\quad (0.09185) \\ &\quad + 0.70772 \cdot \log VAR1_1 \\ &\quad (0.09984)\end{aligned}$$

$$\text{jossa } VAR1 = (1 + TIRG) \cdot [(1 + SOCCRG) \cdot YWG/GDPG]/PGDPG$$

$$\bar{R}^2 = 0.3546 \quad DW = 2.038 \quad SE = 0.0189 \quad 62.1 - 85.4$$

P.28 Välillisten verojen osuus julkisesta toiminnasta
 Indirect Tax Rate, General Government

$$TIRG = (1 + 0.0082 \cdot TIOCG/GDPVG) - 1$$

P.29 Yksityisen kulutuksen hinta, lyhytikäiset ja puolikestävät tavarat
 Private Consumption Prices, Non-Durables and Semi-Durables

$$\Delta \log PCND = \Delta \log(1 + TIRCND) + \Delta \log PCNDIO$$

P.30 Välillisten verojen osuus muiden hyödykkeiden kulutuksesta
 Indirect Tax Rate on Consumption, Non-Durables and Semi-Durables

$$\begin{aligned}TIRCND &= (1 + 3.5532 \cdot (TIV - TSCG)/(GDPFV + MGV - GDPVG) - \\ &\quad 1.3886 \cdot SUB/(GDPFV + MGV - GDPVG))/(1 - 0.7431 \cdot \\ &\quad 0.01 \cdot TSR \cdot D5863) - 1\end{aligned}$$

D5863 Dummy replacing sales tax rate in 1958 - 1963
 GDPFV GDP at factor cost, FIM million
 GDPVG Production at factor cost, general government, FIM million
 MGVI Imports of goods, total, FIM million
 PCCG Central government consumption prices, 1985 = 100
 PCD Private consumption prices, durables, 1985 = 100
 PCDIO Private consumption prices, durables, input-output estimate, 1985 = 100
 PCGIO Public consumption prices, input-output estimate, 1985 = 100
 PCS Private consumption prices, services, 1985 = 100
 PCSIO Private consumption prices, services, input-output estimate, 1985 = 100
 SUB Commodity subsidies, FIM million
 TIRCD Indirect tax rate on consumption, durables
 TIRCG Indirect tax rate on consumption, general government
 TIRCS Indirect tax rate on consumption, services
 TIV Central government revenue from commodity taxes, FIM million
 TSCG Central government revenue from sales tax, FIM million
 TSR Sales tax rate

P.31 Yksityisen kulutuksen hinta, kestokulutustavarat
 Private Consumption Prices, Durables

$$\Delta \log PCD = \Delta \log(1 + TIRCD) + \Delta \log PCDIO$$

P.32 Välillisten verojen osuus kestokulutushyödykkeiden kulutuksesta
 Indirect Tax Rate on Consumption, Durables

$$TIRCD = (1 + 0.8562 \cdot (TIV - TSCG) / (GDPFV + MGVI - GDPVG)) / (1 - 0.9334 \cdot 0.01 \cdot TSR \cdot D5863) - 1$$

P.33 Yksityisen kulutuksen hinta, palvelukset ym.
 Private Consumption Prices, Services

$$\Delta \log PCS = \Delta \log(1 + TIRCS) + \Delta \log PCSIO$$

P.34 Välillisten verojen osuus palvelujen kulutuksesta
 Indirect Tax Rate, Services etc.

$$TIRCS = (1 + 0.08455 \cdot (TIV - TSCG) / (GDPFV + MGVI - GDPVG) - 0.5738 \cdot SUB / (GDPFV + MGVI - GDPVG)) / (1 - 0.06299 \cdot 0.01 \cdot TSR \cdot D5863) - 1$$

P.35 Valtion kulutuksen hinta
 Central Government Consumption Prices

$$\Delta \log PCCG = \Delta \log(1 + TIRCG) + \Delta \log PCGIO$$

D5863 Dummy replacing sales tax rate in 1958 - 1963
 GDPFV GDP at factor cost, FIM million
 GDPVG Production at factor cost, general government, FIM million
 MGVI Imports of goods, total, FIM million
 PCGIO Public consumption prices, input-output estimate, 1985 = 100
 PCLG Local government consumption prices, 1985 = 100
 PIF1 Fixed investment prices, agriculture, 1985 = 100
 PIF1IO
 PIF2 Fixed investment prices, services, 1985 = 100
 PIF2IO
 SUB Commodity subsidies, FIM million
 TIRCG Indirect tax rate on consumption, general government
 TIRIF1 Indirect tax rate on investment, agriculture
 TIRIF2 Indirect tax rate on investment, services
 TIV Central government revenue from commodity taxes, FIM million
 TSCG Central government revenue from sales tax, FIM million
 TSR Sales tax rate

P.36 Kuntien kulutuksen hinta
 Local Government Consumption Prices

$$\Delta \log PCLG = \Delta \log(1 + TIRCG) + \Delta \log PCGIO$$

P.37 Välillisten verojen osuus julkisesta kulutuksesta
 Indirect Tax Rate on Consumption, General Government

$$\begin{aligned}
 TIRCG = & [(1 + 0.1879 \cdot (TIV - TSCG)/(GDPFV + MGVI - GDPVG) - \\
 & 0.3282 \cdot SUB/(GDPFV + MGVI - GDPVG))/(1 - 0.3807 \cdot \\
 & 0.01 \cdot TSR \cdot D5863)]^{0.2578} - 1
 \end{aligned}$$

P.38 Kiinteiden investointien hinta, maatalous
 Fixed Investment Prices, Agriculture

$$\Delta \log PIF1 = \Delta \log(1 + TIRIF1) + \Delta \log PIF1IO$$

P.39 Välillisten verojen osuus investoinneista, maatalous
 Indirect Tax Rate on Investment, Agriculture

$$\begin{aligned}
 TIRIF1 = & (1 + 0.1331 \cdot (TIV - TSCG)/(GDPFV + MGVI - GDPVG) \\
 & - 0.005 \cdot SUB/(GDPFV + MGVI - GDPVG))/(1 - 0.3298 \\
 & \cdot 0.01 \cdot TSR \cdot D5863) - 1
 \end{aligned}$$

P.40 Kiinteiden investointien hinta, palvelukset ym.
 Fixed Investment Prices, Services etc.

$$\Delta \log PIF2 = \Delta \log(1 + TIRIF2) + \Delta \log PIF2IO$$

D5863 Dummy replacing sales tax rate in 1958 - 1963
 GDPFV GDP at factor cost, FIM million
 GDPVG Production at factor cost, general government, FIM million
 MGVI Imports of goods, total, FIM million
 PIF3 Fixed investment prices, forestry, 1985 = 100
 PIFI0 Fixed investment prices, input-output estimate, 1985 = 100
 PIF4 Fixed investment prices, manufacturing, 1985 = 100
 SUB Commodity subsidies, FIM million
 TIRCG Indirect tax rate on consumption, general government
 TIRIF2 Indirect tax rate on investment, services
 TIRIF3 Indirect tax rate on investment, forestry
 TIRIF4 Indirect tax rate on investment, manufacturing
 TIV Central government revenue from commodity taxes, FIM million
 TSCG Central government revenue from sales tax, FIM million
 TSR Sales tax rate
 TSR7 Sales tax rate, industrial machinery and equipment
 TSR8 Sales tax rate, industrial buildings

P.41 Välillisten verojen osuus investoinneista, palvelukset ym.
 Indirect Tax Rate on Investment, Services etc.

$$\begin{aligned} \text{TIRIF2} = & (1 + 0.1331 \cdot (\text{TIV} - \text{TSCG}) / (\text{GDPFV} + \text{MGV} - \text{GDPVG}) \\ & - 0.005 \cdot \text{SUB} / (\text{GDPFV} + \text{MGV} - \text{GDPVG})) / (1 - 0.3298 \\ & \cdot 0.01 \cdot \text{TSR} \cdot \text{D5863}) - 1 \end{aligned}$$

P.42 Kiinteiden investointien hinta, metsätalous
 Fixed Investment Prices, Forestry

$$\Delta \log \text{PIF3} = \Delta \log(1 + \text{TIRIF3}) + \Delta \log \text{PIFI0}$$

P.43 Välillisten verojen osuus investoinneista, metsätalous
 Indirect Tax Rate on Investment, Forestry

$$\begin{aligned} \text{TIRIF3} = & (1 + 0.1331 \cdot (\text{TIV} - \text{TSCG}) / (\text{GDPFV} + \text{MGV} - \text{GDPVG}) \\ & - 0.005 \cdot \text{SUB} / (\text{GDPFV} + \text{MGV} - \text{GDPVG})) / (1 - 0.3298 \\ & \cdot 0.01 \cdot \text{TSR} \cdot \text{D5863}) - 1 \end{aligned}$$

P.44 Kiinteiden investointien hinta, teollisuus
 Fixed Investment Prices, Manufacturing

$$\Delta \log \text{PIF4} = \Delta \log(1 + \text{TIRIF4}) + \Delta \log \text{PIFI0}$$

P.45 Välillisten verojen osuus investoinneista, teollisuus
 Indirect Tax Rate on Investment, Industry

$$\begin{aligned} \text{TIRIF4} = & (1 + 0.1331 \cdot (\text{TIV} - \text{TSCG}) / (\text{GDPFV} + \text{MGV} - \text{GDPVG}) \\ & - 0.005 \cdot \text{SUB} / (\text{GDPFV} + \text{MGV} - \text{GDPVG})) / (1 - 0.3916 \\ & \cdot 0.01 \cdot (0.7432 \cdot \text{TSR7} + (1 - 0.7432) \cdot \text{TSR8}) \\ & \cdot \text{D5863}) - 1 \end{aligned}$$

D5863 Dummy replacing sales tax rate in 1958 - 1963
 GDPF GDP at factor cost, millions of 1985 FIM
 GDPFV GDP at factor cost, FIM million
 GDPVG Production at factor cost, general government, FIM million
 MGV Imports of goods, total, FIM million
 P2 Prices in services etc., 1985 = 100
 PGDPF Value added deflator at factor cost, 1985 = 100
 PICG Central government investment prices, 1985 = 100
 PIFIO Fixed investment prices, input-output estimate, 1985 = 100
 PIH Residential construction prices, 1985 = 100
 PILG Local government investment prices, 1985 = 100
 SUB Commodity subsidies, FIM million
 TIRIG Indirect tax rate on investment, general government
 TIRIH Indirect tax rate on investment, residential construction
 TIV Central government revenue from commodity taxes, FIM million
 TSCG Central government revenue from sales tax, FIM million
 TSR Sales tax rate

P.46 Asuinrakennusinvestointien hinta
 Residential Construction Prices

$$\Delta \log \text{PIH} = \Delta \log(1 + \text{TIRIH}) + \Delta \log \text{P2}$$

P.47 Välillisten verojen osuus asuntoinvestoinneista
 Indirect Tax Rate on Investment, Residential Construction

$$\text{TIRIH} = 1 / (1 - 0.2669 \cdot 0.01 \cdot \text{TSR} \cdot \text{D5863}) - 1$$

P.48 Valtion investointien hinta
 Central Government Investment Prices

$$\Delta \log \text{PICG} = \Delta \log(1 + \text{TIRIG}) + \Delta \log \text{PIFIO}$$

P.49 Kuntien investointien hinta
 Local Government Investment Prices

$$\Delta \log \text{PILG} = \Delta \log(1 + \text{TIRIG}) + \Delta \log \text{PIFIO}$$

P.50 Välillisten verojen osuus investoinneista, julkinen toiminta
 Indirect Tax Rate on Investment, General Government

$$\begin{aligned} \text{TIRIG} = & (1 + 0.1331 \cdot (\text{TIV} - \text{TSCG}) / (\text{GDPFV} + \text{MGV} - \text{GDPVG}) \\ & - 0.005 \cdot \text{SUB} / (\text{GDPFV} + \text{MGV} - \text{GDPVG})) / (1 - 0.3298 \\ & \cdot 0.01 \cdot \text{TSR} \cdot \text{D5863}) - 1 \end{aligned}$$

P.51 Bruttokansantuotteen hinta
 Value Added Deflator at Factor Cost

$$\text{PGDPF} = 100 \cdot \text{GDPFV} / \text{GDPF}$$

C Total private consumption, millions of 1985 FIM
 CG Total public consumption, millions of 1985 FIM
 CGV Total public consumption, FIM million
 CV Total private consumption, FIM million
 I Private fixed investment, millions of 1985 FIM
 IF Private non residential investment, millions of 1985 FIM
 IFV Private non-residential investment, FIM million
 IG Total public investment, millions of 1985 FIM
 IGV Total public investment, FIM million
 ITOT Total fixed investment, millions of 1985 FIM
 ITOTV Total fixed investment, FIM million
 IV Private fixed investment, FIM million
 PCG Public consumption prices, 1985 = 100
 PCP Private consumption prices, 1985 = 100
 PI Private investment prices, 1985 = 100
 PIF Private non-residential investment prices, 1985 = 100
 PIG Public investment prices, 1985 = 100
 PITOT Investment prices, 1985 = 100

P.52 Yksityisten investointien hinta
 Private Investment Prices

$$PI = 100 \cdot IV/I$$

P.53 Yksityisten tuotannollisten investointien hinta
 Private Non-Residential Investment Prices

$$PIF = 100 \cdot IFV/IF$$

P.54 Julkisten investointien hinta
 Public Investment Prices

$$PIG = 100 \cdot IGV/IG$$

P.55 Investointien hinta
 Investment Prices

$$PITOT = 100 \cdot ITOTV/ITOT$$

P.56 Julkisen kulutuksen hinta
 Public Consumption Prices

$$PCG = 100 \cdot CGV/CG$$

P.57 Yksityisen kulutuksen hinta
 Private Consumption Prices

$$PCP = 100 \cdot CV/C$$

D75 Dummy: 60.1 - 74.4 = 1, 75.1 ÷ = 0
 FXSSUR Exchange rate, USD/SUR
 FXSUSD Exchange rate, FIM/USD
 MFOR Imports of Finland's major export countries, 1985 = 100
 P4 Prices in manufacturing, 1985 = 100
 PFXG Index of competing foreign prices, 1985 = 100
 PXGE Export prices of goods, bilateral, 1985 = 100
 PXGW Export prices of goods, multilateral, 1985 = 100
 SMCXG Marginal costs in exports
 TREND Linear trend: 60.1 = .25, 60.2 = .50 etc.
 XGW Exports of goods, multilateral, FIM million

X.4 Tavaroiden idänviennin yksikköarvoindeksi
 Export Prices of Goods, Bilateral

$$\log(PXGE/P4) = -0.18544 \\ (0.02759)$$

$$+ 0.57920 \cdot \log \text{var1} \\ (0.05455)$$

$$+ 0.00882 \cdot \text{TREND} \\ (0.00128)$$

$$\text{jossa var1} = \log[(PXGE_{-1}/P4) \cdot (FXSUSD/FXSUSD_{-1}) \cdot (FXSSUR/FXSSUR_{-1})]$$

$$\bar{R}^2 = 0.937 \quad DW = 2.056 \quad SE = 0.0359 \quad 64.1 - 85.4$$

X.5 Tavaroiden lännenviennin yksikköarvoindeksi
 Export Prices of Goods, Multilateral

$$\Delta \log PXGW = 0.00001 \\ (0.00481)$$

$$+ 0.29938 \cdot \Delta \log SMCXG \\ (0.17541)$$

$$+ 0.60049 \cdot \Delta \log PFXG \\ (0.16122)$$

$$+ 0.10379 \cdot \log(SMCXG_{-1}/PXGW_{-1}) \\ (0.06186)$$

$$- 0.20733 \cdot \Delta^2 \log(PFXG_{-1}/PXGW_{-1}) \\ (0.10011)$$

$$+ 0.07805 \cdot \Delta \log(XGW_{-1}/MFOR_{-1}) \\ (0.04568)$$

$$+ 0.03903 \cdot \Delta \log(XGW_{-2}/MFOR_{-2}) \\ (0.02284)$$

$$- 0.05964 \cdot \Delta D75 \\ (0.03017)$$

$$+ 0.07392 \cdot \Delta D75_{-1} \\ (0.03240)$$

$$\bar{R}^2 = 0.491 \quad DW = 1.982 \quad SE = 0.02313 \quad 70.1 - 85.4$$

KF4 Net stock of fixed capital, manufacturing, millions of
 1985 FIM
 LH4 Performed working hours, manufacturing, millions of hours
 P1 Prices in agriculture, 1985 = 100
 P2 Prices in services etc., 1985 = 100
 P3 Prices in forestry, 1985 = 100
 PMFL Import prices of fuels and lubricants, 1985 = 100
 PMR Import prices of raw materials, 1985 = 100
 SMCXG Marginal costs in exports
 SOCCR4 Employers' social security contribution rate, manufacturing
 TIR4 Indirect tax rate on production, manufacturing
 TIRXG Indirect tax rate on exports, goods
 TREND Linear trend: 60.1 = .25, 60.2 = .50 etc.
 YW4 Wages and salaries, total, FIM million

X.6 Vientituotannon rajakustannus
 Marginal Costs in Exports

$$\begin{aligned}
 \text{SMCXG} &= 1.00866 \cdot (1 + \text{TIRXG}) \cdot \\
 &\quad 1.01334 \cdot (1 + \text{TIR4}) \cdot \\
 &\quad [.437 \cdot 102.83176 \cdot (1 + \text{SOCCR4}) \cdot \text{YW4} / \\
 &\quad \quad \{ \text{LH4} \cdot \text{EXP}(.03063 \cdot \text{TREND}) \cdot \\
 &\quad \quad (.55349 \cdot (\text{KF4}/\text{LH4}) - .14291 + .44651) - 1 / (.14291 - 1) \} + \\
 &\quad .563 \cdot (.1654 \cdot \text{P1} + .2745 \cdot \text{P2} + .0997 \cdot \text{P3} + .2829 \cdot \text{PMR} + .1775 \cdot \text{PMFL})]
 \end{aligned}$$

C Total private consumption, millions of 1985 FIM
 LES Employment (Labour Force Survey), 1000 persons
 LFS Labour force, survey
 MTAX Personal marginal tax rate, estimate
 N Population of working age (15-74 years), 1000 persons
 PCP Private consumption prices, 1985 = 100
 WR Wage rate, total, 1985 = 100

L.13 Työvoima, työvoimatutkimus
 Labour Force (Labour Force Survey)

$$\Delta \log(\text{LFS}/N) = + 0.00026$$

(0.00030)

$$+ 0.64817 \cdot \Delta \log(\text{LES}/N)$$

(0.04672)

$$+ 0.00520 \cdot \Delta \log((1 - \text{MTAX}) \cdot \text{WR}/\text{PCP})$$

(0.00336)

$$- 0.03026 \cdot \Delta \log(\text{C}/N)$$

(0.01609)

$$\bar{R}^2 = 0.6871 \quad DW = 2.0315 \quad SE = 0.0027 \quad 63.1 - 85.4$$

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