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RESEARCH MEMORANDUM

COMMERCIAL INTEGRATION AND FISCAL POLICY IN INTERDEPENDENT, FINANCIALLY INTEGRATED TWO-SECTOR ECONOMIES WITH REAL AND NOMINAL WAGE RIGIDITY

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COMMERCIAL INTEGRATION AND FISCAL POLICY IN INTERDEPENDENT, FINANCIALLY INTEGRATED TWO-SECTOR ECONOMIES WITH REAL AND NOMINAL WAGE RIGIDITY

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A two-country-two-sector model with a portfolio choice between money and highly substitutable domestic and foreign bonds, floating exchange rates and perfect foresight is presented. Account is taken of capital accumulation, government debt and current account dynamics. Numerical methods, including extensive sensitivity analysis, are used to trace the consequences of commercial integration for the effects and spill-over effects of fiscal policy. Another purpose is to establish the relevance of desaggregation for the outcomes of fiscal policy.

1 INTRODUCTION

Economic integration of national economies is an increasingly important phenomenon, as we enter the 1990s. For that reason, economic integration is a key topic of contemporary and, probably, future economics (see for instance the centenary issue of THE ECONOMIC JOURNAL, 1991). Van der Ploeg (1991a), in describing the various phases in the process of European integration,suggests that financial, commodity and labour markets are integrating at different speeds. Low labour mobility is expected to be rather persistent, due to impeding factors like language, culture and tradition (cf. Molle and Van Mourik, 1988 and Bovenberg Kremers and Masson, 1991). On the contrary, there seems to be a strong tendency towards a high degree of international financial mobility, thanks to, amongst others, virtual absence of transportation costs. Integration of commodity markets is considered to take a position somewhere in between. This would

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imply the process of global financial integration to have relatively advanced. There is a certain amount of *prima facie* evidence for increased integration of financial markets (e.g. Frankel, 1989, Keuzenkamp and Van der Ploeg, 1990, Lemmen and Eyffinger, 1992). The consequences of this type of integration, for the effectiveness of fiscal policy, is studied in De Groof and Van Tuyl (1993).

There is less empirical evidence for the second phase in the process, i.e commercial integration. Neven and Röller (1991) tentatively conclude that commercial integration within Europe has proceeded alongside integration between Europe and the rest of the world (except for the food industry).

The present paper examines the consequences of commercial integration for the effects and spill-over effects of fiscal policy, while assuming, that the process of financial integration has been completed. For that purpose, a two-country-two-sector perfect foresight model, allowing for intertemporal government budget constraints, current account dynamics, wealth effects, capital accumulation, a high degree of substitutability between home and foreign bonds, floating exchange rates, imperfect substitution between home and foreign tradables, international labour and intersectoral capital immobility, real wage rigidity at home and nominal wage rigidity abroad is formulated. Within the context of this model, firstly the effects and spillover effects of various types of fiscal policy are established for the reference situation. Next, these are compared with those, generated by the same model, when tradables are supposed to be perfect substitutes. For, it will be argued, that the process of commercial integration can be observed from enhanced substitutability of tradable goods and an increased interdependence of prices.

There is a considerable amount of literature on international interdependent macroeconomics using a portfolio balance framework (e.g. Tobin and de Macedo, 1980, Branson and Henderson, 1985, Ribe and Beeman, 1986, Van de Klundert, 1991). On the other hand, some work has been done on international interdependent two-sector economies, without or with at best an elementary financial sector (Corden and Turnovsky, 1983, Obstfeld, 1988, De Groof and Schaling, 1991).

The dominant feature of the present model is the combination of these two frameworks. The portfolio balance approach enables a careful modelling of

stock-flow relationships. The distinction between tradables and nontradables opens the possibility of investigating the influence of the composition of a change in government expenditure. In doing so, we try to meet the apparent need for disaggregation, as expressed by, for instance, Allen (1991). Moreover, the empirical support for purchasing power parity or the 'Law of One Price' (LOP) holding for an economy as a whole, is flimsy (Visser, 1989). One possible reason is the existence of non-tradable goods. So, if commercial integration is modelled by letting tradabble goods obey the LOP, this should be done within the context of a two-sector model, allowing for a tradables and a non-tradables sector.

The main findings are as follows. Looking at real disposable income as a measure of the regions' spending power, commercial integration appears to influence the outcome of a European fiscal contraction, in that it constitues a beggar-thy-neighbour policy instead of a locomotive policy, which is the characterization in phase before commercial integration has taken place. However, this only applies to a fiscal contraction falling on tradables, which implies, that these (spill-over) effects depend on the commodity composition of government purchases. The paper is organized as follows. In section 2 the model is presented. Its complexity makes an analytical solution intractable. Instead, a comprehensive set of simulations is carried out. Appendix 1 contains the linearized simulations version of the model, along with the numerical assumptions with respect to the initial steady-state situation. Analytical models sacrifice reality by ruling out several sources of dynamics, in order to keep the analysis manageable. On the other hand, the results of the simulations approach are coefficient specific. To overcome this dilemma, the system has been submitted to extensive sensitivity analysis. To that end, intervals of robustness for all behavioural parameters have been established (cf.Karakitsos, 1989). Besides, the role of the economies' sector structure and technology has been critically analyzed. As for the latter, we reverse the sectors' factor intensities as compared to the reference situation, in which tradables production is assumed to be capital-intensive (Prachowny, 1984, Obstfeld, 1988, Verbruggen, 1988). This sensitivity analysis can be found in Appendix 2. Section 3 presents an overview of the effects and spill-over effects of unilateral fiscal expansions for the reference situation. Section 4 considers the influence of commercial integration. For

that purpose we compare, in qualitative terms, the policy multipliers for the reference situation, characterized by a low degree of commercial integration, with those applying for a situation with highly integrated goods markets. The latter situation is modelled by applying the LOP to tradables. Remember, that in the reference situation the process of financial integration is supposed to be completed. This implies, that for the short run the Mundell-Fleming proposition of uncovered interest parity holds. In the medium and long run, however, stock-flow effects drive a wedge between home and foreign interest rates. Appendix 2 contains a number of figures, which may be of some help to understand the dynamics of the system. Section 5 concludes the paper.

2 A TWO-COUNTRY-TWO-SECTOR MODEL WITH IMPERFECT TRADABLES SUBSTITUTION

In this section we present a two-country model by focussing on the equations of country j (j = 1,2); the variables concerning the foreign country contain the subscribt k (k = 1,2, $j \neq k$). Country 1 stands for Europe, country 2 for the U.S.. The subscript i (i = h,n) refers to the home tradables sector and the nontradables sector, respectively. Except for nominal wage formation, the two countries are identical.
Lower-case letters refer to real variables, variables expressed as rates are denoted with a 'tilde', while exogenous variables are barred. The superscript 'e' refers to expectational variables. In order to save space we present nominal and real exchange rates as country-specific variables.

The portfolio subsystem draws on Van de Klundert (1991). Agents spread their real non-human wealth (we) over real cash balances (m), domestic bonds (b_{jj}) and foreign bonds (b_{jk}). Asset demand decisions depend on the rates of return on bonds, which are determined by the nominal interest rates ($\tilde{r}_n$) and the expected change in the nominal exchange rate ($\tilde{e}^e$). The real interest rate ($\tilde{r}$) equals the difference of the nominal interest rate ($\tilde{r}_n$) and the expected rate of CPI inflation ($\tilde{p}_c^e$)

$$\tilde{r}_j = \tilde{r}_{n_j} - \tilde{p}_{c_j}^e \qquad (1) - (2)$$

The real value of bonds is assumed to be fixed within a period (Haas and Masson, 1986). At the same time, bonds are indexed to the CPI, thus constituting sure claims on given amounts of future consumption goods (baskets). Expectations are assumed to be rational. Furthermore, stochastic components are absent. Therefore, agents have perfect foresight.
Transactions demand for real cash balances is supposed to be related to real disposable income of the private sector (y_d; see, for instance, Goodhart 1990, pp. 269-270). Moreover, we ignore currency substitution (McKinnon 1990). Under these assumptions the asset demand functions read

$$m_j = m_j \left(\overset{+}{y_{d_j}}, \overset{+}{we_j}, \overset{\simeq}{r_{n_j}}, \overset{0}{\tilde{r}_{n_k} + \tilde{e}_j^e} \right) \qquad (3) - (4)$$

$$b_{jj} = b_{jj} \left(\overset{-}{y_{d_j}}, \overset{+}{we_j}, \overset{\pm}{r_{n_j}}, \overset{-}{\tilde{r}_{n_k} + \tilde{e}_j^e} \right) \qquad (5) - (6)$$

$$q_{c_j} b_{jk} = q_{c_j} b_{jk} \left(\overset{0}{y_{d_j}}, \overset{+}{we_j}, \overset{\simeq}{r_{n_j}}, \overset{+}{\tilde{r}_{n_k} + \tilde{e}_j^e} \right) \qquad (7) - (8)$$

where q_{c_j} is the real (consumption) exchange rate applying to country j. The bold signs above variables denote the signs of the partial derivatives. The numerical assumptions are compatible with the familiar "adding-up" constraints (Turnovsky 1977).

The supply of real cash balances equals the exogenous money stock ($\underline{M}$) divided by the CPI

$$m_j = \frac{\underline{M}_j}{p_{c_j}} \qquad (9)-(10)$$

Net investment of firms is completely financed by bond issues. It is assumed that all transactions are paid for at the beginning of the period. So, investment goods are bought against today's prices. As a result, the amount of bonds supplied by firms is determined by the real value, in terms of consumption goods, of capital equipment at the beginning of the next period ($k_{i_{+1}} \cdot p_i / p_c$), including net investment of the present period. The supply of government bonds equals outstanding government debt (d),

comprising this period's budget deficit as well. For simplicity, it is assumed that bonds issued by firms and the government are perfect substitutes. Therefore, the supply of domestic bonds (b) reads

$$b_j = \frac{k_{h_j + 1}\, p_{h_j} + k_{n_j + 1}\, p_{n_j}}{p_{c_j}} + d_j \qquad (11)\text{-}(12)$$

Equilibrium in the international bonds markets is stated by

$$b_j = b_{jj} + b_{kj} \qquad (13)\text{-}(14)$$

Finally, real wealth of domestic households consists of real domestic assets and net foreign claims (f)

$$we_j = m_j + b_j + f_j \qquad (15)\text{-}(16)$$

The micro-underpinnings of the foregoing equations concerning the portfolio subsystem, are no more than rudimentary. In this respect, the commodity expenditure equations show close resemblance, as they lack explicit microfoundations in the form of intertemporal choices made by households and firms as well (as, for example, in Van der Ploeg, 1991b). As Van de Klundert (1991) observes, a thorough microeconomic foundation of macroeconomics requires an integration of saving, investment and portfolio decisions. Research in this field is still in its infancy (e.g. Rankin, 1991, Bovenberg and Goulder, 1991). Moreover, we agree with Allen (1991, p 153), who argues, that optimizing models can not avoid ad hoc qualities either, be it of a different nature than non-optimizing models.

Total private consumption (c) is split up between consumption of nontradable (c_n) and tradable (c_t) goods. The latter, in turn, is subdivided into home (c_h) and foreign produced (c_m) goods. The complex decision problem with respect to consumption is supposed to be separable (cf. Deaton and Muellbauer 1980).

First, consumers decide upon total consumption expenditure according to

$$c_j = c_j \left(\overset{+}{y_{d_j}}, \overset{+}{we_j}, \overset{-}{\tilde{r}_{n_j}}, \overset{-}{\tilde{p}^e_{c_j}} \right) \qquad (17)\text{-}(18)$$

Thus, total consumption is positively related to real disposable income (y_d) and real non-human wealth of the private sector (we), whereas it depends negatively on the real interest rate ($\tilde{r}_j$). Assuming consumption to depend on real disposable income implies ascribing naive expectations concerning human wealth to households. Alternatively, one may assume that households are liquidity constrained.

Next, given total consumption demand, consumers choose between tradables and nontradables by maximizing a (CES) utility function. Consumer expenditure on (non-)tradables depends positively on total consumption expenditure, but negatively on the ratio of the price of (non-)tradables to CPI. Hence, sectoral consumption functions read as

$$c_{t_j} = c_t \left(\overset{+}{c_j}, \frac{\bar{p}_{t_j}}{p_{c_j}} \right) \qquad (19)\text{-}(20)$$

$$c_{n_j} = c_n \left(\overset{+}{c_j}, \frac{\bar{p}_{n_j}}{p_{c_j}} \right) \qquad (21)\text{-}(22)$$

Taking the empirical observations of Deardorff and Stern (1986) into account, home and foreign produced tradables are imperfect substitutes, at least in the reference situation.

Having decided upon total demand for tradable consumption goods and services, consumers choose between home and foreign produced tradables by maximizing another (CES) utility function

$$c_{h_j} = c_h \left(\overset{+}{c_{t_j}}, \frac{\bar{p}_{h_j}}{p_{t_j}} \right) \qquad (23)\text{-}(24)$$

$$c_{m_j} = c_m \left(\overset{+}{c_{t_j}}, \frac{\bar{p}_{h_k}\, e_j}{p_{t_j}} \right) \qquad (25)\text{-}(26)$$

where p_h denotes the price of home produced tradables.

Entrepreneurs only gradually adapt the stock of capital equipment (k_i) to its desired level (k_i^d). Consequently, net investment is a fraction

of the gap between the desired and actual stock of capital. The depreciation of capital is exponential at a rate δ, which is uniform across sectors. Thus, the functions with respect to gross investment are

$$i_{i_j} = i_{i_j} \left(\overset{+}{k^d_{i_j}}, \overset{?}{k_{i_j}} \right) \qquad (27)\text{-}(30)$$

The sign of the partial derivative of k_i is ambiguous, depending of the ratio of the accelerator coefficient to the rate of technical obsolescence.

The desired stock of capital equipment in any sector follows from the equality of the nominal interest rate ($\tilde{r}_n$) and the sector's net marginal physical product of capital plus the expected increase in the value of the sector's capital goods ($\frac{\partial y_i}{\partial k_i} - \delta + \tilde{p}^e_i$). The latter equals the expected increase in the sectoral producers' price, since we assume the sector's investment outlays to fall entirely on the goods produced by the sector itself. Allowing for intersectoral and international trade in new capital goods would probably not alter the results substantially (Pasinetti 1981, De Groof and Van Tuijl, 1991). Therefore, the relation for the desired stock of capital equipment can be written as

$$k^d_{i_j} = k^d_{i_j} \left(\overset{+}{y_{i_j}}, \tilde{r}_{n_j} \overset{-}{-} \tilde{p}^e_{i_j} \right) \qquad (31)\text{-}(34)$$

Sectoral outputs (y_i) follow from linear homogeneous (CES) production functions, using inputs of labour (l_i) and sector-specific capital (k_i). Thus,

$$y_{i_j} = y_{i_j} \left(\overset{\bar{+}}{l_{i_j}}, \overset{\bar{+}}{k_{i_j}} \right) \qquad (35)\text{-}(38)$$

where the upper bold signs reflect the signs of the second partial derivatives.

Equilibrium in tradables and nontradables markets is stated by

$$y_{h_j} = c_{h_j} + i_{h_j} + g_{h_j} + c_{m_k} + g_{m_k} \qquad (39)-(40)$$

$$y_{n_j} = c_{n_j} + i_{n_j} + g_{n_j} \qquad (41)-(42)$$

Here g_h and g_m denote exogenous exhaustive government spending on home and foreign produced tradables respectively, while g_n indicates exogenous government expenditure on nontradables.
Macroeconomic real output is defined as

$$y_j \equiv \frac{y_{h_j} p_{h_j} + y_{n_j} p_{n_j}}{p_{y_j}} \qquad (43)-(44)$$

in which p_y represents the macroeconomic producers' price index.

Nominal wages are uniform across sectors, owing to the assumption of the homogeneity of labour. However, labour markets are segmented internationally. Furthermore, they do not clear in the short run, due to rigidity of either nominal wages or real consumers' wages. Empirical evidence points, at least for the short and medium term, to a high degree of nominal wage rigidity in the U.S. and real wage rigidity in Europe (Van der Ploeg, 1988). For expositional purposes we assume inertia causing (almost) perfect short-run nominal and real wage rigidity in the U.S. and Europe, respectively. According to Attenasio, Manasse and Van der Ploeg (1987), empirical evidence does not reject the existence of an error-correction mechanism in the wage relation, ensuring consumers' wages to return to their long-run equilibrium value. We assume a stylized version of this mechanism to apply, so that nominal wages adapt gradually to the labour market situation, as well as to the development of CPI. So, in the long run unemployment is at its natural rate.
Assuming country-specific labour supply to be exogenous, these conditions imply

$$\Delta w_j = \Delta w_j \left(\overset{+}{\Delta p_{c_j}}, \overset{+}{l_j} \right) \qquad (45)-(46)$$

in which w and l denote money wage and macroeconomic employment respectively.

Profit maximizing firms equate the marginal product of labour $(\frac{\partial y_i}{\partial l_i})$ and the real producers' wage $(\frac{w}{p_i})$, with the stock of capital equipment given at each point in time. This results in the following relation for labour demand

$$l_{i_j} = l_{i_j} \left(\overset{+}{y_{i_j}}, \frac{\overset{-}{w_j}}{p_{i_j}} \right) \qquad (47)\text{-}(50)$$

Macroeconomic employment is defined as

$$l_j \equiv l_{h_j} + l_{n_j} \qquad (51)\text{-}(52)$$

Capital accumulation reads as

$$\Delta k_{i_j} \equiv i_{i_{j_{-1}}} - \delta\, k_{i_{j_{-1}}} \qquad (53)\text{-}(56)$$

Government outlays, total real government expenditure plus interest payments on outstanding debt, are financed by lump-sum taxes (t), the issuance of bonds, or by means of the 'printing press' ($\Delta \underline{M}_j$). The selling of bonds raises government debt (d), which immediately becomes clear from writing the government budget *identity* (Buiter 1986) as

$$\Delta d_j = \tilde{r}_j\, d_{j_{-1}} + g_j - t_j - \frac{\Delta \underline{M}_j}{p_{c_j}} \qquad (57)\text{-}(58)$$

In order to prevent government debt from escalation, a feedback rule for taxes is specified, since we intend to reserve exhaustive government spending as a policy instrument. A sensible tax rule was introduced by Buiter (1987). Here, it takes the form

$$t_j = t_j \left(\overset{+}{d_j} \right) \qquad (59)\text{-}(60)$$

The real current account surplus of Europe by definition equals the sum of its balance of trade surplus and its capital income account surplus. Under flexible exchange rates, this sum is equal to the capital account deficit, and, consequently, the increase in country j's net real foreign asset position (Δf)

$$\Delta f_j = \frac{c_{m_k} p_{h_j} - c_{m_j} p_{h_k} e_j + g_{m_k} p_{h_j} - g_{m_j} p_{h_k} e_j}{p_{c_j}}$$

$$+ \tilde{r}_k q_{c_j} b_{jk_{-1}} - \tilde{r}_j b_{kj_{-1}} + b_{jk_{-1}} \Delta q_{c_j} \qquad (61)\text{-}(62)$$

It can easily be verified that $f_k = \frac{-f_j}{q_{c_j}}$.

Real disposable income of the private sector in terms of baskets of consumption goods equals the sum of net value added of firms, interest payments by the domestic government, the capital income account surplus including real-exchange-rate-induced gains on foreign bonds holdings, and the (relative) price-induced wealth effects on physical capital, minus lump-sum as well as inflation taxes. So,

$$y_{d_j} \equiv (y_j - \delta k_j) p_{y_j} / p_{c_j} + \tilde{r}_j d_{j_{-1}}$$

$$+ \tilde{r}_k q_{c_j} b_{jk_{-1}} - \tilde{r}_j b_{kj_{-1}} + b_{jk_{-1}} \Delta q_{c_j}$$

$$+ k_{h_j} \Delta \frac{p_{h_j}}{p_{c_j}} + k_{n_j} \Delta \frac{p_{n_j}}{p_{c_j}} - t_j + \frac{\underline{M}_{j_{-1}}}{p_{c_j}} - \frac{\underline{M}_{j_{-1}}}{p_{c_{j_{-1}}}} \qquad (63)\text{-}(64)$$

The producers' pice index is defined as

$$p_{y_j} \equiv p_h^{\gamma_{h_y}} p_n^{(1 - \gamma_{h_y})} \qquad (65)\text{-}(66)$$

where γ_{h_y} is the share of output of home produced tradables in total output.

The ideal price index of tradables consumption can be written as

$$p_{t_j} = [\ \gamma_{h_t}\ p_{h_j}^{(1-\varphi_{hm})} + (1-\gamma_{h_t})\ (p_{h_k}\ e_j)^{(1-\varphi_{hm})}\ ]^{\frac{1}{1-\varphi_{hm}}} \qquad (67)\text{-}(68)$$

where γ_{h_t} denotes the utility maximizing share of home produced tradables in total consumption of tradables and φ_{hm} indicates the elasticity of substitution between home and foreign produced tradables.

Analogously, the ideal CPI reads as

$$p_{c_j} = [\ \gamma_{t_c}\ p_{t_j}^{(1-\varphi_{tn})} + (1-\gamma_{t_c})\ p_{n_j}^{(1-\varphi_{tn})}\ ]^{\frac{1}{1-\varphi_{tn}}} \qquad (69)\text{-}(70)$$

where γ_{t_c} is the optimal share of consumption of tradables in total consumption expenditure and φ_{tn} indicates the elasticity of substitution between tradables and nontradables consumption.

The macroeconomic real (consumption) exchange rate by definition equals

$$q_{c_j} \equiv \frac{e_j\ p_{c_k}}{p_{c_j}} \qquad (71)$$

In the context of a two sector model, we have to consider a real exchange rate concerning the tradables sector as well

$$q_{h_j} \equiv \frac{e_j\ p_{h_k}}{p_{h_j}} \qquad (72)$$

Of course, q_h represents the inverse of the terms of trade.

Evidently, the exchange rates are related as follows

$$e_k = e_j^{-1} \qquad (73)$$

$$q_{c_k} = q_{c_j}^{-1} \tag{74}$$

$$q_{h_k} = q_{h_j}^{-1} \tag{75}$$

The system is completed by definitional equations for the macroeconomic stock of capital equipment,

$$k_j \equiv \frac{k_{h_j} p_{h_j} + k_{n_j} p_{n_j}}{p_{y_j}} \tag{76)-(77}$$

and real government expenditure, respectively,

$$g_j \equiv \frac{g_{h_j} p_{h_j} + g_{n_j} p_{n_j} + g_{m_j} p_{h_k} e_j}{p_{c_j}} \tag{78)-(79}$$

There are 79 equations in 78 endogenous variables, viz. $\tilde{r}_n$, $\tilde{r}$, m, b_{jj}, b_{jk}, u, we, c, c_t, c_n, c_h, c_m, i_h, i_n, k_h^d, k_n^d, y_h,y_n, y, w, l_h, l_n, l, k_h, k_n, d, g, t, f, y_d, p_h, p_n, p_c, p_t, p_y, e, q_c, q_h, k.
Invoking Walras' law, one of the equilibrium equations is redundant. As a result, equation (14), which reflects equilibrium in the market for foreign assets, can be eliminated.
The model contains ten backward-looking state variables viz. k_h, k_n, w, d and f, since they are constrained by their history. The five remaining state variables, p_h, p_n and e_1 are unconstrained by their past and are forward-looking. For saddlepoint stability to hold, one should therefore have ten stable (negative) roots and five unstable (positive) roots.

3 EFFECTS AND SPILL-OVER EFFECTS OF FISCAL POLICY.

In this section, the international and intersectoral transmission effects of unanticipated once and for all sector-specific fiscal contraction will be studied, by passing in review the qualitative results of numerical exercises. The computations have been carried out with the PSREM package developed by Van der Ploeg and Markink (1991). The simulations version of the model, along with the numerical assumptions is presented in Appendix

1. It should be stressed that, in the context of a linearized model, the symbols now denote *relative deviations from a steady-state solution.*

The qualitative short-and-long-term effects and spill-over effects, of the unilateral policy measures indicated above, are shown in Table 1. They will be explained concisely. As mentioned, we will focus on the private sector's real disposable income, as a measure of the private sectors' spending powers. However, total real output, as a measure of the regions' productive efforts, will be taken into consideration as well. To be sure, macroeconomic employment deserves as much attention. However, the short-term qualifications for total real output also apply to employment, while in the long run the Phillips mechanism invariably restores labour market equilibrium.

The macroeconomic characterizations of the various policies pursued, will be indicated by: 'LOC', 'BLOC', 'BTN' and 'BTS', referring to a 'locomotive', 'backward locomotive', 'beggar-thy-neighbour' and 'beggar-thyself' policy, respectively. These expressions grasp both the effects for the country taking the initiative, as well as spill-over effects for the passive region. They can be defined by means of the following scheme, in which Europe is supposed to take the initiative.

	LOC	BLOC	BTN	BTS
y_{d_1}, y_{d_2}	+,+	-,-	+,-	-,+

If the U.S. take the initiative, the signs for BTN and BTS are reversed, of course.

In the short run, *a European fiscal contraction on home produced tradables* [2] lowers both the nominal and real interest rate in Europe. In the U.S., the real interest rate decreases, while the nominal interest rate rises. Evidently, the fall in the real interest rate in Europe is more pronounced than in the U.S., which is the main factor accounting for Europe's capital income account surplus. Europe also runs a trade balance

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2) In this article, we confine ourselves to fiscal expansions falling on home produced tradables and non-tradables, as this type of fiscal policy seems to be the most obvious one. The case where government expenditure falls on goods of foreign origin is discussed extensively in De Groof and Van Tuijl (1991).

surplus, making its current account surplus substantial. This causes the ECU to appreciate, despite the capital outflow arising from the negative yield differential. Meanwhile, as can also be verified from figure 1a, the European macroeconomic *real* exchange rate rises, since the (CPI) deflation differential dominates the appreciation of the ECU.

In the short run sectoral supply solely depends on the sector's real producers' wage. The reduction in government spending on domestic tradables causes an ex ante excess supply of European tradables, exerting a downward pressure on their price. This induces European consumers to shift their expenditure towards this type of goods and, therefore, away from both nontradables and U.S. tradables. As a result, prices in these sectors drop as well. On the contrary, The price of U.S.' nontradables slightly rises, which on balance results from U.S.' consumers shifting expenditure away from this type of goods, and a rise in U.S.' total consumption, including nontradables. In the U.S., changes in producers' prices cause opposite changes in the real producers' wages, since in the short run money wages hardly respond to the fall in the CPI. As a result, a shift in demand is largely met by a corresponding shift in output. This explains the moderate changes in the U.S.' producers' prices. In Europe nominal wages move in line with CPI. Consequently, the real producers' wage in the tradables sector rises only slightly, whereas it falls in the nontradables sector. Therefore, the tradables production shows only a small drop, while nontradables output increases. So, in Europe, the main outlet for (ex ante) excess supply or demand are price mutations. It is worthwhile noting, that the European terms of trade ($-q_h$) decrease (see figure 1a), while the tradables-nontradables price ratio ($p_t - p_n$) falls in both regions.

European disposable income rises for several reasons. Firstly, taxes are lowered, as the government has less reason to fear a 'runaway debt' (Tobin,1986). Secondly, real cash balances are increased by deflation. Thirdly, as mentioned above, Europe runs a capital income account surplus. These factors dominate a moderate decrease in total European production in terms of (baskets of) consumption goods. To be sure, European total real output in terms of (baskets of) home produced goods (y_1) also decreases on balance. On top of that, the fall in the European external terms of trade cause the purchasing power of real output ($y_1 + p_{y_1} - p_{c_1}$) to fall. U.S.

disposable income also rises, mainly due to the combined effect of higher total output in terms of consumption goods and the increase in real cash balances. As a consequence, in the short run a European fiscal contraction on home produced tradables is a LOC policy.

TABLE 1 reference situation

Effects and spill-over effects of fiscal contractions

Type of shock	$g_{h1} < 0$		$g_{h2} < 0$		$g_{n1} < 0$		$g_{n2} < 0$	
Period	1	∞	1	∞	1	∞	1	∞
y_{d1}	+	+	+	-	+	+	-	-
y_{d2}	+	-	-	+	-	-	+	+
y_1	-	-	+	+	-	+	+	+
y_2	-	+	-	-	+	+	-	+
y_{h1}	-	-	-	+	+	+	-	+
y_{n1}	+	+	+	-	-	-	+	-
y_{h2}	-	+	-	-	-	+	-	+
y_{n2}	+	-	-	+	+	-	-	-
r_{n1}	-	-	+	-	+	-	-	-
r_{n2}	+	-	-	-	-	-	-	-
r_1	-	-	-	-	+	-	-	-
r_2	-	-	-	-	-	-	-	-
e_1	-	-	+	+	-	-	+	+
q_h	+	-	-	+	+	-	-	+
q_c	+	-	+	+	+	-	-	+
$p_{t1} - p_{n1}$	-	-	-	-	+	-	-	-
$p_{t2} - p_{n2}$	-	-	-	-	-	-	+	-

The understanding of the dynamics of the model may be served by the description of the developments in the medium term, for which we arbitrarily take the third period. In the present case, the medium-term picture shows close resemblance to the short-run picture. At least LOC is still the correct label. European output in terms of consumption goods has risen, which is attributable to an increase in nontradables production, arising from a crowding-in of capital investment in the preceding periods. This comes on top of lower taxes, higher real cash balances and a capital income account surplus. The capital income account surplus follows from a sustained current account surplus, which reinforces Europe's position as a net creditor. This causes the ECU to appreciate even further. The European macroeconomic real exchange rate now falls as well (see figure 1a), despite European deflation still being comparatively severe. Disposable income of the U.S. is now lower than in the short run, due to a real cash balance erosion for one reason. The other reason is that, contrary to the first period, the value of the U.S.' capital stock fails to increase. Such an increase arises from a decrease in the ratio of the price of home tradables to the nontradables price. Here it should be remembered, that the production of tradable goods is assumed to be relatively capital intensive. Yet U.S.' disposable income remains above its initial steady state level.

Later on, European disposable income gradually increases to a new steady state level. This must be attributed to lower taxes and a higher capital income account surplus. The increase in real cash balances has come to a complete stop, deflation being absent in the long run ($t \rightarrow \infty$). On the contrary, U.S.' long-run disposable income gets below its initial steady state level, due to a higher capital income account deficit. So, in the long run a European fiscal contraction on domestic tradables is a BTN policy.

It should be noted, that in the long run Europe's terms of trade has risen (figure 1a), turning its trade balance into a deficit, which is compatible with the U.S.' increased debt service requirements. Real wealth in Europe has increased, as the decrease in domestic bonds, following from a considerable reduction of government debt, falls short of the combined effect of the increased value of real cash balances and foreign debt accumulation. On the contrary, U.S.' long-term real wealth falls short of its

initial steady-state level, due to a decrease in real cash balances and net foreign asset holdings.

A cut in European government expenditure on nontradables is a BTN policy in the short run. Now higher government interest payments form an additional factor underlying the increase in European disposable income. The increase in government interest payments results from a rise in the real interest rate. Logically, the present shock exerts on impact pressure on domestic goods markets. Hence, in the short run deflation in Europe is considerable, causing a substantial increase in real cash balances. This, in turn, boosts real disposable income. The latter causes an even stronger increase in the transactions demand for real cash balances, which underlies the somewhat counter-intuitive rise in both the nominal and the real interest rate. In the U.S., production increases in both sectors, since both capital investment and exports increase. Nevertheless U.S.' disposable income falls, mainly due to a considerable capital income account deficit.

In the long run, a European contraction on nontradables can also be chacterized as a BTN policy. European disposable income has increased even further. Total real output as well as the demand for tradables have risen. The latter mainly stems from higher total consumption, originating from an increase in both disposable income and real wealth. A worsened capital income account is the main factor underlying the fall in the U.S.' disposable income.

Initially, the real exchange rate overshoots its long-term steady-state value (figure 2a). A substantial appreciation of the nominal exchange rate, outweighing the deflation gap between the U.S. and Europe, features the movement towards its equilibrium value.

A cut in U.S.' exhaustive government spending on domestic tradables turns out to be a BTS policy in the short run. Remember that the corresponding European fiscal contraction is a LOC policy. One should keep in mind, that any discrepancy with the corresponding European demand shock originates from differences in wage formation.

The present shock leads to an (ex ante) excess supply of U.S. tradables, which depresses their price. As a result, consumers in both regions shift their expenditure towards U.S. tradables away from European tradables as well as nontradables. The price of U.S' nontradables falls as

well. In the U.S., real producers' wages rise in both sectors. The fall in demand is to a great extent attended by lower output, thereby attenuating the decrease in prices. In Europe, the real producers' wage slightly rises in the tradables sector, whereas it drops in the nontradables sector. Consequently, tradables output shows a moderate decrease, while nontradables production increases. Total real output grows on balance. The decrease in the CPI causes an increase in real cash balances, but also contributes to an increase in the real value of U.S.' bonds held by Europeans. These are the factors underlying the increase in disposable income in Europe.

As explained above, if the U.S. reduce their government expenditure on domestic tradables, it experiences a relatively large decrease in output and a relatively moderate deflation, causing only a small increase in real cash balances. So, disposable income falls, reverse to the former case, in which the active country was characterized by real wage rigidity.

Logically, the long term picture is a mirror image of the one discussed before, the RWR-NWR case. In this respect, the type of short-and medium-term wage rigidity is of no importance, since, by virtue of the Phillips mechanism, unemployment returns to its natural rate. Hence, BTN policy is the correct label.

In case of a *U.S. fiscal contraction falling on nontradables*, BTN suits as a short-term characterization. American workers are locked into nominal wage contracts. This time prices tend to go down considerably, as the fiscal shock is directed at the sheltered sector. This implies a strong rise in real producers' wages and, hence, a substantial decrease in output. However, high deflation affects disposable income in two ways. Firstly, with the nominal money stock given, an increase in real cash balances increase. Secondly, the real deprciation of the dollar (figure 4a), causing the real value of European bonds in hands of U.S.' residents to rise. Moreover, the U.S.' government can afford to cut taxes, without losing control of its debt. These three factors combined, dominate the increase in total real output. Therefore, U.S.' real disposable income rises.

In Europe, the real producers' wage increases in the tradables sector, since the rise in the tradables producers' price falls short of the

increase in money wages, which move in line with CPI. A substantial depreciation of the ECU is the main factor underlying CPI inflation..On balance, the level of total real output rises. In the medium run, U.S.' disposable income decreases, as U.S.' residents receive less interest payments from their own government. As a result, their spending power is lower, as compared to the initial steady-state level. In the long run, however, this measure recaptures its status as a BTN policy. As mentioned above, the Phillips mechanism restores the natural rate of unemployment. This time the U.S.' tradables production is boosted. On balance, total real output shows a substantial increase. This explains to a great extent the rise in disposable income. Due to a capital income account deficit, Europe continues to be harmed from this policy, .

A closer look at Table 1 reveals that disaggregation matters, at least in the short run. For, the short-term outcomes hinge on whether the government cuts tradables or nontradables expenditure. On the contrary, in the long run a fiscal contraction invariably turns out to be a BTN policy. Then the stock-flow interactions, notably the state of the capital income account, arising from the net foreign asset position, dominate the picture.

4. The role of commercial integration

This section discusses the consequences of the integration of the markets for tradable goods. Following Van der Ploeg (1989), we consider the process of commercial integration to have proceeded further, the larger trade flows are provoked by given changes in the terms of trade Alternatively, certain impulses trigger larger trade flows, attenuating changes in the terms of trade, the higher the degree of commercial integration. So, the international trade flows, resulting from given changes in price differentials, depend on the elasticity of substitution between home and foreign produced tradables (φ_{hm}). In order to track down the influence of commercial integration on the (spill-over) effects of fiscal policy, we compare the results of the reference situation in which φ_{hm} is relatively low ($\varphi_{hm} = 1$), with those obtained by letting φ_{hm} take such a high value ($\varphi_{hm} = 1000$), that the home and foreign produced tradables are virtually

perfect substitutes. Thus, then the conditions for the LOP to hold, are practically met.

Modelling commercial integration by increasing the elasticity of substitution between tradables and nontradables not only captures the idea, that the two types of tradables become closer substitutes. It also encapsulates the intuition, that the 'rate of Local Good Preference' (LGP) should decrease, as the process of commercial integration proceeds. This is illustrated in figure 1. The initial equilibrium is represented by point A, where the budget line is tangent to the indifference curve I_0.[3] The LGP, analogous to the well known 'rate of Time Preference', is determined by the marginal rate of substitution between home and foreign produced tradables, measured at the intersection of the bisecting line from the origin and I_0. To be more exact: LGP = tg α -1. The indifference curve I_1 compared to I_0, indicates, that commercial integration has taken place to a certain degree. In this situation, LGP = tg β < tg α, which confirms the notion, that commercial integration implies a decrease in LGP.

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3) The slope of the budget line equals -tg45^o, due to the initial prices equalling unity.

Fig. 1. *Commercial integration and the rate of Local Good Preference.*

The results, with respect to the abovementioned comparison, are presented in Table 2. Only the differences with Table 1 are presented. Full integration of the tradable goods markets proves to yield some different macroeconomic outcomes. As far as disposable income is concerned, in the short run, a *European contraction falling on home produced tradables* now generates a BTN instead of a LOC policy.

This divergent result is caused by a real depreciation of the dollar instead of an appreciation, as is the case in the reference situation (figures A 1a and A 1b). This affects the purchasing power of the U.S.' nominal output in the first place. Secondly, the decrease in the U.S.' CPI is smaller now. This leads to a lower increase in real cash balances. The real dollar depreciation (figure A 1b), in its turn, is caused by a fierce nominal depreciation, which can be explained as follows. A high degree of commercial integration implies invariant terms of trade ($q_h = 0$, see Table 2). In the reference situation the U.S.' terms of trade increase. In both situations the producers' prices of U.S. and European tradables react in about the same way. So, comparing the situation of a high degree of commercial integration with the reference situation, the increase of the U.S.' real exchange rate must be brought about by an extra nominal depreciation of the dollar.

TABLE 2 The role of commercial integration

Deviations from Table 1, due to
a high degree of commercial integration

Type of shock	$g_{h1} < 0$		$g_{h2} < 0$		$g_{n1} < 0$		$g_{n2} < 0$	
Period	1	∞	1	∞	1	∞	1	∞
y_{d1}								
y_{d2}	-							
y_1	+							
y_2								
y_{h1}		+						
y_{n1}								
y_{h2}								
y_{n2}					+			
r_{n1}								
r_{n2}	+							
r_1								
r_2								
e_1								
q_h	0	0	0	0	0	0	0	0
q_c	-							
$p_{t1} - p_{n1}$								
$p_{t2} - p_{n2}$					-			

5 CONCLUDING REMARKS

The central question in this paper is, to what extent commercial integration influences the (spill-over) effects of fiscal policy. This question is dealt with, by focusing on the qualitative effects and spill-over effects of the various policy measures. These (spill-over) effects are measured in terms of real disposable income, serving as an indicator of the regions' spending power. It is shown that, within certain boundaries of the behavioural parameters of the model, *commercial integration influences the qualitative (spill-over) effects of fiscal policy.* Especially, a European contraction falling on home produced tradables now generates a BTN instead of a LOC policy in the short run.

Such a divergence is absent, if fiscal contraction falls on European nontradables, which is only one out of many indications, *that disaggregation matters.* Sectors are a fact of life and so are governments, buying tradables as well as nontradables. Therefore, pure macroeconomic policy recommendations are not unconditionally reliable. This raises the intriguing problem of the degree of disaggregation, which would indeed permit robust policy statements.

Sensitivity analysis (Tables A2 1 - A2 3b) shows, that the above results depend on the relative factor intensity. Obstfeld (1988), reaches the same conclusion, although in our analysis its role is not as crucial as in his study. Moreover, the relative size of the industries involved, also influences the results to some extent.

Financial markets, goods markets and labour markets integration are considered to be sucessive phases in the process towards full economic integration. The analysis of the first two phases has been performed now, the last one can be accomplished within the present framework.
In a substantial number of cases, the results with respect to total output are compounds of opposite results for the sectors involved. A crucial condition here is, that the assumed excess supply of labour in one sector can be transferred costlessly to the other. This raises the question of what happens, if labour, qualified for work in the expanding sector, may becomes a bottle-neck. This would be due to labour being sector-specific,

at least temporary. Such an assumption could prevent unemployed workers to move from the contracting sector towards the work available in the prosperous sector. The existence of imperfect intersectoral labour mobility may force a country to undergo a costly reallocation process with employment and output losses. Allowing for temporary sector specificity of labour, therefore, is another possible extension of the present analysis.

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APPENDIX 1 THE LINEAR MODEL AND THE NUMERICAL ASSUMPTIONS

The model presented in section 2 is linearized around a symmetrical steady state-solution. Now, variables are expressed as relative deviations. However, for the rates absolute instead of relative deviations are taken in case no tilde is used. This means that a tilded variable still refers to its initial steady-state value. The numbers of equations correspond with the numbers given in section 2. All coefficients are positively defined. Their numerical values are given below.

Portfolio submodel

$$r_{n_j} = r_j + \Delta p^e_{c_j} \qquad \text{(A1)-(A2)}$$

$$m_j = \varepsilon_{m_{y_d}} y_{d_j} + we_j - \varepsilon_{m_j r_j} \left(\frac{r_{n_j}}{\tilde{r}}\right) \qquad \text{(A3)-(A4)}$$

$$b_{jj} = -\varepsilon_{b_{jj_{y_d}}} y_{d_j} + we_j + \varepsilon_{b_{jj} r_j} \left(\frac{r_{n_j}}{\tilde{r}}\right) - \varepsilon_{b_{jj} r_k} \left(\frac{r_{n_k} + \Delta e^e_j}{\tilde{r}}\right) \qquad \text{(A5)-(A6)}$$

$$b_{jk} + q_{c_j} = + we_j - \varepsilon_{b_{jk} r_j} \left(\frac{r_{n_j}}{\tilde{r}}\right) + \varepsilon_{b_{jk} r_k} \left(\frac{r_{n_k} + \Delta e^e_j}{\tilde{r}}\right) \qquad \text{(A7)-(A8)}$$

$$m_j = - p_{c_j} \qquad \text{(A9)-(A10)}$$

$$u_j = \gamma_{k_u} \{\gamma_{h_y} \kappa_h (k_{h+1} + p_h) + (1 - \gamma_{h_y}) \kappa_n (k_{n+1} + p_n) - \kappa p_c\} + (1-\gamma_{k_u}) d_j \qquad \text{(A11)-(A12)}$$

$$b_j = \gamma_{b_{jj_u}} b_{jj} + (1-\gamma_{b_{jj_u}}) b_{kj} \qquad \text{(A13)-(A14)}$$

$$we_j = \Omega m_j + (1-\Omega) b_j + \omega f_j, \quad \Omega = \gamma_{m_y} / \omega, \quad \omega = \kappa + \gamma_{d_y} + \gamma_{m_y} \qquad \text{(A15)-(A16)}$$

In the initial steady state it is assumed that $\hat{f}_j = 0$, in which $\hat{f}_j$ denotes the initial steady state value of the net foreign asset position of country j. The relative deviation is defined as $\hat{f}_j \equiv \frac{df_j}{y}$.

The commodity subsystem

$$c_j = \varepsilon_{cy_d} y_{d_j} + \varepsilon_{cw} we_j - \varepsilon_{cr} \left(\frac{r_{n_j} - \Delta p^e_{c_j}}{\tilde{r}}\right) \qquad \text{(A17)-(A18)}$$

$$c_{t_j} = c_j - \varphi_{tn} (p_{t_j} - p_{c_j}) \qquad \text{(A19)-(A20)}$$

$$c_{n_j} = c_j - \varphi_{tn} (p_{n_j} - p_{c_j}) \qquad \text{(A21)-(A22)}$$

$$c_{h_j} = c_{t_j} - \varphi_{hm} (p_{h_j} - p_{t_j}) \qquad \text{(A23)-(A24)}$$

$$c_{m_j} = c_{t_j} - \varphi_{hm} (p_{h_k} + e_j - p_{t_j}) \qquad \text{(A25)-(A26)}$$

$$i_{i_j} = k_{i_j} + \frac{\alpha}{\delta} (k^d_{i_j} - k_{i_j}) \qquad \text{(A27)-(A30)}$$

$$k^d_{i_j} = y_{i_j} - \frac{\varphi_{kl_i}}{\tilde{r} + \delta} (r_{n_j} - \Delta p^e_{i_j}) \qquad \text{(A31)-(A34)}$$

$$y_{i_j} = \lambda_{i_j} l_{i_j} + (1-\lambda_{i_j}) k_{i_j} \qquad \text{(A35)-(A38)}$$

$$y_{h_j} = \gamma_{c_h} c_{h_j} + \gamma_{i_h} i_{h_j} + \gamma_{g_h} g_{h_j} + \gamma_{b_h} c_{m_k} + \gamma_{b_{g_h}} g_{m_k} \qquad \text{(A39)-(A40)}$$

$$y_{n_j} = \gamma_{c_n} c_{n_j} + \gamma_{i_n} i_{n_j} + \gamma_{g_n} g_{n_j} \qquad \text{(A41)-(A42)}$$

$$y_j \equiv \gamma_{h_y} y_{h_j} + (1-\gamma_{h_y}) y_{n_j} \qquad \text{(A43)-(A44)}$$

The labour subsystem

$$\Delta w_j = (1-\zeta_j) \Delta w_{j_{-1}} + \zeta_j \Delta p_{c_j} + \eta l_j - \eta (1-\zeta_j) l_{j_{-1}} \qquad \text{(A45)-(A46)}$$

$$l_{i_j} = y_{i_j} - \varphi_{kl_i} (w_j - p_{i_j}) \qquad \text{(A47)-(A50)}$$

$$l_j \equiv \frac{\gamma_{h_y} \lambda_h}{\lambda} l_{h_j} + \frac{(1 - \gamma_{h_y}) \lambda_n}{\lambda} l_{n_j} \qquad \text{(A51)-(A52)}$$

The dynamic subsystem

$$\Delta k_{i_j} = \delta (i_{i_{j_{-1}}} - k_{i_{j_{-1}}}) \qquad \text{(A53)-(A56)}$$

$$d_j = (1+\tilde{r}_j) d_{j_{-1}} + \gamma_{d_y}^{-1} (g_j - t_j) \qquad \text{(A57)-(A58)}$$

$$t_j = \gamma_{d_y} \beta d_j \qquad \text{(A59)-(A60)}$$

it should be noted that changes in taxes are expressed as a percentage of output ($t_j \equiv \frac{dT_j}{y_j}$, where T denotes the steady-state value of lump sum taxes).

$$f_j = f_{j_{-1}} + \Phi (r_k - r_j + \Delta q_{c_j}) + \tilde{r} \Phi (q_{c_j} + b_{jk_{-1}} - b_{kj_{-1}})$$

$$+ \Upsilon\,(c_{m_k} - c_{m_j} - q_h) + \Psi\,(g_{m_k} - g_{m_j} - q_h),$$

$$\Phi \equiv (1 - \gamma_{b_{jj_u}})(\kappa + \gamma_{d_y}), \quad \Upsilon \equiv \gamma_{h_y} \cdot \gamma_{m_h}, \quad \Psi \equiv \gamma_{h_y} \cdot \gamma_{b_{g_h}} \qquad \text{(A61)-(A62)}$$

Definitional equations

$$y_{d_j} \equiv \Theta \{ y_j + p_{y_j} - p_{c_j} + \gamma_{d_y} (r_j + \tilde{r}_j\, d_{j_{-1}}) + \Phi (r_k - r_j + \Delta q_{c_j})$$

$$+ \tilde{r}\, \Phi\, (b_{jk_{-1}} + q_{c_j} - b_{kj_{-1}}) - \delta\, \kappa\, (k_j + p_{y_j} - p_{c_j}) - t_j$$

$$+ \gamma_{h_y}\, \kappa_h\, \Delta\, p_{h_j} + (1-\gamma_{h_y})\, \kappa_{n_j}\, \Delta\, p_{n_j} - (\kappa + \gamma_{m_y})\, \Delta\, p_{c_j} \},$$

$$\Theta \equiv (1 - \delta\, \kappa - \gamma_{t_y} + \tilde{r}\, \gamma_{d_y})^{-1} \qquad \text{(A63)-(A64)}$$

$$p_{y_j} \equiv \gamma_{h_y}\, p_{h_j} + (1-\gamma_{h_y})\, p_{n_j} \qquad \text{(A65)-(A66)}$$

$$p_{t_j} \equiv \gamma_{h_t}\, p_{h_j} + (1-\gamma_{h_t})\, (p_{h_k} + e_j) \qquad \text{(A67)-(A68)}$$

$$p_{c_j} \equiv \gamma_{t_c}\, p_{t_j} + (1-\gamma_{t_c})\, p_{n_j} \qquad \text{(A69)-(A70)}$$

$$q_{c_j} \equiv e_j + p_{c_k} - p_{c_j} \qquad \text{(A71)-(A72)}$$

$$q_{h_j} \equiv e_j + p_{h_k} - p_{h_j} \qquad \text{(A73)-(A74)}$$

$$e_k = - e_j \qquad \text{(A75)}$$

$$q_{c_k} = - q_{c_j} \qquad \text{(A76)}$$

$$q_{h_k} = - q_{h_j} \qquad \text{(A77)}$$

$$k_j \equiv \frac{\gamma_{h_y}\, \kappa_h}{\kappa} (k_{h_j} + p_{h_j}) + \frac{(1-\gamma_{h_y})\, \kappa_n}{\kappa} (k_{n_j} + p_{n_j}) - p_{y_j} \qquad \text{(A78)-(A79)}$$

$$g_j \equiv \gamma_{h_y}\,\gamma_{g_h}\,(\,g_{h_j} + p_{h_j}) + (1-\gamma_{h_y})\,\gamma_{g_n}\,(\,g_{n_j} + p_{n_j})$$

$$+ \gamma_{h_y}\,\gamma_{mg_h}\,(\,g_{m_j} + p_{h_k} + e_j) - \{\,\gamma_{h_y}\,(\gamma_{g_h} + \gamma_{mg_h})$$

$$+ (1-\gamma_{h_y})\,\gamma_{g_n}\,\}\,p_{c_j} \qquad \text{(A80)-(A81)}$$

Parameter values for the reference situation/situation of a high degree of finacial integration

Partial demand elasticities:

$\varepsilon_{m_{yd}} = 1.0$ (disposable) income-elasticity of real cash balances

$\varepsilon_{m_j r_j} = 0.3$ interest-elasticity of real cash balances

$\varepsilon_{b_{jj} yd} = 0.083$ (disposable) income elasticity of home bonds

$\varepsilon_{b_{jj} r_j} = 0.22/2.687$ elasticity of home bonds held by residents with respect to the domestic nominal interest rate

$\varepsilon_{b_{jj} r_k} = 0.2/2.667$ elasticity of home bonds held by residents with respect to the expected yield on foreign bonds

$\varepsilon_{b_{jk} r_j} = 0.78/10.647$ elasticity of foreign bonds held by residents with respect to the domestic nominal interest rate

$\varepsilon_{b_{jk} r_k} = 0.8/10.667$ elasticity of foreign bonds held by residents with respect to the expected yield on foreign bonds

$\varepsilon_{cyd} = 0.8$ (disposable) income-elasticity of private consumption

$\varepsilon_{cr} = 0.225$ interest-elasticity of private consumption

$\varepsilon_{cw} = 0.1$ (real) wealth-elasticity of private consumption

Elasticity of substitution:

φ_{tn} = 1.5 between tradable and nontradable consumption goods

φ_{hm} = 5.0 between 'home produced' and 'foreign produced' tradable consumption goods

φ_{kl_h} = 0.55 between capital and labour in the tradables-sector

φ_{kl_n} = 0.55 between capital and labour in the nontradables-sector

Other behavioural parameters:

α = 0.08 acceleration coefficient

β = 0.5 tax rule feedback coefficient

ζ_1 = 0.999 nominal wage inertia coefficient for Europe

ζ_2 = 0.001 nominal wage inertia coefficient for the U.S.

η = 0.1 Phillips coefficient

Initial steady-state ratio of:

γ_{k_u} = 0.8 bonds issued by firms to total supply of bonds

γ_{m_y} = 0.25 real cash balances to output

$\gamma_{b_{jj_u}}$ = 0.8 holdings of domestic bonds to total bonds holdings of residents

γ_{m_h} = 0.2667 private sector's imports (exports) to tradables-output

γ_{mg_h} = 0.0533 government imports to tradables output

γ_{c_h} = 0.4 private consumption of 'home produced' tradables by residents to tradables output

γ_{c_n}	= 0.6667	private consumption of nontradables to nontradables output
γ_{g_h}	= 0.08	government expenditure on 'home produced' tradables by the domestic government to tradables output
γ_{g_n}	= 0.2	government expenditure on nontradables to nontradables output
γ_{i_h}	= 0.2	gross capital investment to tradables output
γ_{i_n}	= 0.1333	gross capital investment to nontradables output
γ_{h_y}	= 0.5	tradables output to total output
γ_{t_c}	= 0.5	consumption of tradables to total private consumption
γ_{h_t}	= 0.6	consumption of 'home produced' tradables to total tradables consumption
γ_{t_y}	= 0.2	lump sum taxes to total output
γ_{d_y}	= 0.75	government debt to total output

Other non-behavioural parameters

δ	= 0.0556	rate of technical obsolescence
κ_h	= 3.6	capital-output ratio in the tradables sector
κ_n	= 2.4	capital-output ratio in the nontradable sector
λ_h	= 0.6,	wage share in the tradables sector
λ_n	= 0.7333	wage share in the nontradables sector
$\tilde{r}$	= 0.0444	real interest rate

APPENDIX 2 SENSITIVITY ANALYSIS

Tables A2 1 through A2 3 summarize the results of the sensitivity analysis. Table A2 1 presents the intervals of robustness of the behavioural parameters with respect to short-and long-run disposable income. They are given for both the reference situation and the situation of a high degree of financial integration.

Tables A2 2a and 2b reveal, only for the variables y_{d_j} and y_j, the deviations from the reference situation (Table 1) and the situation of a high degree of financial integration (Table 2), due to a reversal of the sectors' factor intensities ($\kappa_h < \kappa_n$ instead of $\kappa_h > \kappa_n$). Tables A2 3a and 3b depict, again for the variables y_{d_j} and y_j, the deviations from the reference situation (Table 1) and the situation of a high degree of financial integration (Table 2), due to a variation in the sector structure ($\gamma_{h_y} = 0.9$ instead of $\gamma_{h_y} = 0.5$).[4)]

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4) Experiments with a comparatively small tradables sector ($\gamma_{h_y} = 0.4$ instead of $\gamma_{h_y} = 0.5$) in the reference situation and in the situation of a high degree of financial integration, proved to influence the results only in one case. Namely, under a high degree of financial integration, a European fiscal expansion on tradables is a BTS instead of a LOC policy, as far as real output is concerned.

Table A2 1 Intervals of robustness; reference situation (RS) and the situation of a high degree of commercial.integration (HDCI)

parameter	reference value	RS t=1	RS t→∞	HDCI t=1	HDCI t→∞
φ_{kl_h}	0.55	0.3 - 0.7	0.2 - 1	0.1 - 0.75 (0.5 - 0.75)	0.1 - 1
φ_{kl_n}	0.55	0.3 - 0.7	0.2 - 1	0.1 - 0.75 (0.5 - 0.75)	0.1 - 1
φ_{tn}	1.5	0.25 - 3	0.25 - 3	0.01 - 5 (1.2 - 5)	0.01 - 20
ε_{cy_d}	0.8	0.7 - 0.9	0.6 - 0.9	0.6 - 1 (0.6 - 0.83)	0.6 - 1
ε_{cw}	0.1	0.05 - 0.25	0.05 - 0.25	0.05 - 0.4	0.05 - 0.4
ε_{cr}	0.225	0.1 - 0.45	0 - 0.45	0.075 - 0.5 (0.075 - 0.4)	0 - 0.5
$\varepsilon_{m_j r_j}$	0.3	0.15 - 0.45	0.1 - 0.6	0.1 - 0.5 (0.26 -0.5)	0.1 - 0.6
$\varepsilon_{m_j y_d}$	1	0.6 - 1.2	0.6 - 1.2	0.6 - 1.2 (0.6 - 1.1)	0.6 - 1.2
α	0.08	0.01 - 0.15	0.01 - 0.15	0.01 - 0.15 (0.01 - 0.15)	0.01 - 0.15
β	0.5	0.3 - 1	0.1 - 1	0.2 - 1 (0.2 - 0.533)	0.1 - 1
η	0.1	0.01 - 0.5	0.01 - ∞	0.01 - 1 (0.01 - 0.15)	0.01 - ∞
ζ_1	0.999	0.95 - 1	0.8 - 1	0.5 - 1 (0.8 - 1)	0 - 1
ζ_2	0.001	0 - 0.2	0 - 0.2	0 - 0.5 (0 - 1)	0 - 1

The role of technology

Table A2 2a
Deviations from the reference situation (Table 1), due to a reversal of the sectoral factor intensities ($\kappa_h < \kappa_n$)

Type of shock	$g_{h1} < 0$		$g_{h2} < 0$		$g_{n1} < 0$		$g_{n2} < 0$	
Period	1	∞	1	∞	1	∞	1	∞
y_{d1}								
y_{d2}								-
y_1	-				+			
y_2		-		-		-		-

Table A2 2b
Deviations from the situation of a high degree of commercial integration (Table 2), due to a reversal of the sectoral factor intensities ($\kappa_h < \kappa_n$)

Type of shock	$g_{h1} < 0$		$g_{h2} < 0$		$g_{n1} < 0$		$g_{n2} < 0$	
Period	1	∞	1	∞	1	∞	1	∞
y_{d1}								
y_{d2}	+							-
y_1	-		-		+			-
y_2		+		+				

The role of the sector structure

Table A2 3a

Deviations from the reference situation (Table 1),
due to a comparatively large tradables sector (γ_{hy} = 0.9)

Type of shock	$g_{h1} < 0$		$g_{h2} < 0$		$g_{n1} < 0$		$g_{n2} < 0$	
Period	1	∞	1	∞	1	∞	1	∞
y_{d1}								
y_{d2}								-
y_1		+				+		
y_2				+				-

Table A2 3b

Deviations from the situation of
a high degree of commercial integration (Table 2),
due to a comparatively large tradables sector (γ_{hy} = 0.9)

Type of shock	$g_{h1} < 0$		$g_{h2} < 0$		$g_{n1} < 0$		$g_{n2} < 0$	
Period	1	∞	1	∞	1	∞	1	∞
y_{d1}			-					
y_{d2}								
y_1		+						-
y_2				+				

APPENDIX 3 FIGURES

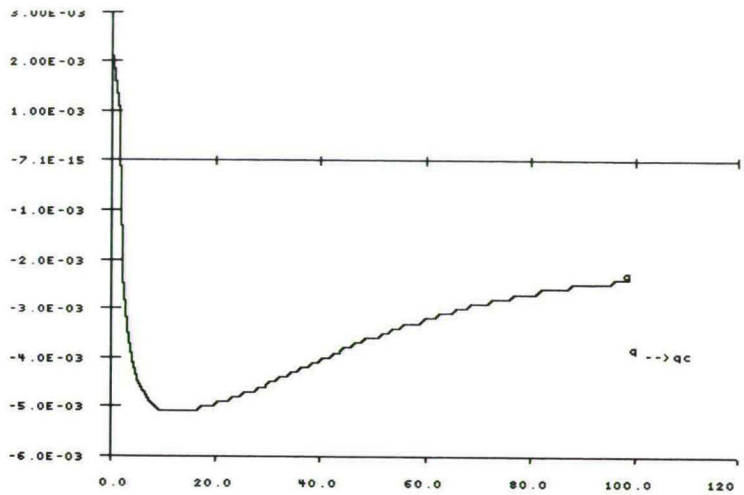

Figure A 1a *Effects of* g_{h_1} *= -1 in case of a low degree of commercial integration*

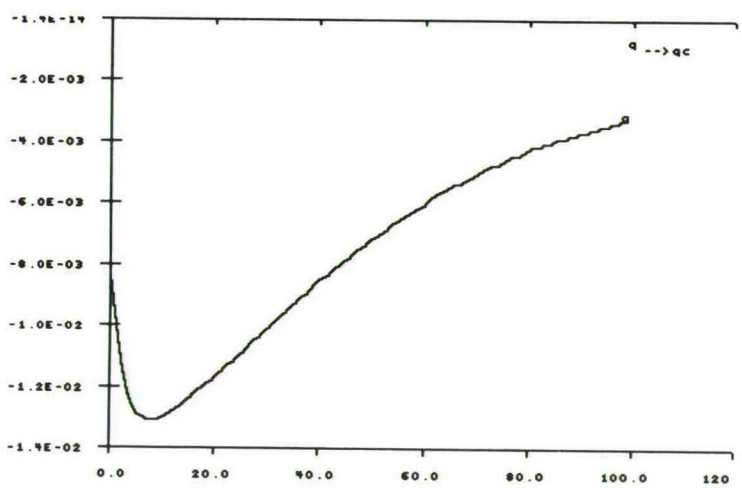

Figure A 1b *Effects of* g_{h_1} *= -1 in case of a high degree of commercial integration*

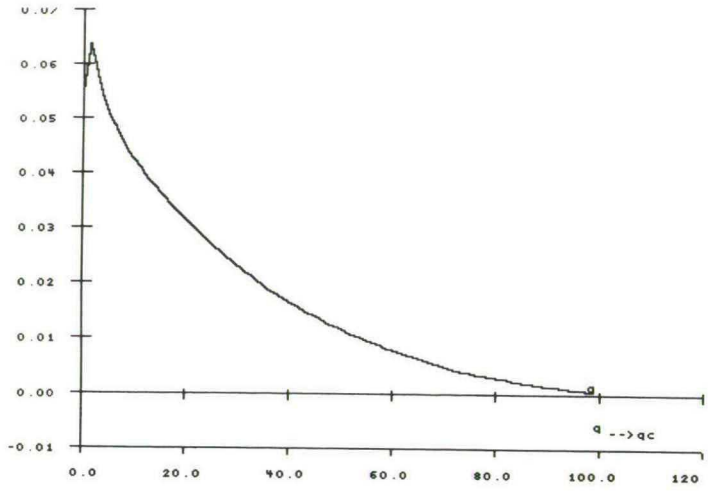

Figure A 2a *Effects of* g_{n_1} *= -1 in case of a low degree of commercial integration*

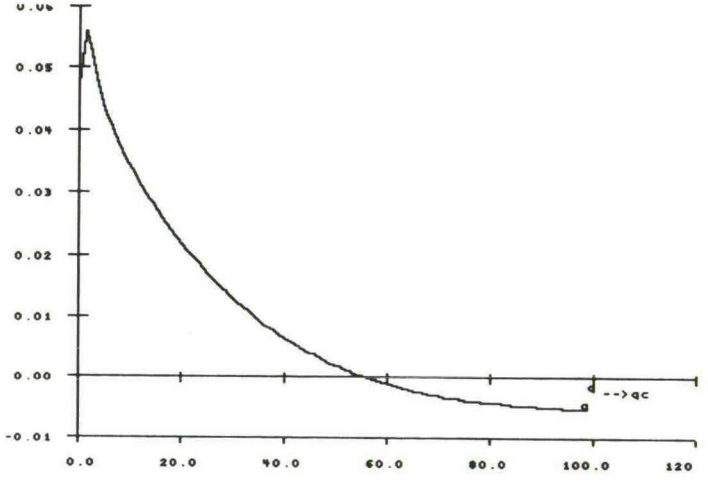

Figure A 2b *Effects of* g_{n_1} *= -1 in case of a high degree of commercial integration*

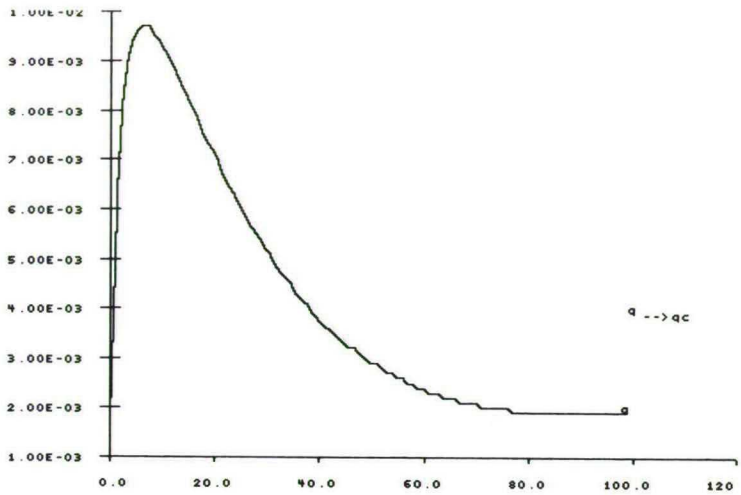

Figure A 3a *Effects of* g_{h_2} *= -1 in case of a low degree of commercial integration*

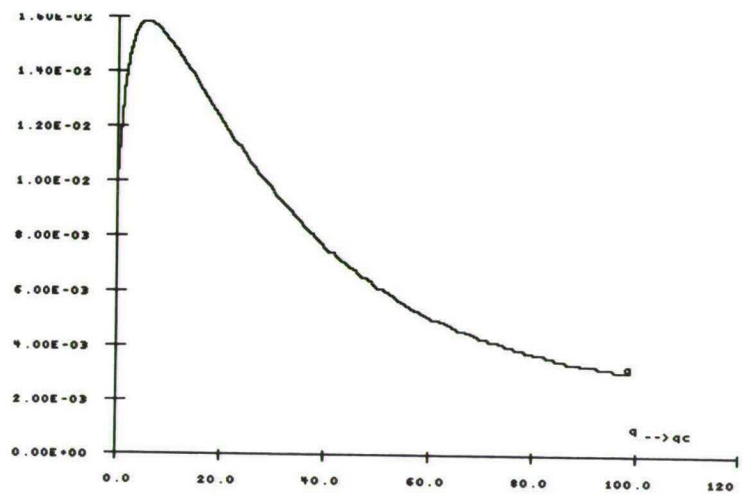

Figure A 3b *Effects of* g_{h_2} *= -1 in case of a high degree of commercial integration*

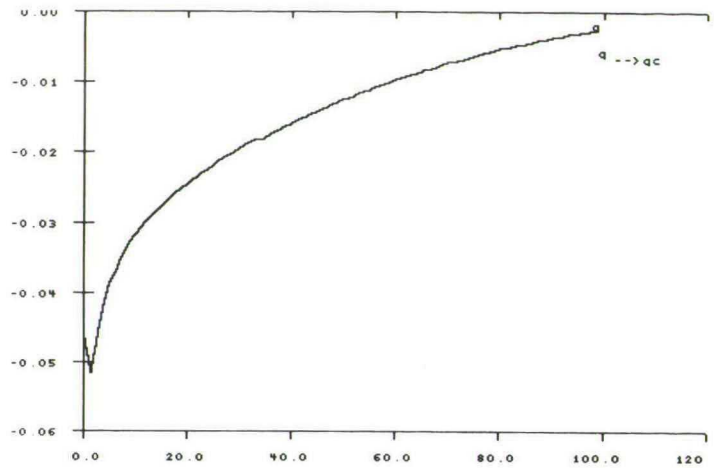

Figure A 4a *Effects of* g_{n_2} *= -1 in case of a low degree of commercial integration*

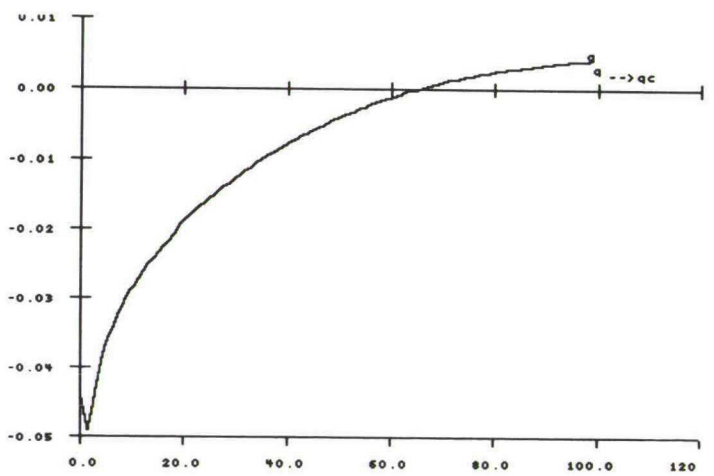

Figure A 4b *Effects of* g_{n_2} *= -1 in case of a high degree of commercial integration*

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