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Welfare Effects of Fiscal Policy under Alternative Exchange Rate Regimes: The Role of the Scale Variable of Money Demand

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ABSTRACT

This paper investigates the implications of alternative scale variables of money demand for the comparison of a flexible exchange rate regime with a monetary union in a NOEM setup. The welfare evaluation of exchange rate regimes depends on the exchange rate response under the flexible regime. When the scale variable is private consumption, a domestic fiscal expansion yields a depreciation. As the associated expenditure switching and terms-of-trade effects are beneficial to the domestic country, households prefer flexible exchange rates. However, when the scale variable is total absorption, we obtain an appreciation and the welfare results are reversed.

Keywords: Fiscal Policy, New Open Economy Macroeconomics, Money Demand Specification, Flexible Exchange Rates, Monetary Union, Pricing-to-Market
JEL Classification: F31, F32, F41 and F42

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1 Introduction

One of the most prominent topics in international finance is the transmission of monetary and fiscal policies in an international context. In particular, researchers are interested in the effects of the respective policy on exchange rate movements, international price differentials, output stimulation, and welfare. Since Mundell (1963) and Fleming (1962) economists have tried to address these issues by formal models. While well established not only in the scientific arena but also in practice, international macro-models of the Mundell-Fleming (MF) type have a severe drawback: The entire absence of microfoundations results in the use of ad-hoc welfare criteria for the evaluation of alternative policy regimes. Starting with Obstfeld and Rogoff (1995), a new promising strand in international macroeconomics has emerged, that combines rigorous microfoundations with the MF assumption of nominal rigidities. This approach allows for an explicit welfare analysis on the basis of the households' preference structure. Today, the so-called New Open Economy Macroeconomics (NOEM) framework provides the standard workhorse for analyzing the international transmission of monetary and fiscal policy in the theoretical literature.

While most of the early NOEM literature has focused on the effects of monetary policy, the formation of the European Monetary Union has stirred increased interest in the analysis of fiscal policy issues. The cost of losing monetary policy as a potential stabilization tool is of great concern particularly among the acceding countries of the European Union. Policy makers have to decide whether to join the European Monetary Union or to only participate in the European Single Market. In that context, renewed attention is directed to fiscal policy as a stabilization instrument. Recent developments in NOEM research may serve to reassess the effectiveness of fiscal policy under alternative exchange rate regimes in terms of welfare.

In this paper, we contribute to the discussion of fiscal policy in the field of New Open Economy Macroeconomics by exploring international fiscal transmission mechanisms and the associated welfare effects under alternative exchange rate regimes. We propose a general analysis framework that enables us to boil down the model to very tractable semi-reduced welfare equations. Specifically, we show that the exchange rate policy implications of NOEM type models are highly sensitive to the theoretical choice of the scale variable of money demand. Against the backdrop of asymmetric fiscal expansions, households in the country where the expansion takes place prefer flexible exchange rates to a monetary union when money demand is based on private consumption as it is standard in NOEM models with money-in-the-utility (MIU). Once the scale variable of money demand amounts to total absorption, the opposite exchange rate policy implication applies.

So far, the issue of the scale variable of money demand against the background of fiscal policy has not been addressed in the NOEM literature.[1] Most of the models rely on money-in-the-utility specifications, where the scale variable of money demand is private consumption, even though the neglect of the public component of money demand leads to very different implications for the exchange rate response and the resulting welfare effects of fiscal policy. In a Mundell-Fleming framework, Chang and Lai (1997) explore alternative specifications of money demand and its implications for the analysis of fiscal policy. Especially the dynamics of the exchange rate hinge crucially on the respective scale variable of money demand. In the case of monetary disturbances, the analysis of competing scale variables is of less importance because private consumption is then the only component of overall expenditure. In a comprehensive theoretical and empirical analysis of alternative money demand specifications Mankiw and Summers (1986) demonstrate that in Keynesian-type models the effects of fiscal policy are quite sensitive to the choice of the scale variable.[2] The authors point out that in principal all components of GNP - including consumer expenditure, investment spending and government expenditure - may generate money demand. However, the relative significance of these components varies substantially. Mankiw and Summers' empirical study on the allocation of money to GNP components, which is based on US data of the year 1980, suggests that private consumption expenditure is by far the most important source of overall money demand. At the same time, however, the observed 20 percent share of government expenditure in GNP translates into 9 percent of M1 holdings allocated to this component. In light of the much greater importance of the public sector in European countries this finding suggests that

[1]For extensive surveys on fiscal policy in NOEM models, see Ganelli and Lane (2002) and Coutinho (2003).

[2]Further empirical studies addressing the question of the appropriate scale variable of money demand are provided by Elyasiani and Nasseh (1994) and Thornton (1988). A survey of recent empirical money demand studies is provided by Sriram (2001a).

a substantial part of money demand in Europe stems from public sources.

There are several ways to overcome problems that are associated with the missing public component in the scale variable of money demand. The most direct approach is to impose cash-in-advance constraints not only on private households but also on governments. By employing this modelling strategy we follow Sargent (1987), chapter V, and Schmitt-Grohé and Uribe (2000).[3] For tractability, we opt for a rigid cash-in-advance constraint in the spirit of Carlstrom and Fuerst (2001), where the interest elasticity of money demand is zero. In a two-country NOEM model with cash-in-advance constraints on households and governments, we investigate the implications of alternative money demand specifications for the comparison of a flexible exchange rate regime with a monetary union allowing for pricing-to-market (PTM) behavior of firms. Following Betts and Devereux (2000), we generate pricing-to-market by assuming that goods prices are temporarily sticky in the currency of the importer.[4] Via variations in public cash requirements we explore the role of alternative scale variables of money demand for the welfare evaluation of asymmetric fiscal expansions. The general analysis framework allows us to derive results that are independent of the persistence of the fiscal expansions.

We show that a welfare comparison of exchange rate regimes depends essentially on the direction of the exchange rate response under the flexible regime and on the degree of PTM behavior. When the scale variable is private consumption as in standard money-in-the-utility models, a domestic fiscal expansion yields a depreciation of the exchange rate under a flexible regime. As the associated expenditure switching and terms-of-trade effects are generally beneficial to the domestic country, domestic households prefer a flexible exchange rate regime to a monetary union. However, when the scale variable of money demand is total absorption, we obtain an appreciation of the exchange rate and the results of the welfare comparison are reversed. A higher degree of pricing-to-market reinforces the respective welfare differentials between the two exchange rate regimes. In the polar case of no pricing-to-market, the expenditure switching and terms-of-trade effects prevailing under a flexible exchange rate regime

[3] Alternatively, a cash-in-advance approach, where households need cash to purchase consumption goods *and* to pay taxes, also takes account of the public component of money demand. Pitterle and Steffen (2004a) and Pitterle and Steffen (2004b) pursue this modelling strategy.

[4] An alternative way of modelling PTM can be found in Bergin (2004). In his analysis of PTM in a monetary union, the author opts for translog preferences. Thereby, he relies neither on price rigidities nor does PTM disappear in a monetary union.

are exactly offsetting. Both exchange rate regimes are then equivalent in terms of the welfare implications of asymmetric fiscal policies. In the end, more empirical research is necessary to decide upon the most appropriate way to model money demand and to determine which exchange rate regime is preferable with fiscal policy being the major source of macroeconomic disturbances.

The paper is organized as follows. Section 2 gives a brief description of the model economies at issue. Section 3 provides the positive analysis, while section 4 explores the welfare implications of asymmetric fiscal policies. Section 5 concludes.

2 The Model

We consider a world that consists of two open economies we refer to as home (h) and foreign (f). All foreign variables will be denoted with an asterisk. The countries are populated by n and $(1-n)$ households, respectively. On the production side, there are n and $(1-n)$ firms that all produce a single differentiated good. Domestic and foreign households interact on the bond market whereas firms trade goods on common goods markets. The production factor labor is assumed to be immobile between countries. As for the exchange rate regime, we consider flexible exchange rates (regime I) and a monetary union (regime II). In the analysis of regime I, we follow Betts and Devereux (2000) in that we allow for different pricing behaviors. A fraction s of firms is able to segment the markets in the two countries, as consumers cannot trade these goods and arbitrage away possible price differences. Thus, the law of one price need not hold for this kind of goods. We assume that these "pricing-to-market" (PTM) firms set prices in the currency of the consumer.[5] The remaining $(1-s)$ goods can be traded by consumers so that prices cannot differ in the two countries when expressed in the same currency, i.e. the law of one price will always hold. As the prices of these goods are set in the currency of the producer, we refer to them as PCP (Producer Currency Pricing) goods. In regime II, the distinction between PTM and PCP firms is irrelevant.

[5] In fact, our concept of pricing-to-market is based on local currency pricing. For brevity, we use the expression "pricing-to-market" throughout the analysis.

2.1 Households

We describe the details of the model for the home country only since most of the equations for the foreign country are completely analogous. We assume that households in both countries are infinitely long living and that they have identical preferences, such that the concept of a representative agent can be applied. The representative domestic household maximizes his discounted life-time utility given by

$$U = \sum_{t=0}^{\infty} \beta^t \left[log\, c_t - \frac{\kappa}{2} h_t^2 + V(g_t) \right] \tag{1}$$

where $\beta \in [0, 1]$ denotes the discount factor. Thus, households derive utility from three different sources. In contrast to most of the NOEM literature we do not assume that government expenditures g_t are purely dissipative. Instead, they affect private utility in an additively separable way via the function $V(g_t)$, which is assumed to be a twice differentiable convex function, that increases monotonously in its argument g_t.[6] Households also gain utility from leisure $(1 - h_t)$. Assuming a quadratic cost of effort, i.e. $-\frac{\kappa}{2} h_t^2$, we capture the implied disutility of labor.[7] Finally, c_t represents a CES real consumption index, which integrates over a basket of goods produced in the domestic economy - denoted with h - and a basket of goods produced in the foreign economy that are denoted with f. Both consumption baskets consist of a fraction s of goods, which are priced to market - denoted with m - and a fraction $(1 - s)$ of goods - denoted with a - for which the law of one price always holds. For instance, $c_t^m(h)$ denotes the representative domestic household's consumption of a domestically produced good that is priced to market. The domestic real consumption index thus reads:

[6] For an analysis of fiscal policy when private and public consumption are not additively separable, see Ganelli (2003). Obviously, the crowding out of private consumption will then be more pronounced, and the output stimulating effects of fiscal policy are limited.

[7] For the sake of a better empirical fit of the model, it is straightforward to extend the model for a general convex cost of effort as in Tille (2001). However, the qualitative implications of the model would not change.

$$c_t = \Big[\int_0^{sn} c_t^m(h)^{\frac{\theta-1}{\theta}} dh + \int_{sn}^{n} c_t^a(h)^{\frac{\theta-1}{\theta}} dh + \int_n^{(1-n)s+n} c_t^m(f)^{\frac{\theta-1}{\theta}} df + \int_{(1-n)s+n}^{1} c_t^a(f)^{\frac{\theta-1}{\theta}} df \Big]^{\frac{\theta}{\theta-1}} \quad (2)$$

The parameter $\theta > 1$ represents the elasticity of substitution between the differentiated goods, with higher values of θ implying a better substitutability of goods. We assume that cross-country and within-country substitutabilities of goods are identical.[8] The price index p_t, which corresponds to equation (2), is obtained by minimizing the household's nominal expenditure that buys exactly one unit of the consumption index. Let $p_t^m(.)$ be the price of an individual PTM good and $p_t^a(.)$ the price of a PCP good. Then, the home country price index is given by

$$p_t = \Big(\int_0^{sn} p_t^m(h)^{1-\theta} dh + \int_{sn}^{n} p_t^a(h)^{1-\theta} dh + \int_n^{(1-n)s+n} p_t^m(f)^{1-\theta} df + \int_{(1-n)s+n}^{1} (p_t^{a*}(f)\, e_t)^{1-\theta} df \Big)^{\frac{1}{1-\theta}} \quad (3)$$

where prices without (with) an asterisk are denoted in home (foreign) currency and e_t represents the nominal exchange rate.[9] Of course, under regime II the respective price aggregators and individual prices are given in the common currency adopted by the two countries. Note from equation (3), that a pure exchange rate variation will affect the home country price index only through a change of the domestic price of PCP goods produced in the foreign country. The prices of imported PTM goods are directly set in the domestic currency and are therefore not subject to exchange rate fluctuations.

It will turn out in the subsequent analysis, that the terms-of-trade are crucial for the evaluation of welfare against the backdrop of a fiscal expansion. We define the domestic terms

[8] Tille (1999, 2001) examines the consequences of different elasticities of substitution within countries and between them.

[9] We define the exchange rate in price notation from the perspective of the domestic country.

of trade as follows

$$\mathcal{T}_t = \frac{\Gamma_t}{\Gamma_t^* \, e_t} \tag{4}$$

where Γ_t denotes the domestic export price index in foreign currency, and Γ_t^* the foreign export price index in domestic currency.

Households allocate consumption expenditures optimally among the differentiated goods. This yields the following domestic per capita demand functions for PTM and PCP goods:

$$c_t^a(h) = \left(\frac{p_t^a(h)}{p_t}\right)^{-\theta} c_t \qquad c_t^a(f) = \left(\frac{e_t \, p_t^{a*}(f)}{p_t}\right)^{-\theta} c_t$$

$$c_t^m(h) = \left(\frac{p_t^m(h)}{p_t}\right)^{-\theta} c_t \qquad c_t^m(f) = \left(\frac{p_t^m(f)}{p_t}\right)^{-\theta} c_t$$

As opposed to the majority of NOEM models, we introduce money into the model economies via a cash-in-advance constraint that captures the role of money as a transaction medium. Hence, the representative household's optimization problem is restricted by the budget constraint

$$m_t^{priv} + R_t f_{t+1} \leq f_t + w_t h_t + \Pi_t - p_t \, T_t \tag{5}$$

and the cash-in-advance constraint

$$m_t^{priv} \geq p_t \, c_t \tag{6}$$

The budget constraint (5) says that nominal expenditure on cash holdings and on bond purchases cannot exceed income after taxes which is derived from maturing bonds, from the remuneration of labor effort and from profits of domestic firms.[10] In order to smooth consumption, households internationally trade nominal one-period bonds f_{t+1}, that are either denominated in domestic currency units (regime I) or in the common currency (regime II). The bond price

[10] We rule out cross-country ownership of firms.

R_t is inversely related to the nominal interest rate. Our timing convention is the following: Bonds denoted with $t+1$ are acquired at the beginning of period t and mature at the beginning of period $t+1$.

The specification of the budget constraint is a short cut to Helpman (1981) as money holdings are not carried over from the previous period, though it is theoretically possible to do so. As Helpman points out, households will not find it reasonable to hold money over periods in the presence of interest yielding bonds. Money thereby reduces "to money to spend". Another important aspect of the budget constraint is the timing of payments. Households receive nominal labor income $w_t h_t$ and profits Π_t instantaneously. In that respect we follow Carré and Collard (2003). We thereby avoid an additional source of distortions that would blur our analysis of fiscal policy with nominal rigidities and monopolistic competition being the distortion of our interest.

Additionally, households face a cash-in-advance constraint (6) à la Helpman (1981) and Lucas (1980, 1982) which is binding in the light of positive nominal interest rates. Households need money in order to carry out consumption goods purchases. Our specification rules out possible distortions of the consumption decision by unexpected inflation as households decide on money demand *after* the occurrence of shocks. The special form of the cash-in-advance constraint can also be found in the literature on real indeterminacy, see for example Carlstrom and Fuerst (2001). As the cash-in-advance constraint determines the household's demand for money, this specification leads to a zero interest elasticity of money demand. [11]

Households maximize intertemporal utility (1) subject to the constraints (5) and (6). The implied domestic Euler equations and optimal labor-leisure trade-offs and its foreign counterparts are stated in table 1.

Private money demand in both countries is simply given by the respective cash-in-advance constraints. In order to fully characterize the equilibrium on part of the households, a standard transversality condition has to be imposed.

[11] Carlstrom and Fuerst refer to this approach as a rigid cash-in-advance constraint.

Table 1: Domestic and foreign optimality conditions

$\beta\, p_t\, c_t = R_t\, p_{t+1}\, c_{t+1}$	$\beta\, p_t^*\, c_t^* = R_t\, \frac{e_{t+1}}{e_t} p_{t+1}^*\, c_{t+1}^*$
$\kappa\, h_t = \frac{w_t}{c_t\, p_t}$	$\kappa\, h_t^* = \frac{w_t^*}{c_t^*\, p_t^*}$

2.2 Central Banks and Governments

Our analysis concentrates on fiscal policy that is not accommodated by the monetary authorities. This assumption does not alter the implications of fiscal policy because shocks to real government expenditures and money supply shocks are additive in our model.

Under regime I (flexible exchange rate), the two independent central banks leave money supply unchanged:

$$m_t^s = m_{t-1}^s = \bar{m}^s = m_t^{s*} = m_{t-1}^{s*} = \bar{m}^{s*}$$

This monetary stance can be motivated by a monetary entity that focuses exclusively on price stability. Specifically, price developments that result from optimal adjustments to fundamental disturbances are not accommodated by expansive or restrictive monetary policies.

Under regime II (monetary union), the common central bank leaves world money supply unchanged. This implies that money supply cannot be controlled separately for the individual countries. Hence, the international money demand pattern determines the amount of currency in circulation in the respective countries.

The government decides in every period on purchases of public goods g_t. Let the public consumption index be defined analogously to the real consumption index (2) of the representative household. Following our discussion of the representative household's utility function, government spending is assumed to enhance private utility in an additive way. Due to the specification of the central bank's policy, the government cannot rely on seignorage as a financing source for public expenditures. Therefore, the government finances its expenditures solely via lump sum taxes T_t.[12] The per capita government budget constraint then reduces to

$$g_t = T_t \tag{7}$$

We follow Sargent (1987) and Schmitt-Grohé and Uribe (2000) in that the government also faces a cash-in-advance constraint for its purchases. This assumption can be motivated by empirical findings that suggest a substantial role of government expenditures for overall money demand, see Mankiw and Summers (1986). We modify the standard specification in that we introduce a parameter $\lambda \in [0, 1]$ that governs the extent of public cash requirements. The public CIA constraint then reads:

$$m_t^{gov} \geq \lambda p_t \, g_t \tag{8}$$

The general formulation provides a high degree of flexibility that allows to capture the whole range of possible public cash requirements. Our main focus, however, lies on the two polar cases $\lambda = 0$ and $\lambda = 1$. In the former case, public expenditures are not exposed to cash constraints. In the latter, all government purchases are subject to cash requirements such that the government faces the same constraint as private households.

2.3 Firms

The general setup of firms holds under both exchange rate regimes, even though the explicit distinction between pricing-to-market and producer currency pricing is irrelevant under regime II, where all producers behave like PCP producers. We assume that output of PTM and PCP firms is linear in its only production factor labor, which is immobile between countries.[13] Recall that both types of firms sell goods on the domestic and on the foreign market. In the case of PCP firms, consumers can arbitrage away price differences, such that the law of one price always holds for this type of goods. Total production of each domestic PCP firm $h \in [s \cdot n, n]$

[12] Introducing distortionary taxes such as income or consumption taxes may be a fruitful extension of the model.

[13] As it is standard in the NOEM literature, we do not consider capital as an input factor. The inherent problem of including capital accumulation in this model context consists in the fact that analytical solutions cannot be derived.

is given by $y_t^a(h) = h_t^a(h)$. Hence, each PCP firm solves the following optimization problem:

$$\begin{aligned} \max_{p_t^a(h)} \quad \Pi_t^a(h) &= p_t^a(h) y_t^a(h) - w_t h_t^a(h) \\ s.t. \quad y_t^a(h) &= \left(\frac{p_t^a(h)}{p_t}\right)^{-\theta} n(c_t + g_t) + \left(\frac{p_t^a(h)}{e_t\, p_t^*}\right)^{-\theta} (1-n)(c_t^* + g_t^*) \end{aligned}$$

In contrast to PCP firms, PTM firms $h \in [0,\, s \cdot n]$ can in principle discriminate between domestic and foreign markets such that prices for their goods - when expressed in the same currency - may differ in the two countries. Dividing total output of each domestic PTM firm into output sold at home, $y_t^m(h)$, and abroad, $y_t^{m*}(h)$, gives $y_t^m(h) + y_t^{m*}(h) = h_t^m(h)$. PTM firms therefore maximize profits by distinguishing explicitly between demand addressed to them by domestic households and demand by foreign households. For each of the locations of demand they set the profit maximizing price. The optimization problem therefore reads

$$\begin{aligned} \max_{p_t^m(h),\, p_t^{m*}(h)} \quad & \Pi_t^m(h) = p_t^m(h) y_t^m(h) + e_t p_t^{m*}(h) y_t^{m*}(h) - w_t h_t^m(h) \\ s.t. \quad & y_t^m(h) = \left(\frac{p_t^m(h)}{p_t}\right)^{-\theta} n(c_t + g_t) \quad \text{and} \quad y_t^{m*}(h) = \left(\frac{p_t^{m*}(h)}{p_t^*}\right)^{-\theta} (1-n)(c_t^* + g_t^*) \end{aligned}$$

Deriving the optimal price setting rules for both types of firms shows that the optimal price is always given as a markup on nominal production costs:

$$p_t^a(h) = p_t^m(h) = e_t p_t^{m*}(h) = \frac{\theta}{\theta - 1} w_t \tag{9}$$

Producers dispose of monopoly power because they all produce a single differentiated good. From equation (9) we see that all domestically produced goods have the same domestic currency price, as long as producers are free to set prices. Since the elasticities of demand are the same in both markets, PTM firms will not charge different prices across countries and the law of one price also holds for their goods. Furthermore, all domestic firms face the same marginal production costs, resulting in an equalization of prices for PCP and PTM goods. Thus, when prices are flexible, purchasing power parity always holds and the distinction between PCP and PTM firms becomes irrelevant even under regime I. In the light of rigid prices, however, a variation of the nominal exchange rate results in different domestic currency prices of PTM goods sold at home and abroad. Profits in domestic currency from sales of PTM goods in the foreign country fluctuate endogenously in this case: A nominal exchange rate appreciation of the domestic currency lowers nominal revenues in the domestic currency, while a nominal depreciation raises nominal revenues.

Note that a better substitutability between the goods, i.e. a higher level of θ, reduces the market power of producers and implies a smaller markup on nominal production costs, which leads to a higher equilibrium output level. Hence, the degree of monopolistic distortion in the economy, which translates into a welfare loss for households, is a decreasing function of θ.

3 Positive Analysis of Asymmetric Fiscal Expansions

With the setup of the model at hand, we now turn to the policy experiment of an unanticipated asymmetric fiscal shock. We propose a general analysis framework that is valid for both temporary and permanent fiscal expansions. Thereby, it is possible to derive policy recommendations that are independent of assumptions about the persistence of macroeconomic disturbances. This section gives a brief description of the solution process and sketches the positive results of the analysis in a semi-reduced form. In section 4, the positive results are evaluated in terms of private utility to the end of a welfare-based evaluation of a transition from flexible exchange rates to a monetary union.

We assume that prices are temporarily sticky and cannot be adjusted in the period when the fiscal shock occurs.[14] In the long run, prices are fully flexible and producers set the optimal price according to equation (9). Therefore, the economy reaches its new steady state right after the shock period.[15] Given this special structure of price rigidities, we may split the algebraic problem into long and short run subsets of equations that can be treated almost independently. The combination of the short run (period t) and long run (period $t+1$) solution yields the solution for exchange rates (under regime I), consumption levels, hours worked and price levels.

[14] Price stickiness can be motivated by a menu cost argument, see Mankiw (1985).

[15] Models that endogenize price rigidities via explicit price adjustment costs like Hairault and Portier (1993) or use Calvo (1983) style price determination as in Kollmann (2001a, 2001b) yield more dynamic optimization problems of the firms. Though these approaches are richer in structure as the economies gradually approach the new steady state they hamper the finding of analytical solutions.

The essential link between the short and long run system will be bond holdings that have been acquired in the shock period.

3.1 Equilibria

This section presents the equilibrium conditions, which comprise money markets, current accounts, goods markets, and Euler equations in the short and long run. As usual in this type of model, the labor market clearing condition is only binding in the long run, because production is entirely demand determined in the short run.

To start with, consider the money market clearing conditions under the two exchange rate regimes. In the short and long run, the domestic money market under regime I (flexible exchange rates) reads

$$\frac{m_\tau^s}{p_\tau} = \frac{m_\tau^{priv}}{p_\tau} + \frac{m_\tau^{gov}}{p_\tau} = c_\tau + \lambda g_\tau \tag{10}$$

where τ takes the values t and $t+1$. An analogous expression holds for the foreign country. Note that the parameter λ governs the scale variable of overall money demand. For $\lambda = 0$, the scale variable amounts to private consumption as in standard money-in-the-utility NOEM models. For $\lambda = 1$, the scale variable is total absorption, i.e. the sum of private consumption and public spending.

The money market under regime II (monetary union) reads

$$\frac{m_\tau^{s\,w}}{p_\tau} = n\left(\frac{m_\tau^{priv}}{p_\tau} + \frac{m_\tau^{gov}}{p_\tau}\right) + (1-n)\left(\frac{m_\tau^{priv\,*}}{p_\tau^*} + \frac{m_\tau^{gov\,*}}{p_\tau^*}\right) = c_\tau^w + \lambda g_\tau^w \tag{11}$$

where $m_t^{s\,w}$ denotes the central bank's world money supply that equals the population weighted sum of domestic and foreign money demand. Union-wide real balances therefore match world consumption and world government expenditures that are subject to cash requirements. Even though we stick to domestic and foreign price indexes, regime II implies a union-wide price level, i.e. $p_\tau = p_\tau^*$, due to symmetric preferences across countries.

The current account can be derived by integrating the households' budget constraints over time and by imposing the transversality condition. Under regime I, the domestic current account in the short run reads

$$p_t(c_t + g_t) + R_t f_{t+1} = (1 - s)\, p_t^a y_t^a + s\,(p_t^{mh} y_t^{mh} + e_t p_t^{mh*} y_t^{mh*}) \tag{12}$$

Nominal expenditures on private and government consumption and on home-currency denominated bonds equal nominal income from goods sales. The latter comprise income from PTM and PCP producers where we imposed symmetry among producers in each group.[16] Once nominal consumption expenditures exceed nominal income, the trade balance is negative and households rely on bond financing. As for the foreign country, the short run current account is analogously defined to equation (12).[17] Since the distinction between PCP and PTM goods is of no consequence in the long run, the domestic current accounts then reduce to

$$p_{t+1}(c_{t+1} + g_{t+1}) + R_{t+1} f_{t+2} = p_{t+1}^h y_{t+1} + f_{t+1} \tag{13}$$

where y_{t+1} now gives the production level of a typical domestic firm. In contrast to the short run, pay-offs derived from maturing bonds acquired in the previous period enter national income. Under regime II, the short and long run current accounts in both countries resemble those of regime I in the long run. All nominal variables are then given in the common currency.

On the goods markets, one has to distinguish between PCP and PTM producers and the respective sales markets only in the case of the short run equilibrium under regime I. The short run domestic goods markets are then defined as

$$y_t^a = \left(\frac{p_t^a}{p_t}\right)^{-\theta} n(c_t + g_t) + \left(\frac{p_t^a}{e_t\, p_t^*}\right)^{-\theta} (1 - n)(c_t^* + g_t^*) \tag{14}$$

$$y_t^{mh} = \left(\frac{p_t^{mh}}{p_t}\right)^{-\theta} n(c_t + g_t) \tag{15}$$

$$y_t^{mh*} = \left(\frac{p_t^{mh*}}{p_t^*}\right)^{-\theta} (1 - n)(c_t^* + g_t^*) \tag{16}$$

[16] For the sake of lean exposition, it is convenient to drop the index h in the case of PCP producers. In the case of PTM producers, the superscript h is necessary to indicate the origin of production while an asterisk points to the foreign sales market.

[17] Note that foreign variables denoted in the domestic currency, e.g. nominal bonds under regime I, have to be adjusted for the nominal exchange rate.

The goods markets relate the respective production levels of the firms to domestic and foreign demand. In the long run, demand for domestically produced goods only hinges on overall world demand and on the relative domestic goods price as purchasing power parity holds:

$$y_{t+1} = \left(\frac{p^h_{t+1}}{p_{t+1}} \right)^{-\theta} \left(c^w_{t+1} + g^w_{t+1} \right) \tag{17}$$

Despite purchasing power parity, domestic and foreign producers set different prices if wages differ internationally. Under regime II, short and long run goods market are defined analogously to equation (17).

Under both regimes, the labor market clearing conditions only bind in the long run. Combining the domestic households' optimal labor supply decision and the firms' pricing rule yields

$$\kappa h_{t+1} = \frac{\theta - 1}{\theta} \frac{p^h_{t+1}}{p_{t+1} c_{t+1}} \tag{18}$$

with an analogous expression holding for the foreign country. Finally, the respective Euler equations of the domestic and foreign households stated in table 1 apply in both periods under both regimes.

3.2 World Aggregates and International Differentials

As the model is non-linear, we recur to an approximative solution via log-linearization.[18] We evaluate the dynamic system around a stationary equilibrium where initial bond holdings and government expenditure equal zero. We do not provide an explicit description of the (pre-shock) steady state as it is by and large standard, see for instance Obstfeld and Rogoff (1995). Instead, we directly turn to the analysis of the (post-shock) linearized short and long run world aggregates and international differentials of consumption and output.

We first take a first-order Taylor approximation of the model and then divide the equations by the respective steady state values of the variables. From then on, only the percentage deviations from the steady state values are considered. Steady state deviations of a variable x are

[18] This implies that we may not consider large shocks to the dynamic system as the approximation error would grow too much once you leave the steady state. In a major contribution to the NOEM literature, Corsetti and Pesenti (2000) present a model solution without recurring to log-linearization.

denoted by $\tilde{x} = \frac{dx}{\bar{x}}$, where $\bar{x}$ represents the steady state value of x. Government expenditures and bond holdings are scaled to steady state world consumption.

It is possible to derive analytical solutions for the individual variables using the fact that any variable may be expressed as a function of the respective world aggregate and its international differential.[19] For any domestic variable x, its deviation from the initial steady state is given by $\tilde{x} = \tilde{x}^w + (1-n)(\tilde{x} - \tilde{x}^*)$ while for its foreign counterpart $\tilde{x}^* = \tilde{x}^w - n(\tilde{x} - \tilde{x}^*)$ holds.

Table 2 summarizes the responses of world consumption and world output in the short and long run which are valid under both regimes.

Table 2: World aggregates depending on λ

$\tilde{c}_t^w = -\lambda \left(n \frac{dg_t}{\bar{c}^w} + (1-n) \frac{dg_t^*}{\bar{c}^w} \right)$	$\tilde{y}_t^w = (1-\lambda) \left(n \frac{dg_t}{\bar{c}^w} + (1-n) \frac{dg_t^*}{\bar{c}^w} \right)$
$\tilde{c}_{t+1}^w = -\frac{1}{2} \left(n \frac{dg_{t+1}}{\bar{c}^w} + (1-n) \frac{dg_{t+1}^*}{\bar{c}^w} \right)$	$\tilde{y}_{t+1}^w = \frac{1}{2} \left(n \frac{dg_{t+1}}{\bar{c}^w} + (1-n) \frac{dg_{t+1}^*}{\bar{c}^w} \right)$

In the long run, classical dichotomy applies because prices are flexible. Combining population weighted sums of long run labor markets and current accounts then gives the response of long run world production. Permanent fiscal expansions stimulate output in the long run. The major mechanism behind this result is that in times of flexible prices households respond to the increased tax burden by supplying more labor. As the labor-leisure trade-off is binding in the long run, they also reduce consumption. Hence, permanent fiscal expansions lead to a partial crowding out of world private consumption.

In the short run, the money market equilibrium governs the responses of the world aggregates. Under regime I (flexible exchange rates), we take weighted sums of the linearized domestic and foreign money markets. Under regime II (monetary union), we make simply use of the linearized version of the world money market equilibrium condition given by equation (11). It is the parameter λ that rules the expansionary effects of fiscal policy in the short run. Once there are no cash requirements for public expenditures, i.e. $\lambda = 0$, private world consumption

[19] See Aoki (1985) for a detailed discussion of the solution method.

Table 3: International Consumption and Output Differentials

$$\tilde{c}_t - \tilde{c}_t^* = -\frac{dg_t - dg_t^*}{\bar{c}^w} - \frac{df_{t+1}}{\bar{p}\bar{c}^w(1-n)(1+\bar{r})} + ((1-s)(\theta-1)+s)\tilde{e}_t$$

$$\tilde{c}_{t+1} - \tilde{c}_{t+1}^* = \frac{1+\theta}{2\theta}\frac{(1-\beta)df_{t+1}}{\bar{p}\bar{c}^w(1-n)} - \frac{1+\theta}{2\theta}\frac{dg_{t+1} - dg_{t+1}^*}{\bar{c}^w}$$

$$\tilde{y}_t - \tilde{y}_t^* = \theta(1-s)\tilde{e}_t$$

$$\tilde{y}_{t+1} - \tilde{y}_{t+1}^* = -\frac{\theta}{1+\theta}(\tilde{c}_{t+1} - \tilde{c}_{t+1}^*)$$

is not crowded out at all and world production is maximally stimulated. In the polar case of $\lambda = 1$, complete crowding out of private consumption leaves world production unchanged. These effects illustrate a general property of cash-in-advance constraints: Money establishes a strict ceiling for the goods to be consumed, see Sriram (2001b). Therefore, the effectiveness of fiscal policy in terms of output stimulation hinges crucially on the cash requirements of the government.

Table 3 shows the log-linear international differences of short and long run consumption and output in a general form.[20] Under regime II, the exchange rate term vanishes, i.e. $\tilde{e}_t = 0$ in the above equations. The long run consumption differential depends on bond holdings and on the government expenditure differential. Negative bond holdings imply permanent interest rate payments and hence a negative wealth effect. In the long run flexible price equilibrium, households then tend to reduce consumption and to raise effort. A positive government expenditure differential reduces the consumption differential because a greater share of the tax burden falls on domestic households. The mirroring property of the output differential is basically due to the long run labor-leisure trade off.

The short run consumption differential follows from the linearized current accounts and goods markets. A positive government spending differential tends to lower relative domestic

[20] In the derivation we made use of the bond market clearing condition, $n\, f_{t+1} = -(1-n)\, f_{t+1}^*$, and the steady state property of long run bond holdings implying $f_{t+1} = f_{t+2}$.

consumption due to the associated tax burden. Domestic accumulation of debt, i.e. $df_{t+1} < 0$, smoothes the short run consumption differential as of higher current consumption possibilities. Finally, the last term captures the combined expenditure switching and terms of trade effects prevailing under flexible exchange rates.[21] The short production differential stems from the linearized goods markets and hinges only on the exchange rate movement and on the pricing behavior of firms. This is a direct consequence of the fact that the short system is entirely demand determined. The production differential can be explained exclusively by expenditure switching associated with exchange rate movements under regime I. In a monetary union, the short run response of production is therefore identical in both countries.

3.3 Exchange Rate and Trade Balance

We now turn to the derivation of the short run exchange rate response under regime I and explore the trade balance responses under both regimes thereafter.

The closed-form solution for the short exchange rate response can be derived from two exchange rate equations that stem from the monetary and the real side of the model, respectively. Subtracting linearized versions of the short run money markets under regime I yields

$$\tilde{m}_t - \tilde{m}_t^* = \tilde{p}_t - \tilde{p}_t^* + \tilde{c}_t - \tilde{c}_t^* + \lambda \, \frac{dg_t - dg_t^*}{\bar{c}^w}$$

With fixed money supplies in both countries and the linearized short run price differential given by $\tilde{p}_t - \tilde{p}_t^* = (1-s)\,\tilde{e}_t$, the exchange rate equation from the monetary part of the model reads

$$(1-s)\tilde{e}_t = -(\tilde{c}_t + \lambda \, \frac{dg_t}{\bar{c}^w}) + (\tilde{c}_t^* + \lambda \, \frac{dg_t^*}{\bar{c}^w}) \qquad (19)$$

On the monetary side of the model, the exchange rate reaction hinges on the differential between domestic and foreign cash-financed absorption. If the sum of domestic private consumption and cash relevant public expenditures exceeds the foreign equivalent, the nominal exchange rate tends to appreciate.

On the real side of the model, that comprises the short run current accounts and goods

[21] These effects will be investigated in detail in section 4.

markets, the exchange rate equation can be derived from the short run consumption differential stated in the previous section:

$$((1-s)(\theta-1)+s)\tilde{e}_t = \tilde{c}_t - \tilde{c}_t^* + \frac{df_{t+1}}{\overline{p}\overline{c}^w(1-n)(1+\bar{r})} + \frac{dg_t - dg_t^*}{\overline{c}^w} \tag{20}$$

By combining the two exchange rate equations and eliminating endogenous bond holdings via the long run consumption differential and the linearized short run Euler equation differential we obtain the short run response of the nominal exchange rate:

$$\tilde{e}_t = \frac{(\bar{r}\,\theta(1-\lambda)+\bar{r}(1-\lambda)-2\theta\lambda)\frac{dg_t - dg_t^*}{\overline{c}^w} + (1+\theta)\frac{dg_{t+1} - dg_{t+1}^*}{\overline{c}^w}}{2\theta + ((1-s)\theta + s)\,\bar{r}\,(1+\theta)} \tag{21}$$

Whether an asymmetric fiscal expansion, where $dg > 0$ and $dg^* = 0$, leads to an appreciation or a depreciation of the exchange rate depends on the persistence of the shock and on the cash requirements of government purchases.[22] In the case of both a temporary and a permanent shock, the exchange depreciates when cash is only required for consumption ($\lambda = 0$). However, when all public purchases are subject to a cash-in-advance constraint ($\lambda = 1$), the exchange rate appreciates. For intermediate values of λ we have to distinguish between a temporary and a permanent shock. A temporary shock leads to an appreciation of the exchange rate for a broad range of λ values, whereas a permanent shock brings about a depreciation even when a large fraction of government purchases are cash relevant.

It is noteworthy that the limiting case of $\lambda = 0$ in the CIA setup generates exactly the same exchange rate response as in a standard money-in-the-utility (MIU) model when real balances enter the utility function logarithmically. This result is due to the formal equivalence of the money market equilibria under the two settings. With $\lambda = 0$, money demand in the CIA setup is consumption based as in a MIU model. Moreover, both specifications result in a unit consumption elasticity of money demand. The only difference between the two money demand variants lies in the interest elasticity: While the CIA constraint implies that money demand is entirely independent of the interest rate, the logarithmic MIU model leads to a very

[22]The results derived in the sequel also apply in the more general case, where $dg > dg^* > 0$.

high interest elasticity of money demand. However, as exchange rate overshooting is precluded in the latter case, the nominal interest rate cancels out of the money market differential and does not affect the equilibrium response of the exchange rate. Intuitively, domestic and foreign money demand are then subject to the same nominal interest rate and relative money demand is independent of the interest rate. Hence, the two specifications of money demand are identical with respect to their implications for the exchange rate response that follows an asymmetric fiscal expansion.[23]

In order to explain the sensitivity of the exchange rate response to the assumed value of λ, we compare the two polar cases $\lambda = 1$ and $\lambda = 0$. If all government expenditures are cash relevant, the scale variable of money demand is the sum of private consumption and government expenditures. According to the CIA constraint, higher tax-financed government expenditures require a fall of private consumption or an increase of the household's real balances. Due to the households' desire to smooth consumption over time, a full reduction of private consumption is not optimal. Hence, domestic households have increased demand for real balances. With fixed money supplies and rigid prices, this can only be brought about by an appreciation of the exchange rate, that leads to lower prices of imports. In contrast, if there are no cash requirements on the side of the government ($\lambda = 0$), the scale variable of money demand reduces to private consumption and there is no direct crowding out effect of the fiscal expansion due to the CIA constraints. However, as domestic households exclusively bear the higher tax burden, they reduce short run consumption, which leads to a lower demand for real balances. This in turn implies that the nominal exchange rate has to depreciate in equilibrium.

Figure 1 provides a numerical illustration of the short run exchange rate responses for the two polar cases $\lambda = 0$ and $\lambda = 1$. We consider a one percent *permanent* increase in domestic government expenditure and graph the exchange rate against the degree of pricing-to-market. For simplicity, the two countries are assumed to be of the same size, i.e. $n = 0.5$. The remaining parameters of the model are taken from the literature, specifically we follow Sutherland (1996) in assuming an elasticity of substitution between individual goods of $\theta = 6$ and a discount factor $\beta = 0.95$, that implies an annual real rate of return of $\bar{r} \approx 0.05$.

[23] In fact, we may show that not only the exchange rate response but also the remaining results are identical

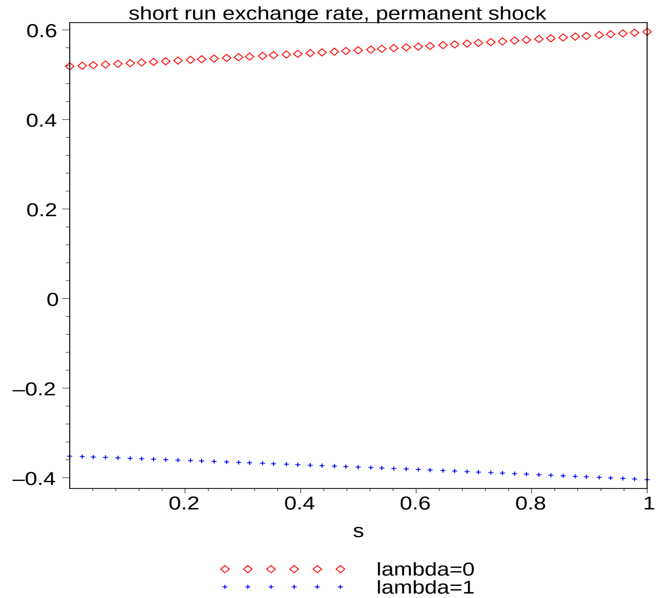


Figure 1: Short run exchange rate

The magnitude of the exchange rate response is governed by the pricing behavior of firms. Higher values of s imply that a smaller share of the prices of imported goods is subject to exchange rate movements and therefore the reaction of the exchange rate has to be more pronounced.

We now turn to the trade balance responses under the two regimes, which provide the essential links between the respective short and long run systems. Under regime I, we make use of the exchange rate equations (19) and (20). The short run trade balance response then reads:

$$\frac{df_{t+1}^{Flex}}{\bar{p}\bar{c}^w} = -(1-\lambda)(1-n)(1+\bar{r})\frac{dg_t - dg_t^*}{\bar{c}^w} + (1-n)(1+\bar{r})((1-s)\theta + s)\tilde{e}_t \tag{22}$$

Figure 2 graphs the trade balance response against the degree of PTM for $\lambda = 0$ and $\lambda = 1$. If all government expenditures are subject to the CIA constraint, the trade balance response is always negative. This is due to the fact that short run domestic production is reduced while overall domestic expenditures on consumption and taxes rise. A higher fraction of PTM producers ameliorates the trade balance as expenditure switching towards foreign goods is

under the two money demand specifications.

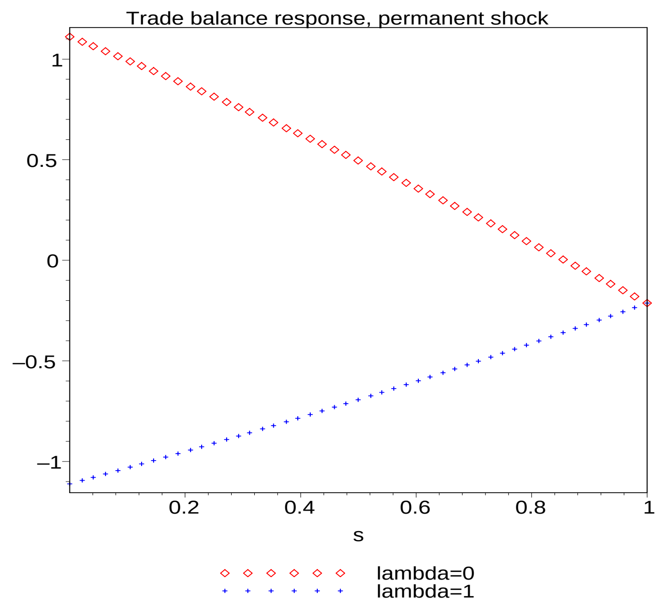


Figure 2: Short run trade balance under regime I

subdued and the income situation of domestic households improves.

For $\lambda = 0$, which corresponds to the logarithmic MIU specification, the trade balance effect is mainly positive because the depreciation of the exchange rate stimulates domestic production. Interestingly, the trade balance response is identical under both λ specifications in the case of complete pricing-to-market. The economic intuition for this lies in the fact that relative producer price changes, which determine nominal unit revenues, exactly offset the differences of the consumption and production profiles in the two settings.

Under regime II (monetary union), the trade balance response can be derived via the long and short run consumption differentials stated in table 3 and the Euler equation differential which decides upon the intertemporal structure of the consumption differentials. The short run trade balance response then reads

$$\frac{df_{t+1}^{MU}}{\overline{p}\overline{c}^w} = (1-n)(1+\overline{r})\left(-\frac{2\theta}{\overline{r}+\theta\overline{r}+2\theta}\frac{dg_t - dg_t^*}{\overline{c}^w} + \frac{1+\theta}{\overline{r}+\theta\overline{r}+2\theta}\frac{dg_{t+1} - dg_{t+1}^*}{\overline{c}^w}\right) \tag{23}$$

In a monetary union, the short run government expenditure differential has a negative effect on the domestic trade balance, whereas the long run differential, that only arises when fiscal policy shocks are permanent, acts towards an improvement. Temporary fiscal shocks thus lead to a strong negative response of the trade balance. Anticipating the higher future income, domestic households - which exclusively bear the tax burden associated with the fiscal expansion - increase their short run consumption level considerably by selling bonds to foreign households. In the case of a permanent fiscal expansion domestic households face a similar income situation in the short and long run, such that consumption smoothing is less relevant. However, as $\theta > 1$, we see from equation (23) that a permanent domestic fiscal expansion also prompts domestic households to run a short run trade balance deficit.

4 Welfare

As our model is based on explicitly optimizing agents, the welfare analysis of fiscal policy does not rely on ad hoc welfare criteria like in Mundell-Fleming type models, but on the specified utility function of the representative households. We follow Tille (2001) in assuming that government expenditure yields the same utility as steady state consumption at the margin, i.e. $V'(g_t) = (\bar{c})^{-1} = (\bar{c}^w)^{-1}$. If government expenditure were purely dissipative as for example in Betts and Devereux (2000), the tax-induced negative welfare effect on domestic households would always dominate the welfare effects of the interplay between the exchange rate response and pricing-to-market behavior, that are at the focus of the analysis. Although our approach is a polar case, it simply scales the results without loss of information because government expenditures enter the utility function additively. Furthermore, when considering the welfare differential of both regimes, the utility component associated with public spending cancels out and does not alter the policy implications. Importantly, the welfare results for the foreign country are always independent of this specification. Totally differentiating the household's utility function (1) yields for any period $\tau \in [t, \infty]$:

$$\begin{aligned} dU_\tau &= \tilde{c}_\tau - \kappa \bar{h}^2 \tilde{h}_\tau + V'(g_\tau) dg_\tau \\ &= \tilde{c}_\tau - \frac{\theta - 1}{\theta} \tilde{h}_\tau + \frac{dg_\tau}{\bar{c}^w} \end{aligned} \tag{24}$$

where we made use of the steady state value of output (hours worked). It is important to note that the degree of monopolistic competition, that is represented by the elasticity of substitution of goods θ, decides upon the relative weight of leisure in the process of utility evaluation. Intuitively, a low substitutability of the differentiated goods implies a low steady state output level and hence a low marginal disutility of labor. At the same time, marginal utility of consumption will be high.

Before turning to a comparison of the short run, long run, and overall welfare evolutions in the two countries under both exchange rate regimes, a closer look at the welfare driving transmission mechanisms under flexible exchange rates is necessary. We identify two effects as the driving forces of the international distribution of overall welfare both of them stemming from the short run movement of the exchange rate: an *expenditure switching effect* and a *terms-of-trade effect*. For $\lambda < 1$ we also obtain a welfare enhancing demand stimulation effect. However, this effect is entirely symmetric and identical under both exchange rate regimes. Therefore, it does not matter for the comparison of exchange rate regimes. In the long run, prices are flexible, and terms-of-trade and expenditure switching effects are fully anticipated. In the short run, however, the response of the exchange rate governs the competitiveness of domestic and foreign firms and thereby affects welfare in both countries. If the exchange rate depreciates, demand is redirected towards domestic firms and short run domestic production is stimulated at the expense of foreign production. From our above reasoning, the monopolistic distortion is then abated in the domestic economy and there is a positive welfare impulse on domestic households. In the case of an appreciation, the output and welfare implications are reversed. The magnitude of the expenditure switching effect is governed by the degree of pricing-to-market. For $s = 0$, it is at its maximum, while it vanishes with complete pricing-to-market. At the same time, however, the purchasing power of additional production varies with the short run evolution of the terms of trade, which we derive for the domestic country by linearizing equation (4):

$$\tilde{\tau}_t = (2\,s - 1)\,\tilde{e}_t \tag{25}$$

Against the backdrop of an exchange rate depreciation (appreciation) and rigid prices, the domestic terms of trade deteriorate (improve) as long as $s < 0.5$ and improve (deteriorate) for

$s > 0.5$. To give some intuition for this result, consider the two polar cases $s = 0$ and $s = 1$ for an exchange rate depreciation. Without pricing-to-market, domestic households face higher import prices, while export prices remain unchanged in domestic currency. In the opposite case of full pricing-to-market, domestic import prices are unchanged whereas unit revenues of exports rise. While the expenditure switching effect decides upon the production structure, the terms of trade determine the consumption possibilities arising from additional output.

Combining both effects, we can give a comprehensive analysis of the role of pricing-to-market for overall welfare. With $s = 0$, the strong expenditure switching effect is exactly offset by the evolution of the terms of trade. The overall welfare effect is then independent of the short term change in relative prices. Hence, an asymmetric fiscal expansion has symmetric effects on welfare in the two countries when the law of one price holds for all goods. With $s = 0.5$, the terms-of-trade are unchanged and it is only the expenditure switching effect which decides upon the welfare evolution in the two countries. With $s = 1$, expenditure switching disappears as relative prices are unchanged. However, depending on the direction of the exchange rate movement, the terms-of-trade work strongly in favor of one of the two countries. In a world of complete pricing-to-market, there is a very asymmetric distribution of welfare gains following a domestic fiscal expansion.

Based on these considerations, we can now analyze short run welfare in the two countries under both exchange rate regimes which is given in a general semi-reduced form by

$$\begin{aligned} dU_t &= \tilde{c}_t^w - \frac{(\theta-1)}{\theta}\tilde{h}_t^w - (1-n)\frac{dg_t}{\bar{c}^w} - \frac{df_{t+1}}{\bar{p}\bar{c}^w(1+\bar{r})} + \frac{dg_t}{\bar{c}^w} + (1-n)s\tilde{e}_t \\ &= \frac{1}{\theta}\,\tilde{h}_t^w - \frac{df_{t+1}}{\bar{p}\bar{c}^w(1+\bar{r})} + s(1-n)\tilde{e}_t \end{aligned} \tag{26}$$

$$dU_t^* = \frac{1}{\theta}\,\tilde{h}_t^w + \frac{n\,df_{t+1}}{\bar{p}\bar{c}^w(1+\bar{r})(1-n)} - n\,s\,\tilde{e}_t \tag{27}$$

where $\tilde{e}_t$ drops out of the system under regime II. The respective responses of the world aggregates, the trade balance, and the exchange rate are stated in section 3.3. Firstly, both countries benefit symmetrically from possible welfare gains that arise if world production is stimulated and consumption possibilities increase. This effect is independent of the exchange rate regime. As outlined above, the degree of output stimulation hinges on the assumed cash requirements for public expenditure. While short run world output does not increase at all for $\lambda = 1$, output stimulation is maximal in the $\lambda = 0$ case, as world private consumption is then not crowded out. Secondly, the domestic trade balance response is unambiguously negative in the $\lambda = 1$ case under flexible exchange rates and in the case of a monetary union. Short run domestic welfare then rises at the expense of foreign welfare. For $\lambda = 0$ under regime I, however, the trade balance response is mainly positive as domestic output increases due to the depreciation of the exchange rate. The trade balance response then tends to favor the foreign country. Thirdly, the exchange rate response under regime I affects short run welfare in both countries. This term captures the combined terms-of-trade and expenditure switching effects and works towards higher domestic welfare in the $\lambda = 0$ case (depreciation) and towards higher foreign welfare in the $\lambda = 1$ case (appreciation).

In order to obtain the welfare effects of a transition from a flexible exchange rate system to a monetary union, we define the domestic welfare differential for any period $\tau \in [t, \infty]$:

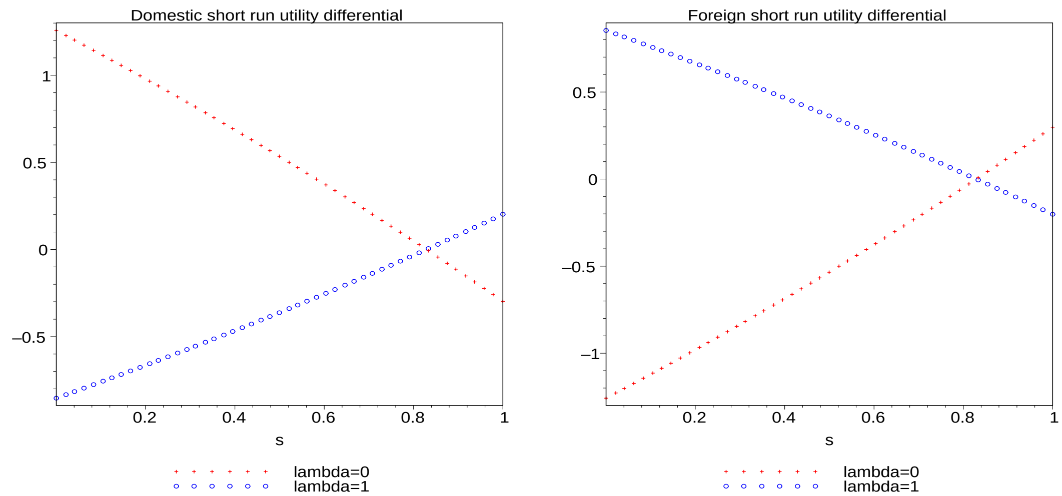
$$dU_\tau^\Delta = dU_\tau^{MU} - dU_\tau^{Flex} \tag{28}$$

with an analogous expression holding for the foreign country. Hence, if $dU_\tau^\Delta > 0$, a transition to a monetary union is beneficial for domestic households. The domestic and foreign short run welfare differentials read

$$dU_t^\Delta = -\frac{df_{t+1}^{MU} - df_{t+1}^{Flex}}{\bar{p}\bar{c}^w(1+\bar{r})} - (1-n)s\tilde{e}_t \tag{29}$$

$$dU_t^{*\Delta} = \frac{n(df_{t+1}^{MU} - df_{t+1}^{Flex})}{\bar{p}\bar{c}^w(1-n)(1+\bar{r})} + ns\tilde{e}_t \tag{30}$$

As the world output stimulation is independent of the monetary regime the respective terms cancel out when taking differences. Thus, the short run welfare differential only depends on the difference in bond holdings and on the exchange rate effect under flexible exchange rates. Figures 3(a) and 3(b) depict the numerical results of the short run utility differential in the two countries for alternative values of λ and a permanent fiscal expansion. For the sake of brevity, we do not present graphical illustrations of a temporary fiscal expansion, which yields the same qualitative results.



(a) Domestic

(b) Foreign

Figure 3: Short run utility differentials, permanent expansion

It becomes evident that the short run welfare implications of a fiscal shock hinge crucially on the assumptions about cash requirements of public expenditures and on the pricing behavior of firms. For $\lambda = 1$, we obtain the following short run welfare results: For a broad range of s, domestic households suffer welfare losses when moving from a flexible exchange rate regime to a monetary union, while foreign households are better off. This is due to the fact that for low values of s the appreciation of the exchange rate in the flexible regime has a positive (negative) impact on short run domestic (foreign) welfare. In equations (29) and (30), the exchange rate term, which works in favor of a monetary union, is then dominated by the bond holding differential, where the flexible part is also driven by the exchange rate movement. On the one hand, expenditure switching leads to lower (higher) domestic (foreign) production and hence less labor effort, which results in short run welfare gains (losses) for domestic (foreign) households. Domestic households recur more to debt financing, which has a strong positive effect on short run welfare. On the other hand, values of s below 0.5 also imply a positive (negative) terms-of-trade effect for domestic (foreign) households under flexible exchange rates, which is absent in the monetary union case. For very high levels of pricing-to-market behavior, in contrast, domestic households are better off under a monetary union as they suffer from a negative terms-of-trade effect under flexible exchange rates. In the polar case of $s = 1$, expenditure switching vanishes under flexible exchange rates and the trade balance response is identical under both regimes as pointed out in the previous section. The positive domestic welfare differential therefore reflects exclusively the different terms-of-trade under the two regimes. The opposite reasoning applies for the foreign country.

In the case of $\lambda = 0$, the short run welfare results are completely reversed. The absence of an exchange rate depreciation in a monetary union makes domestic (foreign) households better (worse) off, except for very high degrees of pricing-to-market.

Turning to the long run welfare effects, the semi-reduced forms of the utility equations under both regimes read

$$dU_{t+1} = \frac{1}{\theta}\,\tilde{h}^w_{t+1} + \frac{\bar{r}\,df_{t+1}}{\bar{p}\bar{c}^w(1+\bar{r})} \tag{31}$$

$$dU^*_{t+1} = \frac{1}{\theta}\,\tilde{h}^w_{t+1} - \frac{n\,\bar{r}\,df_{t+1}}{\bar{p}\bar{c}^w(1+\bar{r})(1-n)} \tag{32}$$

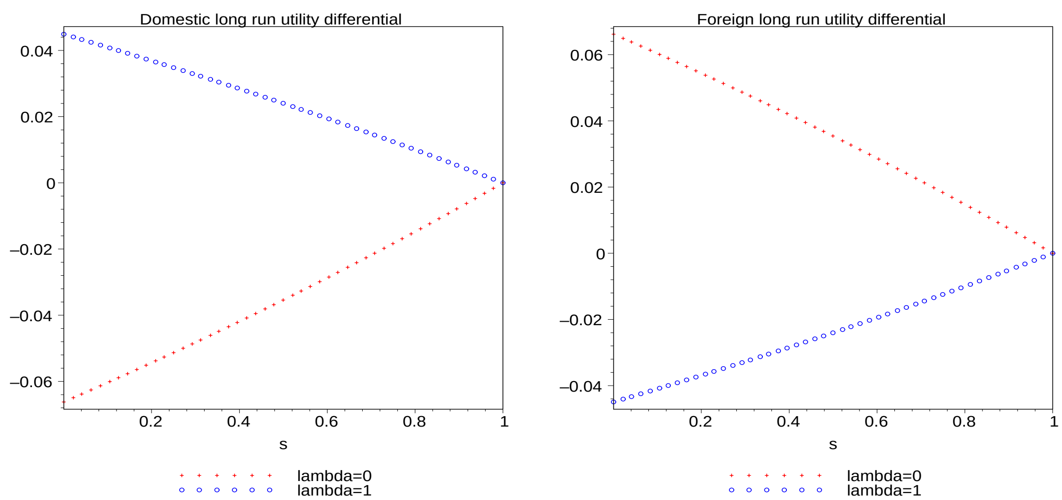
Long run welfare thus only depends on a possible stimulation of world output and on bond holdings. World production increases only in the case of a permanent fiscal expansion. The resulting welfare gains are again equally shared by domestic and foreign households. The utility effects of bond holdings now mirror those of the short run: In the case of $\lambda = 1$ under regime I and in a monetary union domestic households face a utility loss as they have to pay interests on debt accumulated in the short run, whereas foreign households benefit from additional consumption possibilities. The opposite is true for $\lambda = 0$ under regime I, but for high degrees of pricing-to-market.

As in the analysis of the short run, we now derive the semi-reduced long run welfare differentials in both countries:

$$dU^{\Delta}_{t+1} = \frac{df^{MU}_{t+1} - df^{Flex}_{t+1}}{\bar{p}\bar{c}^w(1+\bar{r})} \tag{33}$$

$$dU_{t+1}^{*\Delta} = -\frac{n(df_{t+1}^{MU} - df_{t+1}^{Flex})}{\overline{pc}^w(1-n)(1+\bar{r})} \tag{34}$$

The numerical solutions of the long run welfare differentials for a permanent expansion are depicted in figures 4(a) and 4(b).



(a) Domestic (b) Foreign

Figure 4: Long run utility differentials, permanent expansion

For $\lambda = 1$, domestic long run utility is higher in a monetary union due to the lower short run trade balance response except for the case of $s = 1$. Domestic households then face lower permanent interest payments to foreigners. For the special case of complete pricing-to-market, however, the trade balance response is identical under both regimes and no long run utility differential arises. For $\lambda = 0$, the domestic trade balance differential is always negative except for $s = 1$, hence the negative long run welfare differential. The opposite reasoning applies for the foreign country.

Combining the impact on short and long run welfare we obtain the overall effect on welfare in the two countries:

$$d\Omega_t = \frac{1}{\theta}\left(\tilde{h}_t^w + \frac{1}{\bar{r}}\tilde{h}_{t+1}^w\right) + (1-n)\,s\,\tilde{e}_t \tag{35}$$

$$d\Omega_t^* \quad = \quad \frac{1}{\theta}\left(\tilde{h}_t^w + \frac{1}{\bar{r}}\tilde{h}_{t+1}^w\right) - n\,s\,\tilde{e}_t \tag{36}$$

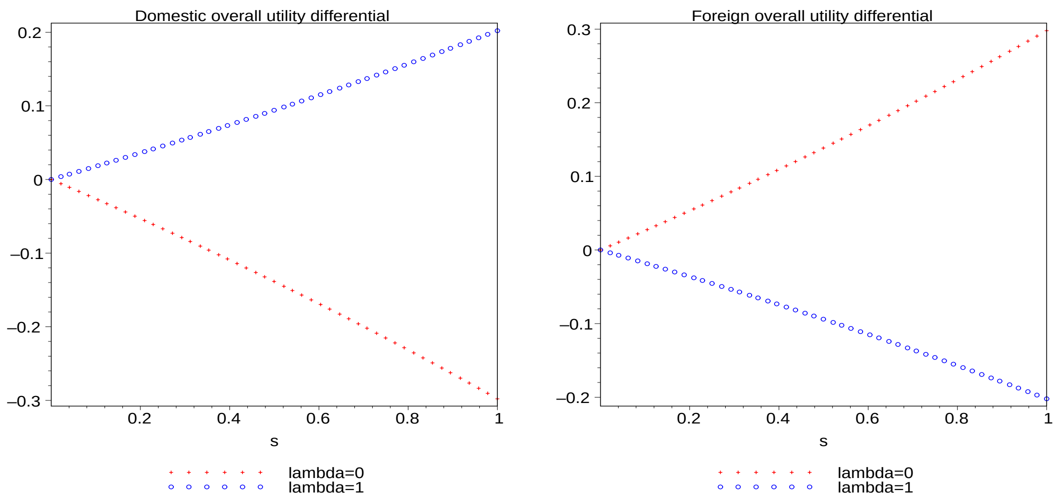
While the pattern of bond holdings determines the intertemporal utility profile, it does not enter overall welfare. The optimal bond holding decision of households is characterized by the trade-off between present and future consumption possibilities. Foreign households are only willing to finance domestic short run consumption if they are entirely compensated via permanent interest income in the future. The net present value of bonds in terms of welfare is therefore zero. Hence, the impact on overall welfare hinges only on the level of the symmetric output stimulation effects and on the asymmetric effects stemming from the short run movement of the nominal exchange rate (regime I). In the case of $s = 0$, expenditure switching and terms-of-trade effects are exactly offsetting such that households in both countries benefit symmetrically from the domestic fiscal expansion not only under regime II, but also under regime I.

Combining the short and long run utility differentials yields the overall welfare differentials which are valid for both temporary and permanent expansions:

$$d\Omega_t^{\Delta} = -(1-n)\,s\,\tilde{e}_t \tag{37}$$

$$d\Omega_t^{*\Delta} = n\,s\,\tilde{e}_t \tag{38}$$

Hence, the overall welfare effects of a transition to a monetary union depend exclusively on the pricing behavior of firms and on the short exchange rate response. The latter, in turn, hinges on the public cash requirements. As also depicted in figures 5(a) and 5(b), with $\lambda = 1$ domestic households are better off in a monetary union regime except for $s = 0$, while foreign households are worse off. With $\lambda = 0$, the welfare implications are completely reversed. As before, we do not depict the welfare results of a temporary expansion which yields the same qualitative results. From an overall welfare perspective, the difference between the two exchange rate regimes lies in the combined expenditure switching and terms-of-trade effects prevailing in the flexible exchange rate regime. The two effects are exactly offsetting when the law of one price holds for all goods ($s = 0$). Hence, the exchange rate regime does not matter for the welfare implications of an asymmetric fiscal expansion. The irrelevance of the exchange rate regime



(a) Domestic

(b) Foreign

Figure 5: Overall utility differentials, permanent expansion

in the $s = 0$ case is closely related to the intrinsic symmetry property of the baseline *Redux* model, where the origin of the macroeconomic disturbance does not affect the international pattern of overall welfare.[24]

As long as a fraction of producers pursue pricing-to-market, the welfare effects of a transition to a monetary union hinge on the short run response of the nominal exchange rate. For $\lambda = 1$, the implied appreciation favors foreign households. The establishment of a monetary union is therefore welfare enhancing for the domestic country and welfare reducing for the foreign country. With complete pricing-to-market, the respective welfare differentials are maximal. Expenditure switching is then absent even under flexible exchange rates while the terms-of-trade effect of the appreciation exerts a strong negative effect on domestic welfare and a strong positive effect on foreign welfare. A monetary union is thus beneficial for the domestic economy and detrimental for the foreign country. For $\lambda = 0$, the resulting depreciation of the nominal exchange rate has exactly the opposite consequences. The establishment of a monetary union is detrimental to domestic households, while it is beneficial for foreign households.

[24] In the light of fiscal policy this result only holds if government expenditures fully enter the households' utility function.

5 Concluding Remarks

In this paper, we have explored the international transmission mechanisms and welfare effects of fiscal policy in a theoretical model of the New Open Economy Macroeconomics approach. We have provided a general analysis framework that allows us to boil down the model to very tractable semi-reduced welfare equations. The solution technique can be of use for the welfare analysis of various topics in international macroeconomics.

At the center of our analysis have been the implications of alternative scale variables of money demand for the comparison of a flexible exchange rate regime with a monetary union. Our main finding is that accounting for the public component of money demand reverses the qualitative welfare implications of asymmetric fiscal policies found in standard NOEM models where private consumption is the scale variable of money demand. Quantitatively, the obtained welfare differentials between the different exchange rate regimes are governed by the degree of pricing-to-market. In general, our analysis cautions for the specific choice of the money demand specification when fiscal policy is the predominant source of macroeconomic disturbances. Given the importance of the public sector in most European countries a money demand function that does not allow for a public component may yield misleading welfare implications of alternative exchange rate regimes.

References

Aoki, M. (1985): "Misadjustment to Anticipated Shocks: An Example of Exchange-Rate Response," *Journal of International Money and Finance*, 4, 415–420.

Bergin, P. (2004): "One Money One Price? Pricing to Market in a Monetary Union," *European Economic Review*, forthcoming.

Betts, C., and M. Devereux (2000): "Exchange Rate Dynamics in a Model of Pricing-to-Market," *Journal of International Economics*, 50, 215–244.

Calvo, G. (1983): "Staggered Contracts in a Utility-Maximizing Framework," *Journal of Monetary Economics*, 12, 383–398.

Carlstrom, C. T., and T. S. Fuerst (2001): "Real Indeterminacy in Monetary Models with Nominal Interest Rate Distortions," *Review of Economic Dynamics*, 4, 767–789.

Carré, M., and F. Collard (2003): "Monetary Union: A Welfare Based Approach," *European Economic Review*, 47, 521–552.

Chang, W., and C. Lai (1997): "The Specification of Money Demand, Fiscal Policy, and Exchange Rate Dynamics," *Journal of Macroeconomics*, 19(1), 79–102.

Corsetti, G., and P. Pesenti (2000): "Welfare and Macroeconomic Interdependence," *mimeo*, Federal Reserve Bank.

Coutinho, L. (2003): "Fiscal Policy in the New Open Economy Macroeconomics and Prospects for Fiscal Policy Coordination," *ENEPRI Working Paper Series*, 21.

Elyasiani, E., and A. Nasseh (1994): "The Appropriate Scale Variable in the U.S. Money Demand: An Application of Nonnested Tests of Consumption versus Income Measures," *Journal of Business and Economics Statistics*, 12, 47–55.

Fleming, M. (1962): "Domestic Financial Policies under Fixed and under Floating Exchange Rates," *International Monetary Fund Staff Papers*, 9, 369–79.

Ganelli, G. (2003): "Useful Government Spending, Direct Crowding-out and Fiscal Policy Interdependence," *Journal of International Money and Finance*, forthcoming.

Ganelli, G., and P. Lane (2002): "Dynamic General Equilibrium Analysis: The Open Economy Dimension," *Trinity College Dublin and CEPR*, mimeo.

Hairault, J.-O., and F. Portier (1993): "Money, New-Keynesian Macroeconomics, and the Business Cycle," *European Economic Review*, 37, 1533–1568.

Helpman, E. (1981): "An Exploration of the Theory of Exchange Rate Regimes," *Journal of Political Economy*, 89, 865–90.

Kollmann, R. (2001a): "The Exchange Rate in a Dynamic-Optimizing Business Cycle Model with Nominal Rigidities: A Quantitative Investigation," *Journal of International Economics*, 55, 243–262.

——— (2001b): "Explaining international comovements of output and asset returns: The role of money and nominal rigidities," *Journal of Economic Dynamics & Control*, 25, 1547–1583.

Lucas, R. E. (1980): "Equilibrium in a Pure Currency Economy," *Economic Inquiry*, 18, 203–220.

Lucas, R. E. J. (1982): "Interest Rates and Currency Prices in a Two-Country World," *Journal of Monetary Economics*, 10, 336–60.

Mankiw, G. (1985): "Small Menu Costs and Large Business Cycles: A Macroeconomic Model of Monopoly," *Quarterly Journal of Economics*, 100, 529–539.

Mankiw, G., and L. Summers (1986): "Money Demand and the Effects of Fiscal Policies," *Journal of Money, Credit and Banking*, 18, 415–429.

Mundell, R. (1963): "Capital Mobility and Stabilization Policy under Fixed and Flexible Exchange Rates," *Canadian Journal of Economics and Political Science*, 29, 475–85.

Obstfeld, M., and K. Rogoff (1995): "Exchange Rate Dynamics Redux," *Journal of Political Economy*, 103, 624–660.

Pitterle, I., and D. Steffen (2004a): "Fiscal Policy in a Monetary Union Model with Home Bias in Consumption," *mimeo*, University of Frankfurt.

——— (2004b): "Spillover Effects of Fiscal Policy under Flexible Exchange Rates," *mimeo*, University of Frankfurt.

Sargent, T. J. (1987): *Dynamic Macroeconomic Theory*. Harvard University Press, Cambridge.

Schmitt-Grohé, S., and M. Uribe (2000): "Price Level Determinacy and Monetary Policy under a Balanced-budget Requirement," *Journal of Monetary Economics*, 45, 211–246.

Sriram, S. S. (2001a): "A Survey of Recent Empirical Money Demand Studies," *IMF Staff Papers*, 47, 334–365.

——— (2001b): "Theory of the Demand for Money: a Survey of the Literature," *The Indian Economic Journal*, 49(1), 103–115.

Sutherland, A. (1996): "Exchange Rate Dynamics and Financial Market Integration," *CEPR Discussion Paper*, 1337.

Thornton, D. (1988): "Should Consumer Expenditures be the Scale Variable in Empirical Money Demand Equations?," *Federal Reserve Bank of St. Louis Working Papers*, 88-003.

Tille, C. (1999): "The Role of Consumption Substitutability in the International Transmission of Shocks," *mimeo*, Federal Reserve Bank of New York.

——— (2001): "The Role of Consumption Substitutability in the International Transmission of Monetary Shocks," *Journal of International Economics*, 53(2), 421–444.

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