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INCOME DISTRIBUTION AND GOVERNMENT FINANCES IN
THE BOF4 MODEL OF THE FINNISH ECONOMY

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ABSTRACT

This paper describes how income distribution and government finances are modelled in BOF4, a quarterly econometric model of the Bank of Finland.

The equations comprising the income distribution and government finances block in the model consist of tax equations, behavioural equations for the local government sector and a large number of accounting identities linking production and prices to incomes of households and other sectors of the economy.

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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. The model consists of about 270 equations, 100 of which are estimated behavioural or otherwise approximate relationships. The model may be characterized as an empirical application of the basic "neoclassical synthesis" approach to macroeconomics. Thus, the model can be seen as consisting of aggregate demand (IS), aggregate supply (AS) and monetary (LM) submodels or "blocks".

The present paper describes the determination of income distribution and government incomes and outlays in BOF4, and completes a series covering all sectors of the model. Reports have previously been published on exports and imports (Tarkka and Willman (1988)), production and employment (Tarkka, Willman and Rasi (1988)), wages and prices (Tarkka, Willman and Rasi (1989)), consumption and investment (Tarkka, Willman and Männistö (1989)) financial markets (Tarkka and Willman (1990)) and the macroeconomic foundations and simulation properties of the model (Tarkka, Männistö and Willman (1990)).

The analysis of taxes and government finances in BOF4 is very similar to the earlier generation of the model, reported in detail in Tarkka and Willman (1985). However, the modelling of income distribution - although still very aggregated - is somewhat more detailed than in BOF3. The analysis of income distribution is carried out to the extent required by the determination of sectoral disposable income, sectoral net saving and the incidence of indirect taxation.

The public finances block comprises the central government, the Social Insurance Institution and local government (municipalities). The exogenous variables and parameters connected with the revenues and expenditures of the central government and the Social Insurance Institution are the fiscal policy instruments of the model. The municipalities, in turn, are treated as endogenous decision-making units comparable to those of the private sector. The behavioural

equations pertaining to local government incomes and outlays are based on the assumption that municipalities - given their budget constraint - seek to maximize the welfare of local inhabitants. The central government's control of local government finances is limited mainly to decisions relating to central government transfers to municipalities.

2 THE ACCOUNTING FRAMEWORK

2.1 National Income

The starting point in the modelling of incomes is, of course, the value-added at factor cost originating in the five production sectors of the model. These are calculated by multiplying real value-added (see determination of output by sectors in Tarkka, Willman and Rasi (1988)) by sectoral value-added deflators. For each sector, the value-added is divided into wages, employers' social security payments and gross operating surplus. Income redistribution starts from these basic income flows.

The sum of sectoral value-added in production (at current prices) gives gross domestic product. By adding investment income from abroad (determined in the balance-of-payments block of the model) and by subtracting consumption of fixed capital (determined in the investment block of the model) from gross domestic product we end up with national income (see equation Y.1 in the list of equations in the appendix). By adding net transfers from abroad to national income we obtain national disposable income, which in the BOF4 model is disaggregated into the disposable income of households (including non-profit institutions), the corporate sector and the government sector (including central and local government and social security funds) (see equations Y.3 - Y.6). Sectoral net lending is obtained by subtracting net investment from disposable income (see equations Y.7 - Y.8). Investment by the household sector is approximated by the sum of residential construction and fixed investment in

agriculture and forestry. In calculating the corporate sector's net lending the fact that the sum of sectoral net lending equals the current account balance is utilized. The national income framework is illustrated by the following table.

TABLE 1

The national income framework in the BOF4 model. Figures for 1985 in millions of FIM

Domestic wages and salaries	150138
Employers' social security contributions	33923
Wages and salaries from abroad, net (exog.)	255
Property income and entrepreneurial income, net	57307
of which: corporations and general government	14039
households and non-profit institutions	43268
Indirect taxes less subsidies	37456
National income	279079
Transfers from abroad, net	-1509
National disposable income	277570
of which: households and non-profit institutions	189109
corporations	11576
general government	77140
Consumption of fixed capital	49620
Property income from abroad, net	-6287
Gross domestic product (in purchasers' values)	334986
Commodity taxes less commodity subsidies	38152
Gross domestic product (in basic values)	296834

Investment income and net transfers from abroad are taken from the balance-of-payments statistics. They deviate slightly from the corresponding SNA figures, and hence also the figures for national and corporate sector disposable income and capital consumption in BOF4 are not exactly same as those published in SNA. The advantages of using the balance-of-payments figures are that they are quarterly and the publishing lag is substantially shorter than for the SNA figures. Moreover, the balance-of-payments figures have in any event to be used in the balance-of-payments block.

2.2 Households' Disposable Income

Besides actual households, the household sector in BOF4 includes non-profit institutions. The determination and components of households' disposable income in BOF4 are summarized in table 2:

TABLE 2.

Components of Household Disposable Income in the BOF4 model in 1985. Millions of FIM.

wages and salaries	150138
+ employers' soc.sec. contributions	33923
+ entrepreneurial income	45472
+ other household income, net	-2204
- transfers to other sectors, net	38220
= households' disposable income	189109

Wages and salaries are computed for each of the five production sectors of the model by multiplying paid labour inputs by the wage rates of the relevant sectors (see equations Y.10 to Y.15).

Employers' social security contributions are likewise computed by production sectors, on the basis of wage bills and statutory social security contribution-rates (see equations Y.16 to Y.20). Social security contributions are divided by recipient in the model into central government, the Social Security Institution and private social security schemes.

The model includes three equations for the determination of households' entrepreneurial income (equations Y.27 to Y.30). For agriculture and forestry, entrepreneurial income is determined by the gross operating surplus less capital consumption in these sectors. In agriculture, subsidies (other than those reflected in prices and hence in value-added) are also taken into account. Entrepreneurial income from the sectors other than agriculture and forestry is simply assumed to grow proportionally to value-added.

Other household income consists mainly of interest, dividends and rent (equation Y.31). This item has a very simplistic equation which explains "other household income" on the basis of the stocks of bank loans and the bank lending rate, the stocks of bank deposits and government bonds and the time deposit rate.

Household net transfers to other sectors (equation Y.34) are determined within the following framework:

TABLE 3.

Composition of Households' Net Transfers to Other Sectors in BOF4 in 1985, millions of FIM.

+ direct taxes (of households)	51214
+ national pensions and sickness insurance contributions	5960
+ employers' soc.sec. contributions	33923
- transfers from central government	12026
- benefits from the Soc.Sec. Institution	18525
- other transfers to households, net	22326
= net transfers to other sectors	38220

The discussion of the determination of households' direct taxes and pensions and sickness insurance contributions to the Social Security Institution is deferred to a later section.

Note that employers' social security contributions, which were included in the definition of households' disposable income, are deducted in net transfers so that the net effect on household income vanishes.

Transfers from central government and benefits from the Social Security Institution are exogenous either in nominal terms (central government transfers and sickness insurance compensation of the Social Security Institution) or in real terms (pensions paid by the Social Security Institution).

Other transfers to households consist mainly of income transfers to households from the rest of the private sector (however, transfers

from local government are also included here). The item is dominated by pensions and insurance benefits from private insurance companies and unemployment insurance funds.

The equation for other transfers to households (see Y.33 in the list of equations) is based on the assumption that in the long run benefits paid by the various private schemes match the corresponding insurance payments. The financial position (surplus or deficit) of the private insurance schemes is approximated by the social security payments accruing to private social security funds, less transfers to households, excluding unemployment benefits. An improvement in the financial position of the private social security funds would accelerate the real growth of transfers to households, and vice versa. Changes in unemployment and in the real wage rate have an independent effect on the growth of transfers through unemployment insurance benefits.

3 TAXES

3.1 Direct Taxes

In BOF4, direct taxes are determined by two equations: one for direct taxes paid by households and another for direct taxes on corporations. The taxes determined by these equations include both central and local government taxes. There is a third, separate equation for the determination of the tax revenue of the local government sector and the part of direct taxes remaining with the central government is then residually determined.

3.1.1 Households

In Finland, the household income tax is a combination of a progressive central government income tax and a proportional local government tax. The household income tax equation (G.1 in the list)

determines the total revenue from both of these taxes. We consider the progressive central government tax first.

In B0F4, the central government tax rate is endogenous. It is modelled as a function of taxpayers' average income and of the parameters which describe the prevailing income tax schedule.

At the individual level, the Finnish progressive income tax schedule may be closely approximated by the following loglinear function:

$$(1) \quad \begin{aligned} t/y &= A + B \log y, & \text{if } y > \exp(-A/B) \\ t/y &= 0, & \text{if } y < \exp(-A/B) \end{aligned}$$

where t/y is the average tax rate of an individual with a taxable income y . The parameters A and B summarize the tax schedule and are in principle changed each year. The parameter B increases with the progressivity of the schedule ($B = 0$ for a proportional system). The average tax rate is equal to zero when $y = \exp(-A/B) = y_0$. This is the lower limit of taxable income of the tax schedule in question.

The time series for parameters of the tax schedule are included as exogenous variables in the B0F4 model. They are estimated separately for each year by fitting the equation (1) by OLS to the statutory income tax schedule for each year. Figure 1 shows the actual tax schedules and estimated tax schedules based on equation (1) for the years 1988 and 1989.

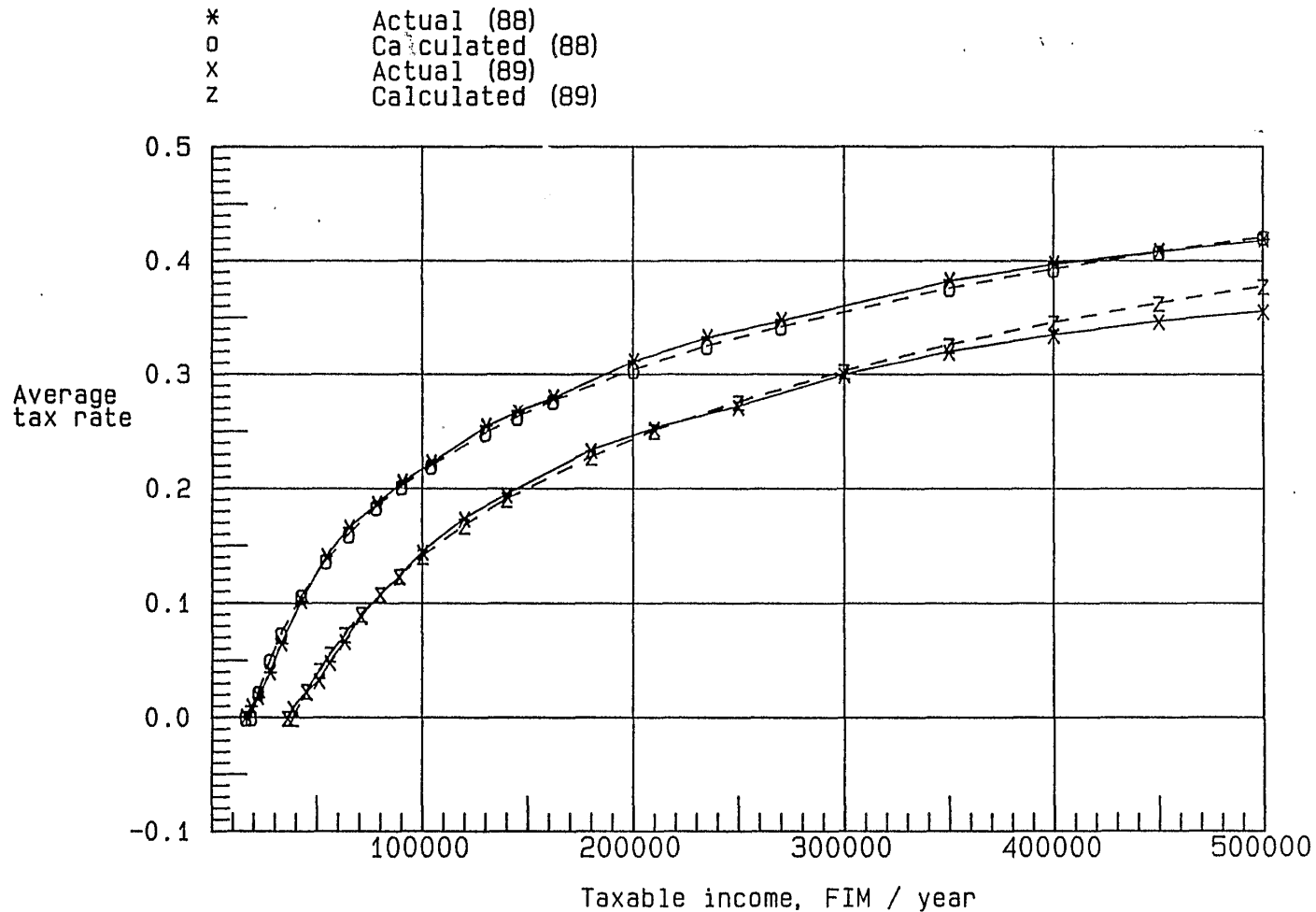
It may be noted that according to this type of tax schedule, the marginal tax rate is determined as follows:

$$(2) \quad dt/dy = A + B(1 + \log y) = t/y + B$$

and the elasticity of tax revenue with respect to income is

$$(3) \quad (dt/dy)(y/t) = B/(t/y) + 1$$

Figure 1: AVERAGE INCOME TAX RATE AS A FUNCTION OF INCOME, ACCORDING TO THE 1988 AND THE 1989 INCOME TAX SCALES.



At the aggregate level, tax revenue depends on income distribution across individual taxpayers. Let income distribution be characterized by the density function $f(y)$, the integral of which is equal to unity. Then aggregate tax revenue is

$$(4) \quad T/N = \int_{y_0}^{\infty} (Ay + By \log y) f(y) dy$$

where T is total tax revenue and N is the number of taxpayers. As shown in Tarkka and Willman (1985, pp. 282 - 292), the expression (4) can further be developed to yield

$$(5) \quad T/(N\bar{y}) = A + B \log \bar{y} + Bk$$

where $k = \int_{y_0}^{\infty} (y/\bar{y}) \log(y/\bar{y}) f(y) dy$ and $N\bar{y}$ equals aggregate taxable income

The distribution of income about its mean \bar{y} is summarized by the function k . If the distribution of income is constant and if the share of individuals below the lower limit of taxable income is also constant, k is constant over time. This assumption is made in BOF4, and a value of 8.25 is estimated for k .

The above discussion applies to the progressive central government income tax. The equation for total taxes levied on households is obtained from the specification (5) by adding to it the average local government tax rate.

Finally, account must be taken of the fact that a rather complicated deduction system links the tax base (or income liable to taxation) to the actually taxable income. Moreover, this deduction system is different for central and local government taxes. In the actual household income tax equation of BOF4 the deduction systems are taken into account in the following way. The terms of the equation pertinent to the central government tax are multiplied by a parameter measuring the share of taxable income in central government taxation and the local government tax rate is multiplied by a similar parameter for local government taxation.

The tax base is approximated by the sum of wage income, households' entrepreneurial income and transfers from the Social Security Institution. Summarizing the above discussion, it can be noted that altogether five tax parameters interact in the determination of direct taxes paid by households: two parameters measuring the origin and progressivity of the central government income tax schedule; the local government tax rate; and two parameters describing the deduction systems in central and local government taxation.

In the 1980s there were two major reforms of personal income taxation in Finland. The tax reform of 1982 widened the tax base to include certain transfers from the Social Security Institution. This change is taken into account in defining the tax base variable. The tax reform of 1989 lowered progressive income tax rates in different income brackets (see figure 1) and reduced deductions. These changes are straightforwardly taken into account by the policy parameters of the personal income tax equation. In addition the tax reform of 1989 tightened the taxation of interest income and capital gains and reduced tax allowances for interest expenses. However, the income classification in the BOF4 model is too aggregated to allow proper treatment of these changes.

The model also includes an equation (G.2) from which an estimate of the "representative" marginal tax rate is computed. This is based on the formula (2), including the local government tax rate and employees' social security contribution rate. The estimate for the "representative" marginal tax rate may be interpreted as the marginal tax rate faced by a taxpayer with an average income.

3.1.2 Corporations

Like households, corporate entities also pay both central and local government income tax. Corporate income tax is proportional (with minor exceptions) and in this sense it is simpler than household income tax. The major difficulties in modelling corporate income tax lie in the determination of taxable income and in the dynamics of tax collection and tax reimbursements.

The taxable income of corporations in central and local government taxation is determined by equations Y.42 and Y.43, respectively. In both of these equations, taxable income is determined on the basis of an approximate measure of corporate profits: gross operating surplus less entrepreneurial income and transfers to households, as defined by equation Y.41. Dummies are included to take into account the reform of business taxation in 1969.

Apart from rather intricate dynamics, the corporate income tax equation (G.4 in the list) is a simple function of taxable incomes and tax rates. The dynamic form of the equation is due to the fact that the collected taxes are determined on the basis of taxable income of two years ago and the difference between collected taxes and taxes payable is settled in the two years following the tax year in question. The dependent variable of the equation includes the property tax paid by corporations until 1967; on the right-hand side of the equation a dummy variable takes the property tax into account.

3.2 Indirect Taxes

Indirect taxes are disaggregated into three types of commodity taxes and other indirect taxes. All of these have their own equation in the model. The commodity taxes are the sales tax, the excise tax on liquid fuels and other commodity taxes. The item "other indirect taxes" includes fees, duties etc. paid by business units to the central government.

The sales tax is levied in Finland as a fixed percentage of the sales price. Most transactions in goods, including imports, are subject to the tax, while services and part of manufacturing investments are not. Since the seller may deduct purchases of goods on which tax is already paid, the system resembles a value-added tax. However, some compounding takes place due to the system of calculating the tax on the basis of the sales price, not the before-tax price. The feature that most services are tax-free also constitutes a significant departure from the pure value-added tax.

On the basis of the 1982 input-output study, the following estimate of the tax base is constructed for the BOF4 model:

93.3 % of private consumption of durables
 74.3 % of private consumption of non- and semi-durables
 6.3 % of private consumption of services
 9.7 % of government consumption
 29.1 % of fixed investment, excluding manufacturing
 6.6 % of exports of goods and services
 32.0 % of value-added in agriculture
 15.4 % of value-added in forestry
 28.6 % of value-added in private services etc.
 9.3 % of value-added in manufacturing
 a variable proportion of fixed investment in manufacturing

The variable proportion of manufacturing fixed investment which is subject to the sales tax takes into account the fact that the sales tax rates applied to manufacturing investment in machinery and equipment and to investment in construction deviate from each other as well as from the general sales tax rate.

The equation (see G.5 in the list) determines tax revenue by multiplying the tax base by the tax rate. Two dummies are included to take into account the period before 1963 when the present tax system was adopted and a third dummy takes into account the changes in the tax treatment of liquid fuels and electricity in 1974 and in 1986.

The equation for the excise tax on liquid fuels (eq. G.6) determines the revenue from this tax on the basis of the (ad quantum) tax rates for liquid fuels and variables which reflect the factors affecting the demand for liquid fuels (real GDP and the real after-tax price of these fuels).

Other commodity taxes include taxes on alcohol, tobacco, cars and some less important items. In the equation for other commodity taxes (see G.7 in the list) tax revenue is assumed to be proportional to the estimated tax base. The estimates of effective tax rates are based on information for the year 1982, and are assumed to be constant in the ordinary use of the model.

Finally, other indirect taxes are simply assumed to be proportional to nominal GDP (see equation G.8).

4 CENTRAL GOVERNMENT FINANCES

In BOF4 the income, expenditure and capital account items of the central government are analyzed within the following framework, which corresponds closely to the SNA data:

TABLE 4.

Central Government Accounts in BOF4, millions of FIM.
(figures for the year 1985)

Income:

direct taxes	25384
indirect taxes	47803
commodity taxes	45358
sales tax	24811
excise tax on liquid fuels	4465
other commodity taxes	16082
other indirect taxes	2445
employers' child allowance payments	671
other revenue	6953
total income	80811

Expenditure:

consumption	22901
subsidies	9878
commodity subsidies	7206
other subsidies	2672
transfers to households	12026
transfers to local government	21153
transfers to the Soc. Sec. Institution	4022
transfers abroad	1060
investment, total	4024
investment, public administration	3766
investment in government enterprises	258
interest on government debt	4575
other expenditure	782
total expenditure	80421

Capital Balance:

total expenditure	80421
total income	80811
net financial deficit	-390
less net increase in housing loans	-1003
net foreign borrowing	1608
net central bank borrowing	-953
net borrowing from deposit banks	-2250
net change in bonds held by the public	4346
other net borrowing	-2138

On the income side, the modelling of taxes has been explained above. The direct tax revenue of the central government is solved in the model by deducting from total direct taxes the part payable to local government. "Other revenue" consists mainly of the operating surplus of various government enterprises and interest and dividend income of the central government (see equation G.12). In the equation determining this revenue item in the BOF4 model, the change in "other revenue" is explained by the change in the wage bill of the general government sector (proxying the operating surplus of this sector) and by the change in housing loans and other net borrowing by the state.

On the expenditure side, consumption and investment are exogenous in real terms, while transfers are exogenous in nominal terms. Only the interest on government debt is endogenized, and the change in this expenditure item is a function of current interest rates and changes in the net foreign and domestic (bond) debt of the state (see equation G.13).

The financial transactions of central government are all exogenous in the normal use of the BOF4 model, with the exception of the net change in bonds held by the public. This item is residually determined on the basis of the net financial surplus or deficit of the state and the net flows in the exogenous financing items.

5 LOCAL GOVERNMENT FINANCES

The most important part of local government finances is endogenously explained in the BOF4 model. The modelling strategy is based on the approach presented by Gramlich (1969) and is essentially the same as in the BOF3 version of the model (see Tarkka and Willman, 1985, pp. 303 - 308). (This approach is also used in the DRI model of the U.S. economy (see Eckstein, 1983)).

The central idea in this approach is that municipalities have a special motive to balance their operating budget, i.e. saving is associated with positive, although decreasing, marginal utility (or equally utility in a negative function of the future interest burden caused by the operating deficit). The municipalities are assumed to decide the local government tax rate and part of local government consumption expenditure. Another part of local government consumption is constrained to be proportional to transfers received by municipalities from the central government. Central government transfers to municipalities are a fiscal policy parameter which is outside the control of municipalities themselves. The preferences of local policy makers are described by a Cobb-Douglas utility function, which includes the following arguments:

- the income of taxpayers after the local government tax
- the voluntary part of local government consumption, financed entirely out of local taxes
- the part of local government consumption which is proportional to transfers from central government
- current saving, equalling investment outlays less net borrowing

The form of the utility function is then:

$$(6) \quad U = \alpha \log(C - s \cdot TR) + \beta \log(s \cdot TR) + \gamma \log(Y - t \cdot Y) + \rho \log(I - B)$$

where C is local government consumption, TR is transfers received from the central government, $1/s$ is the proportion of government financing in that part of consumption which is partly financed with

transfers, Y is taxable income, t is the tax rate, I is investment and B is net borrowing. I is treated as a predetermined variable, as the planning horizon for investment is assumed to be longer than one period. Utility U is maximized with respect to current policy variables C , t and B subject to the following budget constraint:

$$(7) \quad t*Y + TR + B = C + I$$

where SUB is local government subsidies to the private sector. The solution of this optimization problem is given by the following equations for the tax rate t and consumption C :

$$(8) \quad t = b_0 + b_1(C + SUB - TR)/Y$$

$$(9) \quad C = c_0TR + c_1(t*Y - SUB)$$

where

$$b_0 = \rho/(1 + \gamma); \quad b_1 = \gamma/(\rho + \gamma)$$

$$c_0 = \alpha/[\alpha + (1 - k)\rho]$$

$$c_1 = [\alpha + (1 - k)\rho s]/[\alpha + (1 - k)\rho]$$

and k is partial derivate of the tax base Y with respect to a change in local government consumption. The equations actually estimated in the model are derived from the optimality conditions (8) and (9) by allowing a partial adjustment mechanism in the local government tax rate and consumption (see G.14 and G.16 in the list of equations). Tax revenue actually accruing to the local government is determined by the technical relation G.15.

The tax rate setting of the municipalities is characterized by the following elasticities with respect to the tax base and transfers received from the central government:

TABLE 5.

Elasticities of the Average Local Tax Rate in the BOF4 model, evaluated in 1980.

variable	first-year elasticity	second-year elasticity	long-run elasticity
consumption	0	0.09	0.79
transfer revenue	0	-0.04	-0.37
tax base	0	-0.34	-3.05

Consumption behaviour, in contrast, is described by the following propensities to consume:

TABLE 6.

Consumption Propensities of the Local Government Sector out of Different Types of Income in the BOF4 Model

income type	immediate propensity	one-year propensity	long-run propensity
tax revenue	0.24	.41	0.61
transfer revenue	0.54	.91	1.38

Since the model does not include all income and expenditure items of the local government sector, the budget constraint and the net financial surplus concept of that sector in BOF4 are not fully compatible with the SNA.

6 THE SOCIAL SECURITY INSTITUTION

What was noted above about the incompatibility of the BOF4 model data with the SNA in the treatment of the local government sector also holds for social security funds belonging to general government. Their small real activities (consumption, investment, value-added etc.) are abstracted away and merged with the central and local government real-side items in the model. On the financial side, only the most important items of the largest government-operated fund, the Social Security Institution, are included. Other transactions are implicitly assumed to take place within the private non-banking sector.

The revenue items of the Social Security Institution included in the model are the following. 1) contributions from the insured, i.e. households; 2) contributions from employers; and 3) transfers from the central government. Of these, the first two are endogenized on the basis of the aggregate wage bill and the prevailing exogenous contribution rates. In the normal use of the model, transfers from the central government are exogenous. On the expenditure side, the benefits paid by the Social Security Institution are disaggregated in to pensions and sickness insurance compensation.

The significance of variables having to do with the Social Security Institution is that they help to determine the disposable income of households. It should be noted that although the financial repercussions of possible financial surpluses or deficits of the Social Security Institution (or those of the other parts of government, for that matter) are not directly visible in the equations of the model, they are in fact traced in an internally consistent way in the system. This is due to Walras' Law of markets under the assumption of perfect substitutability of domestic non-monetary assets.

APPENDIX

LIST OF EQUATIONS

Values of parameter estimates are ordinary least squares estimates.

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

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

Variables with 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.

\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

CCTV	Consumption of fixed capital
CGV	Total public consumption, FIM million
CLGV	Local government consumption, FIM million
FCGN	Central government borrowing, net, FIM million
GDPV	GDP in Purchasers' Values, FIM million
ICGTV	Central government investment (incl. enterprises), FIM million
ILGV	Local government investment, FIM million
KFCG	Net stock of fixed capital, central government, millions of 1985 FIM
KFLG	Net stock of fixed capital, local government, millions of 1985 FIM
PICG	Central government investment prices, 1985 = 100
PILG	Local government investment prices, 1985 = 100
SOCC	Employers' social security contributions, total, FIM million
SOCCS	Employers' national pension and sickness insurance contributions, FIM million
SOCLS	Insured persons' national pension and sickness insurance contributions, FIM million
SUBT	Subsidies, total, FIM million
TICG	Central government revenue from indirect taxes, FIM million
TRCGL	Central government transfers to local government, FIM million
TRCGS	
TRHGN	Households' transfers to other sectors, net FIM million
TRSHV	Benefits paid by the social Insurance Institution, FIM million
TYLG	Local government revenue from direct taxes, FIM million
Y	National Income, FIM million
YD	Household disposable income, FIM million
YDG	General government disposable income, FIM million
YDTOT	National disposable income, FIM million
YFIN	Investment income from abroad, net, FIM million
YFTR	Income transfers from abroad, net, FIM million
YNWN	Net property and entrepreneurial income, FIM million
YOH	Other household income, FIM million
YSE	Households' entrepreneurial income, total, FIM million
YW	Wages and salaries, total FIM million
YWF	Compensation of employees receivable from the rest of the world, net, FIM million

Y. TULOT
INCOMES

Y.1 Kansantulo
National Income

$$Y = GDPV + YFIN - CCTV$$

Y.2 Omaisuus- ja yrittäjätulot, netto
Net Property and Entrepreneurial Income

$$YNWN = Y - YW - SOCC - YWF - (TICG - SUBT)$$

Y.3 Kansantalouden käytettävissä oleva tulo
National Disposable Income

$$YDTOT = Y + YFTR$$

Y.4 Kotitalouksien käytettävissä oleva tulo
Household Disposable Income

$$YD = YW + YSE + YOH - TRHGN + SOCC$$

Y.5 Julkisyhteisöjen käytettävissä olevat tulot
General Government Disposable Income

$$YDG = 1.02104 \cdot (CGV + ICGTV + ILGV - .01 \cdot CCRG \cdot (PICG \cdot KFCG(1) + PILG \cdot KFLG(1)) - FCGN + (TYLG + TRCGL - CLGV - ILGV) + (SOCLS + SOCCS + TRCGS - TRSHV))$$

BPCV Current account, FIM million
 CCRG Capital consumption rate, general government
 CCRH Capital consumption, residential construction, FIM million
 CCR1 Capital consumption rate, agriculture
 CCR3 Capital consumption rate, forestry
 CV Total private consumption, FIM million
 FB Corporate sector's net saving, FIM million
 FG General government net saving, FIM million
 FH Household net saving, FIM million
 ICGTV Central government investment (incl. enterprises), FIM million
 IFV1 Private fixed investment, agriculture, FIM million
 IFV3 Private fixed investment, forestry, FIM million
 IHV Residential construction, FIM million
 ILGV Local government investment, FIM million
 KFCG Net stock of fixed capital, central government, millions of 1985 FIM
 KFLG Net stock of fixed capital, local government, millions of 1985 FIM
 KF1 Net stock of fixed capital, agriculture, millions of 1985 FIM
 KF3 Net stock of fixed capital, forestry, million of 1985 FIM
 KH Net stock of private residential capital, millions of 1985 FIM
 LW1 Paid labour input, agriculture, millions of 1985 FIM
 PICG Central government investment prices, 1985 = 100
 PIF1 Fixed investment prices, agriculture, 1985 = 100
 PIF3 Fixed investment prices, forestry
 PIH Residential construction prices, 1985 = 100
 PILG Local government investment prices, 1985 = 100
 WR1 Wage rate, agriculture, 1985 = 100
 YD Household disposable income, FIM million
 YDC Corporate sector's disposable income, FIM million
 YDG General government disposable income, FIM million
 YDTOT National disposable income, FIM million
 YW Wages and salaries, total FIM million
 YWF Compensation of employees receivable from the rest of the world, net, FIM million
 YWG Wages and salaries, general government, FIM million
 YW1 Wages and salaries, agriculture, FIM million
 YW2 Wages and salaries, services etc., FIM million
 YW3 Wages and salaries, forestry, FIM million
 YW4 Wages and salaries, manufacturing, FIM million

Y.6 Yhteisöyritysten käytettävissä oleva tulo
Corporate sectors Disposable Income

$$YDC = YDTOT + YWF - YDG - YD$$

Y.7 Kotitalouksien rahoitusjäämä
Households Net Saving

$$\begin{aligned}
 FH = YD - CV + .01 \cdot CCRH \cdot PIH \cdot KH(1) - IHV + \\
 .01 \cdot CCR1 \cdot PIF1 \cdot KF1(1) - IFV1 + \\
 .01 \cdot CCR3 \cdot PIF3 \cdot KF3(1) - IFV3
 \end{aligned}$$

Y.8 Julkisen sektorin rahoitusjäämä
General Government Net Saving

$$\begin{aligned}
 FG = YDG - CGV + .01 \cdot CCRG \cdot (PICG \cdot KFCG(1) + \\
 PILG \cdot KFLG(1) - ICGTV - ILGV
 \end{aligned}$$

Y.9 Yritysten ja rahoituslaitosten rahoitusjäämä
Corporate Sector's Net Saving

$$FB = BPCV - FH - FG$$

Y.10 Palkat, yhteensä
Wages and Salaries, Total

$$YW = YW1 + YW2 + YW3 + YW4 + YWG$$

Y.11 Palkat, maatalous
Wages and Salaries, Agriculture

$$YW1 = LW1 \cdot WR1/100$$

LWG	
LW2	Paid labour input, services etc., millions of 1985 FIM
LW3	Paid labour input, forestry, millions of 1985 FIM
LW4	Paid labour input, manufacturing, millions of 1985 FIM
SOCC	Employers' social security contributions, total, FIM million
SOCCG	Employers' social security contributions, general government, FIM million
SOCCR1	Employers' social security contributions rate, agriculture
SOCC1	Employers' social security contributions, agriculture, FIM million
SOCC2	Employers' social security contributions, services etc., FIM million
SOCC3	Employers' social security contributions, forestry, FIM million
SOCC4	Employers' social security contributions, manufacturing, FIM million
WRG	Wage rate, general government, 1985 = 100
WR2	Wage rate, services and other, 1985 = 100
WR3	Wage rate, forestry, 1985 = 100
WR4	Wage rate, manufacturing, 1985 = 100
YWG	Wages and salaries, general government, FIM million
YW1	Wages and salaries, agriculture, FIM million
YW2	Wages and salaries, services etc., FIM million
YW3	Wages and salaries, forestry, FIM million
YW4	Wages and salaries, manufacturing, FIM million

Y.12 Palkat, palvelukset ym.
Wages and Salaries, Services etc.

$$YW2 = LW2 \cdot WR2/100$$

Y.13 Palkat, metsätalous
Wages and Salaries, Forestry

$$YW3 = LW3 \cdot WR3/100$$

Y.14 Palkat, teollisuus
Wages and Salaries, Manufacturing

$$YW4 = LW4 \cdot WR4/100$$

Y.15 Palkat, julkinen toiminta
Wages and Salaries, General Government

$$YWG = LWG \cdot WRG/100$$

Y.16 Työnantajain sosiaalivakuutusmaksut, yhteensä
Employers' Social Security Contributions, Total

$$SOCC = SOCC1 + SOCC2 + SOCC3 + SOCC4 + SOCCG$$

Y.17 Työnantajain sosiaalivakuutusmaksut, maatalous
Employers' Social Security Contributions, Agriculture

$$SOCC1 = SOCCR1 \cdot YW1$$

SOCCG Employers' social security contributions, general government, FIM million

SOCCRG Employers' social security contributions rate, general government, FIM million

SOCCR1 Employers' social security contributions rate, agriculture

SOCCR2 Employers' social security contribution rate, services etc.

SOCCR3 Employers' social security contribution rate, forestry

SOCCR4 Employers' social security contribution rate, manufacturing

SOCC2 Employers' social security contributions, services etc., FIM million

SOCC3 Employers' social security contributions, forestry, FIM million

SOCC4 Employers' social security contributions, manufacturing, FIM million

SOCGR Employers' child allowance contribution rate

SOCLELR Employers' contribution rate for temporary employee pension scheme

SOCSR Employers' national pensions and sickness insurance contribution rate

YWG Wages and salaries, general government, FIM million

YW2 Wages and salaries, services etc., FIM million

YW3 Wages and salaries, forestry, FIM million

YW4 Wages and salaries, manufacturing, FIM million

Y.18 Työnantajain sosiaalivakuutusmaksut, palvelukset ym.
Employers' Social Security Contributions, Services etc.

$$SOCC2 = SOCCR2 \cdot YW2$$

Y.19 Työnantajain sosiaalivakuutusmaksut, metsätalous
Employers' Social Security Contributions, Forestry

$$SOCC3 = SOCCR3 \cdot YW3$$

Y.20 Työnantajain sosiaalivakuutusmaksut, teollisuus
Employers' Social Security Contributions, Manufacturing

$$SOCC4 = SOCCR4 \cdot YW4$$

Y.21 Työnantajain sosiaalivakuutusmaksut, julkinen toiminta
Employers' Social Security Contributions, General Government

$$SOCCG = SOCCRG \cdot YWG$$

Y.22 Työnantajain sosiaalivakuutusmaksujen osuus palkkasummasta, maatalous
Employers' Social Security Contribution Rate, Agriculture

$$SOCCR1 - SOCSR - SOCGR = + 0.03550 \\ (0.00283)$$

$$+ 0.91941 \cdot SOCLELR \\ (0.03137)$$

$$\bar{R}^2 = 0.957 \quad DW = 0.951 \quad SE = 0.0049 \quad 70.1 - 79.4$$

SOCCR2 Employers' social security contribution rate, services etc.
 SOCCR3 Employers' social security contribution rate, forestry
 SOCCR4 Employers' social security contribution rate, manufacturing
 SOCGR Employers' child allowance contribution rate
 SOCLELR Employers' contribution rate for temporary employee
 pension scheme
 SOCSR Employers' national pensions and sickness insurance
 contribution rate
 SOCTELR Employers' contribution rate for employee pension schemes

Y.23 Työnantajain sosiaalivakuutusmaksujen osuus palkkasummasta,
 palvelukset ym.
 Employers' Social Security Contribution Rate, Services etc.

$$\text{SOCCR2} - \text{SOCSR} - \text{SOCGR} = + 0.01745$$

$$(0.00388)$$

$$+ 0.98524 \cdot (0.76 \cdot \text{SOCTELR} + 0.24 \cdot \text{SOCLELR})$$

$$(0.04516)$$

$$\bar{R}^2 = 0.924 \quad DW = 0.418 \quad SE = 0.0068 \quad 70.1 - 79.4$$

Y.24 Työnantajain sosiaalivakuutusmaksujen osuus palkkasummasta,
 metsätalous
 Employers' Social Security Contribution Rate, Forestry

$$\text{SOCCR3} - \text{SOCSR} - \text{SOCGR} = + 0.03083$$

$$(0.00294)$$

$$+ 0.87228 \cdot \text{SOCLELR}$$

$$(0.03266)$$

$$\bar{R}^2 = 0.948 \quad DW = 0.800 \quad SE = 0.0051 \quad 70.1 - 79.4$$

Y.25 Työnantajain sosiaalivakuutusmaksujen osuus palkkasummasta,
 teollisuus
 Employers' Social Security Contribution Rate, Manufacturing

$$\text{SOCCR4} - \text{SOCSR} - \text{SOCGR} = + 0.04576$$

$$(0.00494)$$

$$+ 1.04788 \cdot \text{SOCTELR}$$

$$(0.05830)$$

$$\bar{R}^2 = 0.892 \quad DW = 0.297 \quad SE = 0.0087 \quad 70.1 - 79.4$$

CCRI Capital consumption rate, agriculture
 KF1 Net stock of fixed capital, agriculture, millions of 1985 FIM
 PIF1 Fixed investment prices, agriculture, 1985 = 100
 SOCCRG Employers' social security contributions rate, general government, FIM million
 SOCGR Employers' child allowance contribution rate
 SOCSR Employers' national pensions and sickness insurance contribution rate
 SUB Subsidies, millions of 1985 FIM
 SUBCG Central government subsidies, FIM million
 SUBLG Local government subsidies, FIM million
 YNW1 Gross operating surplus, agriculture, FIM million
 YSE Households' entrepreneurial income, total, FIM million
 YSE0 Other entrepreneurial income, FIM million
 YSE1 Entrepreneurial income, agriculture, FIM million
 YSE3 Entrepreneurial income, forestry, FIM million

Y.26 Työnantajain sosiaalivakuutusmaksujen osuus palkkasummasta, julkinen toiminta
 Employers' Social Security Contribution Rate, General Government

$$\text{SOCCRG} - \text{SOCSR} - \text{SOCGR} = + 0.06081 \\ (0.01958)$$

$$+ 0.61297 \cdot (\text{SOCCRG}_{-1} - \text{SOCSR}_{-1} - \text{SOCGR}_{-1}) \\ (0.12477)$$

$$\bar{R}^2 = 0.372 \quad \text{DW} = 1.888 \quad \text{SE} = 0.0037 \quad 70.1 - 79.4$$

Y.27 Kotitalouksien tulot toimintaylijäämästä
 Households' Entrepreneurial Income, Total

$$\text{YSE} = \text{YSE1} + \text{YSE3} + \text{YSE0}$$

Y.28 Kotitalouksien tulot maatalouden toimintaylijäämästä
 Entrepreneurial Income, Agriculture

$$\text{YSE1} = 1.02694 \cdot (\text{YNW1} - \text{PIF1} \cdot \text{KF1}_{-1} \cdot \text{CCRI}/100) \\ (0.02830)$$

$$+ 0.51851 \cdot (\text{SUBCG} + \text{SUBLG} - \text{SUB}) \\ (0.08117)$$

$$\bar{R}^2 = 0.9701 \quad \text{DW} = 2.319 \quad \text{SE} = 109.8429 \quad 62.1 - 85.4$$

CCR3	Capital consumption rate, forestry
GDPV2	Production at factor cost, services and other, FIM million
GDPV4	Production at factor cost, manufacturing, FIM million
KDP	Banks' deposits by the public, FIM million
KF3	Net stock of fixed capital, forestry, million of 1985 FIM
KH	Net stock of private residential capital, millions of 1985 FIM
LBP	Bank loans to the public, FIM million
PIF3	Fixed investment prices, forestry
PIH	Residential construction prices, 1985 = 100
RDT	Interest rate, time deposits, per cent
RLB	Bank lending rate, per cent
SECPCG	Central government bonds held by the public, FIM million
YNW3	Gross operating surplus, forestry, FIM million
YOH	Other household income, FIM million
YSEO	Other entrepreneurial income, FIM million
YSE3	Entrepreneurial income, forestry, FIM million

Y.29 Kotitalouksien tulot metsätalouden toimintaylijäämästä
Entrepreneurial Income, Forestry

$$YSE3 = 0.97901 \cdot (YNW3 - PIF3 \cdot KF3_{-1} \cdot CCR3/100) \\ (0.01370)$$

$$\bar{R}^2 = 0.943 \quad DW = 1.4372 \quad SE = 117.6334 \quad 62.1 - 85.4$$

Y.30 Kotitalouksien tulot muusta toimintaylijäämästä
Other Entrepreneurial Income

$$\Delta(100 \cdot YSEO/PIH - 0.04885 \cdot KH_{-1}/4) =$$

$$- 38.82150 \\ (27.67100)$$

$$+ 0.12805 \cdot \Delta[100 \cdot (GDPV2 + GDPV4)/PIH - 0.04885 \cdot KH_{-1}/4] \\ (0.01291)$$

$$+ 0.28573 \cdot \Delta(100 \cdot YSEO_{-1}/PIH_{-1} - 0.04885 \cdot KH_{-2}/4) \\ (0.08656)$$

$$\bar{R}^2 = 0.694 \quad DW = 2.006 \quad SE = 182.594 \quad 75.1 - 85.4$$

Y.31 Kotitalouksien muut tulot
Other Household Income

$$YOH = - 0.00124 \cdot (RLB \cdot LBP_{-1}) \\ (0.00011)$$

$$+ 0.00119 \cdot RDT \cdot (KDP_{-1} + SECPCG_{-1}) \\ (0.00016)$$

$$\bar{R}^2 = 0.964 \quad DW = 0.210 \quad SE = 36.3580 \quad 62.1 - 85.4$$

LU	Unemployment, 1000 persons
PCP	Private consumption prices, 1985 = 100
SOCC	Employers' social security contributions, total, FIM million
SOCCS	Employers' national pensions and sickness insurance contributions, FIM million
SOCG	Central government revenue from employers' child allowance contributions, FIM million
SOCLS	Insured persons national pensions and sickness insurance contributions, FIM million
TRCGH	Central government transfers to households, FIM million
TRHGN	Households' transfers to other sectors, net, FIM million
TRHO	Other transfers to households, net, millions of 1985 FIM
TRHOV	Other transfers to households, net, FIM million
TRSHV	Benefits paid by the Social Insurance Institution, FIM million
TYP	Central and local government revenue from direct taxes on households, FIM million
WR	Wage rate, total, 1985 = 100
YNW	Gross operating surplus, total, FIM million
YNWG	Gross operating surplus, general government, FIM million
YNW1	Gross operating surplus, agriculture, FIM million
YNW2	Gross operating surplus, services and other, FIM million
YNW3	Gross operating surplus, forestry, FIM million
YNW4	Gross operating surplus, manufacturing, FIM million

Y.32 Muut tulonsiirrot kotitalouksille, netto, arvo
Other Transfers to Households, Net, Value

$$TRHOV = TRHO \cdot PCP/100$$

Y.33 Muut tulonsiirrot kotitalouksille, netto, määrä
Other Transfers to Households, Net, Volume

$$\Delta TRHO = 13.56406$$

$$(5.86218)$$

$$+ 0.03007 \cdot \Delta[100 \cdot (SOCC - SOCG - SOCCS)/PCP]$$

$$(0.03625)$$

$$+ 1.66438 \cdot \Delta(LU \cdot WR/PCP)$$

$$(0.58087)$$

$$+ 0.69397 \cdot \Delta[TRHO_{-1} - 1.6 \cdot LU_{-1} \cdot WR_{-1}/PCP_{-1}]$$

$$(0.09512)$$

$$\bar{R}^2 = 0.479 \quad DW = 1.623 \quad SE = 33.3389 \quad 63.1 - 84.4$$

Y.34 Kotitalouksien nettotulonsiirrot muille sektoreille
Households' Transfers to Other Sectors

$$TRHGN = TYP + SOCLS + SOCC - TRCGH - TRSHV - TRHOV$$

Y.35 Bruttotoimintaylijäämä, yhteensä
Gross Operating Surplus, Total

$$YNW = YNW1 + YNW2 + YNW3 + YNW4 + YNWG$$

GDPVG	Production at factor cost, FIM million
GDPV1	Production at factor cost, agriculture, FIM million
GDPV2	Production at factor cost, services and other, FIM million
GDPV3	Production at factor cost, forestry, FIM million
GDPV4	Production at factor cost, manufacturing, FIM million
SOCCG	Employers' social security contributions, general government, FIM million
SOCC1	Employers' social security contributions, agriculture, FIM million
SOCC2	Employers' social security contributions, services etc., FIM million
SOCC3	Employers' social security contributions, forestry, FIM million
SOCC4	Employers' social security contributions, manufacturing, FIM million
TRHOV	Other transfers to households, net, FIM million
YC	Profits of corporate entities before taxation, FIM million
YNW	Gross operating surplus, total, FIM million
YNWG	Gross operating surplus, general government, FIM million
YNW1	Gross operating surplus, agriculture, FIM million
YNW2	Gross operating surplus, services and other, FIM million
YNW3	Gross operating surplus, forestry, FIM million
YNW4	Gross operating surplus, manufacturing, FIM million
YOH	Other household income, FIM million
YSE	Households' entrepreneurial income, total, FIM million
YWG	Wages and salaries, general government, FIM million
YW1	Wages and salaries, agriculture, FIM million
YW2	Wages and salaries, services etc., FIM million
YW3	Wages and salaries, forestry, FIM million
YW4	Wages and salaries, manufacturing, FIM million

Y.36	Bruttotoimintaylijäämä, maatalous Gross Operating Surplus, Agriculture	$YNW1 = GDPV1 - SOCC1 - YW1$
Y.37	Bruttotoimintaylijäämä, palvelukset ym. Gross Operating Surplus, Services etc.	$YNW2 = GDPV2 - SOCC2 - YW2$
Y.38	Bruttotoimintaylijäämä, metsätalous Gross Operating Surplus, Forestry	$YNW3 = GDPV3 - SOCC3 - YW3$
Y.39	Bruttotoimintaylijäämä, teollisuus Gross Operating Surplus, Manufacturing	$YNW4 = GDPV4 - SOCC4 - YW4$
Y.40	Bruttotoimintaylijäämä, julkinen toiminta Gross Operating Surplus, General Government	$YNWG = GDPVG - SOCCG - YWG$
Y.41	Yhteisöjen jakamattomat voitot ennen veroja Profits of Corporate Entities Before Taxation	$YC = YNW - YSE - YOH - TRHOV$

DEVL Profits of corporate entities before taxation, FIM million
 YC Taxable corporate income in central government taxation, FIM million
 YCCG Taxable corporate income in central government taxation, FIM million
 YCLG Taxable corporate income in local government taxation, FIM million

Y.42 Yhteisöjen verotettavat tulot valtion verotuksessa
 Taxable Corporate Income in Central Government Taxation

$$\sum_{i=0}^3 YCCG_{-i} = 0.12938 \cdot \sum_{i=0}^3 YC_{-i} \\ (0.00111)$$

$$+ 0.06945 \cdot \sum_{i=0}^3 (YC \cdot DEVL)_{-i} \\ (0.00985)$$

$$\bar{R}^2 = 0.9815 \quad DW = 0.205 \quad SE = 244.7754 \quad 62.1 - 85.4$$

Y.43 Yhteisöjen verotettavat tulot kunnallisverotuksessa
 Taxable Corporate Income in Local Government Taxation

$$\sum_{i=0}^3 YCLG_{-i} = 0.31040 \cdot \sum_{i=0}^3 YC_{-i} \\ (0.00280)$$

$$+ 0.04726 \cdot \sum_{i=0}^3 (YC \cdot DEVL)_{-i} \\ (0.02493)$$

$$\bar{R}^2 = 0.981 \quad DW = 0.185 \quad SE = 619.4579 \quad 62.1 - 85.4$$

DSOC
 DTCG
 DTLG
 DTYP
 LE Employment, 1000 persons
 MTAX Personal marginal tax rate, estimate
 SOCLR Insured persons' national pensions and sickness insurance
 contribution rate
 TLGR Average local government tax rate
 TRSH Benefits paid by the Social Insurance Institution,
 millions of 1985 FIM
 TYP Central and local government revenue from direct taxes on
 households, FIM million
 TYS
 TYU
 YSE Households' entrepreneurial income, total, FIM million
 YW Wages and salaries, total, FIM million

G. JULKINEN TALOUS
PUBLIC SECTOR

G.1 Valtion ja kuntien tulot kotitalouksien välittömistä veroista
Central and Local Government Revenue from Taxes on Households

$$\text{TYP}/\text{var1} = 1.14007 \cdot \text{DTLG} \cdot \text{TLGR} \\ (0.1396)$$

$$+ 0.93360 \cdot \text{DTCG} \cdot (8.22 + \log \text{DTCG}) \cdot \text{TYS} \\ (0.0615)$$

$$+ 0.94295 \cdot \text{DTCG} \cdot (\text{TYU} + \text{TYS} \cdot \log(\text{var1}/\text{LE})) \\ (0.0650)$$

$$+ 0.02227 \cdot \text{DTYP} \\ (0.0055)$$

$$\text{jossa var1} = \text{YW} + \text{YSE}_{-8} + \text{DSOC} \cdot \text{TRSH}$$

$$\bar{R}^2 = 0.893 \quad \text{DW} = 2.003 \quad \text{SE} = 0.015 \quad 62.1 - 85.4$$

G.2 Kotitalouksien keskimääräisen rajaveroasteen estimaatti
Personal Marginal Tax Rate Estimates

$$\text{MTAX} = 0.943 \cdot \text{DTCG} \cdot \text{TYS} + \text{TYP}/(\text{YW} + \text{YSE}_{-8} + \text{DSOC} \cdot \text{TRSH}) + \text{SOCLR}$$

DPROP
 ET
 MT
 TER Increase in the tax base
 TLGR Average local government tax rate
 TYC Central and local government revenue from direct taxes on corporate entities, FIM million
 TYCR Corporate tax rate in central government taxation
 YCCG Taxable corporate income in central government taxation, FIM million
 YCLG Taxable corporate income in local government taxation, FIM million

G.3 Valtion ja kuntien tulot yhteisöjen välittömistä veroista
 Central and Local Government Revenue from Direct Taxes on Corporate Entities

$$TYC - DPROP = 0.94323 \cdot [ET + 3 \cdot (MT_{-4} - ET_{-4}) + 7 \cdot (MT_{-8} - ET_{-8})] \\ (0.0105)$$

jossa $ET = TYCR \cdot TER \cdot YCCG_{-8} + TLGR \cdot TER \cdot YCLG_{-8}$
 ja $MT = TYCR \cdot YCCG + TLGR \cdot YCLG$

$$\bar{R}^2 = 0.969 \quad DW = 0.349 \quad SE = 49.714 \quad 64.1 - 83.4$$

G.4 Valtion ja kuntien tulot yhteisöjen välittömistä veroista
 Central and Local Government Revenue from Direct Taxes on Corporate Entities

$$TYC - DPROP = 0.86258 \cdot [ET + 3 \cdot (MT_{-4} - ET_{-4}) + 7 \cdot (MT_{-8} - ET_{-8})] \\ (0.01214)$$

jossa $ET = TYCR \cdot TER \cdot YCCG_{-8} + TLGR \cdot TER \cdot YCLG_{-8}$
 ja $MT = TYCR \cdot YCCG + TLGR \cdot YCLG$

$$\bar{R}^2 = 0.9573 \quad DW = 0.2782 \quad SE = 76.4721 \quad 64.1 - 85.4$$

CDV Private consumption, durables, FIM million
 CGV Total public consumption, FIM million
 CNDV Private consumption, non-durables and semi-durables,
 FIM million
 CSV Private consumption, services, FIM million
 D5863
 D6263
 DTO
 GDPV1 Production at factor cost, agriculture, FIM million
 GDPV2 Production at factor cost, services and other, FIM
 million
 GDPV3 Production at factor cost, forestry, FIM million
 GDPV4 Production at factor cost, manufacturing, FIM million
 IFV4 Private fixed investment, manufacturing, FIM million
 ITOTV Total fixed investment, 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
 XV Exports of goods and services, FIM million

G.5 Valtion tulot liikevaihtoverosta
 Central Government Revenue from Sales Tax

$$\log TSCG/TSR = - 4.84506 \\ (0.39243)$$

$$+ 1.01914 \cdot \log SLVV \\ (0.03897)$$

$$+ 1.01707 \cdot \log D5863 \\ (0.02111)$$

$$- 0.03748 \cdot D6263 \\ (0.00794)$$

$$+ 0.10554 \cdot DTO \\ (0.06342)$$

$$\text{jossa } SLVV = 0.933 \cdot CDV + 0.743 \cdot CNDV + 0.063 \cdot CSV + 0.097 \\ \cdot CGV + 0.291 \cdot (ITOTV - IFV4) + 0.066 \cdot XV + \\ 0.320 \cdot GDPV1 + 0.286 \cdot GDPV2 + 0.154 \cdot GDPV3 - \\ 0.093 \cdot GDPV4 + (0.3916(0.7432 \cdot TSR7 + 0.2568 \cdot TSR8) \\ \cdot D5863)/TSR) \cdot IFV4$$

$$\bar{R}^2 = 0.979 \quad RHO = 0.58 \quad SE = 0.0663 \quad 61.1 - 85.4$$

CDV	Private consumption, durables, FIM million
CNDV	Private consumption, non-durables and semi-durables, FIM millions
D5863	
DTO	
GDPF	GDP at factor cost, millions of 1985 FIM
GDPV	GDP in Purchasers' Values, FIM million
MV	Imports of goods and services, FIM million
PCP	Private consumption prices, 1985 = 100
PMFL	Import prices of fuels and lubricants, 1985 = 100
TEBR	Excise tax rate on petrol
TECG	Central government revenue from excise tax on liquid fuels, FIM million
TEDR	Excise tax rate on diesel oil
TIOCG	Central government revenue from other indirect taxes, FIM million
TIOV	Other commodity taxes, FIM million
TSR	Sales tax rate

G.6 Valtion tulot nestemäisten polttoaineiden valmisteverosta
Central Government Revenue from Excise Tax on Liquid Fuels

$$\log(\text{TECG}/(0.5494 \cdot \text{TEBR} + 0.4506 \cdot \text{TEDR})) = - 9.01982$$

$$(0.76486)$$

$$+ 1.50127 \cdot \sum_{i=0}^3 a_i \log \text{GDPF}$$

$$(0.12940) \quad i=0$$

$$- 0.14610 \cdot \log(\text{POIL}/\text{PCP})$$

$$(0.14508)$$

jossa POIL = (1.6133 · PMFL + 100 · (0.5494 · TEBR + 0.4506 · TEDR)) · (100 + DTO · TSR · D5863)

viivästymä i	0	1	2	3	∑
paino a _i	.4	.3	.2	.1	1

$\bar{R}^2 = 0.871$ DW = 2.003 SE = 0.1382 62.1 - 85.4

G.7 Muut hyödykeverot
Other Commodity Taxes

$$\text{TIOV} = 0.84855 \cdot \text{var1}$$

$$(0.00432)$$

jossa var1 = (0.0134 + 0.0006 · TSR · D5863) · MV + 0.138 · CNDV + 0.1341 · CDV + 0.0023 · GDPV

$\bar{R}^2 = 0.9938$ DW = 1.722 SE = 93.2269 62.1 - 85.4

GDPV GDP in Purchasers' Values, FIM million
 SOCCS Employers' national pensions and sickness insurance contributions, FIM million
 SOCG Central government revenue from employers' child allowance contributions, FIM million
 SOCGR Employers' child allowance contribution rate
 SOCSR Employers' national pensions and sickness insurance contribution rate
 TIOCG Central government revenue from other indirect taxes, FIM million
 YW Wages and salaries, total, FIM million

G.8 Valtion tulot muista välillisistä veroista
 Central Government Revenue from Other Indirect Taxes

$$TIOCG = 0.00774 \cdot GDPV \\ (0.00057)$$

$$\bar{R}^2 = 0.540 \quad RHO = 0.980 \quad SE = 10.3996 \quad 62.1 - 85.4$$

G.9 Valtion tulot työntantajain lapsilisämaksuista
 Central Government Revenue from Employers' Child Allowance Contributions

$$SOCG = 0.98594 \cdot SOCGR \cdot YW \\ (0.00855)$$

$$\bar{R}^2 = 0.978 \quad DW = 1.683 \quad SE = 13.4516 \quad 62.1 - 85.4$$

G.10 Kansaneläkelaitoksen tulot työntantajain kansaneläke- ja sairausvakuutusmaksuista
 Employers' National Pensions and Sickness Insurance Contributions

$$SOCCS = 1.01636 \cdot SOCSR \cdot YW \\ (0.00751)$$

$$\bar{R}^2 = 0.990 \quad DW = 0.120 \quad SE = 78.3569 \quad 62.1 - 85.4$$

DTYLG
 FCGHN Central government housing loans, net change, FIM million
 FCGON Central government other borrowing, net, FIM million
 SOCLR Insured persons' national pensions and sickness insurance contribution rate
 SOCLS Insured persons national pensions and sickness insurance contributions, FIM million
 YOCG Central government other revenue, FIM million
 YW Wages and salaries, total, FIM million
 YWG Wages and salaries, general government, FIM million

G.11 Kansaneläkelaitoksen tulot vakuutettujen kansaneläke- ja sairausvakuutusmaksuista
 Insured Persons National Pensions and Sickness Insurance Contributions

$$\text{SOCLS/SOCLR} = 1.04580 \cdot (1 - \text{DTYLG}) \cdot \text{YW} \\ (0.00487)$$

$$+ 0.42085 \cdot \text{DTYLG} \cdot \sum_{i=6}^8 \text{YW}_{-i} \\ (0.00428)$$

$$\bar{R}^2 = 0.996 \quad \bar{D}W = 0.249 \quad SE = 727.7781 \quad 62.1 - 85.4$$

G.12 Valtion muut tulot
 Central Government Other Revenue

$$\text{YOCG} - \text{YOCG}_{-3} = 0.17447 \cdot (\text{YWG} - \text{YWG}_{-3}) \\ (0.04049)$$

$$+ 0.00938 \cdot \sum_{i=0}^2 \text{FCGHN}_i \\ (0.01922)$$

$$- 0.01435 \cdot \sum_{i=0}^2 \text{FCGON}_i \\ (0.00732)$$

$$\bar{R}^2 = 0.444 \quad \bar{D}W = 1.239 \quad SE = 61.1019 \quad 62.1 - 85.4$$

CLGV	Local government consumption, FIM million
DSOC	
DTLG	
DTYLG	
FMCGN	Foreign borrowing by the central government, net, FIM million
FPCGN	Change in holdings of central government bonds by the public, FIM million
GCGI	Central government interest expenditure, FIM million
RDT	Interest rate, time deposits, per cent
RFOR	Average 3 month euromarket interest rate for USD, GBP, DEM and CHF, per cent
SUBLG	Local government subsidies, FIM million
TER	Increase in the tax base
TLGR	Average local government tax rate
TRCGL	Central government transfers to local government, FIM million
TRSHV	Benefits paid by the Social Insurance Institution, FIM million
YCLG	Taxable corporate income in local government taxation, FIM million
YSE	Households' entrepreneurial income, total, FIM million
YW	Wages and salaries, total, FIM million

G.13 Valtion korkomenot
Central Government Interest Expenditure

$$GCGI - GCGI_{-1} = 0.00341 \cdot (RFOR \cdot FMCGN + RDT \cdot FPCGN) \\ (0.00019)$$

$$\bar{R}^2 = 0.672 \quad DW = 0.969 \quad SE = 10.4539 \quad 62.1 - 85.4$$

G.14 Kunnallisveroäyrin keskihinta
Average Local Government Tax Rate

$$TLGR - TLGR_{-4} = 0.00029 + 0.82526(TLGR_{-1} - TLGR_{-5}) \\ (0.0001) \quad (0.0493)$$

$$+ 0.05296(TLGR_{-4} - TLGR_{-4}) \\ (0.0155)$$

$$\text{jossa } TLGRE = 0.09422 - 0.00884 \cdot DRYLG + 0.48837 \left(\frac{CLGV + SUBLG - TRCGL}{VP} \right)$$

$$VP = DTLG \cdot [DTYLG \cdot YW_{-6} + (1 - DTYLG)YW - \\ - TER \cdot (YCLG_{-6} + .715 YSE_{-6}) + DSOC \cdot TRSHV]$$

$$\bar{R}^2 = 0.758 \quad DW = 1.882 \quad SE = 0.0008 \quad 63.1 - 88.4$$

CLG	Local government consumption, millions of 1985 FIM
DSOC	
DTLG	
DTYLG	
PCLG	Local government consumption prices, 1985 = 100
SUBLG	Local government subsidies, FIM million
TER	Increase in the tax base
TLGR	Average local government tax rate
TRCGL	Central government transfers to local government, FIM million
TRSHV	Benefits paid by the Social Insurance Institution, FIM million
TYC	Central and local government revenue from direct taxes on corporate entities, FIM million
TYCG	Central government revenue from direct taxes, FIM million
TYLG	Local government revenue from direct taxes, FIM million
TYP	Central and local government revenue from direct taxes on households, FIM million
YCLG	Taxable corporate income in local government taxation, FIM million
YSE	Households' entrepreneurial income, total, FIM million
YW	Wages and salaries, total, FIM million

G.15 Kuntien tulot välittömistä veroista
Local Government Revenue from Direct Taxes

$$\log(\text{TYLG}/\text{TLGR}) = -1.02961 \\ (0.06850)$$

$$+ 1.10234 \cdot \log \text{VP} \\ (0.00657)$$

$$+ 0.24194 \cdot \text{DTYLG} \\ (0.01344)$$

$$\text{jossa VP} = \text{DTLG} \cdot [\text{DTYLG} \cdot \text{YW}_{-6} + (1 - \text{DTYLG}) \cdot \text{YW} + \\ \text{TER} \cdot (\text{YCLG}_{-6} + 0.715 \cdot \text{YSE}_{-6}) + \text{DSOC} \cdot \text{TRSHV}]$$

$$\bar{R}^2 = 0.999 \quad \text{DW} = 0.443 \quad \text{SE} = 0.0343 \quad 62.1 - 85.4$$

G.16 Kuntien kulutusmenojen määrä
Local Government Consumption, Volume

$$\text{CLG} \cdot \text{PCLG} \cdot 0.01 / (\text{TYLG} \cdot \text{SUBLG}) = 0.23981 \\ (0.0395)$$

$$+ 0.53809 \cdot \text{TRCGL} / (\text{TYLG} - \text{SUBLG}) \\ (0.1029)$$

$$+ 0.60794 \cdot \text{CLG}_{-1} \cdot \text{PCLG}_{-1} \cdot 0.01 / (\text{TYLG} - \text{SUBLG}) \\ (0.0740)$$

$$\bar{R}^2 = 0.973 \quad \text{DW} = 2.023 \quad \text{SE} = 0.0268 \quad 64.1 - 88.4$$

G.17 Valtion tulot välittömistä veroista
Central Government Revenue from Direct Taxes

$$\text{TYCG} = \text{TYP} + \text{TYC} - \text{TYLG}$$

ICG	Central government investment, millions of 1985 FIM
ICGEV	Central government investment in government enterprises, FIM million
ICGTV	Central government investment (including enterprises), FIM million
ICGV	Central government investment, FIM million
PICG	Central government investment prices, 1985 = 100
SOCG	Central government revenue from employers' child allowance contributions, FIM million
SUBCG	Central government subsidies, FIM million
SUBLG	Local government subsidies, FIM million
SUBT	Subsidies, total, FIM million
TECG	Central government revenue from excise tax on liquid fuels, FIM million
TICG	Central government revenue from indirect taxes, FIM million
TIOCG	Central government revenue from other indirect taxes, FIM million
TIOV	Other commodity taxes, FIM million
TIV	Central government revenue from commodity taxes, FIM million
TSCG	Central government revenue from sales tax, FIM million
TYCG	Central government revenue from direct taxes, FIM million
YCGTOT	Central government revenue, total, FIM million
YOCG	Central government other revenue, FIM million

G.18	Valtion tulot hyödykeveroista Central Government Revenue from Commodity Taxes	$TIV = TSCG + TECG + TIOV$
G.19	Valtion tulot välillisistä veroista Central Government Revenue from Indirect Taxes	$TICG = TIV + TIOCG$
G.20	Valtion tulot Central Government Revenue, Total	$YCGTOT = TYCG + TICG + SOCG + YOCG$
G.21	Valtion investointimenojen (ilman liikelaitoksia) arvo Central Government Investment, Value	$ICGV = ICG \cdot PICG/100$
G.22	Valtion investointimenojen (sis. liikelaitokset) arvo Central Government Investment (including enterprises), Value	$ICGTV = ICGV + ICGEV$
G.23	Tukipalkkiot Subsidies	$SUBT = SUBCG + SUBLG$

CCGV	Central government consumption, FIM million
CLGV	Local government consumption, FIM million
FCGH	Central government housing loans, drawing, FIM million
FCGHB	Central government housing loans, redemptions, FIM million
FCGHN	Central government housing loans, net change, FIM million
FCGN	Central government borrowing, net, FIM million
FCGON	Central government other borrowing, net, FIM million
FPCGN	Foreign borrowing by the central government, net, FIM million
FPCGN	Change in holdings of central government bonds by the public, FIM million
GCGI	Central government interest expenditure, FIM million
GCGTOTV	Central government expenditure, FIM million
GLGOV	Other expenditure, local government, FIM million
GOCGV	Other expenditure, central government, FIM million
ICGTV	Central government investment (including enterprises), FIM million
ILG	Local government investment, millions of 1985 FIM
ILGV	Local government investment, FIM million
LBFGN	Central government debt to the Bank of Finland, net, FIM million
PCP	Private consumption prices, 1985 = 100
PILG	Local government investment prices, 1985 = 100
SUBCG	Central government subsidies, FIM million
TRCGF	Central government transfers abroad, FIM million
TRCGH	Central government transfers to households, FIM million
TRCGL	Central government transfers to local government, FIM million
TRCGS	Central government transfers to the social insurance institution, FIM million
TRSH	Benefits paid by the Social Insurance Institution, millions of 1985 FIM
TRSHV	Benefits paid by the Social Insurance Institution, FIM million
TYLG	Local government revenue from direct taxes, FIM million
YCGTOT	Central government revenue, total, FIM million

G.24	Valtion menot, arvo Central Government Expenditure, Value
	$GCGTOTV = CCGV + ICGTV + SUBCG + TRCGH + TRCGL + TRCGS + TRCGF + GCGI + GOCGV$
G.25	Kansaneläkelaitoksen eläke- ja sairausvakuutusmenojen arvo Benefits paid by the Social Insurance Institution, Value
	$TRSHV = TRSH \cdot PCP/100$
G.26	Valtion nettoluotonotto Central Government Borrowing, Net
	$FCGN = GCGTOTV - YCGTOT$
G.27	Valtion asuntolainat, nettomuutos Central Government Housing Loans, Net Change
	$FCGHN = FCGH - FCGHB$
G.28	Yleisön hallussa olevien valtion obligaatioiden muutos Change in Holdings of Central Government Bonds by The Public
	$FPCGN = FCGN - FPCGN - (LBFGN - LBFGN_1) + (LCGBN - LCGBN_1) + FCGHN - FCGON$
G.29	Kuntien investointimenojen arvo Local Government Investment, Value
	$ILGV = ILG \cdot PILG/100$
G.30	Kuntien muut menot, netto, arvo Local Government Other Expenditures, Net, Value
	$GLGOV = TYLG + TRCGL - CLGV - ILGV$

REFERENCES

- GRAMLICH, E.M. (1969) State and Local Governments and their Budget Constraint, *International Economic Review*, vol. 10, 163 - 182.
- TARKKA, J. and WILLMAN, A. (eds. 1985): The BOF3 Quarterly Model of the Finnish Economy, Bank of Finland series D:59.
- TARKKA, J. and WILLMAN, A. (1988) Exports and Imports in the BOF4 Quarterly Model of the Finnish Economy. Bank of Finland Discussion Papers 3/88.
- TARKKA, J., WILLMAN, A. and RASI, C-M. (1988) Production and Employment in the BOF4 Quarterly Model of the Finnish Economy. Bank of Finland Discussion Papers 14/88.
- TARKKA, J., WILLMAN, A. and RASI, C-M. (1988) Labour Supply, Prices and Wages in the BOF4 Quarterly Model of the Finnish Economy. Bank of Finland Discussion Papers 6/89.
- TARKKA, J., WILLMAN, A. and MÄNNISTÖ, H-L. (1989) Consumption and Investment in the BOF4 Quarterly Model of the Finnish Economy. Bank of Finland Discussion Papers 9/89.
- TARKKA, J. and WILLMAN, A. (1990) Financial Markets in the BOF4 Model of the Finnish Economy. Bank of Finland Discussion Papers 1/90.
- TARKKA, J., MÄNNISTÖ, H-L. and WILLMAN, A. (1990) Macroeconomic Foundations and Simulation Properties of the BOF4 Quarterly Model of the Finnish Economy. Bank of Finland Discussion Papers 2/90-

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