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QUEST II

A Multi Country Business Cycle and Growth Model

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Introduction

QUEST was designed to analyse the economies in the member states of the European Union and their interactions with the rest of the world, especially with the United States and Japan. The focus of the model is on the transmission of the effects of economic policy both on the domestic and the international economy. The model was primarily constructed to serve as a tool for policy simulation; less emphasis was put on its ability to serve as a forecasting tool. Given the wide coverage of the model it must necessarily be highly aggregated. A high degree of aggregation and foundation of the specification in current macroeconomic theory also helps in interpreting and understanding the results of the simulations. Finally simplicity also facilitates the solution of the model and reduces the time and memory requirements of the computer-simulations. The new model contains structural models for the EU member states, the US and Japan and distinguishes 10 additional countries/regions in trade feedback models in order to model trade interactions with the rest of the world.

Compared to the former version of the QUEST model, which was presented in European Economy No. 47 (1991), the new model is now considerably modified with respect to its theoretical structure. The previous version of QUEST was deeply rooted in the Keynesian tradition of econometric model building, strongly stressing the demand side of the economy and modelling consumer and investment behaviour in a backward looking fashion. In the new version an attempt was made to base the behavioural equations more strongly on principles of dynamic optimisation of private households and firms. That makes the model substantially more forward looking. Also the supply side is now more explicitly modelled. The present model is also closed with respect to stock-flow interactions. Those stock variables which can be identified on a macroeconomic level such as physical capital, net foreign assets, money and government debt are endogenously determined and wealth effects are allowed to influence savings, production and investment decisions of private households, firms and the government. Moreover, financial linkages between national economies are now more explicitly modelled. In the current version it is assumed that assets determined in different currencies are perfect substitutes - up to an exogenous risk premium. Consistent modelling of international trade and financial linkages also require that at each instant two adding-up constraints hold: trade balances and net foreign asset positions sum to zero. Also the long run properties of the model are now systematically explored.

Apart from simulations related to the Commission's short and medium term projections, the model has been intensively used to analyse the impact of the Maastricht criteria on growth and employment and the long run effects of fiscal consolidation and structural reforms in Europe (e.g. Bayar et al., 1997a). Related to this, the model was used to study the impact of monetary policy on the success of government expenditure cuts (Roeger and in 't Veld, 1997a), and the macroeconomic effects of various tax reforms (Roeger and in 't Veld, 1997b) and VAT harmonisation (Bayar, Roeger and in 't Veld, 1997). The model has also been used to assess the employment and growth effects of the Trans European Transport Networks (European Commission, 1996), while the models for Greece, Ireland, Portugal and Spain have been used to look at the macroeconomic effects of the Structural Funds (Roeger, 1996b).

1. Model Description

This section will give a detailed description of the household, firm and government sector as well as their interaction in goods, labour and asset markets. The general philosophy of the new QUEST model can be characterised as a modern version of the Neoclassical-Keynesian Synthesis. The behavioural equations in the model are now firmly based on microeconomic principles of intertemporal optimising behaviour of households and firms and the supply side of the economy is modelled explicitly via a neo-classical production function. This feature of the model assures that the long run behaviour of the model resembles closely the standard neo-classical growth model and the model reaches a steady state growth path with a growth rate essentially determined by the rate of (exogenous) technical progress and the growth rate of the population. Also the real rate of interest in the long run is determined by private savings behaviour, especially the discount rate of private households. Similarly, the real exchange rate between various countries is fundamentally determined by demand and supply of domestic and foreign output. This immediately implies that in this type of model economic policy will not be able to change the long run growth rate (unless it is able to affect the rate of time preference, the rate of technical progress or the growth rate of the population). It can however affect the long run level of output and thereby the growth rate of the economy over extended periods of time until the new (steady state) income level is reached.

There are two major departures from the neo-classical model in the long run, however. Because firms are not perfectly competitive but can charge markups over marginal cost in the long run, the level of economic activity will be lower than that predicted from a model with perfect competition. Also, the model economy will not reach a steady state equilibrium with full employment, since we use a bargaining framework to describe the interaction between firms and workers. As will be described below, labour market rigidities and therefore involuntary unemployment will persist even in the long run. The short run behaviour of the model will be influenced by standard Keynesian features since the models allows for imperfectly flexible wages and prices, adjustment costs for investment and labour hoarding.

1.1 Sectors

1.1.1 Household Behaviour

Consumption and Saving:

Households form decisions about consumption and labour supply. In this section we will discuss consumer behaviour, while labour supply decisions are dealt with in the section on the labour market. The behaviour of households is characterised by the Life Cycle Hypothesis as formalised by Blanchard (1984) and Buiter (1988), for example. It is a generalization of the Permanent Income Model since it allows the analysis of consumption and saving behaviour of households with possibly only a finite time horizon. This distinction is at least theoretically important, since depending on the forward looking horizon of households the consequences of government policies will be treated differently by households. Ricardian Equivalence for example only holds for infinitely lived households, while finitely lived households will underestimate the future tax payments implied from a certain stock of government debt, *i.e.* their discount rate will be higher.

The Life Cycle Hypothesis is an elegant way to model the basically intertemporal savings-consumption problem of households. According to this hypothesis, households base their

consumption decision on a discounted stream of current and future expected net income LCI_t and on their current stock of financial wealth FW_t. The basic reason for doing this is derived from a concept of inter-temporal utility maximization of households, whereby they find it optimal to smooth consumption over time. If households expect for example a temporary decline in their income they will according to this hypothesis mainly react via a reduction in their savings rate. Alternatively if they expect an increase in their future net income because of credibly announced tax reductions the current savings rate may also fall, *i.e.* consumption may already increase in the present period in anticipation of higher future income. Private consumption C_t under this hypothesis can theoretically be represented as follows

$$C_t = (\theta + p)\left[LCI_t + FW_t\right]P_t / PC_t \tag{1}$$

where θ is the rate of time preference and p the probability of death, or the inverse of the forward looking horizon of the household. Life cycle income is defined as

$$LCI_t = \int_t^{\infty}\left[(1-tl)\frac{W_s N_s}{P_s} + \frac{TR_s}{P_s}\right]\exp\left(-\int_t^s (r_j + p)dj\right)ds \tag{2}$$

The permanent income represents the current and discounted future expected net income stream the household sector is expected to earn. It consists of all non-capital income, *i.e.* net labour income $(1\text{-}tl)W_t N_t$ and all other transfers to households, including unemployment benefits, TR_t. The other determinant for private consumption is financial wealth

$$FW_t = MV_t + F_t + B_t \tag{3}$$

which, on the aggregate level, consists of the market value of firms in the domestic economy MV_t, the net foreign asset position F_t and government debt B_t. Note, however, though government debt enters the definition for private wealth, this does not mean that it has a positive effect on private consumption because households deduct future tax payments and reductions in transfer payments from their permanent income which are required to service the debt. This is also known as Ricardian Equivalence. This proposition does, however, only hold in its extreme form for infinitely lived consumers. Life cycle consumers will discount the future more heavily and thereby underestimate the tax burden associated with government debt. Consequently they will regard government debt at least partially as net wealth of the household sector. As Summers and Poterba have shown, however, this net wealth effect of government debt is negligible in the life cycle model.

Our empirical specification of the model allows for a deviation to formulation (1) above that reflects the findings of many empirical studies of consumer behaviour (e.g. Campbell and Mankiw (1989)) that a sizeable fraction of consumption is based on real current disposable income $YDIS_t$ because of liquidity constrained private households. Therefore, the consumption function used in the model is

$$C_t = (1-\lambda)(\theta + p)\left[LCI_t + FW_t\right]P_t / PC_t + \lambda YDIS_t \tag{1a}$$

where the parameter λ denotes the share of liquidity constrained consumption. Table 1 lists the parameters in our consumption function. A forward looking horizon of 50 years has been assumed, implying a value for p of 0.02. Estimates of λ based on Euler equations for those countries for which quarterly data was available ranged from 0.2 to 0.4, while on annual data they ranged from 0.2 to 0.6. These estimates did not differ significantly between countries

and the hypothesis that λ equals 0.3, roughly the average found in other consumption studies, could not be rejected. Therefore it seemed appropriate to assume the same share of liquidity constrained consumption of 0.3 in all countries. The pure rate of time preference θ was determined from the relationship between wealth and consumption that is implied by the life cycle model[1]. As can be seen in Table 1, it implies a relatively low rate of time preference in high saving countries like Japan and a larger rate in low saving countries like the US.

Table 1: Parameters of the consumption function

country	probability of death * p	rate of time preference θ	share of liquidity constrained consumption ** λ
BL	0.02	0.0092	0.3
DK	0.02	0.0076	0.3
DE	0.02	0.0088	0.3
GR	0.02	0.0096	0.3
ES	0.02	0.0092	0.3
FR	0.02	0.0092	0.3
IR	0.02	0.0092	0.3
IT	0.02	0.0092	0.3
NL	0.02	0.0084	0.3
OS	0.02	0.0084	0.3
PO	0.02	0.0092	0.3
SF	0.02	0.0084	0.3
SW	0.02	0.0078	0.3
UK	0.02	0.0080	0.3
US	0.02	0.0100	0.3
JA	0.02	0.0052	0.3

Notes: * implies a forward looking horizon of 50 years (1/p)
** same coefficient imposed for all countries. Individual country estimates ranged from 0.2 to 0.4 on quarterly data and 0.2 to 0.6 on annual data (estimation period: 1975-1996)

[1] The path of consumption in such a model can be written as $\dot{C} = \left(r - \left(\theta + \pi\right)\right)C - \left(\theta + p\right)nFW$ where π is productivity growth (see eg Buiter (1988)). It follows that along the steady state growth path $\theta = \left[\left(r - \pi\right)C - pnFW\right] / \left(C + nFW\right)$. The value of θ in Table 1 shows the mean value of this expression for each country over the 1990s, with the exception of the cohesion countries for which a small adjustment has been made to capture the relative state of their convergence.

1.1.2 Firm Behaviour

Production:

Firms operate in a monopolistically competitive environment. Private sector GDP Y_t is produced via a nested CES and Cobb Douglas production function with capital K_t, energy E_t and private sector employment N_t as inputs. The variable T_{Kt} represents an efficiency index for the fixed capital stock and the variable T_{Nt} represents labour augmenting technical progress. The following equation describes potential output $YPOT_t$ of the corporate sector under the assumption that all factors of production are fully utilised.

$$YPOT_t = \left(\left[aK_t^{-\rho} + (1-a)E_t^{-\rho} \right]^{-1/\rho} T_{Kt} \right)^{(1-\alpha)} \left(N_t T_{Nt} \right)^{\alpha} \tag{4}$$

Labour augmenting technical progress grows with an exogenous rate π and the efficiency index for capital, T_{Kt} , captures embodiment effects resulting from current and past investment. More specifically, it is a function of the mean age of capital AGE_t

$$T_{Kt} = \tau_0 AGE_t^{\ \tau} \tag{5}$$

with

$$AGE_t = \left(\sum_{i=0}^{\infty} (i+1)(1-\delta)^i J_{t-i} \right) / K_t$$

defined as the sum of current and non-depreciated past investment as a ratio to the current stock of fixed capital. Firms may not always operate at full or optimal capacity, therefore actual output can differ from potential output and we define

$$Y_t = UC_t YPOT_t \tag{6}$$

where UC_t is the rate of capacity utilisation. Capital stock changes according to the rate of fixed capital formation J_t and the rate of geometric depreciation δ

$$\dot{K} = J_t - \delta K_t \tag{7}$$

Furthermore, it is assumed that the investment process is subject to rising marginal costs of installation. Total real investment expenditures are equal to investment purchases J_t plus the costs of installation. The unit installation costs are assumed to be a linear function of the investment to capital ratio. It follows that total investment expenditure I_t can be written as

$$I_t = J_t \left(1 + (\phi / 2) \left(\frac{J_t}{K_t} \right) \right) \frac{PI_t}{P_t} \tag{8}$$

The objective of the firm is to maximize the present value of its cash flow MV_t subject to a capital accumulation constraint and costs of adjustment associated with capital and labour. This model of the firm is a slight generalization of Hayashi's (1982) extension of the neoclassical model of investment. The maximization problem has the following form

$$MaxMV_t = \int_t^{\infty} \left[(1-tc)\left(P(Y_s) F(K_s, N_s, E_s) - W_s N_s - PE_s (1+te) E_s - VC_s VAC_s \right) - PI_s I_s \right] \exp\left(-\int_t^s r dj \right) ds \quad (9)$$

i.e. the firm maximises the present discounted value of its cash flow defined as revenue minus labour, energy and vacancy costs at the rate *VC* for each vacancy. Unlike in the case of perfect competition, it is assumed that firms do not take prices as given but they set prices by varying the markup according to demand conditions. The solution of the maximisation problem gives the following behavioural equations for investment, employment and energy.

Investment:

The optimisation problem yields the following investment rule

$$\frac{I_t}{K_t} = \frac{1}{\phi}\left(\frac{q_t}{(PI_t / P_t)} - 1 \right) \quad (10)$$

where q_t is the shadow price of capital and PI_t/P_t denotes the relative price of investment goods relative to the GDP deflator. The variable q can be interpreted as reflecting the present discounted value of the marginal revenue from current investment. This can also be written as a function of current and discounted future expected profitability, where profitability is expressed as the ratio between gross operating surplus GOS_t and the capital stock. Profitability is adjusted for monopoly rents.

$$q_t = \int_t^{\infty} \left[(1-tc)(1-\eta)\frac{GOS_s}{K_s} + \frac{\phi}{2}\left(\frac{PI_s}{P_s} \right)\left(\frac{I_s}{K_s} \right)^2 \right] \exp\left(-\int_t^s (r+\delta) dj \right) ds \quad (11)$$

As can be seen from this expression the shadow price of capital is a complex expression and depends in particular on current and future real interest rates, profitability and effective corporate tax rates but also on the markup level charged by the firm. The exchange rate can also affect investment directly by changing the relative price between new investment goods which are partly imported and domestic output. By explicitly introducing elements of imperfect competition into the model we can in principle differentiate between the effects of profitability on investment as derived from improved cost conditions versus higher markups. The former will generally stimulate investment whereas the latter will generally lower investment activities. This investment rule assumes that firms do not face financing constraints.

As can be inferred from equation (10) and (11) the investment equation is entirely determined by the parameters of the production function, the markup factor η and the adjustment cost parameter ϕ. Because of the existence of liquidity constraints at least for some firms an empirical aggregate investment equation is likely to be more heavily determined by current profits. A formulation where after tax profits receive a larger weight compared to discounted expected future profits is given by the following equation.

$$\frac{I_t}{K_t} = \frac{1}{\phi_1}\left(\frac{q_t}{\left(PI_t / P_t\right)} - 1\right) + \phi_2\left(1 - tc\right)\left(1 - \eta\right)\left(\frac{GOS_t}{K_t}\right) \tag{12}$$

may be preferable on empirical grounds. However, our experiment conducted so far reveal that the model solution becomes less stable. This prevented us from implementing equation (12) so far.

Private Employment:

Labour is also a quasi fixed factor of production since it takes time for firms to reduce employment or fill existing vacancies. Therefore a distinction between short and long run labour demand elasticities must be made. Labour demand per employee is a positive function of output and is negatively related to total real wage costs. These include - on top of the gross wage rate per employee - a premium which depends on search and vacancy costs of the firm VC_t.

In addition it is negatively affected by the markup the firm charges in product markets.

$$N_t = \left[\left(1 - \eta\right)\frac{\alpha Y_t}{\left(W_t / P_t + \left(r_t + s\right)VC_t\right)}\right]^{(1-nl)} \left(N_{t-1}\right)^{nl} \tag{13}$$

where *s* is the separation rate and *vc* are vacancy costs. It is assumed that vacancy costs are proportional to the trend of real wages. Our Cobb Douglas assumption for technology implies that the elasticity of employment with respect to output and real wage costs is equal to one in the long run. The coefficients defining the markup $1/(1+\eta)$ is taken from a recent OECD study which arrives at markup estimate for OECD countries lying in a narrow, interval between 1.15 (for the US) and 1.26 (for Japan). Unfortunately there is no information on vacancy costs for firms. We make the assumption that vacancy costs amount to 10% of wage costs. We also allow for lagged adjusted of employment to changes in demand and real wage costs. Our choice of functional form implies a wage elasticity of labour demand equal to one. Estimated elasticities are usually somewhat smaller than one. We have decided to retain the Cobb Douglas specification, in order to keep the model simple. To replicate a smaller labour demand elasticity within this framework the speed of adjustment parameter was set to a value which exceeds the estimated parameter, namely to 0.85 for EU countries, to 0.75 for the US and 0.925 for Japan.

Energy Demand:

Energy demand is similar to labour demand. It depends positively on the level of production and is negatively related to relative energy prices which include energy taxes as an important element.

$$E_t = (1-\eta)\frac{(1-a)(1-\alpha)Y_t}{(PE_t / P_t(1+te))^{1/(1+\rho)}} \qquad (14)$$

Table 2 contains the structural parameters of the corporate sector. The production function parameters α , τ and π have been estimated with annual data. The parameter ρ has been imposed such as to yield an elasticity of substitution between capital and energy slightly smaller than one. The adjustment cost parameter in the investment equation has been estimated on quarterly date for the six large countries, Germany, France, Italy, UK, US and Japan, and on the basis of annual data for the other European countries, using an Euler equation approach. We assume that the share of adjustment costs is unlikely to be smaller than 5% of total investment expenditure, which roughly corresponds to a value of 5.5 for ϕ. Therefore the parameter estimate for those countries where a value smaller than 5.5 was obtained in estimation was adjusted upwards.

Table 2: Production parameters

	Output Elasticity of Labour * α	Embodiment Parameter* τ	Capital Energy Substitution** $1/(1+\rho)$	Labour Augmenting Technical Progress* π	Adjustment Costs for Capital*** ϕ
BL	0.69	0.20	0.8	0.013	5.88
DK	0.62	0.56	0.8	0.012	5.50
DE	0.61	0.65	0.8	0.015	7.76
GR	0.68	0.15	0.8	0.008	5.50
ES	0.71	0.18	0.8	0.014	5.50
FR	0.63	0.58	0.8	0.014	5.99
IR	0.72	0.45	0.8	0.025	5.50
IT	0.69	0.40	0.8	0.016	7.24
NL	0.64	0.37	0.8	0.010	7.30
OS	0.62	0.58	0.8	0.009	7.18
PO	0.72	0.21	0.8	0.012	5.50
SF	0.68	0.37	0.8	0.017	5.50
SW	0.64	0.63	0.8	0.010	6.61
UK	0.65	0.96	0.8	0.013	5.50
US	0.61	0.53	0.8	0.006	5.97
JA	0.63	0.13	0.8	0.032	5.58

Note: * Estimated on annual data over period 1974-1995
** Imposed coefficient (see text)
*** Estimated on quarterly data for 6 largest economies, annual data for others

1.1.3 Government

The assumptions about government behaviour are rather conventional. Governments do not maximize an objective function but follow an exogenously given spending pattern. Current expenditure is divided into interest payments on government debt $i_t B_t$, purchases of goods and services G_t (which includes government investment), government employment $W_t NG_t$, net government transfers to households TRH_t net of unemployment benefits BEN_t and other transfers OTR_t. Government spending is financed through labour income taxes TL_t and social security contributions SC_t, corporate income taxes TC_t, energy taxes TE_t, value added tax VAT_t and other receipts R_t

$$\Delta B_t = i_t B_t + PC_t G_t + W_t NG_t + BEN_t + TRH_t + OTR_t - \left(TL_t + SC_t + TC_t + TE_t + VAT_t + R_t\right) \tag{15}$$

It is well known that public debt dynamics is an intrinsically unstable process provided the real interest rate exceeds the average growth rate of the economy and both spending and taxation grow in a fixed proportion with GDP. Dynamic consistency therefore requires the introduction of a debt rule which makes one or several spending or receipt categories of the government budget an instrument for debt stabilisation. To enforce the government's intertemporal budget constraint, the following fiscal policy reaction function is imposed

$$TRH_t = TRH_{t-1} + \psi_1 * \left[\left(B/Y\right)_t - \overline{\left(B/Y\right)}\right] + \psi_2 * \left[\left(B/Y\right)_t - \left(B/Y\right)_{t-1}\right] \tag{16}$$

where $\overline{\left(B/Y\right)}$ is the target for the debt to GDP ratio. As a standard setting this rule is imposed for net government transfers to households, *TRH*, which is least distortionary in the model, but it can also be applied to other receipt or spending categories. Depending on the size of the parameters ψ the government will respond to a deviation of the debt to GDP ratio from its target level by an adjustment of the transfer payments to households. The debt rule is similar in design to those imposed in many other macro models, as reviewed in Church *et al.* (1996). The parameters ψ_1 and ψ_2, , 0.01 and 0.2 respectively, are chosen so that the debt reduction is phased in over time in such a way that the reduction in government spending is not accompanied by a sizeable increase in net transfers in the short run.

Total output is adjusted to include government wages into the definition of total GDP for consistency with the national accounts

$$GDP_t = Y_t + W_t NG_t \tag{17}$$

where *Y* is output, *W* government wages and *NG* government employment.

1.2 Markets and Prices

1.2.1 Pricing Behaviour of Firms in Goods Market

Domestic Prices:

It is assumed that firms set prices sluggishly and they especially respond to changes in the level of capacity utilisation in the following form.

$$\log(P_t) = padj\left(UC_t / UC^*\right) + \sum \pi_i \log(P_{t-i}) \qquad \text{with } \Sigma\pi_i = 1. \tag{18a}$$

Notice, this rule together with the labour demand equation implies that prices set by firms in the current period depend on three elements, namely current unit labour costs ULC_t prices set in the past and two measures of cyclical conditions, namely the rate of capacity utilisation and the change in employment. These last two terms represent cyclical fluctuations of the markup.

$$\log(P_t) = (1+padj)^{-1} \Sigma \pi_i \log\left(P_{t-i}\right) + \frac{padj}{1+padj}(UC_t + \frac{nl}{1-nl}\Delta\log(N_t)) + \frac{padj}{1+padj}\log\left(ULC_t\right) \tag{18b}$$

The consumption price deflator PC_t is defined in the following way

$$PC_t = \left[P_t^{(1-S^m)} PM_t^{S^m}\right](1+tvat) \tag{19}$$

where *tvat* is the VAT-rate and the variable S^m measures the share of imports in total domestic demand. Identical assumptions are made for the investment deflator and the deflator of government purchases (including government investment). This formulation implies that aggregate consumption is close to a Cobb-Douglas aggregate of domestic and foreign goods. We find the price elasticity estimates for imports and exports consistent with this assumption.

Export Prices:

Depending on market structure and the type of products traded, export prices (in domestic currency) charged by firms may deviate from prices charged in domestic markets at least temporarily. This phenomenon has been extensively studied in recent years, both theoretically as well as empirically (see for example Dornbusch (1987), Dixit etc). To capture a wide spectrum of theoretical possibilities we specify the following pricing rule for exports

$$PX_t = P_t^{(1-ptm)} WPXS_t^{ptm} \tag{20}$$

where PX_t is the export price deflator and $WPXS_t$ is a competitor's price index expressed in domestic currencies. The parameter *ptm* determines to what extent there is pricing to

market. If *ptm* is zero then export prices are determined entirely by domestic conditions. This behaviour would for example be consistent with the model of monopolistic competition among small firms where each firm assumes that its influence on other firms is negligible. In alternative models of competition, especially those assuming that there are strategic interactions between firms, i.e. firms are sufficiently large in the market, and where it is assumed that there are special fixed costs involved in setting up an export market in a particular country, market share considerations will play a much larger role and consequently firms will adjust prices to competitors prices. Similar pricing behaviour would also be expected of course in markets for very homogenous products with high competition between domestic and foreign firms.

Table 3 summarises the parameters of the price equations in the model. The price adjustment parameter *padj* was estimated on quarterly data where that was possible. The openness variable S^m measures the share of imports in total domestic demand and converges in the steady state to average levels observed in the 1990s (see table). Estimates of the pricing to market parameter *ptm* are based on estimation of equation (20) in first differences in order to measure the short term response best. These regressions were estimated over the period 1975-1995.

Table 3: Parameters of price equations

	Price Adjustment *padj*	Openness * S^m	Pricing to Market ** *ptm*
BL	0.38	0.84	0.64
DK	0.49	0.39	0.51
DE	0.35	0.26	0.25
GR	0.60	0.29	0.68
ES	0.28	0.27	0.61
FR	0.41	0.23	0.40
IR	0.48	0.66	0.64
IT	0.41	0.25	0.72
NL	0.52	0.57	0.65
OS	0.51	0.43	0.27
PO	0.61	0.42	0.70
SF	0.29	0.32	0.52
SW	0.37	0.40	0.48
UK	0.41	0.30	0.59
US	0.59	0.11	0.21
JA	0.35	0.11	0.54

Note: * Steady state level of openness, based on average shares of imports in total domestic demand over the 1990s

** Estimates based on regressions of eq. (20) in first differences, over period 1975-1995.

1.2.2 Labour Market

Only a very small segment of the labour market corresponds to the Walrasian notion of a spot market, where market participants meet to negotiate a new labour contract with a market clearing price every day. Also, labour services offered and demanded in each segment of this market are certainly not homogeneous. Many highly differentiated skills and abilities are traded in the labour market. Neither for firms nor for workers is the type of work that is required or the quality of work that is offered completely transparent. Also, and in contrast to the spot market notion in the equilibrium model, both workers and firms seem to have an interest in longer term employment contracts due, for example, to training costs or mobility costs or as insurance against unemployment. All these different aspects taken together renders the services traded in labour markets rather complex. Given the information sets of both firms and workers it seems very difficult to achieve an optimal match in very short periods of time. This is also the central idea of search theoretic models: trade in the labour market must be regarded as highly uncoordinated, time-consuming and costly for both workers and firms. The following specification of a theoretical search model for the labour market, which is based on previous work by Howitt (1988) and Pissarides (1990), tries to capture these different aspects.

The basic incentive for search activities in the labour market by both workers and firms are the profit opportunities in present value terms which are associated with a successful job match for both parties. Let us therefore first state the income of workers in both states and the value of an occupied and a vacant position for a firm. Denote the permanent income of an employed and unemployed worker by H_t^e and H_t^u respectively. The process generating permanent income can be described by the following arbitrage conditions:

$$r_t H_t^e = W_t(1 - tl) + s\left(H_t^u - H_t^e\right) + E_t \Delta H_{t+1}^e \qquad (21a)$$

and

$$r_t H_t^u = BEN_t + LEIS_t + prob(.)\left(H_t^e - H_t^u\right) + E_t \Delta H_{t+1}^u \qquad (21b)$$

The left hand side of equation (21a) is the return from the human capital of an employed person and is composed of the wage rate, the risk of losing the job *s* and any changes in H_t^e which result from expected future changes in the wage rate and job security. Similarly, the left hand side of equation (21b) is the return of the human capital of an unemployed person which consists of unemployment benefits BEN_t and an imputed value for leisure $LEIS_t$ [2], an expected capital gain from switching into employment (with probability *prob(.)*), which depends on labour market tightness proxied by the unemployment rate) and a change in the value of H_t^u associated with any future changes in the former components.

The real pure profit of a firm per employee can be defined as revenue minus total wage costs per worker (GOS_t/N_t). The average cost of a vacant position is simply given by VC_t. Let $F^o{}_t$ and $F^v{}_t$ be the present discounted values of an occupied and a vacant position for the firm, then the arbitrage conditions for both an occupied and a vacant position can now be stated as follows

[2] See Box 1

$$r_t F_t^0 = GOS_t / N_t + s\left(F_t^v - F_t^v\right) + E_t \Delta F_{t+1}^o$$

(22a)

and

$$r_t F_t^v = -VC_t + q(.)\left(F_t^0 - F_t^v\right) + E_t \Delta F_{t+1}^v \quad (22b)$$

The return from an occupied position is the pure after tax profit of the firm minus the risk that a position becomes vacant because a worker quits the job *q(.)*, thereby incurring search costs for the firm. The value of a vacant position is minus vacancy costs plus the prospect of filling the position. It is assumed that both parties know about the profit opportunities of their respective opponents. Firms and workers (trade unions) solve the following Nash bargaining problem by setting wages such as to maximize the product

$$\underset{W_t}{Max}\left(H_t^e - H_t^u\right)^{\beta}\left(F_t^0 - F_t^v\right)^{(1-\beta)} \quad (23)$$

This agreement is based on the relative bargaining position of the two parties. The bargaining strength of workers is characterised by the parameter ß (0≤ß≤1) which determines the fraction of total profits from a successful job match going to workers. The solution of this bargaining problem yields the following division of the surplus from a job match

$$H_t^e - H_t^u = \frac{\beta(1-tl)}{\left(1+(1-\beta)scc\right)}\left(H_t^e - H_t^u + F_t^o - F_t^v\right) \quad (24)$$

This equation also shows how marginal tax rates affect the worker's share in total surplus from a job match. A decrease in the marginal tax rate will increase their share. This reaction can be understood by noticing that workers and firms are cooperating against a third player, in this case the government, in order to minimize their tax burden. Since a unit rise in wages conceded by the firm yields only relatively small net benefits to workers under high marginal tax rates, it is optimal for firms and workers under a cooperative outcome to have a smaller share in total surplus. As a full solution of the maximization problem (23), the following wage equation can be obtained.

$$W_t^m = \frac{(1-\beta)}{(1-tl)}\left(BEN_t + LEIS_t\right) + \frac{\beta}{(1+scc)}\left\{\left(\alpha + \eta(1-\alpha)\right)\frac{Y_t}{N_t} + \frac{prob(.)vc_t}{q(.)}\right\} \quad (25)$$

Gross wages are positively indexed to labour productivity with indexation depending on the bargaining power of workers. More precisely, in the case of perfect competition in the goods market, wages are linked to the marginal product of labour, while in the case of imperfect competition and positive ß, there exists some rent sharing between workers and firms. Wages also depend on the reservation wage which is composed of unemployment benefits and the value of leisure, which as noted above can be expressed as a function of household wealth and the average hour of work supplied per period. Provided workers have market power they can ask for real wages which exceed the reservation wage. Real wages also depend negatively on the unemployment rate, since a high unemployment rate has an adverse effect on the probability of finding a job. Equation (25) also shows how labour taxes and social security contributions affect real wages. An increase of either component would make leisure (unemployment benefits) more attractive relative to work and wage

costs would have to rise. As noted above, except for the case of zero bargaining power of workers, a decline in taxes or social security contributions will not lead to a fully proportional decline in wages since workers will increase their share in total surplus. It is also obvious from equation (25) that no different effects on wage costs should be expected from a policy of reducing wage taxes as opposed to cutting social security contributions. It should be expected from a model with informed bargaining behaviour that tax incidence is independent of who pays the tax. Yet, changes in either the tax rate or social security contributions can still lead to different results depending on how employment benefits will respond to these changes.

It is interesting to notice the generality of equation (25). It encompasses the neo-classical labour supply hypothesis - based on consumption leisure choice - and formulations of wage equations known from the bargaining literature where wage rules are postulated, which identify productivity and labour market tightness as major determinants of wage claims by workers. Which feature of the labour supply dominates in this model depends crucially on the bargaining strength of workers which we have left undetermined so far. Some theoretical insights can be gained by specifying alternative institutional details governing the interaction between firms and workers in the labour market. Consider first the oldest solution to the pricing problem which is due to Diamond (1971) where employers would post wage offers and workers search among them randomly without recall. In this situation it is optimal for firms to set wages equal to the reservation wage since this will be the lowest wage workers will accept. As Mortensen (1989) has pointed out, the assumption that employers post wage offers are sufficient to ensure full bargaining power of firms. Also, he observes, since workers are indifferent between employment and unemployment in this equilibrium, unemployment can be termed "voluntary". Recently some other models have been suggested to explain "involuntary" unemployment especially in Europe. Most prominent among these is the insider-outsider model of Lindbeck and Snower (1987). Under this hypothesis incumbent workers have bargaining power because replacing them would be costly for the firm due to search costs. Therefore they can extract a share of the rents generated by these costs from the firm. Though the insider-outsider story is usually told under the assumption that workers possess complete bargaining power, Lindbeck and Snower point out that it is sufficient to assume that insiders receive some part of the rent generated by turnover costs ($ß > 0$). Since under the assumption of some bargaining strength of workers the wage exceeds the reservation wage, this hypothesis can explain the existence of "involuntary" unemployment.

Wage Contracts:

In the above derivation of the wage equation it was assumed that workers and firms negotiate a wage contract every period (quarter). However, wage contracts usually stretch over more periods, very often over one year. Therefore in the model it is assumed that each quarter a fraction of the employees enter wage negotiations for a contract over several periods. A wage contract is set which is a weighted average of the current and N consecutive one period contracts which are based on current expectations on labour market conditions prevailing in these N consecutive periods. Denote the nominal wage from the one period Nash bargaining solution by $W(1)$, then the current wage contract can be written as

$$WCONT_t = \sum_{i=0}^{N-1} \frac{1}{N} E_t \left(W(1)_{t+i} P_{t+i} \right) \tag{26}$$

where N is the length of wage contracts and $E_t(X_{t+i})$ denotes expectations of the variable X for period t+i conditional on information in period t. Currently it is assumed that N equals 4, i.e. wage contracts are set for one year, and negotiated wage contracts are therefore highly forward looking over the duration of the contract length. Notice, however, since only a fraction of wage contracts is negotiated each quarter, average wages also exhibit a substantial amount of inertia, since they are given by

$$W_t = \sum_{i=N-1}^{0} \frac{1}{N} WCONT_{t-i} \tag{27}$$

Table 4 lists the crucial parameters of the wage equation. It is assumed that the probability of filling an open position equals one, i.e. vacancies can be filled within a quarter. Studies of vacancy durations justify this assumption [3]. The last term in wage equation (25), $prob(.)VC_t$, is approximated by a linear function in unemployment U and rewritten as β_0-$\beta_1 U$. Unfortunately there does not exist information on vacancy costs. Therefore we cannot separately identify the parameters VC_t and $prob(.)$. We assume symmetric bargain strength between workers and firms, β=0.5, for all countries, except for the US, where we assume a value of 0.25, which conforms more closely with our priors about the US labour market. The wage equation (25) implies - provided BEN_t and VC_t are proportional to wage costs - a long run elasticity of wages with respect to labour productivity equal to one. The wage equations were estimated over the period 1975-1994 . For the estimation we used data on replacement ratios obtained from the OECD. We rescale these data such that the average replacement ratio conforms approximately with the estimates of unemployment benefits as a percentage of wage costs in Layard et al. (1991).

[3] Van Ours and Ridder (1992) report average vacancy duration of 45 days for the Netherlands and Erdmann (1990) finds similar estimates for Germany. Blanchard and Diamond (1989) report average durations of less than one month for the US.

Table 4: Parameters of wage equation

	Bargaining strength of workers * β	Contemporaneous effect of U on wages $\beta.\beta_1$	Long Run Elasticity of Real Wages	
			Productivity	Unemployment **
BL	0.50	-0.90	1.0	1.18
DK	0.50	-0.90	1.0	1.11
DE	0.50	-0.65	1.0	0.89
GR	0.50	-0.55	1.0	1.24
ES	0.50	-0.88	1.0	1.86
FR	0.50	-0.90	1.0	1.27
IR	0.50	-0.48	1.0	0.71
IT	0.50	-0.95	1.0	1.44
NL	0.50	-0.95	1.0	1.42
OS	0.50	-1.60	1.0	2.53
PO	0.50	-0.64	1.0	1.45
UK	0.50	-0.50	1.0	0.74
SF	0.50	-0.75	1.0	1.28
SW	0.50	-1.10	1.0	1.83
US	0.25	-0.50	1.0	0.55
JA	0.50	-2.50	1.0	3.47

Note: * Imposed coefficients (see text)
** Estimation period 1973-1995.

Box 1: Neo-classical Labour Supply:

Labour supply or wage setting behaviour in the QUEST model differs strongly from the standard neo-classical model of labour supply. However, in our new formulation of the wage equations we have borrowed some elements of the neo-classical labour supply hypothesis. Therefore in order to motivate some aspects of the wage equation the basic elements of the neo-classical labour supply hypothesis are briefly introduced here.

In standard neo-classical labour supply models, the supply of labour is derived from a household utility function where households value leisure positively. This implies that labour supply in terms of hours (h) depends positively on the net real wage rate (substitution effect) and negatively on household wealth, which is composed of life cycle income and financial wealth (income effect) alternatively on consumption which is proportional to LCI_t and FW_t. This standard neoclassical labour supply hypothesis can thus also be rephrased in terms of a wage equation:

$$W_t \,/\, PC_t\left(1-tl\right) = \gamma\left(LCl_t + FW_t\right) / \left(1-h\right) = \gamma' C_t \,/\left(1-h\right) \qquad (28)$$

The interpretation of this equation is as follows: the left hand side of this equation gives the net real consumption wage which induces an individual household to supply h hours of work per period for a given permanent income. The net real wage rate is thus identical to the value of leisure as given by the right hand side of equation (28) and defined as the ratio between the marginal utility of leisure and the marginal utility of consumption ($1/C_t$). Besides unemployment benefits, the value of leisure constitutes a part of the reservation wage. Under positive bargaining strength of workers, the wage rate will exceed the reservation wage as defined by equation (28).

1.2.3 International Trade and the Current Account

The model is closed with respect to international trade. This means that trade relationships for each country included in the model with the rest of the world are modelled and the adding up constraint for world exports and imports is obeyed. Apart from the countries of the European Union, the US and Japan, we distinguish the following remaining regions, namely Central and Eastern Europe (CE), other OECD countries distinguished into Australia (AU), Canada (CA), Norway (NO), Switzerland (CH),and the rest of the OECD (RO), OPEC (OP), the tigers (TI), other industrialised countries (OI) and the rest of the World (RW).

Box 2: Countries and Zones in the Quest II model

Complete country models

1.	BL	Belgium-Luxembourg Economic Union (BLEU)
2.	DK	Denmark
3.	DE	FR of Germany
4.	GR	Greece
5.	ES	Spain
6.	FR	France
7.	IR	Ireland
8.	IT	Italy
9.	NL	Netherlands
10.	OS	Austria
11.	PO	Portugal
12.	SF	Finland
13.	SW	Sweden
14.	UK	United Kingdom
15.	US	United States of America
16.	JA	Japan

Country trade-feedback models

17.	CA	Canada
18.	AU	Australia
19.	NO	Norway
20.	CH	Switzerland

Zone trade-feedback models

21.	RO	The rest of the OECD countries:	Iceland, New Zealand, Turkey
22.	OP	OPEC:	Algeria, Ecuador, Gabon, Indonesia, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, United Arab Emirates, Venezuela
23.	CE	Central and Eastern European Countries:	Albania, Bulgaria, CIS, Czech Republic, Slovakia, Hungary, Poland, Romania
24.	TI	The Asian newly industrializing countries:	Hong Kong, Korea, Malaysia, Philippines, Singapore, Taiwan
25.	OI	Other newly industrialising countries:	Argentina, Brazil, Israel, South Africa, Thailand, former Yugoslavia
26.	RW	The rest of the world:	All countries not included elsewhere, including trade not specified in terms of estimation

It is assumed that each country or region produces a product which is an imperfect substitute for the products of other regions. This allows us to formulate import equations of the following form for each individual country

$$IM_t = S_t^m \left(PC_t \,/\, PM_t \right)^{\sigma m} \left(C_t + G_t + I_t \right) \tag{29}$$

Imports of each country are a function of total domestic demand defined as private and public consumption and total investment and relative prices expressed as the ratio between the domestic consumption and the import price deflator. The coefficient σm is the price elasticity. To capture possible lagged adjustment of imports to price changes the relative price variable appears as a distributed lag of up to 4 quarters. The income elasticity is restricted to one, i.e. we attribute all trend changes in the import share S^m to structural developments such as increased trade integration between countries and regions

Consistent with our specification of imports we define exports of each region as

$$EX_t = \left(WPXS_t \,/\, \left(PX_t \,/\, E_t \right) \right)^{\sigma x} WDEM_t \tag{30}$$

where *PX* is the export deflator, *WPXS* a competitors price index (in dollars) and *WDEM* is an indicator of world demand. Competitors prices for each country are constructed as a weighted average of import prices where the weights denote the share of the individual exporting country in total imports of the importing region. World demand for an individual country is defined as a weighted average of total imports with the weights representing the share of the exporting country in total imports of the importing country or region. Also for exports we allow that they respond sluggishly to changes in relative prices, so that there will be a difference between short and long run price elasticities. The coefficient of the world demand variable is constrained to one.

The current account is the trade balance plus transfer payments and interest rate receipts/payments from net foreign assets. The evolution of net foreign assets F_t is also an endogenous variable in the model, modeled as the accumulation of current account balances

$$F_t = \left(1 + r \right) F_{t-1} + EX_t - IM_t + NTR_t \tag{31}$$

where NTR_t is net transfers received from abroad.

Table 5: Price elasticities of imports and exports

	Imports		Exports	
	short run	long run*	short run	long run*
BL	0.23	1.00	0.18	1.00
DK	0.17	1.00	0.25	1.00
DE	0.22	1.00	0.23	1.00
GR	0.51	1.00	0.92	1.00
ES	0.26	1.00	0.21	1.00
FR	0.21	1.00	0.27	1.00
IR	0.15	1.00	0.28	1.00
IT	0.12	1.00	0.25	1.00
NL	0.24	1.00	0.16	1.00
OS	0.24	1.00	0.28	1.00
PO	0.21	1.00	0.54	1.00
SF	0.24	1.00	0.16	1.00
SW	0.22	1.00	0.14	1.00
UK	0.23	1.00	0.34	1.00
US	0.18	1.00	0.30	1.00
JA	0.19	1.00	0.40	1.00

Note: * Long-run price elasticities have been restricted to 1.0. Unrestricted estimates over the period 1970-1994 ranged from 0.7 to 1.5 for imports and from 0.7 to 1.8 for exports.

1.2.4 Financial Markets and Exchange Rates

Asset markets are assumed to be fully integrated across all the industrialised regions covered in the model, i.e.. there is full capital mobility. Exchange rates between European currencies, US Dollar, Yen and a composite of the remaining OECD countries are fully flexible. In standard setting, nominal exchange rates within the European Union are fixed in nominal terms. The exchange rate of country j is determined endogenously according to the following (uncovered) interest arbitrage relation with respect to the dollar

$$i_t^j = i_t^{us} + \Delta E_{t+1}^j / E_y^j + RPREM_t^j \qquad (32)$$

The second term on the right hand side denotes the expected depreciation of country j's currency vis-a-vis the US dollar. The risk premium (RPREM) is assumed to be exogenous.

Also, the various assets (short and long term private and government bonds) in domestic financial markets are perfectly substitutable. We assume that there is no money illusion in financial markets, implying that the Fisher equation holds

$$i_t = r_t + E_t \Delta P_{t+1} / P_t \tag{33}$$

where i_t and r_t are the nominal and real one period interest rates respectively. Bonds of longer maturity are linked to expected short rates via a term structure relationship.

$$i_t^l = i_t + E_t \Delta i_{t+1}^l / i_t^l \tag{34}$$

Money demand is modelled via a conventional money demand equation which stresses both transaction and speculative motives of money holding

$$M_t / P_t = \left(Y_t \left(1 + i_t\right)^{-b} \right)^{(1-bl)} \left(M_{t-1} / P_{t-1} \right)^{bl} \tag{35}$$

The model can be simulated under alternative monetary policy assumptions. In standard setting it is assumed that the monetary authorities adhere to a regime of monetary targeting, while in an alternative setting interest rate targeting can be assumed. The model contains the following interest rate policy reaction function

$$i_t = i_{t-1} + m_1 \frac{1}{b} \log\left(MT_t / M_t \right) + m_2 \log\left(P_t / P_{t-1} \right) \tag{36}$$

where MT is the money target, b the interest elasticity of money demand and m_1 a switch variable which takes a large value under money targeting and a small value under interest rate targeting. In the first case interest rates are set so as to assure the money target is met almost instantaneously, while in the latter case interest rates are kept almost constant in the short run and move only gradually towards the long run level consistent with money demand and the supply target. These two extreme settings allow us to simulate scenarios that come close to constant money supplies and constant interest rates [4]. With m_2 positive and m_1 close to zero the above interest rate rule approximates inflation targeting. In order to simulate EMU type scenarios, the above interest rate reaction function has also been added for an EU aggregate. In such scenarios a European central bank targets an aggregate EU money target or interest rate.

[4] Obviously, interest rates cannot be permanently kept constant as that would lead to price level indeterminacy

1.3 Trade-Feedback Models

In order to close the model and to provide an "echo" for the structural models in linked simulation, equations determining imports, exports and the evolution of net foreign assets are added for these countries and regions which are not represented by structural models. Export equations for those regions are specified in exactly the same ways as for the structural models (see equation (30)). Imports are determined by an exogenous GDP compound DD_t and a wealth effect which is a linear function of the net foreign asset position of the country or region.

$$IM_t = \left(PXS_t \,/\, PMS_t\right)^{\sigma m} \left(DD_t + (r+\varepsilon)F_t\right) \tag{37}$$

where a small positive constant ε is added to the real interest rate in order to guarantee a sustainable current account development. Net foreign assets are modelled similarly as in the structural models (eq.(31)). All exchange rates of these regions are at the moment linked to the US dollar.

Table 6: Price elasticities of imports and exports in trade-feedback models

	Imports		Exports	
	short run	long run*	short run	long run*
AU	0.24	1.00	0.78	1.00
CA	0.36	1.00	0.40	1.00
CH	0.16	1.00	0.20	1.00
NO	0.36	1.00	0.27	1.00
CE	0.25	1.00	0.25	1.00
OI	0.25	1.00	0.16	1.00
OP	0.29	1.00	0.21	1.00
TI	0.32	1.00	0.21	1.00
RO	0.25	1.00	0.25	1.00
RW	0.25	1.00	0.25	1.00

Note: * Long-run price elasticities have been restricted to 1.

2. STANDARD SIMULATIONS

In this section simulation results are presented of standard demand and supply shocks to illustrate the most important transmission mechanisms in the model as well as the spillovers between countries. First we consider monetary policy and fiscal policy shocks, then an example of a productivity shock follows. Monetary shocks are not only interesting in their own right for policy analysis, they are also a good way of testing whether price homogeneity holds in the model. As far as fiscal policy shocks are concerned, the discussion here is limited to increases in government spending (more specifically government purchases of goods and services). Various other shocks on earlier versions of the model have been discussed elsewhere [5].

The results below are presented either as percentage or percentage point deviations from the baseline. This base scenario incorporates the most recent projections of the Commission services. These projections were imposed on the model and residuals were calculated so that the model reproduced this forecast. As stock-flow adjustments can be very prolonged, a much longer baseline is required for the model to settle down in a simulation after a shock. Therefore, the base was further extrapolated to the steady state solution of the model, so that the model can be simulated over a time span of at least 70 years. This allows for enough time for dynamic adjustment mechanisms to work through and for the stock-flow adjustments to take place. All simulations are performed in fully linked mode, i.e. all foreign variables are endogenously determined and the impact a shock has on other countries is fully taken into account.

The simultaneous solution to the equations of the model is calculated using a Newton-Raphson solution algorithm[6]. As various endogenous variables in the model have leads, representing expectations of these variables in future time periods, an assumption has to be made on the formation of expectations. It is assumed that expectations are model-consistent, *i.e.* each period's future expectations coincide with the model's solution for the future. In simulations this means that the leads in the model equations are equal to the solution values from future periods. This is done by applying a stacked-time algorithm that solves for multiple time periods simultaneously, *i.e.* stacks the time periods into one multiple system of equations and solves them simultaneously. The appendix to this paper contains more details on the model solution method.

[5] Roeger and in 't Veld (1997b) discuss the short and long term effects of government expenditure cuts accompanied by various tax reductions. Roeger (1996a) discusses the long term effects of fiscal consolidation and compares the long run effects of changes to tax rates, benefits and increased competition on the steady state solution of the model. Leppä (1996) reports on a wide variety of temporary shocks using an earlier preliminary version of the Finnish country model of QUEST.

[6] The model is simulated using the TROLL software system (see Hollinger and Spivakovsky (1996).)

2.1 Monetary shocks

The first simulation we consider is a permanent monetary expansion in the United States. In this scenario the money target for the US is shocked permanently by 1 per cent. It is assumed that the US monetary authorities apply a regime of strict money targeting and that the target is met instantaneously. On the other hand, for all other countries we assume that monetary policy is accommodating and the authorities target their nominal interest rates. This effectively means that exchange rates within Europe remain fixed.

Table 7 shows the results of this simulation for the US. Under these assumptions a monetary expansion raises output in the short run, but this boost is short-lived. In the first year GDP grows by 0.5 per cent [7], but this effect ebbs away quickly in the following years. Prices rise instantaneously and within 3 years they have risen by three quarters of a per cent. In the long run the monetary expansion is fully reflected in proportionally higher prices and there is no long run effect on real variables. This simulation is of course run under an extreme assumption of tight money targeting to illustrate the transmission mechanisms of the model. For policy analysis, a more realistic scenario would assume looser targeting of the money supply by the central bank and that would obviously reduce the speed of adjustment.

The international transmission effects of a monetary expansion in one country is theoretically ambiguous. On the one hand, the monetary expansion in the US lowers real interest rates and raises US demand for European exports. On the other hand, it leads to an appreciation of the European currencies which boosts their imports and shifts demand away towards the US. As can be seen in Table 7.a, which summarises the international transmission effects on the other countries, these two effects more or less cancel each other out and the spillover effects are small. For countries like Germany and Sweden the increase in world demand dominates and output rises, while for the smaller open economies like the Netherlands, Belgium and Ireland, the negative effects of the appreciation dominate and demand is shifted away abroad. On the whole, though, the net effects on GDP are small for all countries.

Table 8 summarises the results of a permanent monetary expansion of 1 per cent in the EU countries (detailed tables in the annex). Exchange rates are flexible and monetary targeting is assumed to be strict. Under these assumptions, output rises in the EU by on average 0.6 per cent in the first year. The monetary expansion is reflected in an immediate depreciation of the exchange rate and a rise in prices. In real terms the depreciation is much smaller though and in the medium term competitiveness is fully restored. After three years prices have risen by at least three quarters of a percent while the exchange rate has depreciated by one percent. The gains from a monetary expansion are short-lived and in the long run money is neutral in the model.

[7] This impact multiplier is consistent with the findings of Blanchard (1989) who finds that the short run effect of a monetary expansion on output in a VAR system with keynesian features is roughly of that order of magnitude.

Table 7: Effects of US monetary expansion: (permanent increase in money target of 1%)

year: US:	1	2	3	4	5	6	7	8	9	10
GDP	0.55	0.33	0.21	0.15	0.11	0.09	0.08	0.07	0.07	0.06
potential.private.GDP	0.22	0.19	0.14	0.11	0.09	0.08	0.07	0.07	0.07	0.06
private.consumption	0.47	0.27	0.17	0.13	0.11	0.10	0.09	0.08	0.07	0.07
private.investment	1.62	0.75	0.41	0.21	0.10	0.05	0.02	0.01	0.00	0.00
total.public.expenditure	0.29	0.27	0.17	0.12	0.09	0.08	0.07	0.06	0.06	0.05
exports	0.11	0.17	0.17	0.16	0.15	0.14	0.14	0.13	0.12	0.12
imports	0.62	0.28	0.15	0.09	0.05	0.04	0.03	0.02	0.02	0.02
employment	0.28	0.21	0.12	0.08	0.05	0.04	0.03	0.03	0.03	0.03
real.wage.costs	0.04	0.21	0.13	0.09	0.07	0.06	0.05	0.04	0.04	0.04
price.level	0.45	0.67	0.79	0.85	0.89	0.91	0.92	0.93	0.93	0.93
cons.price.level	0.48	0.69	0.80	0.86	0.89	0.91	0.92	0.93	0.94	0.94
dollar.exchange.rate	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DM.exchange.rate	0.81	0.94	1.02	1.06	1.07	1.08	1.09	1.09	1.09	1.09
real.exchange.rate	-0.45	-0.67	-0.78	-0.84	-0.88	-0.90	-0.91	-0.92	-0.92	-0.93
real.eff.exch.rate	0.13	0.09	0.07	0.07	0.06	0.06	0.05	0.05	0.05	0.05
money	1.01	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
short.rate *	0.11	0.11	0.05	0.02	0.01	0.01	0.00	0.00	0.00	0.00
long.rate *	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
real.short.rate *	-0.16	-0.04	-0.03	-0.02	-0.01	-0.01	-0.01	-0.01	0.00	0.00
inflation *	0.45	0.22	0.12	0.06	0.03	0.02	0.01	0.01	0.01	0.00
unemployment.rate *	-0.26	-0.20	-0.12	-0.07	-0.05	-0.04	-0.03	-0.03	-0.03	-0.02
debt. (% of GDP) *	-0.20	0.00	0.02	0.01	0.01	0.01	0.01	0.01	0.00	0.00
deficit (% of GDP) *	0.49	0.06	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
trade.balance (% of GDP) *	-0.10	-0.03	-0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01

Note: percentage differences from base (except those marked *: absolute differences from base)

Table 7.a: International transmission of US monetary expansion: (first year GDP effect)

	DE	FR	IT	UK	ES	NL	BE	DK	IR	PO	GR	OS	SW	SF	US	JA
GDP	0.04	0.02	0.01	0.02	0.01	-0.05	-0.07	0.01	-0.04	0.01	0.01	0.00	0.04	0.02	0.55	0.04

Note: GDP effect in first year, percentage difference from base; monetary assumption: interest rate targeting in EU and Japan.

Table 8: Effects of EU wide monetary expansion: (permanent increase in money target of 1%)

year: EU15:	1	2	3	4	5	6	7	8	9	10
GDP	0.61	0.36	0.21	0.12	0.08	0.05	0.04	0.03	0.02	0.01
potential.private.GDP	0.14	0.09	0.05	0.04	0.03	0.02	0.02	0.01	0.01	0.01
private.consumption	0.51	0.22	0.13	0.09	0.07	0.06	0.05	0.04	0.04	0.03
private.investment	1.36	0.79	0.40	0.15	0.02	-0.03	-0.06	-0.07	-0.07	-0.06
total.public.expenditure	0.45	0.42	0.25	0.16	0.12	0.09	0.07	0.06	0.05	0.05
employment	0.16	0.07	0.01	0.00	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
real.wage.costs	0.28	0.43	0.24	0.15	0.09	0.07	0.05	0.04	0.03	0.03
price.level	0.39	0.63	0.78	0.87	0.91	0.94	0.95	0.96	0.97	0.97
consumer.price.level	0.41	0.68	0.83	0.92	0.97	1.00	1.01	1.02	1.02	1.03
dollar.exchange.rate	0.57	0.78	0.90	0.97	1.00	1.01	1.01	1.01	1.01	1.01
real.exchange.rate	0.18	0.15	0.12	0.10	0.08	0.07	0.06	0.05	0.04	0.04
real.eff.exch.rate	0.05	0.06	0.05	0.05	0.04	0.04	0.03	0.03	0.03	0.02
money	1.01	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
short.rate *	0.26	0.16	0.08	0.04	0.02	0.01	0.00	0.00	0.00	0.00
long.rate *	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
real.short.rate *	-0.01	-0.02	-0.02	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
inflation *	0.39	0.25	0.15	0.08	0.05	0.03	0.01	0.01	0.01	0.00
unemployment.rate *	-0.14	-0.06	-0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01
debt.(% of GDP) *	-0.14	0.03	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00
deficit. (% of GDP) *	0.63	0.02	-0.02	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00
trade.balance. (% of GDP) *	-0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01

Note: percentage differences from base (except those marked *: absolute differences from base)

2.2 Fiscal shocks

How fiscal policy affects an economy depends on a wide range of other factors. Assumptions on financing, the composition of (changes in) expenditure and taxation, as well as the monetary stance are all crucial elements in the analysis of fiscal policy. The model distinguishes between various expenditure components and changes in each of these will have a different impact on the economy. Moreover, for the government's intertemporal budget constraint to hold, any increase in spending will have to be accompanied by (future) increases in taxation and the net effect of a fiscal expansion will depend crucially on which type of tax is raised.

In the simulations below we look at increases in government purchases of goods and services. The size of the first shock we consider is equivalent to 1 per cent of real baseline GDP for a period of 10 years, and then reduced gradually. As discussed above, the model contains a fiscal closure rule that stabilises the debt to GDP ratio and rules out unstable debt dynamics. This reaction function adjusts government transfer payments to households to respond to a deviation of the debt to GDP ratio from its target level. As an increase in government spending raises government debt, it will lead to a reduction in such transfers to households, reducing consumption and reversing the increase in the deficit to GDP ratio. Because the purpose of this standard simulation is to show the direct effects of a fiscal expansion, this reaction function has been turned off during the first 10 years of the simulation and only comes into effect after that period. As the simulations reported below were run for 60 additional years after the 10 years shown in the tables, this allows for sufficient time for the debt to GDP ratio to stabilise in the long run. Of course, the forward looking behaviour of households is not affected by this change and consumers will still anticipate the future reductions in transfer payments that are required to stabilise the debt to GDP ratio in the long run.

While in the long term the effect of a fiscal expansion is negligible, or even slightly negative, depending on the financing assumptions, the size of the effects in the short run depends crucially on the conduct of monetary policy. Under a non-accommodating stance of strict monetary targeting, even the short run output effects of a fiscal expansion are minor, but if the authorities target nominal interest rates the short run effects can be significant[8]. The latter in fact implies that following a fiscal expansion, the monetary authorities will allow the money supply to expand in order to avoid changes in interest rates. It is this accommodating monetary policy that gives rise to the positive output effects in the initial years of the simulations.

In the first scenario below we assume an extremely loose form of money targeting in which German interest rates are kept almost constant in the short run. Moreover, it is assumed that all European bilateral exchange rates are fixed and in that respect the simulation could be seen as a variant of an EMS type exchange rate regime with German hegemony and in which all EU member states participate. The tables in the annex show the macroeconomic effects for each country. For all countries the impact multiplier is significantly smaller than 1. The positive output effects of the fiscal expansion do not last long and tend to be reversed in the medium term. The increase in government purchases reduces private consumption as households anticipate future reductions in income due to lower transfer payments. Although the impact of the fiscal impulse on investment is positive, in the medium term investment is reduced as firms anticipate lower long term profitability. Prices rise as capacity utilisation increases and real wage costs increase initially. The real effective exchange rate appreciates,

[8] See Roeger and in 't Veld (1997a) for an illustration of this on a two country version of the QUEST model

exports are depressed and imports rise. Employment gains are relatively small and fade away slowly in the years following the immediate expansion.

The positive short run output effects are much less pronounced in countries like Ireland, Belgium and the Netherlands, where the high degree of openness means that a much larger share of the fiscal impulse leaks abroad via higher imports[9]. In these small open economies the price level rises less than in the other countries, as the share of imports is much higher. With a smaller inflationary response to the fiscal expansion there is a smaller reduction in real short interest rates and the impact multiplier is accordingly smaller or even negligible.

Spillovers

The extent to which fiscal policy actions of a country affect its trading partners depends crucially on the exchange rate regime and the monetary regime in the country undertaking fiscal action. Under fully flexible exchange rates the spillovers are small. A fiscal expansion in one country will be accompanied by a monetary expansion and higher prices. There may be a small depreciation of the exchange rate, but in real terms there will be an appreciation of the effective exchange rate as domestic prices rise faster than foreign prices. The boost to other countries from higher export demand will however be partially offset by higher real interest rates, which depresses domestic demand. Because these two effects go in opposite directions, the total spillover effect is likely to be small.

Under fixed exchange rates and monetary targeting spillovers can become negative when a fiscal expansion leads to higher interest rates abroad. Assume, for instance, an ERM-type scenario in which all European countries fix their exchange rates vis-à-vis the DM and follow the German interest rate policy. If the German authorities adhere to a strict money targeting regime, a German fiscal expansion has only small expansionary effects in Germany as German interest rates are raised instantaneously. Due to this monetary tightening the German exchange rate will appreciate relative to the dollar. But this will lead to an increase in interest rates all over Europe, as the other European countries must follow with a monetary contraction to keep exchange rates in the ERM fixed. The dampening effect of the higher interest rates on domestic demand more than offsets the positive effect of higher demand for exports, which are small anyway under money targeting, and the net effect on GDP in the other European countries will be largely negative. Obviously, such negative spillovers will be mitigated under EMU when interest rates are set by a European central bank, which targets total money supplies in the EU. Then a German fiscal expansion will lead to a much smaller increase in interest rates as its effect on total EU money demand is significantly smaller. Consequently, the negative spillover to other European countries will be considerably smaller, also because the smaller increase in German interest rates will allow a larger domestic expansion and higher demand for other countries' exports.

Table 9 below summarises the spillover effects of a fiscal expansion in Germany under flexible and fixed exchange rates and under alternative monetary assumptions. The first three rows in the table relate to an accommodating monetary policy with, respectively, national, German and EU monetary authorities targeting nominal interest rates. A fiscal expansion in Germany raises export demand and boosts growth in all other European countries. These spillover effects lead to higher growth in those countries that have a relatively large degree of

[9] A crucial assumption here is that the same share of the government purchases of goods and services is imported from abroad as for other domestic demand components. The impact multiplier would be higher if a domestic bias is assumed for government purchases.

openness, like Ireland and Belgium. Generally speaking one could say that spillover effects in the model are relatively small. As would be expected, the spillovers of a demand shock in Germany are largest in the Netherlands, Belgium and Austria, the countries for which exports to Germany form a relatively large share of total demand. Table 10 gives the spillover effects under an EMS regime for shocks originating in different European countries, as discussed in the section above and shown in the country tables in the annex.

Table 9: Impact and spillover effects on GDP of German fiscal expansion
(increase in government purchases of 1% of baseline GDP in Germany, for 10 years)

country:	DE	FR	IT	UK	ES	NL	BE	DK	IR	PO	GR	OS	SW	SF	EU15
Interest rate targeting:															
Flex.rate	0.49	0.07	0.05	0.04	0.05	0.17	0.16	0.09	0.11	0.04	0.01	0.15	0.08	0.06	0.18
EMS	0.48	0.00	-0.02	-0.02	-0.03	0.08	0.09	0.04	0.03	-0.01	-0.04	0.14	0.01	-0.03	0.12
EMU	0.54	0.06	0.03	0.03	0.04	0.19	0.17	0.09	0.10	0.04	0.01	0.19	0.06	0.04	0.18
Money targeting:															
Flex rate	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
EMS	0.03	-0.46	-0.47	-0.43	-0.53	-0.31	-0.47	-0.33	-0.48	-0.37	-0.41	-0.24	-0.47	-0.54	-0.32
EMU	0.43	-0.06	-0.08	-0.08	-0.09	0.08	0.03	0.00	-0.03	-0.06	-0.09	0.09	-0.06	-0.09	0.07

Note: GDP percentage difference from base in first year. EMS scenario assumes German interest rates are targeted by German monetary authorities, EMU assumes targeting by EU monetary authorities.

Table 10: Impact and spillover effects of fiscal expansion with German interest rate targeting
(increase in government purchases of 1% of baseline GDP, for 10 years)

	DE	FR	IT	UK	ES	NL	BE	DK	IR	PO	GR	OS	SW	SF	EU15
DE	0.48	0.00	-0.02	-0.02	-0.03	0.08	0.09	0.04	0.03	-0.01	-0.04	0.14	0.01	-0.03	0.12
FR	0.09	0.57	0.06	0.04	0.08	0.08	0.19	0.04	0.10	0.04	0.00	0.03	0.03	0.03	0.16
IT	0.06	0.07	0.63	0.01	0.03	0.04	0.06	0.03	0.04	0.01	0.02	0.07	0.03	0.01	0.14
UK	0.09	0.08	0.04	0.61	0.07	0.11	0.15	0.13	0.35	0.06	0.02	0.05	0.15	0.14	0.16
ES	0.03	0.05	0.02	0.02	0.61	0.02	0.04	0.02	0.03	0.05	-0.01	0.02	0.03	0.01	0.07
NL	0.04	0.02	0.00	0.01	0.01	0.09	0.06	0.02	0.03	0.01	-0.01	0.01	0.02	0.01	0.02
BE	0.03	0.03	0.00	0.01	0.00	0.04	-0.03	0.01	0.02	0.00	-0.01	0.01	0.02	0.00	0.02
DK	0.02	0.00	0.00	0.00	0.00	0.01	0.01	0.28	0.01	0.01	0.00	0.01	0.08	0.03	0.01
IR	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.01	0.06	0.00	0.00	0.00	0.01	0.01	0.01
PO	0.01	0.02	0.01	0.01	0.05	0.01	0.01	0.01	0.01	0.29	0.00	0.00	0.01	0.01	0.02
GR	0.01	0.01	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.00	0.55	0.01	0.00	0.01	0.01
OS	0.04	-0.01	0.00	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00	-0.01	0.27	0.00	0.00	0.01
SW	0.02	0.01	0.00	0.01	0.01	0.02	0.02	0.08	0.02	0.01	0.00	0.01	0.47	0.12	0.02
SF	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.01	0.00	0.00	0.01	0.06	0.57	0.01

Note: The first row shows the effects of a fiscal expansion in Germany on GDP in each other country, the second row of an expansion in France, etc. (percentage difference from base)

Permanent fiscal expansion under alternative tax assumptions

In the above scenario it was assumed that the increase in public spending is paid for by a reduction in transfers from the government to households in the long term, which is the standard assumption in the model. Such lump sum transfers are the least distortionary in the model. Financing by other tax increases is considerably more distortionary. To demonstrate

the importance of financing we show in this section the long term effects of a permanent fiscal expansion in all EU countries under different financing assumptions, namely an increase in labour income tax, an increase in corporate tax and an increase in VAT [10]. These alternative scenarios are simulated with the steady state version of the model and show the long term effects after all adjustments have taken place. The shock is a permanent increase of 1 percentage point in the share of government purchases in total GDP in all EU member states. It is assumed that monetary authorities target the price level and that the GDP deflator is constant in the long run.

In the first scenario it is assumed that the increase in public spending is paid for by a reduction in (lump sum) transfers from the government to households, which is the standard assumption in the model. A fiscal expansion funded by a reduction in transfer payments has clearly the smallest crowding-out effects (see Table 11.a). The long term effect on output is positive, due to higher labour supply which raises potential output and employment increases slightly. The increase in labour supply stems from the fall in the value of leisure which reduces the reservation wage. This in turn is caused by the drop in private consumption as transfers to households are reduced. The expansion in output is accompanied by a small depreciation of the exchange rate.

When the fiscal expansion is funded by an increase in labour taxes, there are large negative employment effects (see Table 11.b). Employment falls by between 0.5 and 1.8 per cent in the long run. On average, output is around 1.2 percent lower in the new steady state. The fall in consumption is even larger than in the previous scenario with a reduction in transfers. Employment effects are small in the third scenario where corporate taxes are increased to pay for the increase in fiscal spending (see Table 11.c). Higher corporate taxation imply lower investment by firms and lead to a lower capital stock. This implies a considerably lower level of potential output in the new steady state. Finally, when the fiscal expansion is funded by a VAT increase, the net output effects is slightly negative (see Table 11.d). The VAT increase reduces consumption and output and employment are both lower in the new steady state.

Table 11.a: Effects of permanent EU wide fiscal expansion financed by cut in transfers to households

	GDP	private GDP	cons	invest.	empl.	wages	cons deflator	GDP deflator *	trade balance **
DE	0.18	0.20	-1.26	0.26	0.14	0.03	-0.11	-0.19	-0.02
FR	0.17	0.19	-1.34	0.24	0.12	0.03	-0.06	-0.17	-0.02
IT	0.12	0.13	-1.32	0.17	0.09	0.02	-0.04	-0.12	-0.02
UK	0.17	0.18	-1.32	0.21	0.15	0.01	-0.03	-0.17	0.00
ES	0.14	0.15	-1.36	0.19	0.11	0.02	-0.04	-0.14	-0.02
NL	0.11	0.12	-1.25	0.16	0.08	0.02	-0.01	-0.11	-0.02
BE	0.17	0.19	-1.20	0.21	0.14	0.01	-0.06	-0.17	-0.01
DK	0.15	0.18	-1.41	0.22	0.11	0.02	0.02	-0.15	-0.03
IR	0.18	0.20	-1.24	0.24	0.14	0.02	-0.06	-0.18	-0.02
PO	0.11	0.13	-1.54	0.16	0.08	0.02	0.00	-0.11	-0.02
GR	0.11	0.13	-1.33	0.16	0.09	0.02	-0.01	-0.11	-0.02
OS	0.09	0.10	-1.38	0.16	0.06	0.03	0.03	-0.09	-0.03
SW	0.11	0.13	-1.38	0.18	0.07	0.03	0.00	-0.11	-0.01
SF	0.11	0.13	-1.23	0.18	0.08	0.03	0.00	-0.11	-0.02
EU15	0.15	0.17	-1.31	0.22	0.12	0.02	-0.05	-0.15	-0.02

Note: Percentage difference from base, * GDP deflator at market prices, ** trade balance as percentage of GDP (absolute difference from base)

[10] Roeger and in 't Veld (1997b) contains a more detailed analysis of the different effects under various tax and spending assumptions.

Table 11.b: Effects of permanent EU wide fiscal expansion financed by labour income tax

	GDP	private GDP	cons	invest.	empl.	wages	cons deflator	GDP deflator *	trade balance **
DE	-1.83	-2.06	-3.22	-1.78	-1.82	0.15	1.69	1.86	-0.03
FR	-1.38	-1.65	-3.00	-1.51	-1.30	0.08	1.38	1.40	-0.03
IT	-0.96	-1.11	-2.46	-1.07	-0.89	0.03	0.98	0.97	-0.02
UK	-0.85	-0.93	-2.26	-0.85	-0.84	0.04	0.87	0.85	-0.01
ES	-0.56	-0.64	-2.11	-0.59	-0.53	0.03	0.62	0.56	-0.02
NL	-1.61	-1.80	-3.06	-1.74	-1.51	0.03	1.68	1.64	-0.02
BE	-1.57	-1.78	-2.92	-1.77	-1.44	0.00	1.55	1.60	-0.03
DK	-1.53	-1.94	-3.00	-1.72	-1.43	0.12	1.36	1.55	-0.08
IR	-1.67	-1.86	-3.14	-1.77	-1.59	0.05	1.71	1.70	-0.03
PO	-0.74	-0.90	-2.25	-0.82	-0.69	0.05	0.63	0.75	-0.03
GR	-0.83	-0.93	-2.16	-0.85	-0.80	0.04	0.78	0.83	-0.03
OS	-0.59	-0.67	-2.36	-0.75	-0.50	-0.04	0.89	0.59	-0.01
SW	-1.04	-1.27	-2.73	-1.19	-0.95	0.04	1.13	1.05	-0.02
SF	-0.92	-1.08	-2.43	-1.02	-0.84	0.04	1.04	0.92	-0.02
EU15	-1.27	-1.46	-2.75	-1.34	-1.19	0.07	1.22	1.25	-0.02

Note: Percentage difference from base,* GDP deflator at market prices,** trade balance as percentage of GDP (absolute difference from base)

Table 11.c: Effects of permanent EU wide fiscal expansion financed by corporate taxes

	GDP	private GDP	cons	invest.	empl.	wages	cons deflator	GDP deflator *	trade balance **
DE	-1.81	-1.79	-2.69	-5.34	0.14	-1.96	1.94	1.85	0.05
FR	-1.98	-1.95	-2.71	-5.72	0.10	-2.09	2.02	2.02	0.06
IT	-2.17	-2.16	-2.59	-6.14	0.05	-2.22	2.01	2.21	0.03
UK	-3.53	-3.55	-2.84	-9.38	-0.22	-3.30	2.76	3.66	-0.06
ES	-1.73	-1.72	-2.17	-4.98	0.06	-1.80	1.56	1.76	0.03
NL	-1.93	-1.91	-2.65	-5.65	0.13	-2.07	1.99	1.97	0.05
BE	-2.01	-1.98	-2.53	-5.97	0.19	-2.21	1.95	2.05	0.04
DK	-2.54	-2.53	-2.90	-7.13	0.03	-2.57	2.35	2.61	0.05
IR	-2.00	-2.00	-2.77	-5.56	-0.02	-1.98	2.17	2.04	0.05
PO	-1.93	-1.92	-1.95	-5.46	0.03	-1.96	1.45	1.97	0.00
GR	-1.76	-1.76	-2.05	-5.01	0.03	-1.80	1.50	1.80	0.02
OS	-1.90	-1.89	-2.32	-5.37	0.03	-1.92	1.68	1.93	0.05
SW	-3.62	-3.60	-3.20	-10.10	0.07	-3.69	2.94	3.75	-0.02
SF	-3.12	-3.12	-3.35	-8.73	0.03	-3.16	2.82	3.23	0.07
EU15	-2.23	-2.23	-2.66	-6.17	0.04	-2.28	2.09	2.30	0.03

Note: Percentage difference from base, * GDP deflator at market prices, ** trade balance as percentage of GDP (absolute difference from base)

Table 11.d: Effects of permanent EU wide fiscal expansion financed by VAT

	GDP	private GDP	cons	invest.	empl.	wages	cons deflator	GDP deflator *	trade balance **
DE	-0.34	-0.38	-1.86	-0.35	-0.33	0.02	0.99	0.34	0.00
FR	-0.24	-0.28	-1.84	-0.28	-0.22	0.00	0.94	0.24	0.00
IT	-0.23	-0.26	-1.71	-0.26	-0.21	0.00	0.83	0.23	0.00
UK	-0.22	-0.24	-1.65	-0.23	-0.21	0.01	0.80	0.22	0.00
ES	-0.09	-0.11	-1.64	-0.11	-0.08	0.00	0.73	0.09	0.00
NL	-0.29	-0.33	-1.71	-0.33	-0.27	0.00	0.85	0.29	0.00
BE	-0.19	-0.22	-1.61	-0.23	-0.17	-0.01	0.73	0.19	0.00
DK	-0.33	-0.42	-1.97	-0.38	-0.30	0.02	1.14	0.33	-0.01
IR	-0.39	-0.44	-1.88	-0.43	-0.37	0.00	1.05	0.39	0.01
PO	-0.22	-0.27	-1.84	-0.25	-0.20	0.01	0.94	0.22	-0.01
GR	-0.21	-0.24	-1.66	-0.23	-0.20	0.00	0.80	0.22	0.00
OS	-0.14	-0.16	-1.74	-0.18	-0.12	-0.01	0.86	0.14	0.00
SW	-0.25	-0.31	-1.84	-0.29	-0.23	0.01	1.00	0.25	0.00
SF	-0.25	-0.29	-1.69	-0.28	-0.22	0.01	0.85	0.25	0.00
EU15	-0.25	-0.29	-1.77	-0.27	-0.23	0.01	0.88	0.25	0.00

Note: Percentage difference from base, * GDP deflator at market prices, ** trade balance as percentage of GDP (absolute difference from base)

2.3 Technology shocks

Above we considered the effects of demand shocks in the model. To illustrate the supply side of the model we look in this section at a technology shock and analyse the effects of an increase in technical progress. In this scenario we shock labour augmenting technical progress T_{Nt} in all European countries by 1 per cent permanently. It is assumed that monetary authorities target the money supply and that exchange rates are flexible.

A permanent improvement in productivity raises potential output and boosts growth immediately. The results in Table 12 show that under certain assumptions concerning wage behaviour, namely that unemployment benefits are indexed to real wages, the long run solution of the model to a percent change in labour augmenting technical progress exhibits standard features of the neoclassical growth model. A new steady state will be reached with a percentage increase in GDP and real wages close to the percentage increase in productivity[11] but no change in the unemployment rate. The long run results would of course be different under alternative indexation rules for benefits. The impact multiplier is around a quarter but increases fast in the following years. It would take the economy about 3 years to complete half of the adjustment.

Table 12: Effects of EU wide productivity shock
(permanent increase in labour-augmenting technical progress of 1%)

year: EU15:	1	2	3	4	5	6	7	8	9	10	30
GDP	0.23	0.44	0.54	0.60	0.64	0.67	0.69	0.72	0.74	0.76	0.99
potential.private.GDP	0.64	0.65	0.66	0.68	0.69	0.71	0.73	0.75	0.77	0.79	1.01
private.consumption	0.37	0.58	0.63	0.65	0.67	0.69	0.71	0.73	0.75	0.76	0.93
private.investment	0.13	0.50	0.73	0.81	0.82	0.83	0.84	0.85	0.86	0.87	1.03
total.public.expenditure	0.24	0.43	0.54	0.60	0.64	0.67	0.69	0.72	0.74	0.76	1.01
employment	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	0.03
real.wage.costs	0.26	0.45	0.56	0.62	0.66	0.69	0.71	0.73	0.75	0.77	0.96
price.level	-0.30	-0.49	-0.60	-0.66	-0.69	-0.72	-0.74	-0.77	-0.79	-0.80	-1.01
consumer.price.level	-0.32	-0.52	-0.63	-0.69	-0.72	-0.75	-0.77	-0.78	-0.80	-0.81	-0.95
dollar.exchange.rate	-0.57	-0.72	-0.78	-0.81	-0.82	-0.82	-0.82	-0.82	-0.82	-0.82	-0.68
real.exchange.rate	-0.28	-0.23	-0.19	-0.15	-0.13	-0.10	-0.08	-0.06	-0.03	-0.01	0.33
real.eff.exch.rate	-0.03	-0.03	-0.02	-0.01	0.01	0.02	0.03	0.04	0.05	0.06	0.23
money	-0.30	-0.28	-0.29	-0.29	-0.29	-0.29	-0.29	-0.28	-0.28	-0.28	-0.23
short.rate *	-0.22	-0.08	-0.04	-0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.01
long.rate *	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
real.short.rate *	0.01	0.05	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.01
inflation *	-0.30	-0.20	-0.11	-0.06	-0.04	-0.03	-0.02	-0.02	-0.02	-0.02	0.00
unemployment.rate *	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-0.03
debt. (as % of GDP) *	-0.02	-0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
deficit. (as % of GDP) *	-0.01	0.02	0.01	0.00	-0.01	0.00	0.01	0.01	0.01	0.01	0.00
trade.bal (as % of GDP) *	-0.04	-0.06	-0.05	-0.04	-0.03	-0.02	-0.02	-0.01	-0.01	-0.01	-0.01

Note: percentage differences from base (except those marked *: absolute differences from base). Money in EU15 is aggregated in DMs and can therefore differ from zero despite money targetting in each individual country.

[11] There can be minor deviations because of terms of trade effects.

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Appendix Model Solution Method [12]

There are various ways of solving forward looking models with rational expectations. Most of them are based on linearisations of the model around the steady state and then applying closed form solution algorithms to the linearised system, like for example the method suggested by Blanchard and Kahn (1980). TROLL uses a method developed by Laffarque (1990), Boucekkine (1995) and Juillard (1996) to solve the nonlinear model by Newton-Raphson directly. This certainly has the advantage of increased accuracy and applicability of the method to economies which are not operating close to a steady state initially, but it has the drawback that terminal conditions must be explicitly specified. This appendix compares three alternative methods of imposing terminal conditions.

The stacked-time solution algorithm in TROLL essentially works as follows. Let $\mathbf{y}_t$ (*nx1*) and $\mathbf{x}_t$ (*kx1*) be vectors of endogenous and exogenous variables respectively. The model can be expressed compactly as

$$\mathbf{f}_t\left(\mathbf{y}_{t-1}, \mathbf{y}_t, E_t\mathbf{y}_{t+1}, \mathbf{x}_t\right) = 0 \qquad (1)$$

where $\mathbf{f}_t$ is a vector of *n* nonlinear dynamic equations. The presence of predetermined state variables $\mathbf{y}_{t-1}$ and forward looking expectations (jumping variables) $E_t\mathbf{y}_{t+1}$ introduces simultaneity across time periods. One way of solving that model (with starting date *t*), is to stack the system for the T+1 periods

$$\mathbf{F}(\mathbf{z}, \mathbf{x}; t) = \begin{bmatrix} \mathrm{f}_t\left(\mathbf{z}_t, \mathbf{x}_t\right) \\ \vdots \\ \mathrm{f}_{t+j}\left(\mathbf{z}_{t+j}, \mathbf{x}_{t+j}\right) \\ \vdots \\ \mathrm{f}_{t+T}\left(\mathbf{z}_{t+T}, \mathbf{x}_{t+T}\right) \end{bmatrix} = 0 \qquad (2)$$

where $\mathbf{z}_{t+j}=(\mathbf{y}_{t+j-1}, \mathbf{y}_{t+j}, E_t\mathbf{y}_{t+j+1})$. This stacked system of equations is then solved by Newton-Raphson[13] subject to the predetermined variable $\mathbf{y}_{t-1}$ and the terminal condition $\mathbf{y}_{t+T+1}$.

Three Alternative Terminal Conditions

We consider three methods of dealing with the problem of selecting terminal conditions. This analysis is conducted under the assumption that the model can be formulated in efficiency units and the model reaches a steady state growth path in the long run. Of course, the methods discussed can also be applied to the level of the variables, but it would slightly complicate the notation. The three methods can briefly be described as follows

Method 1: No Terminal Condition (NTC) - *i.e.* don't worry about the problem and use the same terminal condition as for the baseline.

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[12] This appendix draws on Roeger and in't Veld (1997c)

[13] The Jacobian matrix, which has to be inverted, can become very large, but the algorithm makes use of the repetitive structure of the stacked system, which is triangular by blocks corresponding to the different time periods. The computational costs can be minimised by inverting the matrix by blocks and taking advantage of the sparsity within the single period blocks. Details on this method can be found in Hollinger and Spivakovsky (1996).

This is obviously a theoretically incorrect way of dealing with the problem. However, it is very likely that the terminal condition will not have a big impact on the solution at the beginning of the simulation. Therefore, if it is possible to run simulations over a long enough horizon it is likely that the solution reaches a steady state at some point before it then departs from the steady state as the (incorrect) terminal condition exerts its influence on the solution. If one ignores the solution after the model has reached the steady state, then nothing would be lost by applying this method. In that regard a comparison of this solution method with the other, theoretically more adequate methods discussed below is instructive since it will illustrate whether, and over which time horizon, this solution might be close to the correct solution. The big advantage of this method is of course its simplicity. However, the computational costs can be excessive, since applying this method may require very long stacks in order to obtain reliable results over the adjustment period.

Method 2: Terminal Condition in Levels (TCL) - *i.e.* use the correct terminal condition as calculated from the "static" or "equilibrium" counterpart of the dynamic model.

The correct way of dealing with the problem of the 'unknown' solution in period T+1 is to construct, prior to simulating the dynamic model (1), the equilibrium counterpart to the dynamic model, *i.e.* set up a system which gives the long run solution of $\mathbf{y}_t$ to any vector $\mathbf{x}^*$ of exogenous variables, where $\mathbf{x}^*$ denotes the long run level of the exogenous variables. Let this system be given by

$$\mathbf{f}^{s}(\mathbf{y}^*,\mathbf{x}^*) = 0 \tag{3}$$

and let $\mathbf{y}^*$ be the long run solution for $\mathbf{y}_t$. To give an example, suppose the vector $\mathbf{y}_t$ can be split into l predetermined state variables and m jumping variables contained in the vectors $\mathbf{y}^{s}_t$ and $\mathbf{y}^{j}_t$ and let the dynamic model be represented by

$$\begin{aligned} \mathbf{y}^{s}_t &= A\mathbf{y}^{s}_{t-1} + B\mathbf{y}^{j}_t + \gamma_1\mathbf{x}_t \\ E_t\mathbf{y}^{j}_{t+1} &= C\mathbf{y}^{s}_{t-1} + D\mathbf{y}^{j}_t + \gamma_2\mathbf{x}_t \end{aligned} \tag{4}$$

Define $\Pi = \begin{bmatrix} A & B \\ C & D \end{bmatrix}$

then the steady state version of this model would be given by

$$\begin{bmatrix} y^{s}* \\ y^{j}* \end{bmatrix} = (\mathrm{I} - \Pi)^{-1}\gamma \mathrm{X}^* \tag{5}$$

Using this detour it is possible to calculate the long run solution implied by a given dynamic model by running a simple simulation of the model $\mathbf{f}^{s}(..)$ in order to calculate $\mathbf{y}^*$ for the long run values $\mathbf{x}^*$ of the exogenous variables. The dynamic simulation can then be computed by imposing the solution values $\mathbf{y}^{j}*$ from this static model on the terminal conditions $\mathbf{y}_{t+T+1}$. This method certainly has the advantage that the solution procedure is theoretically correct. However, it has the disadvantage that the solution method becomes very cumbersome and requires the maintenance of two models which should be identical up to the dynamic specification.

Method 3: Terminal Condition in Differences (TCD) - Define jumping variables $\dot{\mathbf{y}}_t^{\mathrm{j}}$ as transformations of the initial jumping variables $\mathbf{y}_t^{\mathrm{j}}$ with the property that $\dot{\mathbf{y}}_{t+T+1}^{\mathrm{j}}$ is invariant to exogenous interventions.

This method consists of exploiting properties of the steady state solution for the definition of the jumping variables. Knowing that the model reaches a steady state implies a certain knowledge about the change of variables between two successive periods. If the system is formulated in efficiency units, for example, then we know that in the steady state, the percentage change of $\mathbf{y}_t^{\mathrm{j}}$ is equal to zero for any shock and any steady state reached by the model solution[14]. If we define a new vector of jumping variables $\dot{\mathbf{y}}_t^{\mathrm{j}} = \mathbf{y}_t^{\mathrm{j}} - \mathbf{y}_{t-1}^{\mathrm{j}}$, then $\dot{\mathbf{y}}_{t+T+1}^{\mathrm{j}} = 0$ if we choose T large enough such that the model reaches a steady state in period t+T. In terms of the example given above, this amounts to the following specification.

$$\begin{aligned} \mathbf{y}_t^{\mathrm{s}} &= A\mathbf{y}_{t-1}^{\mathrm{s}} + B\mathbf{y}_t^{\mathrm{j}} + \gamma_1 \mathbf{x}_t \\ \mathbf{y}_t^{\mathrm{j}} &= I\mathbf{y}_{t-1}^{\mathrm{j}} + I\dot{\mathbf{y}}_t^{\mathrm{j}} \\ E_t\dot{\mathbf{y}}_{t+1}^{\mathrm{j}} &= C\mathbf{y}_{t-1}^{\mathrm{s}} + (D-I)\mathbf{y}_t^{\mathrm{j}} + \gamma_2 \mathbf{x}_t \end{aligned} \qquad (6)$$

Notice that in this system of equations, the variable $\dot{\mathbf{y}}_{t+1}^{\mathrm{j}}$ is the jumping variable, while $\mathbf{y}_t^{\mathrm{j}}$ has now become a predetermined state variable. Thus the model can be reformulated such that the terminal conditions are invariant to the policy shock. This seems to be the most elegant solution and it is the solution we have implemented in QUEST II. There is only a small cost associated with it, namely the model must be extended by adding *m* equations defining the vector $\dot{\mathbf{y}}_t^{\mathrm{j}}$.

Simulation Results

In Roeger and in 't Veld (1997c) we have compared these three methods by applying three types of permanent shocks: a fiscal shock, a monetary shock and a technology shock. We found that in practice the first method can give satisfactory results if a long enough horizon can be applied in the simulation. As this is often not practical, it fails as a general model solution procedure. The third method gives almost identical results to that obtained under the (theoretically correct) second method, but has the additional advantage of easy implementation. This is the method used in our standard simulations.
Chart 1 below shows the results of three methods with a permanent fiscal shock under money targeting. In these simulations governement purchases are reduced by 1 per cent of GDP permanently and the debt to GDP ratio is reduced by 10 per cent. The three methods yield fairly similar results. It is however visible that it takes the model longer to reach the long run solution and there seems to be some small endpoint problems also associated with the solution methods TCL and TCD. It is interesting to notice that TCD does best in this case. We attribute this to the fact that the discrepancy between the steady state solution and the solution value from the dynamic simulation is larger if the terminal conditions are formulated in levels instead of first differences. It can also be seen from Chart 2 that the solution under NTC deviates from TCL and TCD already after 10 years. Thus it is not generally true that NTC replicates the correct solution over one half of the simulation horizon.

[14] This holds for QUEST II which is formulated in efficiency units. However, this method also works if all variables are specified in levels. In that case the vector $\dot{\mathbf{y}}_{t+\ +1}^{\mathrm{j}}$ contains the values of the steady state growth rate of the jumping variables.

Chart 1: Long-run GDP-effect

Permanent Reduction of Government Purchases by 1% of GDP and of Debt to GDP ratio by 10 %-points (phased in over 10 years)

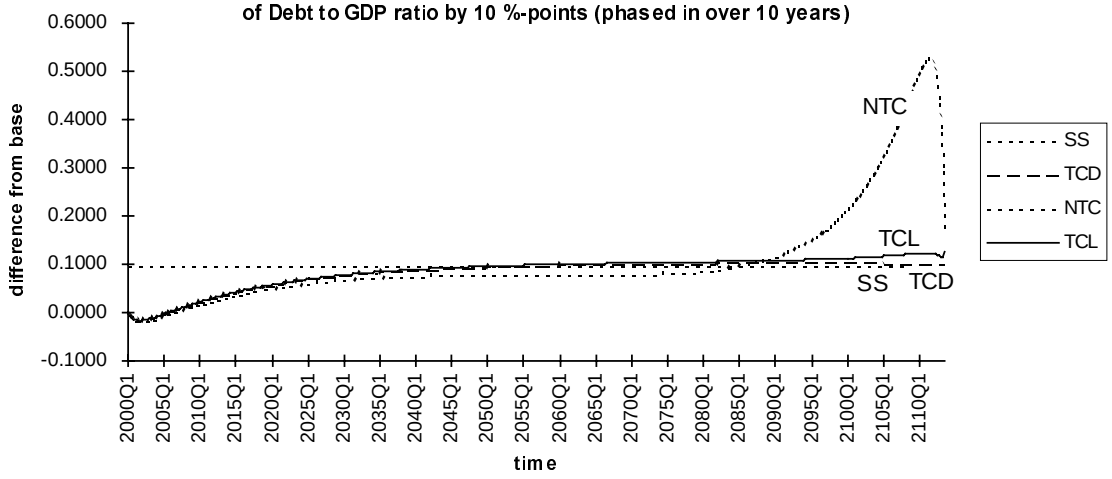
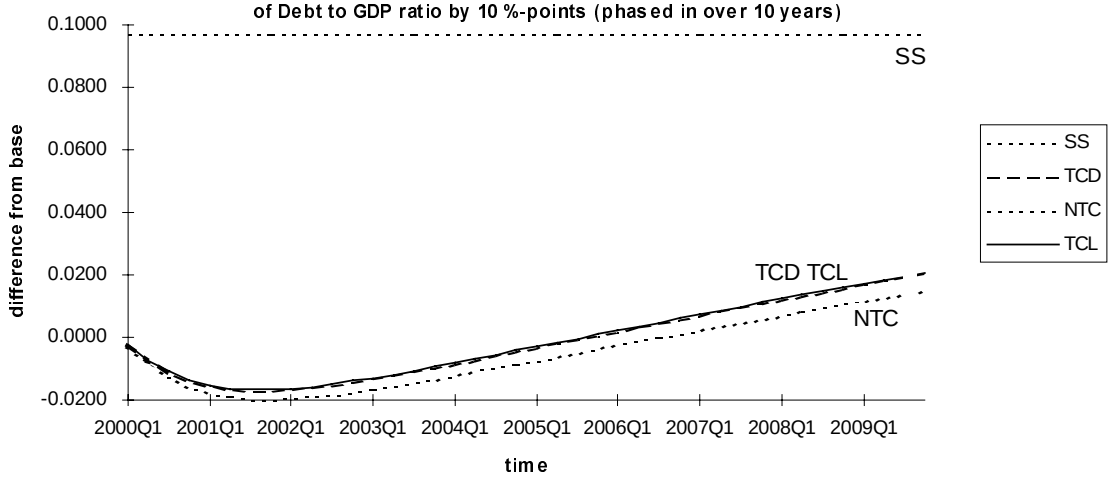


Chart 2: Short-run GDP-Effect

Permanent Reduction of Government Purchases by 1% of GDP and of Debt to GDP ratio by 10 %-points (phased in over 10 years)



ANNEX Country Tables Standard Simulations

TABLE A.1: GERMANY

Increase of 1% in Money Target (permanent)

Year:	1	2	3	4	5	6	7	8	9	10
TOTAL.GDP %	0.63	0.38	0.22	0.13	0.07	0.04	0.02	0.01	0.00	0.00
POT.PRIV.GDP %	0.14	0.09	0.04	0.02	0.01	0.00	0.00	0.00	-0.01	-0.01
PRIV.CONS %	0.47	0.25	0.15	0.10	0.08	0.06	0.05	0.05	0.04	0.04
PRIV.INV %	1.10	0.70	0.37	0.15	0.02	-0.04	-0.07	-0.08	-0.08	-0.08
TOT.PUBL.EXP %	0.50	0.45	0.29	0.19	0.13	0.10	0.07	0.06	0.05	0.05
EXPORTS %	1.00	0.56	0.37	0.27	0.21	0.18	0.15	0.14	0.13	0.12
IMPORTS %	0.62	0.35	0.20	0.12	0.08	0.06	0.05	0.05	0.05	0.05
EMPLOYMENT %	0.16	0.08	0.00	-0.02	-0.03	-0.03	-0.03	-0.03	-0.02	-0.02
REAL.WAGE.COSTS %	0.29	0.47	0.28	0.17	0.11	0.07	0.05	0.03	0.02	0.02
PRICE.LEVEL %	0.36	0.60	0.76	0.86	0.91	0.94	0.96	0.97	0.98	0.98
CONS.PRICE.LEVEL %	0.40	0.67	0.84	0.94	0.99	1.02	1.04	1.05	1.05	1.05
DOLLAR.EXCH.RATE %	0.52	0.75	0.89	0.96	0.99	1.01	1.01	1.01	1.01	1.00
REAL.EXCH.RATE %	0.16	0.15	0.12	0.10	0.08	0.06	0.05	0.04	0.03	0.02
REAL.EFF.EXCH.RATE %	0.03	0.06	0.06	0.05	0.04	0.03	0.03	0.02	0.01	0.01
MONEY %	1.01	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SHORT.RATE	0.29	0.17	0.09	0.05	0.02	0.01	0.00	0.00	0.00	0.00
LONG.RATE	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REAL.SHORT.RATE	0.03	-0.01	-0.02	-0.02	-0.02	-0.01	-0.01	-0.01	-0.01	-0.01
INFLATION	0.36	0.24	0.16	0.09	0.05	0.03	0.02	0.01	0.01	0.00
UNEMPL.RATE	-0.15	-0.07	0.00	0.02	0.03	0.03	0.03	0.02	0.02	0.02
DEBT.TO.GDP	-0.13	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
DEFG.TO.GDP	0.51	0.03	-0.01	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00
TRADE.BAL.TO.GDP	0.09	0.05	0.04	0.03	0.03	0.03	0.03	0.03	0.02	0.02

Increase in Government Purchases of 1% of GDP

Year:	1	2	3	4	5	6	7	8	9	10
TOTAL.GDP %	0.48	0.16	0.06	0.01	-0.01	-0.02	-0.04	-0.06	-0.09	-0.13
POT.PRIV.GDP %	0.13	0.08	0.03	0.01	0.00	-0.02	-0.04	-0.06	-0.09	-0.12
PRIV.CONS %	-0.30	-0.62	-0.65	-0.64	-0.61	-0.59	-0.58	-0.56	-0.56	-0.56
PRIV.INV %	0.28	-0.41	-0.67	-0.79	-0.86	-1.01	-1.22	-1.45	-1.73	-2.02
TOT.PUBL.EXP %	5.45	5.39	5.36	5.41	5.49	5.47	5.41	5.35	5.29	5.20
EXPORTS %	-0.25	-0.45	-0.49	-0.51	-0.53	-0.53	-0.53	-0.53	-0.53	-0.53
IMPORTS %	1.22	0.94	0.87	0.84	0.82	0.79	0.75	0.69	0.63	0.56
EMPLOYMENT %	0.16	0.09	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.05
REAL.WAGE.COSTS %	0.14	0.18	0.04	-0.01	-0.04	-0.06	-0.07	-0.10	-0.13	-0.20
PRICE.LEVEL %	0.28	0.35	0.38	0.39	0.39	0.39	0.39	0.39	0.40	0.40
CONS.PRICE.LEVEL %	0.21	0.25	0.27	0.27	0.27	0.27	0.28	0.28	0.29	0.29
DOLLAR.EXCH.RATE %	-0.07	-0.07	-0.06	-0.06	-0.05	-0.04	-0.04	-0.03	-0.02	-0.01
REAL.EXCH.RATE %	-0.35	-0.42	-0.44	-0.44	-0.44	-0.43	-0.42	-0.42	-0.41	-0.40
REAL.EFF.EXCH.RATE %	-0.29	-0.36	-0.37	-0.37	-0.37	-0.36	-0.36	-0.36	-0.35	-0.34
MONEY %	0.73	0.45	0.37	0.33	0.31	0.30	0.29	0.27	0.24	0.21
SHORT.RATE	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01
LONG.RATE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REAL.SHORT.RATE	-0.09	-0.03	-0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.02
INFLATION	0.28	0.07	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00
UNEMPL.RATE	-0.15	-0.09	-0.05	-0.04	-0.03	-0.03	-0.03	-0.04	-0.04	-0.04
DEBT.TO.GDP	0.22	1.42	2.50	3.56	4.61	5.71	6.79	7.87	8.96	10.05
DEFG.TO.GDP	1.00	1.08	1.11	1.14	1.16	1.19	1.21	1.24	1.27	1.29
TRADE.BAL.TO.GDP	-0.34	-0.32	-0.32	-0.33	-0.35	-0.34	-0.32	-0.30	-0.28	-0.26

Note: % percentage difference from base, otherwise absolute difference from base.
Monetary shock: permanent EU-wide 1% increase in money supply, under fully flexible exchange rates.
Fiscal shock: increase in government purchases of goods and services of 1% of GDP for a period of 10 years, with tax rule switched off for 10 years. Fixed exchange rates in EU, with German interest rate targetting.

TABLE A.2: FRANCE

Increase of 1% in Money Target

Year:	1	2	3	4	5	6	7	8	9	10
TOTAL.GDP %	0.60	0.35	0.20	0.12	0.07	0.05	0.04	0.04	0.03	0.03
POT.PRIV.GDP %	0.15	0.09	0.05	0.04	0.04	0.04	0.03	0.03	0.03	0.03
PRIV.CONS %	0.45	0.23	0.15	0.11	0.10	0.09	0.08	0.08	0.07	0.07
PRIV.INV %	1.39	0.78	0.40	0.18	0.07	0.02	0.00	0.00	0.00	0.00
TOT.PUBL.EXP %	0.40	0.40	0.22	0.13	0.08	0.06	0.05	0.04	0.04	0.04
EXPORTS %	0.80	0.42	0.26	0.17	0.13	0.10	0.09	0.08	0.08	0.07
IMPORTS %	0.66	0.37	0.22	0.15	0.11	0.09	0.08	0.08	0.07	0.07
EMPLOYMENT %	0.16	0.06	0.01	-0.01	-0.01	-0.01	-0.01	0.00	0.00	0.00
REAL.WAGE.COSTS %	0.28	0.43	0.23	0.13	0.08	0.06	0.05	0.04	0.04	0.03
PRICE.LEVEL %	0.40	0.65	0.80	0.88	0.92	0.94	0.95	0.95	0.96	0.96
CONS.PRICE.LEVEL %	0.40	0.65	0.81	0.89	0.93	0.95	0.96	0.97	0.97	0.97
DOLLAR.EXCH.RATE %	0.53	0.74	0.87	0.93	0.95	0.97	0.97	0.97	0.97	0.96
REAL.EXCH.RATE %	0.12	0.09	0.07	0.05	0.04	0.03	0.02	0.01	0.01	0.00
REAL.EFF.EXCH.RATE %	-0.03	-0.02	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
MONEY %	1.01	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SHORT.RATE	0.26	0.17	0.08	0.04	0.02	0.01	0.00	0.00	0.00	0.00
LONG.RATE	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REAL.SHORT.RATE	-0.01	-0.02	-0.02	-0.01	-0.01	-0.01	-0.01	-0.01	0.00	0.00
INFLATION	0.40	0.24	0.15	0.08	0.04	0.02	0.01	0.01	0.00	0.00
UNEMPL.RATE	-0.14	-0.06	-0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.00
DEBT.TO.GDP	-0.10	0.03	0.03	0.02	0.01	0.01	0.01	0.01	0.00	0.00
DEFG.TO.GDP	0.49	0.02	-0.02	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00
TRADE.BAL.TO.GDP	0.04	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00

Increase in Government Purchases of 1% of GDP

Year:	1	2	3	4	5	6	7	8	9	10
TOTAL.GDP %	0.57	0.18	0.06	0.02	0.00	-0.02	-0.04	-0.06	-0.10	-0.15
POT.PRIV.GDP %	0.18	0.10	0.05	0.02	0.01	-0.01	-0.03	-0.05	-0.09	-0.12
PRIV.CONS %	-0.21	-0.54	-0.59	-0.58	-0.56	-0.54	-0.53	-0.53	-0.53	-0.54
PRIV.INV %	0.78	-0.33	-0.68	-0.80	-0.87	-1.07	-1.35	-1.67	-2.04	-2.45
TOT.PUBL.EXP %	5.31	5.26	5.17	5.20	5.27	5.24	5.17	5.10	5.02	4.91
EXPORTS %	-0.12	-0.34	-0.37	-0.39	-0.40	-0.40	-0.40	-0.40	-0.39	-0.39
IMPORTS %	1.40	1.05	0.96	0.93	0.92	0.88	0.82	0.75	0.67	0.58
EMPLOYMENT %	0.19	0.09	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.05
REAL.WAGE.COSTS %	0.19	0.23	0.05	-0.01	-0.04	-0.05	-0.07	-0.10	-0.14	-0.22
PRICE.LEVEL %	0.40	0.49	0.51	0.51	0.51	0.50	0.50	0.49	0.48	0.47
CONS.PRICE.LEVEL %	0.27	0.33	0.34	0.34	0.33	0.32	0.32	0.32	0.32	0.31
DOLLAR.EXCH.RATE %	-0.01	-0.01	-0.01	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00
REAL.EXCH.RATE %	-0.40	-0.49	-0.52	-0.52	-0.51	-0.50	-0.50	-0.49	-0.48	-0.47
REAL.EFF.EXCH.RATE %	-0.36	-0.45	-0.47	-0.47	-0.46	-0.45	-0.45	-0.45	-0.44	-0.43
MONEY %	0.95	0.61	0.51	0.47	0.45	0.43	0.40	0.37	0.33	0.27
SHORT.RATE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LONG.RATE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REAL.SHORT.RATE	-0.13	-0.04	-0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03
INFLATION	0.39	0.09	0.02	0.00	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
UNEMPL.RATE	-0.17	-0.08	-0.04	-0.03	-0.03	-0.03	-0.04	-0.04	-0.04	-0.04
DEBT.TO.GDP	0.20	1.46	2.61	3.70	4.78	5.92	7.04	8.16	9.29	10.43
DEFG.TO.GDP	1.06	1.12	1.15	1.18	1.20	1.22	1.25	1.28	1.30	1.33
TRADE.BAL.TO.GDP	-0.39	-0.35	-0.34	-0.35	-0.36	-0.35	-0.32	-0.30	-0.26	-0.23

Note: % percentage difference from base, otherwise absolute difference from base.
Monetary shock: permanent EU-wide 1% increase in money supply, under fully flexible exchange rates.
Fiscal shock: increase in government purchases of goods and services of 1% of GDP for a period of 10 years, with tax rule switched off for 10 years. Fixed exchange rates in EU, with German interest rate targetting.

TABLE A.3: ITALY

Increase of 1% in Money Target

Year:	1	2	3	4	5	6	7	8	9	10
TOTAL.GDP %	0.60	0.33	0.18	0.10	0.06	0.04	0.03	0.02	0.02	0.01
POT.PRIV.GDP %	0.14	0.06	0.03	0.02	0.02	0.02	0.02	0.01	0.01	0.01
PRIV.CONS %	0.64	0.19	0.10	0.08	0.06	0.05	0.05	0.04	0.04	0.03
PRIV.INV %	1.19	0.87	0.41	0.15	0.02	-0.02	-0.04	-0.05	-0.05	-0.04
TOT.PUBL.EXP %	0.44	0.43	0.22	0.13	0.09	0.06	0.05	0.05	0.04	0.04
EXPORTS %	0.63	0.38	0.24	0.16	0.11	0.09	0.08	0.07	0.07	0.06
IMPORTS %	0.73	0.29	0.14	0.08	0.05	0.04	0.04	0.03	0.03	0.03
EMPLOYMENT %	0.15	0.04	-0.01	-0.02	-0.02	-0.01	-0.01	-0.01	-0.01	-0.01
REAL.WAGE.COSTS %	0.33	0.45	0.22	0.11	0.07	0.05	0.04	0.03	0.02	0.02
PRICE.LEVEL %	0.40	0.66	0.82	0.90	0.93	0.95	0.96	0.97	0.97	0.98
CONS.PRICE.LEVEL %	0.43	0.71	0.87	0.95	0.99	1.01	1.02	1.02	1.03	1.03
DOLLAR.EXCH.RATE %	0.58	0.83	0.95	1.00	1.02	1.02	1.03	1.02	1.02	1.02
REAL.EXCH.RATE %	0.18	0.17	0.13	0.10	0.08	0.07	0.06	0.05	0.05	0.04
REAL.EFF.EXCH.RATE %	0.04	0.08	0.06	0.05	0.04	0.04	0.04	0.03	0.03	0.03
MONEY %	1.01	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SHORT.RATE	0.36	0.16	0.07	0.03	0.01	0.00	0.00	0.00	0.00	0.00
LONG.RATE	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REAL.SHORT.RATE	0.08	-0.03	-0.03	-0.02	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
INFLATION	0.40	0.26	0.16	0.08	0.04	0.02	0.01	0.01	0.00	0.00
UNEMPL.RATE	-0.14	-0.03	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01
DEBT.TO.GDP	-0.22	0.05	0.04	0.02	0.01	0.01	0.00	0.00	0.00	0.00
DEFG.TO.GDP	1.05	0.03	-0.04	-0.02	-0.01	-0.01	0.00	0.00	0.00	0.00
TRADE.BAL.TO.GDP	-0.04	0.01	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01

Increase in Government Purchases of 1% of GDP

Year:	1	2	3	4	5	6	7	8	9	10
TOTAL.GDP %	0.63	0.19	0.04	-0.01	-0.03	-0.05	-0.07	-0.11	-0.15	-0.19
POT.PRIV.GDP %	0.18	0.07	0.02	-0.01	-0.02	-0.05	-0.07	-0.10	-0.14	-0.18
PRIV.CONS %	-0.23	-0.60	-0.68	-0.69	-0.67	-0.65	-0.64	-0.63	-0.62	-0.62
PRIV.INV %	0.81	-0.64	-1.07	-1.21	-1.30	-1.50	-1.78	-2.09	-2.46	-2.85
TOT.PUBL.EXP %	6.42	6.24	6.13	6.20	6.31	6.28	6.18	6.08	5.98	5.85
EXPORTS %	-0.07	-0.17	-0.19	-0.20	-0.20	-0.21	-0.21	-0.21	-0.20	-0.20
IMPORTS %	1.42	1.06	0.95	0.91	0.90	0.86	0.81	0.75	0.68	0.60
EMPLOYMENT %	0.20	0.07	0.03	0.02	0.02	0.03	0.03	0.03	0.03	0.04
REAL.WAGE.COSTS %	0.27	0.28	0.04	-0.03	-0.05	-0.07	-0.10	-0.14	-0.18	-0.27
PRICE.LEVEL %	0.42	0.55	0.58	0.59	0.58	0.58	0.58	0.58	0.58	0.57
CONS.PRICE.LEVEL %	0.33	0.43	0.45	0.45	0.44	0.44	0.44	0.44	0.44	0.43
DOLLAR.EXCH.RATE %	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
REAL.EXCH.RATE %	-0.43	-0.56	-0.59	-0.59	-0.59	-0.59	-0.59	-0.59	-0.58	-0.57
REAL.EFF.EXCH.RATE %	-0.40	-0.53	-0.56	-0.56	-0.56	-0.56	-0.56	-0.56	-0.55	-0.55
MONEY %	1.03	0.68	0.56	0.51	0.49	0.47	0.45	0.41	0.37	0.31
SHORT.RATE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LONG.RATE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REAL.SHORT.RATE	-0.17	-0.05	-0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.03
INFLATION	0.43	0.13	0.03	0.00	0.00	0.00	0.00	0.00	0.00	-0.01
UNEMPL.RATE	-0.17	-0.06	-0.02	-0.02	-0.02	-0.02	-0.03	-0.03	-0.03	-0.04
DEBT.TO.GDP	-0.49	0.96	2.20	3.34	4.43	5.55	6.66	7.77	8.90	10.04
DEFG.TO.GDP	0.97	1.11	1.15	1.17	1.18	1.20	1.22	1.25	1.28	1.31
TRADE.BAL.TO.GDP	-0.33	-0.27	-0.25	-0.25	-0.26	-0.25	-0.23	-0.21	-0.19	-0.17

Note: see Table A.1.

TABLE A.4: UK

Increase of 1% in Money Target

Year:	1	2	3	4	5	6	7	8	9	10
TOTAL.GDP %	0.59	0.36	0.23	0.15	0.11	0.08	0.06	0.05	0.04	0.03
POT.PRIV.GDP %	0.15	0.14	0.10	0.08	0.06	0.05	0.04	0.03	0.02	0.02
PRIV.CONS %	0.42	0.22	0.15	0.10	0.07	0.06	0.05	0.04	0.03	0.02
PRIV.INV %	1.95	0.99	0.51	0.23	0.06	-0.02	-0.06	-0.07	-0.08	-0.08
TOT.PUBL.EXP %	0.50	0.41	0.28	0.21	0.16	0.13	0.11	0.09	0.08	0.07
EXPORTS %	0.52	0.31	0.21	0.16	0.13	0.11	0.09	0.08	0.08	0.07
IMPORTS %	0.62	0.29	0.16	0.09	0.05	0.02	0.01	0.01	0.01	0.01
EMPLOYMENT %	0.17	0.13	0.07	0.04	0.02	0.01	0.00	0.00	-0.01	-0.01
REAL.WAGE.COSTS %	0.20	0.35	0.23	0.16	0.11	0.09	0.07	0.05	0.04	0.04
PRICE.LEVEL %	0.38	0.62	0.75	0.83	0.88	0.91	0.93	0.94	0.95	0.96
CONS.PRICE.LEVEL %	0.47	0.69	0.83	0.91	0.95	0.98	1.00	1.01	1.02	1.02
DOLLAR.EXCH.RATE %	0.68	0.83	0.93	0.98	1.01	1.02	1.02	1.02	1.02	1.02
REAL.EXCH.RATE %	0.30	0.22	0.18	0.15	0.13	0.11	0.09	0.08	0.07	0.06
REAL.EFF.EXCH.RATE %	0.18	0.13	0.12	0.10	0.09	0.08	0.07	0.06	0.06	0.05
MONEY %	1.01	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SHORT.RATE	0.14	0.13	0.06	0.04	0.02	0.01	0.00	0.00	0.00	0.00
LONG.RATE	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REAL.SHORT.RATE	-0.14	-0.03	-0.03	-0.02	-0.02	-0.02	-0.01	-0.01	-0.01	-0.01
INFLATION	0.38	0.24	0.14	0.08	0.05	0.03	0.02	0.01	0.01	0.01
UNEMPL.RATE	-0.16	-0.12	-0.07	-0.03	-0.02	0.00	0.00	0.00	0.01	0.01
DEBT.TO.GDP	-0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DEFG.TO.GDP	0.44	0.02	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
TRADE.BAL.TO.GDP	-0.08	-0.02	0.00	0.01	0.01	0.02	0.02	0.02	0.02	0.01

Increase in Government Purchases of 1% of GDP

Year:	1	2	3	4	5	6	7	8	9	10
TOTAL.GDP %	0.61	0.23	0.11	0.05	0.02	-0.01	-0.04	-0.08	-0.12	-0.18
POT.PRIV.GDP %	0.18	0.14	0.09	0.05	0.03	0.00	-0.03	-0.07	-0.11	-0.16
PRIV.CONS %	-0.14	-0.39	-0.44	-0.46	-0.46	-0.46	-0.47	-0.48	-0.49	-0.50
PRIV.INV %	1.27	-0.19	-0.65	-0.86	-1.01	-1.27	-1.60	-1.98	-2.43	-2.94
TOT.PUBL.EXP %	5.17	5.02	4.94	4.94	4.97	4.95	4.90	4.85	4.79	4.71
EXPORTS %	-0.06	-0.21	-0.24	-0.25	-0.25	-0.25	-0.25	-0.25	-0.24	-0.24
IMPORTS %	1.44	1.11	1.00	0.94	0.90	0.84	0.77	0.69	0.60	0.49
EMPLOYMENT %	0.21	0.16	0.10	0.07	0.05	0.04	0.04	0.03	0.02	0.02
REAL.WAGE.COSTS %	0.12	0.20	0.07	0.02	-0.02	-0.04	-0.07	-0.10	-0.14	-0.22
PRICE.LEVEL %	0.41	0.52	0.54	0.55	0.54	0.54	0.53	0.52	0.51	0.50
CONS.PRICE.LEVEL %	0.30	0.37	0.38	0.38	0.37	0.37	0.36	0.36	0.36	0.35
DOLLAR.EXCH.RATE %	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.05
REAL.EXCH.RATE %	-0.37	-0.48	-0.50	-0.50	-0.50	-0.49	-0.48	-0.47	-0.47	-0.45
REAL.EFF.EXCH.RATE %	-0.35	-0.45	-0.47	-0.48	-0.47	-0.47	-0.46	-0.45	-0.45	-0.44
MONEY %	1.00	0.70	0.59	0.54	0.50	0.46	0.43	0.38	0.33	0.26
SHORT.RATE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LONG.RATE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REAL.SHORT.RATE	-0.17	-0.04	-0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.02
INFLATION	0.41	0.11	0.03	0.00	0.00	-0.01	-0.01	-0.01	-0.01	-0.01
UNEMPL.RATE	-0.20	-0.15	-0.10	-0.07	-0.05	-0.04	-0.03	-0.03	-0.02	-0.02
DEBT.TO.GDP	0.07	1.25	2.39	3.51	4.65	5.85	7.05	8.28	9.53	10.81
DEFG.TO.GDP	0.91	1.10	1.16	1.20	1.25	1.30	1.35	1.40	1.45	1.49
TRADE.BAL.TO.GDP	-0.42	-0.36	-0.34	-0.34	-0.34	-0.32	-0.29	-0.26	-0.23	-0.19

Note: see Table A.1.

TABLE A.5: SPAIN

Increase of 1% in Money Target

Year:	1	2	3	4	5	6	7	8	9	10
TOTAL.GDP %	0.68	0.44	0.29	0.19	0.14	0.10	0.08	0.06	0.05	0.05
POT.PRIV.GDP %	0.14	0.09	0.06	0.06	0.06	0.05	0.05	0.04	0.04	0.03
PRIV.CONS %	0.52	0.26	0.18	0.13	0.10	0.09	0.07	0.06	0.05	0.05
PRIV.INV %	1.95	1.13	0.62	0.30	0.12	0.03	-0.01	-0.02	-0.03	-0.03
TOT.PUBL.EXP %	0.54	0.54	0.34	0.24	0.18	0.14	0.11	0.10	0.08	0.07
EXPORTS %	0.53	0.32	0.22	0.16	0.12	0.10	0.09	0.08	0.07	0.07
IMPORTS %	0.74	0.35	0.19	0.10	0.04	0.02	0.01	0.00	0.00	0.00
EMPLOYMENT %	0.14	0.04	0.00	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
REAL.WAGE.COSTS %	0.40	0.55	0.32	0.21	0.15	0.11	0.09	0.07	0.06	0.05
PRICE.LEVEL %	0.31	0.54	0.70	0.79	0.85	0.89	0.91	0.92	0.93	0.94
CONS.PRICE.LEVEL %	0.39	0.63	0.78	0.88	0.93	0.96	0.98	0.99	1.00	1.00
DOLLAR.EXCH.RATE %	0.63	0.81	0.92	0.98	1.02	1.03	1.03	1.03	1.03	1.03
DM.EXCH.RATE %	0.11	0.06	0.04	0.03	0.02	0.02	0.02	0.02	0.02	0.03
REAL.EXCH.RATE %	0.32	0.27	0.22	0.19	0.16	0.14	0.12	0.11	0.10	0.09
REAL.EFF.EXCH.RATE %	0.19	0.17	0.16	0.14	0.12	0.11	0.10	0.09	0.08	0.08
MONEY %	1.01	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SHORT.RATE	0.17	0.15	0.08	0.04	0.02	0.01	0.00	0.00	0.00	0.00
LONG.RATE	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REAL.SHORT.RATE	-0.08	-0.03	-0.04	-0.03	-0.02	-0.02	-0.01	-0.01	-0.01	-0.01
INFLATION	0.30	0.23	0.16	0.09	0.06	0.04	0.02	0.02	0.01	0.01
UNEMPL.RATE	-0.11	-0.03	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01
DEBT.TO.GDP	-0.10	0.04	0.03	0.02	0.01	0.01	0.01	0.01	0.00	0.00
DEFG.TO.GDP	0.63	0.00	-0.02	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00
TRADE.BAL.TO.GDP	-0.12	-0.04	-0.02	0.00	0.01	0.02	0.02	0.02	0.02	0.01

Increase in Government Purchases of 1% of GDP

Year:	1	2	3	4	5	6	7	8	9	10
TOTAL.GDP %	0.61	0.23	0.08	0.03	0.01	0.00	-0.02	-0.04	-0.07	-0.11
POT.PRIV.GDP %	0.14	0.08	0.04	0.03	0.02	0.00	-0.01	-0.04	-0.07	-0.10
PRIV.CONS %	-0.15	-0.44	-0.50	-0.50	-0.48	-0.46	-0.46	-0.45	-0.45	-0.46
PRIV.INV %	1.07	-0.09	-0.47	-0.58	-0.62	-0.77	-1.00	-1.27	-1.58	-1.95
TOT.PUBL.EXP %	6.37	6.21	6.14	6.24	6.38	6.37	6.29	6.21	6.12	6.01
EXPORTS %	-0.05	-0.15	-0.18	-0.19	-0.19	-0.19	-0.19	-0.19	-0.19	-0.19
IMPORTS %	1.43	1.07	0.95	0.92	0.92	0.89	0.84	0.78	0.71	0.62
EMPLOYMENT %	0.15	0.06	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03
REAL.WAGE.COSTS %	0.30	0.31	0.08	0.02	-0.01	-0.02	-0.04	-0.06	-0.09	-0.16
PRICE.LEVEL %	0.28	0.40	0.44	0.45	0.45	0.45	0.45	0.45	0.44	0.44
CONS.PRICE.LEVEL %	0.18	0.24	0.26	0.26	0.25	0.25	0.25	0.25	0.26	0.26
DOLLAR.EXCH.RATE %	-0.02	-0.02	-0.02	-0.02	-0.02	-0.01	-0.01	-0.01	-0.01	-0.01
REAL.EXCH.RATE %	-0.30	-0.41	-0.45	-0.46	-0.46	-0.46	-0.46	-0.46	-0.46	-0.45
REAL.EFF.EXCH.RATE %	-0.28	-0.39	-0.43	-0.44	-0.44	-0.44	-0.44	-0.44	-0.43	-0.43
MONEY %	0.87	0.59	0.47	0.43	0.41	0.40	0.38	0.36	0.33	0.28
SHORT.RATE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LONG.RATE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REAL.SHORT.RATE	-0.15	-0.06	-0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.02
INFLATION	0.28	0.11	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00
UNEMPL.RATE	-0.12	-0.05	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
DEBT.TO.GDP	0.13	1.41	2.59	3.69	4.76	5.89	7.01	8.14	9.27	10.42
DEFG.TO.GDP	1.08	1.15	1.18	1.19	1.21	1.23	1.26	1.28	1.31	1.33
TRADE.BAL.TO.GDP	-0.47	-0.38	-0.36	-0.37	-0.39	-0.37	-0.35	-0.32	-0.29	-0.25

Note: see Table A.1.

TABLE A.6: NETHERLANDS

Increase of 1% in Money Target

Year:	1	2	3	4	5	6	7	8	9	10
TOTAL.GDP %	0.55	0.27	0.12	0.05	0.02	0.00	-0.01	-0.02	-0.02	-0.02
POT.PRIV.GDP %	0.13	0.06	0.01	0.00	-0.01	-0.01	-0.02	-0.02	-0.03	-0.03
PRIV.CONS %	0.48	0.13	0.05	0.02	0.01	0.01	0.00	0.00	0.00	-0.01
PRIV.INV %	0.61	0.25	0.04	-0.08	-0.14	-0.16	-0.16	-0.15	-0.14	-0.13
TOT.PUBL.EXP %	0.35	0.33	0.16	0.09	0.06	0.04	0.03	0.03	0.02	0.02
EXPORTS %	0.95	0.61	0.39	0.27	0.22	0.20	0.18	0.17	0.17	0.16
IMPORTS %	0.69	0.40	0.27	0.22	0.19	0.19	0.18	0.18	0.18	0.18
EMPLOYMENT %	0.16	0.05	0.00	-0.01	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
REAL.WAGE.COSTS %	0.24	0.37	0.16	0.07	0.04	0.02	0.01	0.00	-0.01	-0.01
PRICE.LEVEL %	0.46	0.74	0.88	0.95	0.98	0.99	1.00	1.00	1.01	1.01
CONS.PRICE.LEVEL %	0.42	0.74	0.92	1.01	1.05	1.08	1.09	1.09	1.09	1.10
DOLLAR.EXCH.RATE %	0.50	0.78	0.94	1.01	1.05	1.06	1.07	1.07	1.06	1.06
DM.EXCH.RATE %	-0.03	0.03	0.05	0.06	0.06	0.05	0.05	0.05	0.06	0.06
REAL.EXCH.RATE %	0.04	0.05	0.06	0.07	0.07	0.07	0.07	0.06	0.06	0.05
REAL.EFF.EXCH.RATE %	-0.10	-0.05	-0.01	0.01	0.03	0.04	0.04	0.04	0.04	0.04
MONEY %	1.01	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SHORT.RATE	0.36	0.21	0.10	0.05	0.02	0.01	0.00	0.00	0.00	0.00
LONG.RATE	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REAL.SHORT.RATE	0.06	0.03	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
INFLATION	0.46	0.27	0.14	0.07	0.03	0.01	0.01	0.01	0.00	0.00
UNEMPL.RATE	-0.15	-0.05	0.00	0.01	0.02	0.02	0.02	0.02	0.02	0.02
DEBT.TO.GDP	-0.14	0.02	0.02	0.00	0.00	-0.01	-0.01	-0.01	-0.01	0.00
DEFG.TO.GDP	0.63	0.02	-0.03	-0.02	-0.01	0.00	0.00	0.00	0.00	0.00
TRADE.BAL.TO.GDP	0.14	0.13	0.08	0.05	0.03	0.02	0.01	0.01	0.00	0.00

Increase in Government Purchases of 1% of GDP

Year:	1	2	3	4	5	6	7	8	9	10
TOTAL.GDP %	0.09	0.01	0.00	0.00	-0.01	0.00	0.00	0.00	-0.01	-0.01
POT.PRIV.GDP %	0.04	0.01	0.01	0.00	0.00	0.00	0.00	-0.01	-0.01	-0.01
PRIV.CONS %	-0.27	-0.48	-0.46	-0.45	-0.43	-0.41	-0.40	-0.39	-0.38	-0.37
PRIV.INV %	-0.15	-0.11	-0.11	-0.10	-0.09	-0.12	-0.16	-0.21	-0.27	-0.34
TOT.PUBL.EXP %	7.09	7.09	7.10	7.13	7.17	7.15	7.10	7.06	7.01	6.96
EXPORTS %	-0.08	-0.13	-0.12	-0.11	-0.10	-0.10	-0.11	-0.12	-0.13	-0.13
IMPORTS %	1.10	0.98	0.97	0.96	0.96	0.95	0.95	0.95	0.94	0.94
EMPLOYMENT %	0.05	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
REAL.WAGE.COSTS %	0.00	0.02	0.00	-0.01	-0.01	-0.01	-0.01	-0.01	-0.02	-0.03
PRICE.LEVEL %	0.09	0.07	0.07	0.06	0.05	0.05	0.05	0.06	0.06	0.06
CONS.PRICE.LEVEL %	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02
DOLLAR.EXCH.RATE %	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
REAL.EXCH.RATE %	-0.10	-0.08	-0.08	-0.07	-0.06	-0.06	-0.07	-0.07	-0.07	-0.07
REAL.EFF.EXCH.RATE %	-0.08	-0.06	-0.06	-0.05	-0.04	-0.04	-0.04	-0.05	-0.05	-0.05
MONEY %	0.15	0.03	0.02	0.01	0.00	0.01	0.01	0.01	0.01	0.01
SHORT.RATE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LONG.RATE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REAL.SHORT.RATE	0.04	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
INFLATION	0.09	-0.02	0.00	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00
UNEMPL.RATE	-0.05	-0.02	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
DEBT.TO.GDP	0.54	1.65	2.70	3.73	4.76	5.84	6.91	7.98	9.06	10.14
DEFG.TO.GDP	1.04	1.09	1.11	1.14	1.16	1.19	1.21	1.24	1.27	1.30
TRADE.BAL.TO.GDP	-0.66	-0.64	-0.65	-0.67	-0.69	-0.68	-0.68	-0.68	-0.67	-0.67

Note: see Table A.1.

TABLE A.7: BELGIUM

Increase of 1% in Money Target

Year:	1	2	3	4	5	6	7	8	9	10
TOTAL.GDP %	0.61	0.37	0.22	0.13	0.07	0.03	0.00	-0.02	-0.03	-0.04
POT.PRIV.GDP %	0.14	0.10	0.06	0.03	0.01	-0.01	-0.03	-0.04	-0.05	-0.06
PRIV.CONS %	0.76	0.17	0.05	0.00	-0.03	-0.04	-0.05	-0.06	-0.06	-0.07
PRIV.INV %	1.54	0.72	0.21	-0.14	-0.37	-0.45	-0.44	-0.41	-0.37	-0.32
TOT.PUBL.EXP %	0.33	0.41	0.26	0.18	0.13	0.10	0.07	0.05	0.03	0.02
EXPORTS %	0.82	0.53	0.39	0.31	0.29	0.28	0.27	0.25	0.24	0.22
IMPORTS %	0.95	0.39	0.24	0.19	0.18	0.19	0.20	0.21	0.21	0.21
EMPLOYMENT %	0.15	0.08	0.03	0.00	-0.02	-0.03	-0.03	-0.03	-0.03	-0.03
REAL.WAGE.COSTS %	0.26	0.43	0.26	0.16	0.11	0.07	0.04	0.02	0.00	-0.01
PRICE.LEVEL %	0.37	0.63	0.78	0.87	0.93	0.96	0.99	1.00	1.02	1.03
CONS.PRICE.LEVEL %	0.31	0.61	0.82	0.96	1.06	1.12	1.15	1.16	1.17	1.18
DOLLAR.EXCH.RATE %	0.44	0.69	0.86	0.96	1.03	1.08	1.10	1.11	1.12	1.12
DM.EXCH.RATE %	-0.08	-0.06	-0.03	0.01	0.04	0.07	0.09	0.10	0.11	0.12
REAL.EXCH.RATE %	0.07	0.06	0.08	0.09	0.11	0.12	0.11	0.11	0.10	0.09
REAL.EFF.EXCH.RATE %	-0.08	-0.04	0.00	0.04	0.06	0.08	0.09	0.09	0.08	0.08
MONEY %	1.01	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SHORT.RATE	0.25	0.19	0.12	0.08	0.05	0.03	0.02	0.01	0.00	0.00
LONG.RATE	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REAL.SHORT.RATE	-0.03	0.01	0.01	0.02	0.01	0.00	0.00	-0.01	-0.01	-0.01
INFLATION	0.37	0.25	0.15	0.09	0.05	0.03	0.02	0.02	0.01	0.01
UNEMPL.RATE	-0.13	-0.07	-0.02	0.00	0.02	0.02	0.03	0.03	0.03	0.03
DEBT.TO.GDP	-0.27	0.05	0.06	0.03	0.02	0.01	0.00	0.00	0.00	0.00
DEFG.TO.GDP	1.12	0.06	-0.04	-0.03	-0.02	-0.02	-0.01	0.00	0.00	0.00
TRADE.BAL.TO.GDP	-0.11	0.11	0.12	0.11	0.10	0.07	0.05	0.03	0.02	0.01

Increase in Government Purchases of 1% of GDP

Year:	1	2	3	4	5	6	7	8	9	10
TOTAL.GDP %	-0.03	-0.03	-0.03	-0.04	-0.05	-0.05	-0.04	-0.04	-0.04	-0.05
POT.PRIV.GDP %	-0.01	-0.01	-0.02	-0.03	-0.03	-0.04	-0.05	-0.05	-0.05	-0.05
PRIV.CONS %	-0.31	-0.48	-0.48	-0.48	-0.48	-0.47	-0.46	-0.44	-0.43	-0.42
PRIV.INV %	-0.22	-0.21	-0.23	-0.25	-0.28	-0.25	-0.19	-0.14	-0.09	-0.05
TOT.PUBL.EXP %	7.09	7.18	7.29	7.39	7.48	7.48	7.43	7.38	7.33	7.29
EXPORTS %	0.02	0.04	0.06	0.08	0.11	0.13	0.12	0.11	0.10	0.09
IMPORTS %	0.91	0.80	0.81	0.82	0.83	0.86	0.88	0.88	0.89	0.90
EMPLOYMENT %	-0.01	-0.01	-0.01	-0.01	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
REAL.WAGE.COSTS %	-0.01	-0.02	-0.02	-0.03	-0.03	-0.02	-0.02	-0.03	-0.03	-0.03
PRICE.LEVEL %	-0.01	-0.03	-0.04	-0.05	-0.07	-0.08	-0.07	-0.07	-0.06	-0.06
CONS.PRICE.LEVEL %	0.00	0.01	0.01	0.02	0.02	0.03	0.02	0.02	0.02	0.02
DOLLAR.EXCH.RATE %	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
REAL.EXCH.RATE %	-0.01	0.01	0.02	0.03	0.05	0.06	0.06	0.05	0.05	0.04
REAL.EFF.EXCH.RATE %	0.02	0.03	0.05	0.06	0.08	0.09	0.08	0.08	0.07	0.07
MONEY %	-0.07	-0.09	-0.11	-0.13	-0.16	-0.16	-0.15	-0.14	-0.14	-0.14
SHORT.RATE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LONG.RATE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REAL.SHORT.RATE	0.02	0.01	0.01	0.02	0.01	0.00	0.00	0.00	0.00	0.00
INFLATION	-0.01	-0.01	-0.01	-0.01	-0.02	-0.01	0.00	0.01	0.01	0.00
UNEMPL.RATE	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02
DEBT.TO.GDP	0.69	1.74	2.79	3.84	4.90	5.97	7.01	8.06	9.12	10.18
DEFG.TO.GDP	1.05	1.09	1.11	1.13	1.15	1.17	1.20	1.23	1.26	1.29
TRADE.BAL.TO.GDP	-0.77	-0.68	-0.70	-0.72	-0.74	-0.75	-0.76	-0.77	-0.78	-0.79

Note: see Table A.1.

TABLE A.8: DENMARK

Increase of 1% in Money Target

Year:	1	2	3	4	5	6	7	8	9	10
TOTAL.GDP %	0.53	0.31	0.17	0.09	0.05	0.02	0.01	0.00	-0.01	-0.02
POT.PRIV.GDP %	0.16	0.10	0.05	0.02	0.01	0.00	-0.01	-0.01	-0.02	-0.02
PRIV.CONS %	0.50	0.20	0.10	0.06	0.03	0.02	0.02	0.01	0.01	0.00
PRIV.INV %	1.39	0.63	0.20	-0.03	-0.13	-0.17	-0.17	-0.16	-0.15	-0.14
TOT.PUBL.EXP %	0.34	0.39	0.23	0.14	0.09	0.07	0.05	0.04	0.03	0.02
EXPORTS %	0.67	0.39	0.26	0.19	0.14	0.11	0.10	0.09	0.08	0.07
IMPORTS %	0.68	0.33	0.17	0.09	0.06	0.05	0.04	0.04	0.04	0.04
EMPLOYMENT %	0.14	0.06	0.01	-0.02	-0.02	-0.03	-0.02	-0.02	-0.02	-0.02
REAL.WAGE.COSTS %	0.23	0.39	0.22	0.13	0.08	0.05	0.03	0.02	0.01	0.00
PRICE.LEVEL %	0.42	0.66	0.81	0.89	0.94	0.96	0.98	0.98	0.99	1.00
CONS.PRICE.LEVEL %	0.47	0.73	0.89	0.97	1.02	1.05	1.06	1.07	1.07	1.08
DOLLAR.EXCH.RATE %	0.58	0.78	0.90	0.96	0.99	1.00	1.01	1.01	1.01	1.00
DM.EXCH.RATE %	0.06	0.03	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00
REAL.EXCH.RATE %	0.16	0.12	0.09	0.07	0.06	0.04	0.03	0.02	0.02	0.01
REAL.EFF.EXCH.RATE %	0.01	0.02	0.02	0.01	0.01	0.01	0.00	0.00	0.00	0.00
MONEY %	1.01	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SHORT.RATE	0.21	0.16	0.08	0.04	0.02	0.01	0.00	0.00	0.00	0.00
LONG.RATE	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REAL.SHORT.RATE	-0.06	-0.02	-0.02	-0.02	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
INFLATION	0.42	0.24	0.15	0.08	0.04	0.02	0.01	0.01	0.01	0.00
UNEMPL.RATE	-0.13	-0.06	0.00	0.02	0.02	0.02	0.02	0.02	0.02	0.02
DEBT.TO.GDP	-0.15	0.02	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00
DEFG.TO.GDP	0.54	0.05	-0.01	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00
TRADE.BAL.TO.GDP	-0.02	0.02	0.04	0.04	0.04	0.04	0.03	0.03	0.02	0.02

Increase in Government Purchases of 1% of GDP

Year:	1	2	3	4	5	6	7	8	9	10
TOTAL.GDP %	0.28	0.12	0.07	0.04	0.03	0.03	0.02	0.01	-0.01	-0.04
POT.PRIV.GDP %	0.11	0.08	0.06	0.05	0.04	0.04	0.03	0.01	-0.01	-0.03
PRIV.CONS %	-0.28	-0.56	-0.56	-0.53	-0.50	-0.48	-0.46	-0.45	-0.44	-0.44
PRIV.INV %	0.53	-0.01	-0.22	-0.29	-0.32	-0.45	-0.67	-0.94	-1.27	-1.67
TOT.PUBL.EXP %	4.23	4.26	4.23	4.24	4.27	4.25	4.21	4.16	4.10	4.02
EXPORTS %	-0.06	-0.13	-0.15	-0.15	-0.15	-0.15	-0.15	-0.16	-0.16	-0.16
IMPORTS %	1.32	1.08	1.05	1.04	1.06	1.04	1.01	0.97	0.91	0.84
EMPLOYMENT %	0.10	0.07	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.05
REAL.WAGE.COSTS %	0.07	0.12	0.04	0.01	0.00	0.00	-0.01	-0.03	-0.05	-0.11
PRICE.LEVEL %	0.23	0.29	0.31	0.31	0.31	0.31	0.32	0.32	0.33	0.33
CONS.PRICE.LEVEL %	0.12	0.15	0.16	0.16	0.15	0.15	0.16	0.16	0.17	0.17
DOLLAR.EXCH.RATE %	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REAL.EXCH.RATE %	-0.24	-0.29	-0.31	-0.31	-0.31	-0.31	-0.32	-0.32	-0.33	-0.34
REAL.EFF.EXCH.RATE %	-0.23	-0.28	-0.30	-0.30	-0.30	-0.30	-0.30	-0.31	-0.32	-0.32
MONEY %	0.47	0.31	0.27	0.26	0.25	0.25	0.25	0.25	0.23	0.20
SHORT.RATE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LONG.RATE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REAL.SHORT.RATE	-0.07	-0.03	-0.01	0.00	0.00	0.00	-0.01	-0.01	-0.01	0.01
INFLATION	0.24	0.05	0.02	0.00	0.00	0.00	0.01	0.01	0.01	0.00
UNEMPL.RATE	-0.09	-0.06	-0.04	-0.04	-0.03	-0.03	-0.04	-0.04	-0.04	-0.04
DEBT.TO.GDP	0.37	1.55	2.69	3.81	4.91	6.07	7.20	8.35	9.50	10.67
DEFG.TO.GDP	1.08	1.17	1.19	1.21	1.24	1.26	1.29	1.32	1.36	1.39
TRADE.BAL.TO.GDP	-0.54	-0.46	-0.46	-0.47	-0.49	-0.48	-0.46	-0.44	-0.41	-0.37

Note: see Table A.1.

TABLE A.9: IRELAND

Increase of 1% in Money Target

Year:	1	2	3	4	5	6	7	8	9	10
TOTAL.GDP %	0.59	0.35	0.22	0.14	0.10	0.08	0.07	0.06	0.05	0.05
POT.PRIV.GDP %	0.19	0.16	0.12	0.09	0.07	0.06	0.06	0.05	0.05	0.04
PRIV.CONS %	0.57	0.26	0.19	0.16	0.15	0.13	0.12	0.11	0.10	0.09
PRIV.INV %	1.63	0.73	0.35	0.16	0.08	0.03	0.00	-0.01	-0.01	0.00
TOT.PUBL.EXP %	0.27	0.30	0.19	0.12	0.09	0.07	0.05	0.05	0.04	0.04
EXPORTS %	0.82	0.49	0.29	0.17	0.11	0.08	0.06	0.05	0.05	0.04
IMPORTS %	0.90	0.47	0.29	0.19	0.14	0.11	0.10	0.09	0.08	0.08
EMPLOYMENT %	0.20	0.14	0.08	0.04	0.03	0.02	0.01	0.01	0.01	0.01
REAL.WAGE.COSTS %	0.17	0.34	0.21	0.14	0.10	0.08	0.06	0.06	0.05	0.04
PRICE.LEVEL %	0.43	0.66	0.78	0.85	0.89	0.91	0.93	0.94	0.94	0.95
CONS.PRICE.LEVEL %	0.27	0.56	0.72	0.81	0.85	0.88	0.90	0.91	0.92	0.93
DOLLAR.EXCH.RATE %	0.42	0.66	0.80	0.87	0.90	0.92	0.93	0.94	0.94	0.94
DM.EXCH.RATE %	-0.11	-0.09	-0.09	-0.09	-0.09	-0.08	-0.08	-0.07	-0.07	-0.06
REAL.EXCH.RATE %	-0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.00	-0.01
REAL.EFF.EXCH.RATE %	-0.20	-0.11	-0.07	-0.05	-0.04	-0.03	-0.03	-0.02	-0.02	-0.02
MONEY %	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SHORT.RATE	0.35	0.19	0.09	0.05	0.02	0.01	0.01	0.00	0.00	0.00
LONG.RATE	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REAL.SHORT.RATE	0.10	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INFLATION	0.43	0.23	0.12	0.07	0.04	0.02	0.01	0.01	0.01	0.01
UNEMPL.RATE	-0.18	-0.13	-0.07	-0.04	-0.02	-0.01	-0.01	-0.01	-0.01	0.00
DEBT.TO.GDP	-0.11	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
DEFG.TO.GDP	0.57	0.02	-0.02	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00
TRADE.BAL.TO.GDP	0.00	0.04	0.02	0.00	-0.01	-0.02	-0.02	-0.02	-0.02	-0.02

Increase in Government Purchases of 1% of GDP

Year:	1	2	3	4	5	6	7	8	9	10
TOTAL.GDP %	0.06	0.01	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.00
POT.PRIV.GDP %	0.03	0.02	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00
PRIV.CONS %	-0.33	-0.54	-0.53	-0.52	-0.50	-0.48	-0.47	-0.45	-0.44	-0.43
PRIV.INV %	-0.01	-0.04	-0.04	-0.03	-0.01	-0.01	-0.04	-0.06	-0.10	-0.14
TOT.PUBL.EXP %	6.92	7.05	7.14	7.21	7.27	7.25	7.20	7.15	7.10	7.04
EXPORTS %	-0.04	-0.06	-0.05	-0.04	-0.03	-0.03	-0.04	-0.05	-0.06	-0.07
IMPORTS %	1.20	1.05	1.06	1.07	1.09	1.10	1.09	1.09	1.08	1.07
EMPLOYMENT %	0.03	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01
REAL.WAGE.COSTS %	0.00	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	-0.01
PRICE.LEVEL %	0.05	0.04	0.03	0.02	0.01	0.02	0.02	0.03	0.03	0.03
CONS.PRICE.LEVEL %	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
DOLLAR.EXCH.RATE %	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REAL.EXCH.RATE %	-0.05	-0.04	-0.03	-0.03	-0.02	-0.02	-0.02	-0.03	-0.03	-0.04
REAL.EFF.EXCH.RATE %	-0.04	-0.03	-0.03	-0.02	-0.01	-0.01	-0.02	-0.02	-0.03	-0.03
MONEY %	0.08	0.01	0.00	-0.01	-0.02	-0.01	0.00	0.00	0.00	0.01
SHORT.RATE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LONG.RATE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REAL.SHORT.RATE	0.01	0.01	0.01	0.01	0.00	-0.01	-0.01	0.00	0.00	0.00
INFLATION	0.05	-0.01	-0.01	-0.01	-0.01	0.00	0.01	0.00	0.00	0.00
UNEMPL.RATE	-0.03	-0.02	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
DEBT.TO.GDP	0.58	1.63	2.64	3.62	4.56	5.62	6.70	7.78	8.87	9.97
DEFG.TO.GDP	1.05	1.10	1.13	1.14	1.15	1.17	1.20	1.23	1.26	1.29
TRADE.BAL.TO.GDP	-0.76	-0.69	-0.71	-0.72	-0.74	-0.75	-0.75	-0.74	-0.74	-0.74

Note: see Table A.1.

TABLE A.10: PORTUGAL

Increase of 1% in Money Target

Year:	1	2	3	4	5	6	7	8	9	10
TOTAL.GDP %	0.51	0.26	0.13	0.08	0.05	0.04	0.04	0.04	0.04	0.04
POT.PRIV.GDP %	0.16	0.09	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.04
PRIV.CONS %	0.40	0.15	0.09	0.06	0.04	0.03	0.03	0.02	0.01	0.01
PRIV.INV %	1.94	0.90	0.45	0.22	0.12	0.07	0.04	0.03	0.03	0.03
TOT.PUBL.EXP %	0.34	0.30	0.14	0.08	0.05	0.05	0.04	0.04	0.04	0.04
EXPORTS %	0.41	0.20	0.11	0.07	0.05	0.04	0.03	0.03	0.03	0.03
IMPORTS %	0.76	0.35	0.20	0.12	0.07	0.05	0.04	0.03	0.02	0.01
EMPLOYMENT %	0.15	0.06	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REAL.WAGE.COSTS %	0.22	0.35	0.16	0.09	0.06	0.05	0.04	0.04	0.04	0.04
PRICE.LEVEL %	0.49	0.74	0.87	0.92	0.94	0.95	0.96	0.96	0.96	0.96
CONS.PRICE.LEVEL %	0.50	0.72	0.85	0.91	0.94	0.95	0.96	0.96	0.97	0.97
DOLLAR.EXCH.RATE %	0.66	0.82	0.92	0.96	0.98	0.99	0.99	0.99	0.99	0.99
DM.EXCH.RATE %	0.14	0.07	0.03	0.01	-0.01	-0.02	-0.02	-0.02	-0.02	-0.01
REAL.EXCH.RATE %	0.17	0.08	0.05	0.04	0.04	0.03	0.03	0.03	0.03	0.03
REAL.EFF.EXCH.RATE %	0.00	-0.03	-0.03	-0.02	-0.01	-0.01	0.00	0.01	0.01	0.01
MONEY %	1.01	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SHORT.RATE	0.18	0.13	0.06	0.03	0.01	0.00	0.00	0.00	0.00	0.00
LONG.RATE	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REAL.SHORT.RATE	-0.10	-0.03	-0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INFLATION	0.50	0.25	0.13	0.05	0.02	0.01	0.00	0.00	0.00	0.00
UNEMPL.RATE	-0.14	-0.05	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DEBT.TO.GDP	-0.08	0.03	0.02	0.01	0.01	0.01	0.00	0.00	0.00	0.00
DEFG.TO.GDP	0.55	-0.01	-0.02	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00
TRADE.BAL.TO.GDP	-0.23	-0.08	-0.04	-0.02	-0.01	0.00	0.00	0.01	0.01	0.01

Increase in Government Purchases of 1% of GDP

Year:	1	2	3	4	5	6	7	8	9	10
TOTAL.GDP %	0.29	0.09	0.03	0.02	0.02	0.02	0.01	0.00	-0.02	-0.04
POT.PRIV.GDP %	0.11	0.06	0.04	0.03	0.03	0.03	0.02	0.01	-0.01	-0.03
PRIV.CONS %	-0.16	-0.39	-0.40	-0.39	-0.36	-0.35	-0.34	-0.34	-0.34	-0.34
PRIV.INV %	0.40	-0.13	-0.26	-0.28	-0.28	-0.44	-0.66	-0.90	-1.17	-1.46
TOT.PUBL.EXP %	4.80	4.66	4.65	4.72	4.82	4.81	4.76	4.71	4.65	4.58
EXPORTS %	-0.06	-0.10	-0.10	-0.10	-0.09	-0.09	-0.09	-0.09	-0.08	-0.08
IMPORTS %	1.12	0.88	0.84	0.82	0.82	0.79	0.74	0.68	0.62	0.55
EMPLOYMENT %	0.12	0.06	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03
REAL.WAGE.COSTS %	0.07	0.11	0.01	-0.01	-0.01	-0.01	-0.01	-0.03	-0.04	-0.08
PRICE.LEVEL %	0.29	0.33	0.33	0.31	0.30	0.29	0.28	0.27	0.27	0.26
CONS.PRICE.LEVEL %	0.12	0.13	0.13	0.12	0.10	0.10	0.10	0.10	0.10	0.10
DOLLAR.EXCH.RATE %	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
REAL.EXCH.RATE %	-0.30	-0.34	-0.33	-0.32	-0.31	-0.29	-0.29	-0.28	-0.27	-0.27
REAL.EFF.EXCH.RATE %	-0.29	-0.33	-0.32	-0.31	-0.29	-0.28	-0.28	-0.27	-0.26	-0.26
MONEY %	0.56	0.38	0.32	0.29	0.28	0.27	0.26	0.24	0.22	0.19
SHORT.RATE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LONG.RATE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REAL.SHORT.RATE	-0.06	-0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.02
INFLATION	0.29	0.04	0.00	-0.01	-0.02	-0.01	-0.01	-0.01	-0.01	-0.01
UNEMPL.RATE	-0.11	-0.06	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03
DEBT.TO.GDP	0.35	1.52	2.62	3.68	4.71	5.82	6.91	8.01	9.12	10.23
DEFG.TO.GDP	1.05	1.12	1.15	1.17	1.18	1.20	1.23	1.26	1.28	1.31
TRADE.BAL.TO.GDP	-0.57	-0.48	-0.48	-0.50	-0.52	-0.49	-0.45	-0.41	-0.37	-0.32

Note: see Table A.1.

TABLE A.11: GREECE

Increase of 1% in Money Target

Year:	1	2	3	4	5	6	7	8	9	10
TOTAL.GDP %	0.51	0.26	0.14	0.08	0.05	0.04	0.03	0.03	0.03	0.03
POT.PRIV.GDP %	0.14	0.10	0.06	0.04	0.04	0.03	0.03	0.03	0.03	0.03
PRIV.CONS %	0.44	0.12	0.06	0.04	0.03	0.02	0.01	0.01	0.00	0.00
PRIV.INV %	1.28	0.71	0.33	0.14	0.05	0.02	0.00	0.00	0.00	0.00
TOT.PUBL.EXP %	0.30	0.29	0.15	0.09	0.06	0.04	0.04	0.04	0.03	0.03
EXPORTS %	0.36	0.17	0.10	0.06	0.05	0.04	0.04	0.04	0.03	0.03
IMPORTS %	0.63	0.26	0.13	0.06	0.03	0.01	-0.01	-0.01	-0.02	-0.02
EMPLOYMENT %	0.16	0.08	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00
REAL.WAGE.COSTS %	0.17	0.31	0.16	0.09	0.06	0.04	0.04	0.03	0.03	0.03
PRICE.LEVEL %	0.50	0.74	0.86	0.92	0.95	0.96	0.96	0.97	0.97	0.97
CONS.PRICE.LEVEL %	0.51	0.75	0.87	0.92	0.95	0.96	0.97	0.98	0.98	0.98
DOLLAR.EXCH.RATE %	0.66	0.86	0.95	0.99	1.00	1.01	1.02	1.02	1.02	1.02
DM.EXCH.RATE %	0.14	0.11	0.06	0.03	0.01	0.01	0.00	0.01	0.01	0.01
REAL.EXCH.RATE %	0.16	0.11	0.08	0.07	0.06	0.05	0.05	0.05	0.05	0.04
REAL.EFF.EXCH.RATE %	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.03	0.03	0.03
MONEY %	1.01	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SHORT.RATE	0.31	0.12	0.05	0.02	0.01	0.01	0.00	0.00	0.00	0.00
LONG.RATE	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REAL.SHORT.RATE	0.04	-0.03	-0.02	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
INFLATION	0.52	0.25	0.12	0.06	0.03	0.01	0.01	0.00	0.00	0.00
UNEMPL.RATE	-0.14	-0.07	-0.03	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
DEBT.TO.GDP	-0.11	0.03	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00
DEFG.TO.GDP	0.92	-0.01	-0.02	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00
TRADE.BAL.TO.GDP	-0.10	-0.03	-0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01

Increase in Government Purchases of 1% of GDP

Year:	1	2	3	4	5	6	7	8	9	10
TOTAL.GDP %	0.55	0.15	0.04	0.00	-0.03	-0.05	-0.08	-0.12	-0.15	-0.20
POT.PRIV.GDP %	0.18	0.11	0.05	0.02	-0.01	-0.03	-0.06	-0.09	-0.13	-0.17
PRIV.CONS %	-0.07	-0.33	-0.39	-0.40	-0.40	-0.41	-0.41	-0.42	-0.42	-0.44
PRIV.INV %	0.60	-0.66	-0.95	-1.08	-1.16	-1.34	-1.55	-1.78	-2.04	-2.32
TOT.PUBL.EXP %	6.48	6.30	6.16	6.17	6.22	6.21	6.17	6.13	6.08	6.01
EXPORTS %	-0.17	-0.20	-0.20	-0.20	-0.19	-0.18	-0.17	-0.16	-0.15	-0.14
IMPORTS %	1.37	1.00	0.88	0.81	0.75	0.68	0.60	0.52	0.42	0.32
EMPLOYMENT %	0.21	0.12	0.06	0.05	0.04	0.04	0.04	0.03	0.03	0.03
REAL.WAGE.COSTS %	0.09	0.18	0.02	-0.03	-0.06	-0.09	-0.11	-0.15	-0.18	-0.26
PRICE.LEVEL %	0.55	0.63	0.63	0.61	0.59	0.56	0.53	0.50	0.47	0.44
CONS.PRICE.LEVEL %	0.35	0.41	0.40	0.39	0.37	0.35	0.33	0.32	0.30	0.28
DOLLAR.EXCH.RATE %	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REAL.EXCH.RATE %	-0.55	-0.63	-0.63	-0.61	-0.59	-0.56	-0.53	-0.50	-0.47	-0.43
REAL.EFF.EXCH.RATE %	-0.54	-0.63	-0.63	-0.61	-0.58	-0.55	-0.52	-0.49	-0.46	-0.43
MONEY %	1.08	0.74	0.62	0.56	0.51	0.46	0.40	0.34	0.27	0.19
SHORT.RATE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LONG.RATE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REAL.SHORT.RATE	-0.15	-0.01	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.04
INFLATION	0.58	0.09	0.00	-0.02	-0.02	-0.03	-0.03	-0.03	-0.03	-0.03
UNEMPL.RATE	-0.19	-0.11	-0.06	-0.04	-0.04	-0.03	-0.03	-0.03	-0.03	-0.03
DEBT.TO.GDP	-0.34	1.05	2.23	3.35	4.47	5.69	6.92	8.17	9.45	10.76
DEFG.TO.GDP	0.99	1.10	1.18	1.23	1.24	1.28	1.33	1.38	1.43	1.48
TRADE.BAL.TO.GDP	-0.33	-0.25	-0.22	-0.21	-0.20	-0.18	-0.16	-0.14	-0.12	-0.09

Note: see Table A.1.

TABLE A.12: AUSTRIA

Increase of 1% in Money Target

Year:	1	2	3	4	5	6	7	8	9	10
TOTAL.GDP %	0.53	0.27	0.14	0.08	0.05	0.04	0.04	0.03	0.03	0.03
POT.PRIV.GDP %	0.12	0.05	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03
PRIV.CONS %	0.51	0.20	0.11	0.09	0.08	0.07	0.06	0.06	0.05	0.05
PRIV.INV %	1.11	0.59	0.30	0.15	0.08	0.04	0.03	0.02	0.02	0.01
TOT.PUBL.EXP %	0.43	0.32	0.14	0.08	0.06	0.05	0.04	0.04	0.04	0.04
EXPORTS %	0.53	0.27	0.16	0.10	0.07	0.06	0.05	0.05	0.05	0.05
IMPORTS %	0.66	0.34	0.20	0.14	0.11	0.09	0.08	0.07	0.06	0.06
EMPLOYMENT %	0.13	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REAL.WAGE.COSTS %	0.31	0.38	0.15	0.08	0.06	0.05	0.04	0.04	0.03	0.03
PRICE.LEVEL %	0.44	0.72	0.86	0.91	0.94	0.95	0.95	0.96	0.96	0.96
CONS.PRICE.LEVEL %	0.45	0.70	0.84	0.91	0.94	0.96	0.97	0.97	0.97	0.98
DOLLAR.EXCH.RATE %	0.59	0.79	0.89	0.94	0.96	0.97	0.97	0.97	0.97	0.96
DM.EXCH.RATE %	0.07	0.04	0.01	-0.02	-0.03	-0.04	-0.04	-0.04	-0.04	-0.04
REAL.EXCH.RATE %	0.15	0.07	0.04	0.02	0.02	0.02	0.01	0.01	0.01	0.00
REAL.EFF.EXCH.RATE %	0.00	-0.04	-0.05	-0.04	-0.03	-0.02	-0.02	-0.01	-0.01	-0.01
MONEY %	1.01	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SHORT.RATE	0.19	0.15	0.06	0.03	0.01	0.00	0.00	0.00	0.00	0.00
LONG.RATE	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REAL.SHORT.RATE	-0.12	-0.04	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INFLATION	0.44	0.27	0.14	0.06	0.02	0.01	0.00	0.00	0.00	0.00
UNEMPL.RATE	-0.12	-0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DEBT.TO.GDP	-0.13	0.04	0.03	0.02	0.01	0.01	0.01	0.00	0.00	0.00
DEFG.TO.GDP	0.58	0.03	-0.02	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00
TRADE.BAL.TO.GDP	-0.09	-0.03	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01

Increase in Government Purchases of 1% of GDP

Year:	1	2	3	4	5	6	7	8	9	10
TOTAL.GDP %	0.27	0.07	0.01	0.00	0.00	0.01	0.01	0.00	-0.01	-0.03
POT.PRIV.GDP %	0.07	0.03	0.02	0.02	0.02	0.01	0.01	0.00	-0.01	-0.03
PRIV.CONS %	-0.20	-0.46	-0.48	-0.46	-0.44	-0.41	-0.40	-0.39	-0.39	-0.38
PRIV.INV %	0.20	-0.13	-0.20	-0.19	-0.17	-0.26	-0.40	-0.58	-0.78	-1.01
TOT.PUBL.EXP %	5.08	5.04	5.03	5.12	5.22	5.23	5.19	5.15	5.10	5.04
EXPORTS %	-0.10	-0.20	-0.22	-0.21	-0.20	-0.19	-0.19	-0.19	-0.19	-0.20
IMPORTS %	1.12	0.91	0.88	0.87	0.88	0.86	0.83	0.79	0.75	0.69
EMPLOYMENT %	0.08	0.03	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.02
REAL.WAGE.COSTS %	0.12	0.10	0.00	-0.01	-0.01	0.00	0.00	-0.01	-0.02	-0.06
PRICE.LEVEL %	0.23	0.28	0.28	0.26	0.24	0.24	0.24	0.24	0.25	0.25
CONS.PRICE.LEVEL %	0.10	0.11	0.11	0.09	0.08	0.08	0.08	0.09	0.09	0.09
DOLLAR.EXCH.RATE %	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
REAL.EXCH.RATE %	-0.24	-0.29	-0.29	-0.28	-0.25	-0.25	-0.25	-0.25	-0.25	-0.26
REAL.EFF.EXCH.RATE %	-0.22	-0.27	-0.27	-0.25	-0.23	-0.23	-0.23	-0.23	-0.23	-0.24
MONEY %	0.46	0.28	0.23	0.20	0.18	0.19	0.19	0.19	0.18	0.17
SHORT.RATE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LONG.RATE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REAL.SHORT.RATE	-0.08	-0.01	0.01	0.02	0.01	0.00	0.00	0.00	0.00	0.01
INFLATION	0.23	0.05	0.00	-0.02	-0.02	-0.01	0.00	0.00	0.00	0.00
UNEMPL.RATE	-0.08	-0.02	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.02
DEBT.TO.GDP	0.38	1.57	2.70	3.79	4.87	5.98	7.07	8.17	9.27	10.39
DEFG.TO.GDP	1.07	1.13	1.15	1.17	1.19	1.22	1.25	1.28	1.31	1.34
TRADE.BAL.TO.GDP	-0.58	-0.52	-0.53	-0.56	-0.59	-0.57	-0.54	-0.51	-0.47	-0.43

Note: see Table A.1.

TABLE A.13: SWEDEN

Increase of 1% in Money Target

Year:	1	2	3	4	5	6	7	8	9	10
TOTAL.GDP %	0.60	0.36	0.21	0.12	0.07	0.05	0.03	0.02	0.01	0.01
POT.PRIV.GDP %	0.14	0.08	0.04	0.03	0.02	0.02	0.01	0.01	0.00	0.00
PRIV.CONS %	0.61	0.22	0.13	0.09	0.07	0.05	0.05	0.04	0.03	0.03
PRIV.INV %	1.26	0.81	0.39	0.12	-0.03	-0.09	-0.11	-0.12	-0.12	-0.11
TOT.PUBL.EXP %	0.42	0.43	0.25	0.16	0.11	0.08	0.06	0.05	0.04	0.04
EXPORTS %	0.76	0.45	0.29	0.20	0.15	0.12	0.10	0.09	0.08	0.08
IMPORTS %	0.75	0.37	0.21	0.13	0.09	0.07	0.06	0.06	0.06	0.06
EMPLOYMENT %	0.14	0.05	0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
REAL.WAGE.COSTS %	0.30	0.45	0.24	0.14	0.09	0.06	0.04	0.03	0.02	0.02
PRICE.LEVEL %	0.38	0.63	0.78	0.87	0.91	0.94	0.96	0.96	0.97	0.98
CONS.PRICE.LEVEL %	0.39	0.67	0.84	0.93	0.98	1.01	1.02	1.03	1.03	1.04
DOLLAR.EXCH.RATE %	0.50	0.74	0.87	0.93	0.97	0.98	0.99	0.99	0.99	0.99
DM.EXCH.RATE %	-0.03	-0.01	-0.02	-0.02	-0.03	-0.03	-0.02	-0.02	-0.02	-0.02
REAL.EXCH.RATE %	0.12	0.11	0.09	0.07	0.05	0.04	0.03	0.02	0.02	0.01
REAL.EFF.EXCH.RATE %	-0.03	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00
MONEY %	1.01	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SHORT.RATE	0.31	0.18	0.09	0.04	0.02	0.01	0.00	0.00	0.00	0.00
LONG.RATE	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REAL.SHORT.RATE	0.05	-0.01	-0.02	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
INFLATION	0.38	0.24	0.15	0.09	0.05	0.03	0.02	0.01	0.01	0.00
UNEMPL.RATE	-0.13	-0.05	-0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
DEBT.TO.GDP	-0.15	0.03	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00
DEFG.TO.GDP	0.64	0.03	-0.02	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00
TRADE.BAL.TO.GDP	0.00	0.02	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02

Increase in Government Purchases of 1% of GDP

Year:	1	2	3	4	5	6	7	8	9	10
TOTAL.GDP %	0.47	0.18	0.07	0.03	0.02	0.01	0.01	-0.01	-0.03	-0.06
POT.PRIV.GDP %	0.13	0.08	0.05	0.04	0.03	0.02	0.01	0.00	-0.02	-0.05
PRIV.CONS %	-0.20	-0.51	-0.56	-0.55	-0.52	-0.50	-0.48	-0.47	-0.46	-0.46
PRIV.INV %	1.09	0.00	-0.36	-0.46	-0.48	-0.65	-0.89	-1.19	-1.54	-1.95
TOT.PUBL.EXP %	4.19	4.11	4.02	4.03	4.09	4.08	4.04	4.00	3.95	3.88
EXPORTS %	-0.06	-0.20	-0.23	-0.24	-0.23	-0.23	-0.23	-0.23	-0.23	-0.24
IMPORTS %	1.59	1.27	1.19	1.16	1.17	1.14	1.10	1.05	0.98	0.91
EMPLOYMENT %	0.13	0.07	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03
REAL.WAGE.COSTS %	0.18	0.22	0.06	0.01	-0.01	-0.02	-0.02	-0.04	-0.06	-0.11
PRICE.LEVEL %	0.30	0.40	0.43	0.43	0.43	0.42	0.42	0.42	0.42	0.42
CONS.PRICE.LEVEL %	0.18	0.24	0.25	0.25	0.24	0.23	0.23	0.23	0.24	0.24
DOLLAR.EXCH.RATE %	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DM.EXCH.RATE %	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REAL.EXCH.RATE %	-0.30	-0.40	-0.43	-0.43	-0.42	-0.42	-0.41	-0.41	-0.42	-0.42
REAL.EFF.EXCH.RATE %	-0.29	-0.39	-0.42	-0.42	-0.41	-0.40	-0.40	-0.40	-0.40	-0.40
MONEY %	0.74	0.52	0.43	0.39	0.37	0.36	0.36	0.34	0.32	0.30
SHORT.RATE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LONG.RATE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REAL.SHORT.RATE	-0.13	-0.05	-0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.01
INFLATION	0.30	0.10	0.03	0.00	-0.01	-0.01	0.00	0.00	0.00	0.00
UNEMPL.RATE	-0.12	-0.06	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03
DEBT.TO.GDP	0.10	1.34	2.52	3.66	4.80	5.97	7.13	8.29	9.47	10.67
DEFG.TO.GDP	1.01	1.14	1.17	1.21	1.24	1.27	1.31	1.34	1.38	1.41
TRADE.BAL.TO.GDP	-0.55	-0.47	-0.46	-0.47	-0.49	-0.48	-0.46	-0.43	-0.41	-0.37

Note: see Table A.1.

TABLE A.14: FINLAND

Increase of 1% in Money Target

Year:	1	2	3	4	5	6	7	8	9	10
TOTAL.GDP %	0.64	0.42	0.27	0.18	0.12	0.08	0.05	0.03	0.02	0.01
POT.PRIV.GDP %	0.14	0.10	0.06	0.04	0.03	0.02	0.01	0.00	0.00	-0.01
PRIV.CONS %	0.59	0.30	0.19	0.13	0.10	0.07	0.05	0.04	0.03	0.02
PRIV.INV %	1.40	0.88	0.49	0.21	0.04	-0.05	-0.09	-0.11	-0.12	-0.12
TOT.PUBL.EXP %	0.49	0.51	0.35	0.25	0.19	0.15	0.12	0.10	0.08	0.07
EXPORTS %	0.74	0.45	0.31	0.23	0.18	0.15	0.13	0.12	0.11	0.10
IMPORTS %	0.74	0.40	0.23	0.12	0.06	0.04	0.02	0.01	0.01	0.01
EMPLOYMENT %	0.14	0.07	0.01	-0.01	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
REAL.WAGE.COSTS %	0.33	0.50	0.32	0.21	0.15	0.10	0.07	0.05	0.04	0.03
PRICE.LEVEL %	0.31	0.54	0.70	0.80	0.86	0.90	0.93	0.94	0.96	0.97
CONS.PRICE.LEVEL %	0.38	0.64	0.81	0.92	0.99	1.03	1.05	1.06	1.07	1.08
DOLLAR.EXCH.RATE %	0.54	0.75	0.89	0.96	1.01	1.03	1.04	1.04	1.04	1.04
DM.EXCH.RATE %	0.01	0.00	0.00	0.01	0.02	0.02	0.03	0.03	0.03	0.03
REAL.EXCH.RATE %	0.22	0.21	0.19	0.17	0.15	0.13	0.11	0.10	0.08	0.07
REAL.EFF.EXCH.RATE %	0.10	0.12	0.12	0.12	0.11	0.10	0.09	0.08	0.07	0.06
MONEY %	1.01	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SHORT.RATE	0.23	0.17	0.10	0.06	0.03	0.01	0.01	0.00	0.00	0.00
LONG.RATE	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REAL.SHORT.RATE	-0.01	-0.01	-0.02	-0.02	-0.02	-0.02	-0.01	-0.01	-0.01	-0.01
INFLATION	0.31	0.23	0.15	0.10	0.06	0.04	0.03	0.02	0.01	0.01
UNEMPL.RATE	-0.12	-0.06	-0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02
DEBT.TO.GDP	-0.13	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DEFG.TO.GDP	0.49	0.04	-0.01	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00
TRADE.BAL.TO.GDP	-0.02	0.00	0.01	0.02	0.03	0.03	0.03	0.03	0.03	0.03

Increase in Government Purchases of 1% of GDP

Year:	1	2	3	4	5	6	7	8	9	10
TOTAL.GDP %	0.57	0.23	0.11	0.05	0.02	0.00	-0.02	-0.05	-0.09	-0.14
POT.PRIV.GDP %	0.15	0.10	0.06	0.04	0.02	0.00	-0.02	-0.06	-0.09	-0.14
PRIV.CONS %	-0.27	-0.62	-0.67	-0.66	-0.64	-0.61	-0.59	-0.58	-0.57	-0.57
PRIV.INV %	1.15	0.02	-0.43	-0.64	-0.77	-0.98	-1.25	-1.56	-1.93	-2.36
TOT.PUBL.EXP %	5.12	5.04	4.98	5.02	5.10	5.08	5.04	4.98	4.93	4.84
EXPORTS %	-0.06	-0.17	-0.20	-0.21	-0.22	-0.22	-0.22	-0.23	-0.23	-0.23
IMPORTS %	1.57	1.17	1.06	1.02	1.00	0.95	0.90	0.83	0.75	0.65
EMPLOYMENT %	0.15	0.09	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03
REAL.WAGE.COSTS %	0.22	0.27	0.10	0.03	0.00	-0.03	-0.05	-0.08	-0.12	-0.20
PRICE.LEVEL %	0.28	0.38	0.42	0.44	0.45	0.45	0.45	0.45	0.45	0.45
CONS.PRICE.LEVEL %	0.20	0.27	0.29	0.30	0.30	0.30	0.30	0.31	0.31	0.31
DOLLAR.EXCH.RATE %	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REAL.EXCH.RATE %	-0.28	-0.38	-0.42	-0.44	-0.44	-0.45	-0.45	-0.45	-0.45	-0.45
REAL.EFF.EXCH.RATE %	-0.28	-0.38	-0.42	-0.43	-0.44	-0.44	-0.44	-0.44	-0.44	-0.44
MONEY %	0.82	0.53	0.44	0.40	0.38	0.36	0.34	0.31	0.28	0.23
SHORT.RATE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LONG.RATE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REAL.SHORT.RATE	-0.14	-0.05	-0.02	-0.01	0.00	0.00	0.00	0.00	0.00	0.01
INFLATION	0.28	0.10	0.04	0.02	0.01	0.00	0.00	0.00	0.00	0.00
UNEMPL.RATE	-0.13	-0.08	-0.04	-0.03	-0.02	-0.02	-0.02	-0.02	-0.02	-0.03
DEBT.TO.GDP	0.15	1.37	2.51	3.60	4.66	5.81	6.94	8.08	9.23	10.40
DEFG.TO.GDP	0.99	1.14	1.16	1.19	1.21	1.23	1.26	1.29	1.32	1.35
TRADE.BAL.TO.GDP	-0.47	-0.38	-0.35	-0.35	-0.35	-0.34	-0.31	-0.29	-0.26	-0.22

Note: see Table A.1.