Bureau d'économie théorique et appliquée (BETA)

UMR 7522

Documents de travail

CnrS

Nancy-Université
Université Nancy 2

UNIVERSITÉ DE STRASBOURG

Fiscal policy efficiency and coordination: The New Open Economy Macroeconomics Approach

Gilbert Koenig, Irem Zeyneloglu

Abstract

The paper offers a survey of recent research on fiscal policy in both deterministic and stochastic models of the New Open Economy Macroeconomics (NOEM) initiated by Obstfeld and Rogoff (1995, 2002b). The survey includes a comparison of the implications of the deterministic benchmark model to the empirical evidence obtained in recent studies. It provides a detailed discussion of the recent extensions induced by the gap between theoretical and empirical implications. These extensions revise the traditionally studied aspects of fiscal issues such as the transmission channels of fiscal policy by introducing production specialization at the international level or by diversifying the pricing decisions of firms. They also cover current economic issues such as the effect of financial globalization on fiscal policy efficiency and the implication of a reduction in public employment in order to cut taxes.

After presenting the basic features of a benchmark stochastic NOEM model for fiscal policy, the paper discusses the recent developments the gains from international fiscal policy cooperation with respect to gains from fiscal stabilization.

Keywords: New Open Economy Macroeconomics, fiscal policy, stochastic and deterministic general equilibrium models
JEL classification: E62, E63, F41, F42

Résumé

L'article propose une revue de la littérature sur la politique budgétaire qui s'est développée dans le cadre des modèles déterministes et stochastiques de la nouvelle macroéconomie internationale à la suite des apports de Obstfeld et Rogoff (1995, 2002b). Il compare les résultats obtenus dans le modèle déterministe de référence à ce obtenus dans les travaux empiriques récents. Il fournit une discussion détaillée des extensions récentes de ce modèle suscitées par la différences de ces résultats. Ces extensions reconsidère l'analyse traditionnel de la politique budgétaire, notamment celle qui porte sur le mécanisme de transmission internationale de cette politique en introduisant la spécialisation internationale de la production ou en tenant compte de différentes modalités de prise de décision en matière de prix. Elles analysent également les implications de phénomènes récents, comme celles de la globalisation financière sur la politique budgétaire et celle d'une réduction de l'emploi dans le secteur public qui doit permettre de réduire la pression fiscale.

Apres avoir présenter les caractéristiques essentiels d'un modèle stochastique de référence de la nouvelle macroéconomie internationale, cet article discute les prolongements récents de cette approche ainsi que les gains résultants d'une coopération budgétaire internationale et ceux provenant d'une politique de stabilisation budgétaire.

Mots-clés : nouvelle macroéconomie internationale, politique budgétaire, modèles déterministes et stochastiques d'équilibre général

Classification JEL : E62, E63, F41, F42

1 Introduction

After a period of neglect since the 70s, fiscal policy has regained attention recently. Several current events can explain this recovery of interest. First, higher public debt and increasing budget deficits experienced in most of the developed countries have called for significant fiscal reactions. These reactions, due to a lack of coordination, exerted undesired effects in the neighbor countries. Second, the co-movement of public and current account deficits in some countries such as the US suggested a possible causality between the two phenomena, justifying restrictive fiscal policy in order to reduce trade imbalances. Finally, fiscal policy turned out to be especially indispensable when monetary policy is not available or inefficient. Indeed, fiscal policy is the only instrument to stimulate economic activity when monetary policy is inefficient because of a nearly-zero level of interest rates as in the case of Japan, or when monetary policy is not available as in the case of European countries which delegated monetary policy to the supranational European Central Bank (ECB).

Because of their lack of microeconomic foundations, the traditional models of Mundell-Fleming do not allow to consider these issues in a detailed way. Similarly, the models of the 80s which adopt an intertemporal approach fail to offer a realistic view of fiscal policy issues since they neglect market imperfections and the empirically observed price and wage rigidity.

The new open economy macroeconomics (NOEM) framework, initiated by Obstfeld and Rogoff (1995, 1996) (O-R hereafter), offers a renewal of the macroeconomic policy analysis by building a bridge between the two preceding approaches. Indeed, while assuming short run price rigidity as in Mundell-Fleming models, NOEM adopts the intertemporal approach of the flexible-price models through optimizing behavior of agents under imperfect competition in order to consider the international transmission mechanism of macroeconomic policy. The microeconomic foundations of NOEM help improve the analysis of fiscal policy transmission channels and allow for a welfare-based evaluation of fiscal policy efficiency instead of social loss functions generally postulated in traditional models.

O-R (1995) puts light on the role of these new features in analyzing macroeconomic policy in a two-country framework. They analyze the effects of discretionary policy under flexible exchange rates and integrated financial markets in a setup where ricardian equivalence holds. With this benchmark framework, they provide a starting point for future research in policy analysis in open economies. In this context, fiscal expansion is beggar-thyself and prosper-thy-neighbor. Moreover, fiscal expansion may cause a trade deficit or surplus depending on whether the expansion is temporary or permanent. In contrast to the

Dornbusch model, fiscal policy does not lead to an over/undershooting of the exchange rate. O-R (1995) also find that fiscal expansion reduces consumption and hence welfare in the implementing country.

Some of these results are in contrast with those obtained in empirical analyses. The over simplified structure of the theoretical model was considered as one of the reasons to this difference in results. Indeed, the benchmark model limits the definition of fiscal policy to goods purchases and neglects much of the empirical reality. Therefore, efforts have been made to render the setup more realistic by introducing empirical facts such as the imperfect pass-through of exchange rates and production specialization at the international level, among others.

Other authors attempted to extend the setup to shed light on current economic issues. Indeed, the formation of European Union gave way to the analysis of fiscal policy in NOEM under fixed exchange rates and in a currency union setup. Similarly, the recent enhancement of financial market integration at the international level stimulated research regarding the impact of such integration on fiscal policy efficiency. Finally, the twin deficit problem in the US induced extensions of the benchmark model that study the relation between trade balance and public deficit.

O-R (2000, 2002b) extend O-R (1995) to a stochastic environment which gives a second impulse to the analysis of macroeconomic policy in NOEM framework. The authors use this setup to analyze gains from stabilization and from international coordination of monetary policy. Their results are similar to those of traditional models: gains from monetary cooperation are negligible, a result that can explain the divergence between the Fed's and ECB's monetary policies. Some of the following work introduced fiscal policy in this setup to evaluate the gains from fiscal policy coordination and to see if the availability of fiscal policy can modify the pessimistic results of O-R on the coordination of monetary policies. Fiscal policy is generally introduced through contingent fiscal rules, which can be interpreted as automatic stabilizers.

The present paper offers a survey of the NOEM litterature which has grown rapidly in recent years focusing on the fiscal issues stated above. First, the paper aims to produce a complete up to date inventory of deterministic NOEM models. Our survey is larger than that of Ganelli and Lane (2003) who devote a section to the discussion of the early contributions in their presentation of dynamic general equilibrium models. It is also larger than that of Coutinho (2005) who reconsiders these early extensions of deterministic NOEM model. The present survey compares the implications of the benchmark model as well as those of its early

extensions to the empirical evidence obtained in recent studies. The gap between theoretical and empirical implications led to further development of the benchmark model, which the survey discusses in detail. It also discusses the recent extensions concerning current economic issues such as the effect of imperfect financial integration on fiscal policy efficiency and the implications of alternative structures of public spending. In addition, it considers the effect of a cash-in–advance constraint for money demand which is particularly suited to fiscal policy analysis. Second, the paper discusses the stochastic NOEM models which allow to analyse the stabilization capacity and the international coordination of fiscal policy. Again, our discussion covers a wider range of issues than Coutinho (2005) who makes a first effort to discuss fiscal policy in the stochastic NOEM setup at a time when research on the subject is yet limited. The recent development of the research on the stabilization role of fiscal policy in a NOEM framework allows us to present the basic features of a benchmark model in contrast to Coutinho (2005).

The paper is organized as follows: section 2 presents the basic deterministic setup of O-R (1995) adapted to fiscal policy analysis and discusses the assumptions that are later relaxed in the research that followed. Section 3 analyzes the implications of fiscal policy in deterministic NOEM models. Section 4 discusses the work that extends O-R (1995) to the analysis of current economic issues. Section 5 presents the stochastic framework adapted to fiscal policy analysis and reviews the research on fiscal stabilization and gains from fiscal cooperation in a stochastic NOEM framework as well as monetary and fiscal policy interactions. Section 6 concludes.

2 The Benchmark Model for Fiscal Policy Analysis and the Deterministic NOEM Framework

The general equilibrium framework of O-R (1995, 1996) constitutes the benchmark setup of deterministic NOEM models. Much of the assumptions of this benchmark model are later relaxed by others.

The model describes two identical interdependent economies, called Home and Foreign, with imperfect competition in goods markets. The world population is normalized to one. Households indexed on the interval [0, n] reside in the home country while the residents of the foreign country are indexed on the interval (n, 1]. Each of these infinitely-lived households with perfect foresight produces a single differentiated good z and consumes a basket of all available home and foreign goods.

2.1 Household Preferences

In the benchmark model, households in both countries have similar preferences. Furthermore, the consumer-producer households in each country are identical. The preferences of the representative home household j are given by the following utility function:

$$U_s^j = \sum_{s=t}^{\infty} \beta^{s-t} \left[\log C_s^j + \chi \log \frac{M_s^j}{P_s} - \frac{K}{2}(y_s^j)^2 \right] \text{ where } \chi, K > 0 \text{ and } 0 < \beta < 1 \qquad (1)$$

The above equation, where β is the discount factor, states that utility in period t depends positively on the log value of the agent's consumption C_t^j and real balances M_t^j / P_t and negatively on the agent's production y_t^j which measures his labor effort. The overall price index is denoted by P_t.

The fact that consumption enters logarithmically in the utility function implies that the intertemporal consumption elasticity is equal to one. The assumption of unit consumption substitution elasticity which is retained in most of the NOEM models for simplicity is relaxed in Tille (1999) and Corsetti and Pesenti (2001).

Most of the NOEM models introduce money in the utility function either in a logarithmic or non-logarithmic way. Implicit to this assumption is the idea that agents need cash balances only for private consumption transactions. However, in the case of a tax-financed fiscal expansion agents also need cash balances to pay taxes. In order to take account of all types of transactions Carré and Collard (2003) and Steffen (2005) introduce money through a cash-in-advance constraint.

The third component in equation (1), $-\frac{K}{2}(y_s^j)^2$, corresponds to the disutility generated by higher production due to the increase in labor effort and the resulting decrease in leisure. The disutility may increase for a given level of production if there is an exogenous fall in labor productivity, i.e. an increase in K.

Several authors like Corsetti and Pesenti (2001) and Ganelli (2005b) relax the assumption of consumer-producer households and introduce an explicit labor market. In this case, the third component in equation (1) is replaced by $-\frac{K}{2}(l_s^j)^2$ which translates the disutility from increasing the quantity of labor l_s^j supplied by household j. The quadratic and additively separable form of labor disutility is retained in most of the NOEM models except for Carré and Collard (2003) where consumption and leisure are considered as non-separable.

In the benchmark model, public spending is assumed to be pure waste. This assumption is not crucial in models that aim to compare the impact of fiscal expansion on key

macroeconomic variables under alternative regimes. However, the nature of public spending becomes crucial in models that aim a welfare-based analysis of fiscal policy efficiency. In models with a welfare analysis, generally public spending enters in the utility in an additively separable form. One exception is Ganelli (2003) where public and private expenditures are considered as non-separable. This implies a direct but imperfect substitution between public and private consumption. As such, it becomes possible to consider a direct crowding out effect of public spending on private consumption[1].

The preferences of the representative foreign household j^* are given similarly to equation (1), where an asterisk denotes foreign variables. The parameters that affect the utility, such as χ and K, are also identical across countries. Corsetti and Pesenti (2001) allow for different values of these parameters at home and abroad, but this assumption does not have a significant effect on the implications of their model.

2.2 Private Consumption

The private consumption index is given as follows in the benchmark model:

$$C_t^j = \left[\int_0^1 c_t^j(z)^{\frac{\theta-1}{\theta}} dz \right]^{\frac{\theta}{\theta-1}} \text{ with } \theta \succ 1 \tag{2}$$

where c_t^j represents the agent j's consumption of good z. According to (2) agents are indifferent to the origin of goods they consume and the intratemporal elasticity of substitution θ between goods produced within a country is the same for home and foreign goods. The latter implies that the intratemporal substitution elasticity between home and foreign goods is also equal to θ. Hence the foreign consumption index is identical to equation (2).

McCallum (1995) and Helliwell (1996) show empirically using data on Canadian intra-provinces trade flows and those between provinces and U.S., that households of a country have a stronger preference for goods produced within the country. The analysis in the baseline model is extended by Warnock (1998) to take account of consumption preferences that are biased towards domestically produced goods. The introduction of a home bias in consumption requires a reformulation of equation (2) as follows:

$$C_t = \left[\varpi^{\frac{1}{\theta}}(C_t^H)^{\frac{\theta-1}{\theta}} + (1-\varpi)^{\frac{1}{\theta}}(C_t^F)^{\frac{\theta-1}{\theta}} \right]^{\frac{\theta}{\theta-1}} \tag{3}$$

---

[1] This specification of public spending is considered by Heijdra and Lighart (1997) and Finn (1998) in a closed economy context.

where C_t^H and C_t^F represent respectively the home consumption of home and foreign goods. If the bias parameter ϖ is greater than $\frac{1}{2}$, home households have higher preferences for the goods produced in the home country.

Tille (1999) argues that the assumption of identical substitution elasticity between home and foreign goods rules out the possibility of specialization in the production of different goods at the international level, a situation that is empirically observed. Such a possibility implies that the elasticity of substitution between goods produced within a country must be higher than the substitution elasticity between home and foreign goods. According to Tille (1999), Marshall-Lerner-Robinson condition holds when the substitution elasticity between home and foreign goods is greater than one. This indicates that an increase in the consumption of home goods following a fall in home relative prices is sufficiently large to increase the sales revenue of home producers.

Instead of the CES specification of the consumption index in the benchmark model, Corsetti and Pesenti (2001) consider a Cobb-Douglas specification as follows: $C_t = (C_t^H)^\gamma (C_t^F)^{1-\gamma}$. This implies that the share of home goods in the consumption bundle may be different from that of foreign goods ($\gamma \neq 1/2$) and that the elasticity of substitution between home and foreign goods is equal to one. While this specification of the consumption index has the advantage of allowing for analytical solutions without resorting to local approximations, it eliminates the international transmission channel of fiscal policy through the current account balance considered by O-R.

Most of the NOEM models assume that all goods are internationally tradable. However, it is possible to introduce in a two-country setup the distinction made in the appendix of O-R (1995) between a non-tradable goods sector with imperfect competition and a tradable goods sector with perfect competition in a small open economy framework.

2.3 Wages and Prices

In the baseline model, the prices of home and foreign goods $p_t(z)$ and $p_t^*(z)$ respectively, expressed in local currency, are completely fixed in the first period which corresponds to the short run, but they are perfectly flexible in the second period which represents the long run. As an alternative to this definition of price rigidity, several authors like Sutherland (1996) and Pierzioch (2004a, b) among others, consider a progressive adjustment of prices through Calvo (1983) pricing decisions. However, because of this

assumption, the solutions obtained in these models are numeric in contrast to the benchmark model.

The law of one price $(p_t(z) = e_t \, p_t^*(z))$ along with the assumption of identical preferences implies that the purchasing power parity (PPP) holds: $P_t = e_t \, P_t^*$. The nominal exchange rate e_t is defined as the home currency price of one unit of foreign currency. The overall home and foreign price indexes P_t and P_t^* are defined as the minimum expenditure required to purchase one unit of the composite consumption good given in equation (2) and its foreign analogue. They are defined as CES aggregators over home and foreign single goods prices. When the composite consumption good is in Cobb-Douglas form as in Corsetti and Pesenti (2001), the overall price indexes are also in Cobb-Douglas form.

The exchange rate flexibility enables adjustment through relative prices even if home (foreign) goods prices expressed in home (foreign) currency are fixed in the short run. This adjustment mechanism exists in Mundell-Fleming models and in the most NOEM models. It is based on the assumption that export-goods prices are fixed in the currency of the producer country (Producer Currency Pricing- PCP). In this case any variation of the nominal exchange rate is entirely reflected on the prices of these goods expressed in currency of the importing country and thereby on the consumer prices (perfect pass-through). This implies that the equilibrium real exchange rate is equal to one.

However, the empirically observed fluctuations in the real exchange rate suggest that the exchange rate pass-through on national prices is incomplete. Indeed, some producers fix their prices in the currency of the importing country (Local Currency Pricing -LCP)[2]. Hence, a variation of the nominal exchange rate has no effect on the foreign currency price of these goods and only a partial effect on consumer price index depending on the share of firms practicing LCP. As a result, PPP no longer holds and the expenditure-switching effect of the exchange rate is lower.

Betts and Devereux (2001) introduce LCP into the benchmark model to study the impact of a monetary and fiscal expansion on key macroeconomic variables under the assumption of local currency pricing. Carré and Collard (2003) and Steffen (2005) also assume that a fixed share of home and foreign firms set their prices in the buyer's currency and use this setup to assess the impact of a change in this share on the implications of a fiscal expansion.

---

[2] Engel (2002) provides various explanations for imperfect pass-through and reviews alternative NOEM setups to address this issue.

Instead of considering short run price rigidity, it is possible to introduce another type of nominal rigidity in O-R (1995) assuming that wages are fixed due to monopolistically supplied labor while goods prices are completely flexible. Corsetti and Pesenti (2001) assume wage rigidity rather than price rigidity but the authors show that wage rigidity automatically implies price rigidity when the demand elasticity is constant since in this case prices are a constant mark-up over wages.

2.4 Public Spending

In the baseline setup for fiscal policy analysis, the public sector consists of a passive central bank controlling the money supply and of a fiscal authority pursuing discretionary tax-financed fiscal policy. Hence, without seignorage, the budget constraint of the public sector is given as follows:

$$G_t = T_t \qquad (4)$$

Since ricardian equivalence holds in this setup, it is possible to exclude debt-financed public spending from (4) without loss of generality.

Real home per capita public demand is defined similarly to the private consumption index given in (2) so that public consumption index is a CES aggregator over all available goods regardless of their origin:

$$G_t = \left[\int_0^1 g_t(z)^{\frac{\theta-1}{\theta}} dz \right]^{\frac{\theta}{\theta-1}} \qquad (5)$$

In equation (5), the intratemporal substitution elasticity of public consumption θ is identical to that of private consumption. A distinction between the two elasticites is considered by Ganelli (2008) in order to study the effect of a fiscal policy that aims at changing the elasticity of public demand thereby influencing the monopoly power of private firms.

According to (5), public spending falls equally on all existing goods implying that public demand g_t for a typical good z is not biased towards domestically produced goods. Models that introduce some degree of home bias in private consumption, such as Warnock (1998), assume that public demand is also biased. However, Trionfetti (2001) shows that in major developed countries the public sector imports are significantly less than the imports of the private sector. This difference in private and public preferences is considered in Tille (1999) and Corsetti and Pesenti (2001) by assuming full home bias in public spending whereas

private households are assumed to be completely indifferent to the origin of goods they consume.

Similar to most research on fiscal policy, the benchmark model assumes that public spending is composed of goods purchases only. This assumption is relaxed for the first time by Finn (1998) using US data. The author distinguishes between the public purchases of goods and the remuneration of state employees within the framework of a real business cycle model. This distinction is first introduced into the NOEM setup by Ganelli (2005b). Ganelli and Tervala (2007) considers also a distinction in the public purchases of goods between those that improve the productivity of private firms and those that increase household welfare.

2.5 Household's Optimal Decisions

In O-R (1995), the representative home household is subject to the following budget constraint:

$$M_{t-1}^{j} + p_t(j)y_t(j) + P_t(1+r_t)B_t^{j} = P_tC_t^{j} + M_t^{j} + P_tT_t^{j} + P_tB_{t+1}^{j} \tag{6}$$

In equation (6), the resources of the household in period t consists of his nominal income from production $p_t(z)y_t^{j}(z)$, of cash balances carried over from the previous period M_{t-1}^{j} and of the value of his financial investment on a riskless real bond B_t^{j}. Assets are denoted according to their due date. Hence, B_t^{j} refers to assets purchased at the beginning of t-1 arriving at maturity at the beginning of t with a real rate of return r_t.

These resources are used for consumption $P_tC_t^{j}$, for lump sum tax payments $P_tT_t^{j}$, and for purchasing financial assets $P_tB_{t+1}^{j}$ and cash balances M_t^{j} to be carried over to period t+1.

Household j determines his demand for a single good z by maximizing (2) under his income constraint which yields:

$$c_t^{j}(z) = \left[\frac{p_t(z)}{P_t}\right]^{-\theta} C_t^{j} \tag{7}$$

Public demand for a typical good z is defined similarly to the private demand (7) on the basis of the public consumption index (5).

Aggregating private and public demand for good z it is possible to define the total demand faced by the producer of a typical good z as follows:

$$y_t^{d}(z) = \left[\frac{p_t(z)}{P_t}\right]^{-\theta} (C_t^{w} + G_t^{w}) \tag{8}$$

In equation (8), the world private C_t^w and public demand G_t^w are defined as $C_t^w = nC_t + (1-n)C_t^*$ and $G_t^w = nG_t + (1-n)G_t^*$. The home and foreign relative price of the good z are identical since the assumptions of PPP and the law of one price imply $p_t(z)/P_t = p_t^*(z)/P_t^*$.

Home household j maximizes individual utility given in (1) with respect to B_{t+1}^j, M_t^j and y_t^j under the budget constraint (6) taking into account the goods demand given in (8). The first order conditions imply:

$$C_{t+1}^j = \beta(1+r_{t+1})C_t^j \tag{9a}$$

$$\frac{M_t^j}{P_t} = \chi C_t^j \left[\frac{1+i_{t+1}}{i_{t+1}} \right] \tag{9b}$$

$$(y_t^j)^{\frac{\theta+1}{\theta}} = \frac{\theta-1}{\theta\kappa}(C_t^w + G_t^w)^{\frac{1}{\theta}} \frac{1}{C_t^j} \tag{9c}$$

The consumption Euler equation (9a) characterizes the intertemporal consumption smoothing behavior for a unit intertemporal elasticity of substitution. Equation (9b) gives the optimal money demand in terms of consumption and the nominal interest rate. Equation (9c) gives the optimal trade-off between labor and leisure, which holds only in the long run since in the short run supply is demand determined due to price rigidity.

Households' consumption smoothing behavior leads to current account movements. The current account balance for the home country is defined as follows:

$$B_{t+1} - B_t = r_t B_t + \frac{p_t(h)y_t}{P_t} - C_t - G_t \tag{10}$$

The first order conditions are similar for the foreign country and its current account balance is complementary to (10).

If public and private consumption are non-separable as in Ganelli (2003), equations (9a)-(9c) depend not only on private consumption but also on public spending. Hence, fiscal policy has a direct effect on money demand similarly to the cash-in-advance specification in Carré and Collard (2003) where agents need money to pay taxes and consumption expenditures.

2.6 Solving the Model

In order to analyze the short and long run effects of fiscal policy, O-R (1995) take a first order approximation to the model around a symmetric steady-state.

In the steady-state, prices are flexible and each variable is constant over time[3]. The steady-state is symmetric in the sense that each producer in each country chooses the same price and the same level of production and each household consumes the same quantity of goods.

When consumption is constant across periods, home and foreign Euler equations imply the following steady-state real interest rate level at home and abroad:

$$\bar{r} = \bar{r}^* = \frac{1-\beta}{\beta} \tag{11}$$

In the steady-state, current account is balanced. Hence equation (10) and its foreign analogue imply:

$$\overline{C} = \bar{r}\overline{B} + \frac{\overline{p}(h)\overline{y}}{\overline{P}} - \overline{G} \tag{12a}$$

$$\overline{C}^* = -\frac{n}{1-n}\bar{r}\overline{B} + \frac{\overline{p}^*(f)\overline{y}^*}{\overline{P}^*} - \overline{G}^* \tag{12b}$$

where $n\overline{B} + (1-n)\overline{B}^* = 0$.

The benchmark model solves for the symmetric steady-state assuming that initial foreign asset holdings and public spending are equal to zero in each country: $\overline{B}_0 = \overline{B}_0^* = 0$ and $\overline{G}_0 = \overline{G}_0^* = 0$ where the subscript zero indicates this initial steady-state. Then equations (12a) and (12b) yield $\overline{C}_0 = \overline{C}_0^* = \overline{y} = \overline{y}_0 = 0$. Combining this result with the steady-state versions of (9b) and (9c) gives:

$$\overline{y}_0 = \overline{y}_0^* = \left(\frac{\theta-1}{\theta\kappa}\right)^{\frac{1}{2}} \tag{13}$$

$$\frac{\overline{M}_0}{\overline{P}_0} = \frac{\overline{M}_0^*}{\overline{P}_0^*} = \frac{\chi(1+\bar{r})}{\bar{r}}\overline{y}_0 \tag{14}$$

The short and long run log linear equations are given in appendix A where all variables are expressed in terms of their deviations from the steady-state.

Ghironi (2006) criticizes O-R (1995) for postulating an initial level of foreign assets in order to be able to solve for the steady-state. Indeed, this assumption leads to steady-state indeterminacy in O-R (1995). The steady-state current account equations (12a) and (12b), which express consumption in terms of foreign asset holdings, imply that any level of foreign assets is compatible with the assumption of fixed consumption across periods. Hence, when an initial level of foreign assets is postulated arbitrarily, the steady-state defined as such becomes also arbitrary. However, in some models, the sign and the magnitude of fiscal multipliers may depend on the initial asset distribution across countries. Hence, an arbitrary

---

[3] An overbar indicates steady-state variables.

choice of asset levels may limit the generality of the results of the benchmark model. Moreover, relative consumption follows a random walk in O-R (1995). Hence, any shock that changes current consumption has permanent effects and the economy does not return to its initial steady-state following a temporary or permanent fiscal shock.

To eliminate the non-stationary nature of the steady-state, Corsetti and Pesenti (2001) offer a setup which shuts off the international wealth distribution through current account movements by combining the PPP assumption and the Cobb-Douglas consumption index while keeping the assumption of zero initial foreign assets. These assumptions lead to a constant value of relative consumption making it possible to obtain analytical solutions without resorting to an approximation. Another solution to the stationarity problem is to assume that financial markets are complete. In this case, asset accumulation does not affect

3 The Effects of Fiscal Policy in Deterministic NOEM Models

The benchmark model is extended by relaxing several highly restrictive assumptions namely on the structure of public spending, the individual preferences and the international transmission mechanism of fiscal policy effects.

3.1 Fiscal Policy in the Benchmark Model

The implications of the benchmark model on the effects of fiscal policy are different from those obtained in flexible price models or in Mundel-Fleming models. Therefore it is necessary to confront these results with those obtained in recent empirical work on open economy issues.

3.1.1 The Effects of a Home Fiscal Expansion

The short and long run effects of a tax-financed temporary or permanent home fiscal expansion on key macroeconomic variables in the benchmark model are derived in Appendix B[4]. Table 1 below gives the sign of the effects of home fiscal expansion.

Table 1 The effects of a home fiscal expansion

Expansion	$\widetilde{C}$	$\widetilde{C}^*$	$\widetilde{y}$	$\widetilde{y}^*$	$\widetilde{\overline{C}}$	$\widetilde{\overline{C}}^*$	$\widetilde{\overline{y}}$	$\widetilde{\overline{y}}^*$	$\widetilde{e} = \widetilde{\overline{e}}$	$\widetilde{B}$	$\widetilde{r}$	dU	dU^*
Temporary	−	+	+	+	−	+	+	−	+	−	0	−	+
Permanent	−	+	+	−	−	+	+	+	+	+	−	−	+

[4]The deviation of any short run variable x with respect to its initial steady-state value $\overline{x}_0$ is expressed as $\widetilde{x} = dx/\overline{x}_0 \cong (x - \overline{x}_0)/\overline{x}_0$. Similarly, the deviation of any long run variable $\overline{x}$ with respect to its initial steady-state $\overline{x}_0$ is defined as $\widetilde{\overline{x}} = (\overline{x} - \overline{x}_0)/\overline{x}_0$. Since the initial values of public demand and foreign assets are zero by assumption, their relative deviations are given with respect to the value of initial consumption $\overline{C}_0$ or $\overline{C}_0^*$.

In the short run where prices are fixed, a permanent home fiscal expansion ($\widetilde{G} = \widetilde{\widetilde{G}} > 0$) leads to an increase in home and foreign output due to the absence of home bias in public spending. However, higher tax burden on home households creates a negative wealth effect at home and home consumption falls. This reduces home money demand, while money supply is constant by assumption. Money market equilibrium is restored through a depreciation of the home currency. The short run exchange rate increase is identical to the long run increase which implies no over or undershooting of the exchange rate. Consumption increases in the foreign country because of higher income due to higher output.

The expenditure switching effect of home currency depreciation increases home output and decreases the foreign. The fall in foreign output is stronger than the initial increase due to higher home public demand and foreign output falls overall. Home currency depreciation increases home exports more than the increase in imports due to higher public demand and the home country runs a current account surplus.

A temporary home fiscal expansion ($\widetilde{G} > 0, \widetilde{\widetilde{G}} = 0$) implies a lower tax burden with respect to the permanent expansion case. This determines a less pronounced decline in the demand for money and a lower depreciation of the home currency. Therefore, the expenditure switching effect is too weak to more than compensate the initial positive effect of fiscal expansion on foreign output and the negative impact on the current account. As a result, foreign income increases and the home country runs a déficit.

In the long run where prices are flexible, a temporary home fiscal expansion decreases home consumption and increases the foreign. Indeed, the debt accumulation due to trade deficit in the short run leads to higher interest burden at home in the long run. For the same reason, foreign agents enjoy higher capital income. Home households work harder and consume less leisure as implied by the labor-leisure trade-off equation. Therefore long run home output increases while foreign output falls.

A temporary home fiscal expansion reduces home short run and long run consumption in the same way. Hence, the intertemporal consumption profile remains unchanged which implies that the short run real interest rate is not affected by a temporary home fiscal expansion. In contrast, the interest rate decreases when the fiscal expansion is permanent, since in this case home short run increases relative to long run consumption.

A permanent expansion leads to an increase in foreign long run consumption and home long run output whereas home consumption falls as in the temporary expansion case. In contrast to a temporary expansion, it increases foreign long run output. The reason is that, the

expenditure switching effect of a fall in relative prices is lower in the permanent expansion case since the fall in home consumption is mitigated by the positive effect of the interest income from current account surplus. Hence, the initial increase in foreign output due to higher home public demand dominates the relative price effect and foreign output increases overall when home fiscal expansion is permanent.

It is possible to evaluate welfare effects of fiscal policy by using the individual utility functions assuming that utility from money balances are negligible with respect to utility from consumption and leisure.

Differentiating equation (1), excluding money balances, yields the following expression for home welfare:

$$dU = \widetilde{C} - \frac{\theta-1}{\theta}\widetilde{y} + \frac{\beta}{1-\beta}(\widetilde{\widetilde{C}} - \frac{\theta-1}{\theta}\widetilde{\widetilde{y}}) \tag{15}$$

Equation (15) states that a temporary or a permanent home fiscal expansion reduces home welfare because it leads to a fall in consumption and leisure both in short and in long run. In contrast, a temporary home fiscal expansion enhances foreign welfare despite its negative effect on short run leisure by increasing long run leisure and short and long run consumption. A permanent home fiscal expansion also enhances foreign welfare despite the fall in long run leisure. Therefore, in the benchmark model fiscal policy is beggar-thyself and prosper-thy-neighbor.

3.1.2 Reconciling Theory and Evidence

The impact of fiscal policy in open economies is the subject of theoretical and empirical debate on the validity of alternative models and the practical relevance of the implied policy prescriptions. This debate has mostly developed in two areas. One concerns the effectiveness of fiscal policy which is measured by its effect on welfare, hence depends on its effects on consumption and income. The other concerns the capacity of a country to reduce its trade deficit which depends on the relationship between variations in public spending and trade balance.

According to O-R (1995), a fiscal expansion in one country leads to an increase in output and a decline in private consumption in this country. These effects are the same as those obtained in the neo-classical models, such as Baxter and King (1993). They differ from those obtained by the Keynesian macro models, such as that of Frenkel et al. (2002) in which a fiscal expansion increases income and private consumption.

Several empirical studies estimate the impact of fiscal policy on consumption and output and compare their results with those implied by theoretical models. These studies use mostly structural VAR models with alternative identification schemes. Fatás and Mihov (2001) and Blanchard and Perotti (2002) find that a fiscal expansion has significant positive effects on consumption and income. Burnside et al (2003) also find a positive effect of fiscal policy on consumption but this effect is weak.

Ravn et al (2007) show that these different conclusions result from the nature of the government spending shocks. Specifically, the identification scheme in Fatás and Mihov (2001) and Blanchard and Perotti (2002) corresponds to an unanticipated fiscal shock, while the method used by Burnside et al (2003) implies that the fiscal shock is anticipated. Ravn et al (2007) reconcile these findings by introducing a pricing-to-habits mechanism. In this setup, the impact of fiscal policy on consumption depends on whether the fiscal shock is anticipated or not. If the fiscal expansion is unanticipated, it increases the domestic private consumption. The reason is that the endogenous mark up rate decreases following the fiscal expansion. Hence, labor demand increases which raises the real wage. Households consume less leisure and increase their goods demand. This effect may be sufficiently high to dominate the negative welfare effect of taxes. In contrast, an anticipated fiscal expansion does not increase private consumption. Consumption may even fall immediately after the fiscal expansion as in theoretical neoclassical models. A similar mechanism based on mark up rates is present in Ganelli (2008).

Using other methods of fiscal policy identification, studies like Mountford and Uhlig (2008) conclude that an increase in public expenditure induces a small effect on consumption.

The co-movement of public and current account deficits in the US induces researchers to look for some causality between these deficits. However the results of the empirical studies do not provide definitive conclusions on this issue. Kim and Roubini (2008) show in a VAR model using U.S data between 1973 and 2002 that a fiscal expansion improves the current account balance because of its positive effect on private sector savings. This result, which differs from the findings of many theoretical models, is obtained in O-R (1995) only when fiscal expansion is permanent.

Using panel-data for 21 OECD countries for the period 1960-2003 Bussière et al (2005) show that trade balance movements are mainly driven by the variations in productivity and that the effect of fiscal policy is very weak. Corsetti and Müller (2006) confirm this result for relatively closed economies like the U.S and Australia. However, in reltively open economies like UK and Canada, a fiscal expansion leads to a significant current account deficit. The

degree of openness is important because the more the economies are open the more the gap between home and foreign rate of return of investment increases in response to an increase in public spending. A fiscal expansion may lead to a higher level of investment which requires an increase in foreign savings due to insufficient domestic savings.

Using a similar approach to that of Blanchard and Perotti (2002), Bems et al (2007) also find that the increase in the U.S trade deficit during the 90s is due to the productivity deviation in the software sector. However, the authors find that fiscal policy plays a significant role in the trade deficit after 2000.

The sometimes contradictory results of the empirical studies on fiscal policy have stimulated theoretical research. The latter has rapidly grown in recent years following the extensions of O-R (1995) by introducing alternative structures of public spending, by considering alternative specifications of individual preferences and by enriching the international transmission channels of fiscal policy.

3.2 The Structure of Public Spending and Alternative Specifications of Household Preferences

The definition of public spending in the benchmark model is quite restrictive in that it considers public spending consisting only of goods purchases. This may explain, at least partially, the divergence between the empirical findings and the theoretical results of O-R (1995), especially those concerning the effect of fiscal expansion on consumption.

Ganelli (2005b) considers a richer structure of public spending. Specifically, public spending is assumed to be composed of goods purchases and provision of public services. In addition, the model incorporates two types of labor market: one for the private sector and another for the public sector. This allows to consider the effects of fiscal policies currently implemented in most countries, such as reducing the number of state employees in order to cut taxes. When this type of policy is temporary, it leaves domestic short run consumption unchanged since lower taxes offset lower income of public employees. In contrast, when fiscal policy is permanent, it causes an increase in short run domestic consumption because agents anticipate a subsequent reduction in taxes. Moreover, employment in the private sector increases thanks to the flexibility of prices in the long run, which compensates the reduction in public employment. In the long run, the consumption and output gaps across the countries increase.

This type of public spending structure also allows for alternative definitions of fiscal policy by introducing a trade-off between the provision of public services and goods

purchases. If, for example, home fiscal authority aims at reducing wage payments in the public sector in order to finance an increase in goods purchases, the effect of fiscal policy on key macroeconomic variables becomes ambiguous. Indeed, reducing the number of state employees leads to an income loss which decreases home consumption. On the other hand, higher public demand increases home output as in the benchmark model which has a positive effect on home consumption. The net effect depends on the share of income induced by public employment. The higher the share of public wages in total income, the higher is the negative effect of fiscal policy on home consumption.

As in the benchmark model, Ganelli (2005b) assumes that public spending is pure waste, which is crucial when carrying out a welfare-based evaluation of policy efficiency. Indeed, the introduction of public spending in the individual utility function may mitigate or reverse the negative effect of fiscal policy on consumption and leisure and hence on welfare.

Ganelli and Tervala (2007) introduces the public spending in the utility function by distinguishing between public infrastructure expenditures which can improve the productivity of private firms and public spending on goods and services which have a direct impact on household utility. The authors show that a permanent domestic shift in the composition of public spending toward public infrastructure expenditures increases the domestic output and consumption. The domestic welfare may increase or decrease depending on the productivity gains relative to the consumer welfare losses. The foreign welfare falls in the short run and increases in the long term. This can lead to a virtuous technological cycle if the foreign country reacts to the fall in short run foreign welfare by increasing foreign public infrastructure expenditures.

Ganelli and Tervala (2007) introduce public spending in the utility function in an additively separable way, which implies that it does not affect the responses of key variables but affects only the welfare implication of fiscal policy. However, if public spending enters in a non-separable way as in Ganelli (2003), the impact of fiscal policy on key variables differs from those implied in the benchmark model. The non-separability between public and private consumption implies that these two are direct substitutes and thus public spending has a direct crowding-out effect on private consumption. In this setup, the short run results are qualitatively the same as in the baseline model. However, the effects of fiscal policy on home and foreign output and on exchange rate are mitigated. In contrast, because of the direct crowding-out effect, the impact on home consumption is amplified. The long run effect of a domestic fiscal expansion is the same as in the short run for home consumption and for home and foreign income, but the effects on foreign consumption and foreign welfare are

ambiguous. The mechanism that lies behind these results is the impact of public spending on money demand. Indeed, following an increase in public spending, the marginal utility of private consumption falls due to the non-separability feature. Therefore, agents are less induced to lower their money demand leading to a lower depreciation of the home currency.

Such a mechanism also exists in NOEM models with cash-in-advance constraint as in Steffen (2005). Since agents need cash in order to pay taxes, an increase in public spending, hence in taxes, increases money demand. Therefore, in contrast to the benchmark model, the exchange rate falls when the money supply is constant. This leads to an expenditure switching effect towards foreign goods, which decreases the short run home output while increasing the foreign. However the appreciation of the exchange rate does not alter qualitatively the effects of a fiscal expansion on other key variables.

The impact of fiscal policy can be mitigated if agents have a higher preference over the goods produced within their country. The introduction of such a bias in preferences may be important for fiscal policy implications. For example, a complete home bias in public spending as in Ganelli (2003) and Corsetti and Pesenti (2001) leads to an equal change in short run home output following a temporary home fiscal expansion leaving all other variables unchanged. When the home bias concerns both public and private preferences as in Warnock (1998), the current account surplus following a temporary fiscal expansion increases with the degree of home bias. Indeed, the positive effect of the home currency depreciation on the current account is amplified by the impact on imports which increases with the bias. Furthermore, in contrast to the benchmark model, the purchasing power parity no longer holds and home bias in household preferences leads to exchange rate overshooting.

3.3 The International Transmission Mechanism of Fiscal Policy

In the baseline model, the international transmission mechanism of the effects of fiscal policy is based on restrictive assumptions concerning the degree of substitution between the products and the impact of exchange rate fluctuations on product prices. The current account movements also play a central role in the transmission of fiscal policy effects. By introducing different substitution elasticities between the goods and incomplete pass-through and by considering alternative specifications of the role of current account, one can modify the reallocation of consumption across countries and obtain a more detailed transmission channel for fiscal policy.

3.3.1 The Role of Intratemporal Substitution Elasticity between Goods

O-R (1995) assumes the same intratemporal substitution elasticity between goods consumed by private and public sectors and between home and foreign goods.

Since this model introduces public expenditure in the same form as private spending, it cannot analyze the possibility of a structural policy which consists of increasing the price elasticity of public consumption.[5] This type of policy will reduce the monopoly power of private firms that sell goods to the government and improve the efficiency of discretionary fiscal policy. Ganelli (2008) considers that the UK government has taken such a measure in the late 1970s by setting the amount of public spending in nominal terms rather than in real terms. Indeed, this implies an increase in the price elasticity of public spending since this elasticity is equal to zero when fiscal spending is fixed in volume.

In order to consider the effects of this type of policy on the efficiency of public spending, Ganelli (2008) extends the basic model by distinguishing the substitution elasticity between goods consumed by public sector from that of goods consumed by the private sector. As in O-R (1995), a permanent home fiscal expansion reduces the home short run consumption and increases the foreign consumption. However, the reduction of home consumption due to higher taxes is mitigated by an increase in the substitution elasticity η of publicly consumed goods. Indeed, the increase in η reduces the mark up rate of private firms. This induces a redistribution of resources in favor of private consumers. This implies that the fall in money demand and the resulting exchange rate depreciation are also mitigated. This exchange rate effect mitigates the increase in foreign private demand for home goods. On the other hand, a higher η determines a higher foreign public demand for home goods since it renders the public demand more sensitive to the fall in relative prices. This second effect dominates the first one and a higher η amplifies the increase in home short run output.

The interest income at home resulting from current account surplus is sufficiently high to induce an increase in home long run consumption despite higher taxes and higher leisure due to labor-leisure trade-off. In the foreign country the higher interest burden mitigates the increase in the long run consumption which implies a lower increase in leisure.

In this setup, the home fiscal policy has ambiguous effects on welfare in the two countries but it is prosper-thyself and beggar-thy-neighbor for plausible values of the parameters. These

---

[5] According to the specification de O-R (1996, p.661), the parameter θ which represents the intratemporal substitution elasticity in (5) is also the price elasticity of the public demand addressed to the private monopolist.

effects are amplified by an increase in η which should push the countries with a large public sector to take structural measures in order to improve fiscal policy efficiency.

In contrast to Ganelli (2008), Tille (1999) assumes the same intratemporal substitution elasticity between goods consumed by private and public sectors but allows for a higher substitution elasticity between goods produced within a country than that between home and foreign goods. This allows for the analysis of the international transmission mechanism of fiscal policy in the case of production specialization at the international level.

If the home permanent fiscal expansion is limited to domestically produced goods, it determines an increase in the long run output which increases the marginal cost of labor effort. This leads to an improvement in the terms of trade and a switching of private consumption toward foreign goods which mitigates the initial increase in home output. This expenditure-switching effect is high when home and foreign goods are close substitutes, i.e. when their substitution elasticity θ is greater than one. It reduces the real sales revenue at home in spite of higher home prices, which has a negative effect on home private consumption. In contrast, when home and foreign goods are poor substitutes ($\theta<1$) an improvement in the terms of trade leads to an increase in home sales revenues, which increases home consumption. In the short run, home consumption decreases if $\theta>1$ because the residents expect a decrease in their future income which implies, as in O-R, an increase in the exchange rate and a trade surplus. If $\theta<1$, the home short run consumption increases, which induces a home currency appreciation and a trade deficit.

Fiscal policy is prosper-thyself because public spending enters in the utility function. Its effect on foreign welfare is negative since it worsens the terms of trade for the foreign residents. The effect of fiscal policy increases as the elasticity of substitution between home and foreign goods fall.

3.3.2 Fiscal Policy and Incomplete Pass-through

The analysis in Tille (1999) is based on the implications of the substitution elasticity on sales revenues. If home and foreign goods are poor substitutes, the expenditure switching effect is low and the price increase dominates the fall in quantity. This is because prices are set in the currency of the producer country. Any increase in prices at home is reflected entirely on foreign prices (perfect pass-through). In contrast, if some of the home producers set their prices in the importing country's currency, foreign currency prices will increase only partially following an increase in home prices. In this case, home sales revenues increase less

or they may even decrease since it is possible that the quantity fall dominate the price increase even if home and foreign goods are not close substitutes.

The assumption of LCP implies a deviation from the PPP condition. Hence, in contrast to O-R (1995), in this setup it is possible to have real exchange rate fluctuations. This is true only when prices are fixed, because when prices are flexible, firms fix the same mark up over wages with the same demand elasticity in each country and the PPP holds regardless of LCP.

Betts and Devereux (2000) introduce LCP into O-R (1995) by assuming that some firms set their prices in the buyer's currency. In this case, the prices of import goods in the foreign country are not affected by the variations in the nominal exchange rate implying an imperfect pass-through. This, in turn, affects the international transmission mechanism of the fiscal policy. By calibrating their model, the authors show that the assumption of LCP does not modify qualitatively the results of O-R (1995) based on the assumption of PCP. However, under LCP, the reaction of the nominal exchange rate is stronger following an increase in home public spending which leads to a higher gap between home and foreign output.

The welfare analysis in Betts and Devereux (2000) is limited to monetary policy. Steffen (2005) provides a welfare analysis for fiscal policy in a setup with LCP assuming that public spending is welfare enhancing. He finds that a permanent fiscal expansion at home increases home welfare relative to foreign. The welfare distribution across countries becomes more asymmetric as the share of LCP firms increases due to the higher expenditure switching effect of the nominal exchange rate depreciation.

3.3.3 Fiscal Policy in the Absence of Current Account Dynamics

In the baseline model, current account movements play a central role in the international transmission of the effects of domestic fiscal policy because they induce a reallocation of consumption across the countries. The nature of this reallocation depends on financial and goods markets structure and on pricing decisions of firms.

The financial market structure matters for the international transmission of fiscal policy because it determines the international risk sharing pattern. Indeed when financial markets are incomplete as in O-R (1995), fiscal policy induces an asymmetric consumption distribution since home households can not fully cover themselves against the risk of an unanticipated fall in their relative consumption. In contrast, international consumption risk sharing is full under complete financial markets since agents can hold a combination of assets that ensure the same marginal utility of consumption across countries in all states of nature. However, the assumption of complete financial markets shuts down the transmission channel through

current account balance. When financial markets are complete agents do not need to borrow or lend internationally since consumption risk sharing is perfect.

Betts and Devereux (2001) compare the transmission of fiscal policy under complete and incomplete financial markets. When financial markets are complete, the cost of higher public spending at home is shared equally across countries. Fiscal policy affects both countries in the same way without any impact on the nominal exchange rate and on current account balance. However, under incomplete financial markets, fiscal policy has asymmetric effects on home and foreign variables as in O-R (1995).

The financial market structure becomes irrelevant with Cobb-Douglas consumption indexes. As shown in Cole and Obstfeld (1991) a unit elasticity between home and foreign goods imply that agents need not borrow or lend internationally because relative price movements ensure that home income stays constant in relative terms with respect to foreign following a policy shock. Corsetti and Pesenti (2001) show that, with Cobb-Douglas consumption index, the current account remains in equilibrium following a fiscal shock assuming that initially households do not hold foreign assets[6]. In this setup, short run home consumption is not crowded out by temporary public consumption which focuses exclusively on domesticaly produced goods. The only effect is an equal increase in home output at unchanged terms of trade. In the long run, the economy returns to the initial equilibrium following a temporary fiscal shock.

When the fiscal expansion is permanent, long run consumption falls while and home output and the relative price of home goods increase with respect to the initial equilibrium. Since the ratio of home and foreign consumption remains constant in equilibrium, the adjustment mechanism is based entirely on terms of trade variations.

In the long run, the domestic fiscal expansion depreciates the foreign terms of trade and reduces the foreign consumption. Its effect on foreign output depends on the value of the intertemporal substitution elasticity. If the substitution elasticity is higher than one, home and foreign goods are complements. In this case, the demand for foreign goods falls following the fiscal expansion and foreign output decreases. In contrast, if home and foreign goods are substitutes, the foreign consumption decreases and the output increases. Hence, the effect of

---

[6]According to Ghironi (2006), these assumptions cannot satisfactorily solve the problem of non-stationary equilibrium in O-R models, making it difficult to run a comparative static analysis. He proposes to remedy this shortcoming through a model that combines the approach of OR with incomplete financial markets and the overlapping generations model of Weil (1989).

home fiscal expansion on foreign welfare is ambiguous. However, in contrast to O-R (1995), it seems to be negative for plausible values of the parameters.

4 Fiscal Policy and Current Macroeconomic Issues

The baseline model is extended in order to assess the effect of recent macroeconomic developments in the world on fiscal policy efficiency. These recent developments cover the current macroeconomic issues such as the currency union or the fixed exchange rate regime, the enhancement of financial integration and alternative ways of financing public spending.

4.1 Fiscal Policy in a Currency Union or under Fixed Exchange Rate Regimes

Most extensions of the benchmark model retain the assumption of flexible exchange rates. However the emergence of the European Monetary Union (EMU) and the need for candidate countries to maintain the exchange rate against the euro within definite limits have induced researchers to extend the baseline model to the analysis of fiscal policy effects under fixed exchange rates or in a currency union.

Extending the benchmark model to a fixed exchange rate setup, Caselli (2001) and Coutinho (2005) find that a permanent tax-financed fiscal policy is beggar-thyself and prosper-thy-neighbor as in the flexible exchange rate case. Indeed fiscal policy has the same effect on consumption and output as in O-R (1995), but the impact of fiscal policy on the interest rate depends on whether the fixed exchange rate is maintain unilaterally or bilaterally.

In a fixed exchange rate system where the home country is concerned with the exchange rate stability while the foreign country is only concerned with price stability, Caselli (2001) shows that a home fiscal expansion induces an increase in the interest rate. Indeed, because of lower home money demand home country must reduce home money supply in order to avoid the depreciation of its currency. Foreign money demand increases following the home fiscal expansion but the foreign country keeps the money supply constant in order to guarantee price stability. In this case, the money market equilibrium can only be restored through a higher interest rate. This type of policy was applied in the 90s by several European countries which pegged their exchange rate to the German currency while Germany continued to pursue an independent monetary policy aimed at price stability.

In contrast, if both countries commit to maintaining a fixed exchange rate, they react to changes in money demand by adjusting the money supply in the opposite direction. The result is a fall in the interest rate as in O-R (1995).

By joining a monetary union, countries lose the opportunity to conduct an exchange rate policy and a national monetary policy. In this case, national fiscal policies are the only stabilisation instruments. As shown by Carré and Collard (2003), the transition from a regime of flexible exchange rates to a monetary union amplifies the effects of fiscal policy on home welfare, while the impact on the foreign welfare is lower. These effects increase as the share of LCP firms increases relative to those that set a single price, since an increase in the number of LCP firms reduces the expenditure switching effect of a variation of the exchange rate.

The results imply that, in contrast to the literature on optimal currency areas, a currency union does not necessarily improve the welfare of all residents.

4.2 International Financial Market Integration

Financial market integration at the international level is one of the most visible signs of the recent process of globalization. However, full financial integration is not yet achieved. Indeed, all potential market participants do not face the same rules, do not have equal access to the market and are not treated equally when they take action in the market. However, most of the NOEM models with flexible exchange rates assume that international financial markets are perfectly integrated. Sutherland (1996) is the first to introduce imperfect financial integration in a NOEM setup by assuming that agents in one country incur transaction costs when buying the assets of the other country. In this case, in contrast to the benchmark model, home fiscal expansion tilts the intertemporal consumption profile since it causes a deviation in home and foreign interest rates. Home interest rate increases relative to foreign under imperfect financial integration and home consumption falls less in the short run. The exchange rate depreciates less under perfect integration with respect to imperfect financial integration. Hence output increases less which confirms the traditional results of the Mundell-Fleming models.

The increased consumption and output volatility following the fiscal policy under imperfect financial integration may be mitigated if goods markets are also imperfectly integrated. However this leads to stronger exchange rate volatility. This is the result obtained by Senay (1998) in a setup with LCP pricing where both financial and goods markets are imperfectly integrated, the latter implying that the PPP condition fails to hold in the short run.

Pierdzioch (2004a) provides a counter example to the results of Sutherland (1996) and Senay (1998) which confirm the similarities between the fiscal policy implications in NOEM and in Mundell-Fleming models. The author introduces nominal income targeting monetary policy alongside discretionary fiscal policy in the setup proposed by Sutherland (1996). In this

setup monetary authority reacts by increasing the money supply in response to the impact of fiscal policy on output growth. Following a permanent home fiscal expansion, short run home output increases more and money supply decreases more under imperfect financial integration with respect with the perfect integration case. As prices adjust, the output growth increases leading to an increase in the money supply. As a result, the home currency depreciates. This depreciation is larger under high financial integration yielding a higher interest rate with respect to the low integration regime. Therefore, the home output growth is higher under high financial integration in the medium run. A similar result is obtained in Pierdzioch (2005) by introducing a home-product bias in Sutherland (1996).

Most of the work regarding currency unions in the NOEM assumes that the existence of a common currency leads automatically to full financial integration. The empirically observed dissociation between financial integration and monetary integration reported in ECB (2007) requires relaxing this assumption. For this, Pierdzioch (2004b) extends the analysis in Sutherland (1996) to a currency union. The author uses this setup to analyze the impact of capital mobility on the propagation of fiscal shocks and their effects on key macroeconomic variables. He finds that the effect of the degree of financial integration on the implications of fiscal policy is rather weak.

4.3 Fiscal Policy and the Public Debt

The benchmark model considers only the effects of a tax-financed fiscal policy because debt financed fiscal policy yields the same results since ricardian equivalence holds in this basic setup. Ganelli (2005a) relaxes the ricardian equivalence in order to consider the effects of a debt-financed fiscal spending in a model which combines the baseline model of O-R (1995) and an overlapping generations (OLG) model à la Blanchard (1985). This setup eliminates the assumption of infinite life time by assuming that at each period of time, new agents are born with probability q of surviving the next period. Country population is constant across time and households belonging to different age cohorts coexist in each country at each period.

Ganelli (2005a) considers mainly the effects of domestic debt-financed tax cut without any change in public consumption. In the short run, the initial tax cut is perceived as a net increase in wealth because of the positive probability of death. Indeed, each household anticipates that the discounted value of his future tax burden will be less than the current tax cut because the subjective discount rate which depends on the probability of death is higher than the market interest rate. Hence, home relative consumption and money demand increase,

which implies a home currency appreciation in the short run. The resulting expenditure switching effect reduces the gap between home and foreign output. The home trade deficit in the short run induces home agents to accumulate debt vis-à-vis the foreign. As a result, long run home relative consumption and money demand fall and home currency depreciates.

Welfare analysis is rather delicate in this setup since several generations coexist at the same period of time. Ganelli (2005a) offers a welfare measure which is a weighed average of welfare of current and future generations. If the weight on the utility of current generation is higher than that of future generations, home relative welfare increases following the debt-financed tax cut at home. However, if agents put a higher weight on the welfare of future generations, home relative welfare falls depending on the size of the home country.

In this setup, the effects of a tax-financed fiscal expansion are the same as in the baseline model. In contrast, a debt-financed fiscal expansion, which Ganelli (2005a) defines as the sum of a debt-financed tax cut and a tax-financed fiscal expansion, has ambiguous effects on key macroeconomic variables. However the effect of the tax cut policy may dominate if the deviation from the ricardian equivalence is sufficiently high.

The global fiscal model (GFM) developed by the IMF to replace the MULTIMOD model considers an OLG setup that is similar to that of Ganelli (2005a). In addition, it introduces distortionary taxes and households who have no access to international financial markets. Using this setup Botman et al (2006) analyze the effects of a fiscal policy aimed at setting the tax rate which allows the desired debt-to-GDP ratio. The authors show that the spillover effects of a debt-financed tax cut depend on the country size because of the impact of this type of policy on the world interest rate . Furthermore, taxes on profits have more distortionary effects than taxes on wages but these effects are lower with respect to the perfect competition case.

5 Fiscal Policy under Uncertainty

Obstfeld and Rogoff (2000, 2002a) introduce uncertainty into the basic deterministic model. Their aim is to provide an explicit analytical explanation on the impact of uncertainty by considering a second order approximation in contrast to models that neglect the second order moments in order to be able to derive exact equilibrium relationships. The authors show analytically that, in contrast to first generation models of policy coordination, uncertainty affects not only the variability but also the covariances between key variables of the model.

This new setup is first used by O-R (2002b) and Canzoneri et al (2005) to assess the stabilization role of monetary policy and to evaluate gains from international monetary

cooperation on a welfare basis assuming that monetary authority reacts to exogenous productivity shocks through contingency rules. Recently, this new setup is extended to analyze the stabilization capacity and the international coordination of fiscal policy. These extensions assume that the fiscal authorities react to exogenous productivity shocks through contingency rules just like the monetary authorities. This assumption reflects the preference for automatic fiscal stabilizers which are considered as more flexible than discretionary fiscal policy (ECB, 2001).

In the static stochastic model of O-R (2002b) and its extensions, an exact closed-form solution is obtained for the first and second moments of the endogenous variables which are affected by macroeconomic policy. This leads to several simplifications that limit the scope of these models. A dynamic approach allows to expand the perspective of these models at the cost of greater complexity that requires the use of numerical solutions.

5.1 The Analytical Framework of Static Stochastic General Equilibrium Models

O-R (2002b) describes a setup with two identical countries with flexible exchange rates. In contrast to the deterministic model, price indexes and the consumption bundle of home and foreign goods are of Cobb-Douglas type implying a unit elasticity of substitution between home and foreign goods. Therefore, the setup excludes international wealth redistribution as in Corsetti and Pesenti (2001). However, the international consumption risk sharing remains imperfect as long as the degree of risk aversion is different from one. Similarly, Sutherland and Lombardo (2004) and Andersen and Spange (2006) allow for imperfect risk sharing. While in the latter this is achieved by assuming a non-unit risk aversion coefficient, in the former the imperfect risk sharing is achieved by assuming a consumption bundle of CES type instead of unit elasticity of substitution between home and foreign goods. In contrast, Coutinho (2008) assumes perfect risk sharing among the two countries.

Since current account movements are excluded in the setup, a shock during the current period does not modify foreign bond holdings which affect the decisions concerning the next period. Without this linkage between periods, the analysis is static and concerns only the decisions during the period in which the shock occurs. However, the labour supply decisions are made in the pre-shock period because wages are assumed to be rigid and set by workers with monopoly power.

The preferences of a representative household *i* are defined by the following utility function which depends on consumption, money balances and leisure:

$$U^i = \left[\frac{(C^i)^{1-\rho}}{1-\rho} + \chi \log \frac{M^i}{P} - \frac{K}{\upsilon}(L^i)^{\upsilon} \right]; \chi, K, \upsilon > 0 \tag{20}$$

In (20) ρ represents the coefficient of risk aversion. When ρ has a unit value, consumption appears in logarithmic form and (20) boils down to (1).

Following O-R (2002b), international asset trading is excluded in static stochastic models of fiscal stabilization except in Lombardo and Sutherland (2004). The latter introduces financial markets with two types of assets which may ensure perfect risk sharing across two countries. Home asset yields a pay-off of one unit of disposable income while the foreign asset yields one unit of foreign disposable income. As such, the fiscal authority may influence the degree of risk sharing through its effect on the disposable income.

The resources of the representative agent consist of wage income, profit shares Π_i from firm equities and money holdings which are used to finance consumption and tax payments:

$$M_0^i + W(i)L_i + \Pi_i = M + PT^i + PC^i \tag{21}$$

Maximizing (20) under (21) with respect to the wage rate $W(i)$, taking into account the labour demand, yields the optimal preset wage below where ϕ is the elasticity of substitution between different types of labour:

$$W(i) = \frac{\phi}{\phi-1} \frac{E(KL^i)}{E\left[(L^i/P)(C^i)^{-\rho}\right]} \tag{22}$$

Foreign wages are set similarly by maximizing an analogous utility function subject to similar constraints.

The optimal wage given in (22) which is set in the pre-shock period depends on the expected future labour effort i.e. on the uncertainty implied by an eventual productivity shock which may trigger a policy reaction. Through this channel uncertainty affects the expected levels of consumption, output and the terms of trade.

In order to adapt the OR (2002b) setup to the analysis of fiscal policy, one needs to change the specification of this model in such a way that the fiscal policy instrument appears in household and firm decisions given by the first order conditions. There are several ways to achieve this. First, it is possible to consider that public spending is financed by distortionary taxes. The introduction of labor taxes as in Andersen and Spange (2006) implies that the tax rate appears directly in (22) and fiscal policy acts through its effect on labor supply. Indeed, when a shock occurs, the labor supply decision implied by (22) is no longer optimal. In order to restore the optimality of labor leisure trade-off, the fiscal authority can manipulate the labor supply decision by modifying the labor income tax rate.

If the public spending is financed by firm income taxes as in Coutinho (2008), the tax rate appears in the pricing decisions of firms which determine the terms of trade. Hence fiscal policy acts through its effect on goods prices in order to manipulate the terms of trade.

Lombardo and Sutherland (2004) offer a second way of introducing a link between first order conditions and public spending. In their setup, the international consumption risk sharing is imperfect and therefore the optimal choice of bond holdings depends on the disposable income which is affected by public spending.

Two other ways can be offered following the extensions used in deterministic models. First, it is possible to consider that public and private consumption are non-separable in the utility function as in Ganelli (2003). In this case, public spending directly affects the money demand and the labor supply decision. Second, it is possible to introduce money demand through a cash-in-advance constraint, as in Carré and Collard (2003). This implies that agents need cash in order not only to finance their consumption spending but also to pay lump sum taxes.

The state-contingent fiscal rule is defined by the following function where a caret over variables denotes the deviation of the variable from its expected level:

$$\hat{g} = \delta_w \hat{\kappa}_w + \delta_d \hat{\kappa}_d \tag{23}$$

In what follows lower-case will denote the logs of their upper-case counterparts so that in (23) g may represent the log of public spending or the tax rate depending on the choice of fiscal policy instrument. The world shock κ_w which affects the two countries symmetrically is defined as $(\kappa + \kappa^*)/2$ while the difference shock has an asymmetric effect on home and foreign countries and is defined as $\kappa_d = (\kappa - \kappa^*)/2$. The fiscal rule implies that the fiscal reaction is conditional on the occurrence of the shock and its magnitude is proportional to the innovation in the shock. The policy parameter δ determines the magnitude of the fiscal response.

Neglecting the utility from money balances, one can express the individual utility function in terms of the expected levels of consumption, output and the terms of trade. Taking a second order approximation to (22) it is possible to express the expected levels of the terms of trade and consumption in terms of second moments of the relevant variables. Therefore, the setup allows to express expected welfare in terms of the second moments of the model's variables. When public spending is assumed to be welfare enhancing as in Andersen and Spange (2006) and Lombardo and Sutherland (2004), the expected level and the variance of public spending also enter directly in the welfare expression.

If we choose to introduce fiscal policy through a cash-in-advance constraint, the real money balances will amount to the sum of private consumption and tax payments in both countries. Subtracting the home money demand from foreign making use of the definitions of the price indexes, one can derive the deviation of the terms of trade $\hat{\tau}$ from its expected level under fixed wages. Adding up the home and foreign money demand equations allows to derive the deviation of consumption $\hat{c}$:

$$\hat{\tau} = -(\hat{g} - \hat{g}^*) \text{ and } \hat{c} = -\tfrac{1}{2}(\hat{g} + \hat{g}^*) \tag{24}$$

Combining equations (23) and (24) allows to compute the second moments of the model's variables in terms of the policy parameter δ and the variance of the shock $\sigma_{\kappa_i}^2$ where $i = w, d$. For example, if we know the deviation of consumption $\hat{c}$, and that of the terms of trade $\hat{\tau}$ then the covariance between the two is given by $\sigma_{c\tau} = \hat{c}\hat{\tau}$ which will be a function of $\hat{g}$ and hence a function of the policy parameter and the variance of the shock as implied by (23).

Having determined the second moments as a function of the policy parameters and the variance of the shock, we can express the expected welfare as:

$$EU = u(\delta_i, \delta_i^*, \sigma_{\kappa_i}^2) \text{ with } i = w, d \tag{25}$$

Under the Nash regime, home fiscal authority maximizes (25) with respect to δ while the foreign fiscal authority maximizes the foreign analogue with respect to δ^*. When home and foreign fiscal authorities decide to cooperate they maximize the weighed average of (25) and its foreign counterpart with respect to their own policy parameters. This yields the optimal policy coefficients under Nash and under cooperation. Introducing the optimal values of δ and δ^* into (25) and its foreign analogue yields the expected home and foreign welfare under Nash and cooperation regimes.

5.2 Fiscal Stabilization and Coordination in Static Stochastic Models

In static stochastic models of fiscal stabilization and coordination, fiscal authorities face two major distortions stemming from the imperfect sharing of consumption risks and from wage rigidity. Imperfect consumption risk sharing increases consumption volatility and thereby reduces welfare. Moreover, since wages are set before the shock occurs, the preset wage becomes suboptimal following the productivity shock which perturbs the trade-off between marginal utility of consumption and leisure. Fiscal authorities aim at restoring the optimal consumption-leisure trade-off and at reducing consumption volatility by improving

risk sharing. However, in some cases, policy makers can face a trade-off between these two targets which makes it impossible to achieve the flexible-wage level of welfare.

International consumption risk sharing is perfect when productivity shocks are symmetric across countries or when the coefficient of risk aversion is equal to one. In this case, the only distortion is wage rigidity. Hence, fiscal authorities in both countries can eliminate this distortion and achieve the flexible-wage welfare under both Nash and cooperative games. In contrast when risk sharing is imperfect, fiscal authorities have to choose between improving risk sharing and eliminating wage distortions. International fiscal cooperation privileges improving the risk sharing while Nash strategies aim at reducing distortions from wage rigidity. Hence a discrepancy between Nash and cooperative results occurs. This difference allows to assess the gain from international policy cooperation in addition to the stabilization gains from Nash strategy.

Andersen and Spange (2006) consider such gains in a currency union where fiscal policy instrument is the labour income tax. In this context, fiscal authority aims at minimizing the variability of consumption and output i.e., the labour effort. Optimal fiscal policy indicates a positive value of the policy parameter and hence a positive relationship between public spending and income implying that optimal fiscal policy is pro-cyclical. Combined with the positive effect of the terms of trade on home income, the pro-cyclical fiscal reaction increases income variability at home following a positive productivity shock. On the other hand, home fiscal reaction stabilizes home and foreign consumption and foreign output. Hence, it has a positive effect on foreign welfare. Since the spillover effect is positive, the cooperative response is higher than the Nash response implying that there are gains from international fiscal cooperation in the absence of monetary policy.

The numerical analysis shows that the cooperative response is greater than the Nash response and decreases as the share of import goods in the consumption bundle increases i.e., as the degree of openness increases. Furthermore, fiscal policy efficiency increases as the public sector size becomes larger. However, gains from international fiscal cooperation are small in all cases.

The small cooperation gains are often considered as the result of the structural symmetry between the two countries. In order to see this, Spange (2007) introduces a labor market asymmetry in Andersen and Spange (2006). Specifically, the author assumes completely fixed wages in one country while wages are fully flexible in the other country. The results show that gains from fiscal cooperation remain weak despite the asymmetry. However, in contrast to Andersen and Spange (2006) the optimal fiscal policy may no longer be pro-cyclical in the

two countries. Indeed, a pro-cyclical tax policy implemented in the flexible-wage country may be destabilizing.

By excluding the possibility of an active monetary policy Andersen and Spange (2006) and Spange (2007) overlook the possible interactions between monetary and fiscal policy. However, this theme has gained particular importance since the emergence of the European currency union. The idea is to verify in a new setup whether following a common monetary policy can enhance the efficiency of fiscal policy and induce fiscal cooperation. This idea is briefly analyzed in Lombardo and Sutherland (2004). The results show that although cooperative fiscal policy can not fully eliminate all the distortions, it generates a higher level of welfare with respect to Nash strategy in a currency union. Moreover, in the case of asymmetric shocks absence of fiscal reaction is preferable to uncoordinated fiscal policy in a currency union.

Lombardo and Sutherland (2004) consider mainly the case of flexible exchange rates. The authors show that in this case fiscal cooperation alone can not achieve full stabilization if monetary policy is absent, but the efficiency of fiscal cooperation is enhanced when home and foreign monetary authorities cooperate. Whether there are gains from fiscal cooperation depends on the elasticity of substitution when monetary policy is uncoordinated even though the welfare effects of fiscal cooperation are not large. However, the question of fiscal cooperation becomes irrelevant under monetary cooperation because coordinated monetary policy replicates the flexible-wage level of welfare regardless of the fiscal regime.

Despite the differences in the assumptions of O-R (2002b) and Lombardo and Sutherland (2004), the mechanism that derives the results is similar in both models. In Lombardo and Sutherland (2004), the fiscal or monetary authority has to choose between eliminating wage rigidity and improving risk sharing as in O-R (2002b). In the former, home policy maker is induced to reduce home output when the disutility of work effort increases at home while searching to offset the impact of the terms of trade on home output in order to restore the optimality of the preset wage. Similarly, home fiscal authority reduces the variability of home disposable income in order to shift relative asset prices in favour of home households in order to improve risk sharing. Therefore, the trade-off between these two strategies will imply potential gains from policy cooperation. It is worth noting that the trade-off between targeting flexible wages and improving risk sharing disappears as in O-R (2002b) when risk sharing is perfect, i.e. when the shocks are symmetric or when the elasticity of substitution between home and foreign goods is equal to one.

In a different perspective than previous studies, Coutinho (2008) adapts O-R (2002b) to the analysis of optimal taxation by introducing distortionary taxes on firm income which are then used to finance transfers to the private sector assuming there is no public spending. Since wages are preset but prices are flexible, these distortionary taxes are directly reflected on the prices through the mark up rates. Therefore, by modifying the tax rate following common or asymmetric labour supply shocks, fiscal authorities are able to affect the terms of trade in order to shift demand away from or towards domestic output. This way, fiscal policy can affect the marginal utility of consumption in both countries. As in O-R (2002b), by making transfers of tradables between the countries through terms of trade manipulations, fiscal authorities can improve international consumption risk sharing. However, since $\rho = 1$, consumption risk sharing is perfect in Coutinho (2008) whatever the nature of the shock. In this case, similarly to O-R (2002b), monetary policy is capable of achieving the flexible-wage level of welfare both under Nash and cooperative strategy. Therefore, fiscal authorities need not react to shocks when monetary policy is active. However, when the two countries form a currency union, fiscal policy becomes the only instrument that allows to react to asymmetric shocks. Under Nash strategy each fiscal authority is induced to manipulate the terms of trade against the other. Hence there are gains from fiscal cooperation depending on the elasticity of labour supply.

5.3 Fiscal Stabilization and Coordination in a Dynamic Setup

The dynamic stochastic approach allows to extend the analysis of optimal taxation and of the interaction between macroeconomic policies which are analyzed in the previous static models.

The adoption of a dynamic perspective allows Kim and Kim (2003) to introduce capital into a framework that is similar to O-R (2002b). This setup, in which monetary aspects are neglected, considers not only income taxes as in Coutinho (2008) but also capital taxes. The numerical results show that the optimal tax policy against productivity shocks is pro-cyclical. By varying the tax rate on labour or capital, fiscal authority affects the components of welfare, namely output and consumption, through its effect on labor supply and investment. The optimal fiscal response to a productivity shock under capital taxation yields a higher welfare with respect to wage taxation. This is because, capital mobility helps agents benefit from the productivity differences across countries while the absence of labor mobility limits the impact of wage taxation on the production capacity. Both types of taxation policy imply positive

35

spillover effects. Therefore, fiscal cooperation generates non negligible gains with respect to uncoordinated fiscal policy.

Beetsma and Jensen (2005) reconsider the monetary and fiscal policy interactions in a currency union setup which Lombardo and Surtherland (2004) have analyzed in a static model. The authors show how a dynamic structure can shed light on the role of macroeconomic policy credibility, a recurrent theme since the publication of Kydland and Prescott (1977) and Barro and Gordon (1983)[7]. In contrast to O-R (2002b), the authors assume complete financial markets which imply perfect international risk sharing. Moreover, the public spending in each country falls only on domestic goods and it is considered to be welfare enhancing as in Andersen and Spange (2006) and Lombardo and Sutherland (2004). The dynamics of the setup is based on a process of gradual adjustment of prices described by Calvo (1983). This setup is used to study the stabilization role of discretionary policy versus commitment policy under cooperative fiscal policy in which inflation plays an important role.

The commitment of monetary authority to restrictive monetary policy helps reduce the inflationary expectations following a symmetric productivity shock which increases inflation at the union level. If countries react identically to price variations the impact of the commitment on expectations is sufficient to stabilize current inflation and eliminate the consumption gap. In this case the fiscal authority reacts simply by choosing the efficient level of public spending. However, when there is a variation in the home inflation relative to foreign, fiscal policy plays a stabilization role by influencing inflation expectations and by reducing the gap between current and steady state terms of trade. This stabilization effect of fiscal policy is lower under discretion with respect to commitment because the effect of discretionary fiscal policy on inflation expectations is lower since this type of policy is less credible than commitment policies.

When the two countries react differently to price variations, common monetary policy concentrates on the country with higher price rigidity. This creates higher price variability in the other country inducing a more aggressive fiscal policy.

Calibration shows that there are non negligible stabilization gains from fiscal policy. However, in contrast to the common opinion, these gains do not depend on the correlation of shocks.

By relaxing the assumption of tax financed public spending it is possible to extend the monetary and fiscal interactions analysis to that of different ways of financing public

---

7 Discretionary and commitment policies are especially compared in the recent literature by Dixit and Lambertini (2001), Lambertini (2007) and Chari and Kehoe (2008) in the context of a currency union.

spending. Such an analysis seems to be particularly suitable to the European monetary union constrained by the stability and growth pact which draws limits to public debt and deficit. In this context it is possible to determine the conditions for optimal financing of public spending which is contingent to the occurrence of the shock. It may also give insight about how monetary authorities affect the cost or the real value of public debt by varying the money supply or the interest rate and thereby modify the optimal public spending finance. However, such an analysis concerns literatures other than those that follow directly from O-R (2002b)[8].

6. Conclusion

The present paper offers a survey of recent research on fiscal policy in both deterministic and stochastic models of the new open economy macroeconomics initiated by O-R (1995, 2002b). This new framework is characterized by imperfect markets, explicit cross-country relations and micro-founded welfare analysis. It also assumes short-run rigidities as in Mundell-Fleming models.

This new setup is used to reconsider several contemporary issues like the impact of financial globalization on the efficiency of fiscal policy, the effect of fiscal policy in a currency union like the European Monetary Union and the role of a fiscal contraction in reducing trade deficits as in the case of U.S. Moreover, it is used to further develop the traditionally studied aspects of fiscal issues such as the transmission channels of fiscal policy which is based on intertemporal optimization decisions and variations of the current account. The NOEM framework serves equally well to analyze generally neglected aspects of fiscal policy such as the composition of public spending. The latter is particularly important since it allows to distinguish between public goods purchases and the provision of public services which enables to evaluate the effect of reducing the number of state employees which is a source of current debate in some countries. Similarly, it is possible to enrich the analysis of fiscal policy transmission channels by introducing international production specialization possibilities or by diversifying the pricing decisions of firms. In the latter case the imperfect pass-through justifies the fiscal intervention since exchange rate flexibility is no longer sufficient to ensure the necessary price adjustments.

In stochastic models of NOEM, fiscal policy is considered as a stabilization tool against exogenous shocks. This definition of fiscal policy is particularly suitable for the members of the EMU. Indeed, these countries are induced to switch from discretionary fiscal policy to

---

8 This question was first addressed in the context of closed economies with perfect competition, especially by Lucas and Stokey (1983). It is then extended by introducing imperfect competition and price rigidity as in Schmitt-Grohe and Uribe (2004). Other researchers such as Lambertini (2007) adapt this setup to a two-country framework.

automatic stabilizers following the stability and growth pact. Moreover, the productivity shock analyzed in this setup can be considered as resulting from the modification of weekly working hours which is an ongoing debate in Europe. The stochastic setup allows for analytical solutions, which show explicitly the effect of uncertainty in all aspects implying that the fiscal authority has to take into account not only the variance of the shock but also its covariance with the endogenous variables of the model. Furthermore, the analytical solutions show that output and inflation are not the only relevant variables for policy decision but consumption and terms of trade are equally important for welfare maximization and hence for the design of optimal policy. Finally, this approach allows for an evaluation of gains from international fiscal policy cooperation with respect to gains from fiscal stabilization.

One inconvenience of the NOEM models appears to be the sensitivity of the results to the underlying assumptions. The implications of fiscal policy can depend on whether public spending is welfare enhancing, on how money balances are introduced or on the degree of substitution between private and public consumption. Unfortunately, empirical results hardly provide a guide for the choice of welfare functions specification. However, they can provide guidance for the choice of other factors that can influence the efficiency of fiscal policy. For example, Bergin (2004) estimates that in contrast to what economists believed for a long time, the elasticity of substitution between home and foreign goods is equal to one and a significant share of firms apply LCP.

Despite the new perspectives on the analysis of fiscal policy that NOEM allowed, there still remain questions to be answered in future research. First, there has been little attention paid on labor market structure and on employment issues in NOEM. Generally, it is assumed that the representative household is composed of agents, each of which is employed and provides the same amount of labor. It is possible to introduce unemployment in this setup through the utility function, following Dotsey and King (2006), by assuming that the representative household is composed of both employed and unemployed agents. In this case agents who are employed decide not only to supply more or less labor but also to keep or quit their jobs. This allows to analyze the role of labor mobility in the international transmission of fiscal policy as well as the impact of fiscal policy on the optimal labor supply and on the ratio between employed and unemployed agents. This way, it may be possible to alter the typical result in NOEM models which suggests that an increase in public spending always induces the representative agent to work harder and hence reduces welfare.

Second, most of the NOEM models have limited the analysis of fiscal policy to tax-financed policy because of the assumption of ricardian equivalence. Relaxing this assumption

allows to consider alternative ways of financing public spending and enables healthier comparisons between the results of theoretical analyses and those of empirical studies in which ricardian equivalence does not hold. Moreover, tax-financed fiscal policy implies that the disposable income falls whenever public spending increases and this reduces welfare because of private consumption crowding-out. However, this crowding effect is likely to disappear if we consider debt-financed fiscal policy. Ganelli (2005a) makes the first attempt to relax the assumption of ricardian equivalence by assuming that agents have finite lives. He uses this setup to compare the efficiency of tax-financed fiscal policy to that of debt-financed public spending but finds that the difference between the two policies is ambiguous. Therefore, more research is needed to have a robust conclusion on the optimal way of financing fiscal policy. For this, one can consider alternative ways of relaxing the ricardian equivalence such as increasing country population offered by Weil (1989) or the rule-of-thumb behavior proposed by Gali et al. (2004).

A third stream of future research may be developed in the framework of stochastic NOEM models. In the latter, the definition of the shock is limited to a labor supply shock. The current economic crisis may inspire researchers to extend the stochastic NOEM setup in order to consider more complex fiscal rules that react to financial or demand shocks. Indeed the analysis of fiscal policy seems particularly suitable for study demand shocks since public demand substitutes private demand naturally. In contrast, in the case of a labor shock fiscal policy must be able to affect labor supply decisions in order to play a stabilization role. This requires introducing fiscal policy through distortionary taxes or through the payoff of internationally traded bonds, which complicates the analysis. This, in turn, makes it difficult to introduce the traditional features analyzed in the deterministic NOEM models such as the imperfect pass-through or alternative compositions of public spending if one chooses not to sacrifice tractability.

APPENDIX A: Log-linear Version of the Deterministic Benchmark Model

Long run		Short run	
Current account :		Price indexes:	
$\widetilde{\overline{C}} = \overline{r}\widetilde{\overline{B}} + \widetilde{\overline{p}}(h) + \widetilde{\overline{y}} - \widetilde{\overline{P}} - \widetilde{\overline{G}}$	(A1a)	$\widetilde{P} = (1-n)\widetilde{e}$	(A6a)
$\widetilde{\overline{C}}^* = -\frac{n}{1-n}\overline{r}\widetilde{\overline{B}} + \widetilde{\overline{p}}^*(f) + \widetilde{\overline{y}}^* - \widetilde{\overline{P}}^* - \widetilde{\overline{G}}^*$	(A1b)	$\widetilde{P}^* = -n\widetilde{e}$	(A6b)
Price indexes		Purchasing power parity:	
$\widetilde{\overline{P}} = n\widetilde{\overline{p}}(h) + (1-n)(\widetilde{\overline{e}} + \widetilde{\overline{p}}^*(f))$	(A2a)	$\widetilde{\overline{P}} = \widetilde{e} + \widetilde{P}^*$	(A7)
$\widetilde{\overline{P}}^* = n(\widetilde{\overline{p}}(h) - \widetilde{\overline{e}}) + (1-n)\widetilde{\overline{p}}^*(f)$	(A2b)	Goods market:	
		$\widetilde{y} = \theta(1-n)\widetilde{e} + \widetilde{C}^w + \widetilde{G}^w$	(A7a)

$\widetilde{\widetilde{P}} = \widetilde{\widetilde{e}} + \widetilde{\widetilde{P}}^*$ (A2c)	$\widetilde{y}^* = -\theta n \widetilde{e} + \widetilde{C}^w + \widetilde{G}^w$ (A7b)
Goods market:	**Euler equations:**
$\widetilde{\widetilde{y}} = \theta(\widetilde{\widetilde{P}} - \widetilde{\widetilde{p}}(h)) + \widetilde{\widetilde{C}}^w + \widetilde{\widetilde{G}}^w$ (A3a)	$\widetilde{\widetilde{C}} = \widetilde{C} + (1-\beta)\widetilde{r}$ (A8a)
$\widetilde{\widetilde{y}}^* = \theta(\widetilde{\widetilde{P}}^* - \widetilde{\widetilde{p}}^*(h)) + \widetilde{\widetilde{C}}^w + \widetilde{\widetilde{G}}^w$ (A3b)	$\widetilde{\widetilde{C}}^* = \widetilde{C}^* + (1-\beta)\widetilde{r}$ (A8b)
$\widetilde{\widetilde{y}}^w = \widetilde{\widetilde{C}}^w + \widetilde{\widetilde{G}}^w$ (A3c)	**Money demand:**
Labor-leisure trade-off:	$\widetilde{M} - \widetilde{P} = \widetilde{C} - \beta\widetilde{r} - \beta\dfrac{\widetilde{\widetilde{P}} - \widetilde{P}}{1-\beta}$ (A9a)
$(\theta+1)\widetilde{\widetilde{y}} = -\theta\widetilde{\widetilde{C}} + \widetilde{\widetilde{C}}^w + \widetilde{\widetilde{G}}^w$ (A4a)	
$(\theta+1)\widetilde{\widetilde{y}}^* = -\theta\widetilde{\widetilde{C}}^* + \widetilde{\widetilde{C}}^w + \widetilde{\widetilde{G}}^w$ (A4b)	$\widetilde{M}^* - \widetilde{P}^* = \widetilde{C}^* - \beta\widetilde{r} - \beta\dfrac{\widetilde{\widetilde{P}}^* - \widetilde{P}^*}{1-\beta}$ (A9b)
Money demand:	**Current account:**
$\widetilde{\widetilde{M}} - \widetilde{\widetilde{P}} = \widetilde{\widetilde{C}} - \beta\bar{r}$ (A5a)	$\widetilde{B} = \widetilde{y} - \widetilde{C} - \widetilde{G} - (1-n)\widetilde{e}$ (A10a)
$\widetilde{\widetilde{M}}^* - \widetilde{\widetilde{P}}^* = \widetilde{\widetilde{C}}^* - \beta\bar{r}$ (A5b)	$\widetilde{B}^* = -\dfrac{n}{1-n}\widetilde{B} = \widetilde{y}^* - \widetilde{C}^* - \widetilde{G}^* + n\widetilde{e}$ (A10b)

APPENDIX B: The Effects of Fiscal Policy

Short run effects on home variables	Short run effects on foreign variables
$\widetilde{C} = -\dfrac{(1-n)\bar{r}(1+\theta)}{\bar{r}\theta(1+\theta)+2\theta}[(\widetilde{G}-\widetilde{G}^*)+\dfrac{1}{\bar{r}}(\widetilde{\widetilde{G}}-\widetilde{\widetilde{G}}^*)]$ (B1a)	$\widetilde{C}^* = \dfrac{n\bar{r}(1+\theta)}{\bar{r}\theta(1+\theta)+2\theta}[(\widetilde{G}-\widetilde{G}^*)+\dfrac{1}{\bar{r}}(\widetilde{\widetilde{G}}-\widetilde{\widetilde{G}}^*)]$ (B1b)
$\widetilde{y} = \dfrac{\bar{r}(1+\theta)+2n}{\bar{r}(1+\theta)+2}\widetilde{G} + \dfrac{2(1-n)}{\bar{r}(1+\theta)+2}\widetilde{G}^*$ $+\dfrac{(1-n)(1+\theta)}{\bar{r}(1+\theta)+2}(\widetilde{\widetilde{G}}-\widetilde{\widetilde{G}}^*)$ (B2a)	$\widetilde{y}^* = \dfrac{2n}{\bar{r}(1+\theta)+2}\widetilde{G} + \dfrac{\bar{r}(1+\theta)+2(1-n)}{\bar{r}(1+\theta)+2}\widetilde{G}^*$ $-\dfrac{n(1+\theta)}{\bar{r}(1+\theta)+2}(\widetilde{\widetilde{G}}-\widetilde{\widetilde{G}}^*)$ (B2b)
$\widetilde{e} = \dfrac{\bar{r}(1+\theta)}{\bar{r}\theta(1+\theta)+2\theta}[(\widetilde{G}-\widetilde{G}^*)+\dfrac{1}{\bar{r}}(\widetilde{\widetilde{G}}-\widetilde{\widetilde{G}}^*)]$ (B3)	
$\widetilde{B} = \dfrac{(1-n)\bar{r}(1+\theta)}{\bar{r}(1+\theta)+2}[(\widetilde{G}-\widetilde{G}^*)+\dfrac{1}{\bar{r}}(\widetilde{\widetilde{G}}-\widetilde{\widetilde{G}}^*)]-(1-n)(\widetilde{G}-\widetilde{G}^*)$ (B4)	
$\widetilde{r} = -\dfrac{1}{2(1-\beta)}\widetilde{\widetilde{G}}^w$ (B5)	
Long run effects on home variables	Long run effects on foreign variables
$\widetilde{\widetilde{C}} = -\dfrac{n\theta\bar{r}(1+\theta)+2(1-n+\theta)}{2\theta[\bar{r}(1+\theta)+2]}\widetilde{\widetilde{G}}$ $-\dfrac{(1-n)[\theta\bar{r}(1+\theta)-2]}{2\theta[\bar{r}(1+\theta)+2]}\widetilde{\widetilde{G}}^* - \dfrac{(1-n)(1+\theta)\bar{r}}{\theta[\bar{r}(1+\theta)+2]}(\widetilde{G}-\widetilde{G}^*)$ (B6a)	$\widetilde{\widetilde{C}}^* = -\dfrac{n[\theta\bar{r}(1+\theta)-2]}{2\theta[\bar{r}(1+\theta)+2]}\widetilde{\widetilde{G}}$ $-\dfrac{2(n+\theta)+(1-n)\theta\bar{r}(1+\theta)}{2\theta[\bar{r}(1+\theta)+2]}\widetilde{\widetilde{G}}^* + \dfrac{n(1+\theta)\bar{r}}{\theta[\bar{r}(1+\theta)+2]}(\widetilde{G}-\widetilde{G}^*)$ (B6b)
$\widetilde{\widetilde{y}} = \dfrac{n\bar{r}(1+\theta)+2}{2[\bar{r}(1+\theta)+2]}\widetilde{\widetilde{G}} + \dfrac{(1-n)\bar{r}(1+\theta)}{2[\bar{r}(1+\theta)+2]}\widetilde{\widetilde{G}}^*$ $+\dfrac{(1-n)\bar{r}}{\bar{r}(1+\theta)+2}(\widetilde{G}-\widetilde{G}^*)$ (B7a)	$\widetilde{\widetilde{y}}^* = \dfrac{n\bar{r}(1+\theta)}{2[\bar{r}(1+\theta)+2]}\widetilde{\widetilde{G}} + \dfrac{(1-n)\bar{r}(1+\theta)+2}{2[\bar{r}(1+\theta)+2]}\widetilde{\widetilde{G}}^*$ $-\dfrac{n\bar{r}}{\bar{r}(1+\theta)+2}(\widetilde{G}-\widetilde{G}^*)$ (B7b)

Fiscal Policy in the Short Run

The short run exchange rate deviation and the deviation of home relative short run consumption are derived from the system of two equations given below:

$$\widetilde{e} = -(\widetilde{C} - \widetilde{C}^*)$$

$$\widetilde{e} = \frac{2\theta + \bar{r}(1+\theta)}{\bar{r}(\theta^2 - 1)}(\widetilde{C} - \widetilde{C}^*) + \frac{1}{\theta - 1}\left[(\widetilde{G} - \widetilde{G}^*) + \frac{1}{\bar{r}}(\widetilde{\widetilde{G}} - \widetilde{\widetilde{G}}^*)\right]$$

The first equation above is derived from short run and long run money demand equations (A9a and b) and (A5a and b) together with short and long run PPP equations (A2c) and (A7) where $\widetilde{e} = \widetilde{\widetilde{e}}$. The second relation above is derived from the real sector of the economy, namely from equations (A1a and b), (A4a and b), (A7a and b), (A10a and b) and (A2c).

Solving the system above allows to determine the impact of fiscal policy on short run exchange rate (B3) and on home relative consumption. Knowing the effect of fiscal policy on $\widetilde{C} - \widetilde{C}^*$ and remembering that $\widetilde{C}^w = 0$, we can use the Aoki (1981) method to compute the effect of fiscal policy on home and foreign short run consumption (B1a and b).

Knowing the solution for the exchange rate we can use the difference between home and foreign short run goods market equations (A7a and b). Remembering that $\widetilde{y}^w = \widetilde{G}^w$ and knowing solution for the relative home output, we can use the Aoki method to derive equations (B2a and b).

Home current account (B4) can be derived from the difference between (A10a and b) introducing (B3) along with the differences between (B1a and b) and (B2a and b) for home relative consumption and output respectively.

It is possible to derive a relation between $\widetilde{r}$ and $\overline{\widetilde{C}}^w$ from (A8a and b). Introducing (A3c) and (A7a and b) into this relationship, it is possible to derive the effect of fiscal policy on short run interest rate as given in (B5).

Fiscal Policy in the Long Run

Home relative long run consumption can be derived as follows from the difference between (A1a and b) taking into account the differences between (A3a and b) and (A2a and b):

$$\widetilde{\widetilde{C}} - \widetilde{\widetilde{C}}^* = \frac{1+\theta}{2\theta}\left[\frac{1}{1-n}\bar{r}\widetilde{\widetilde{B}} - (\widetilde{\widetilde{G}} - \widetilde{\widetilde{G}}^*)\right]$$

Introducing the above equation into the difference between (A4a and b) yields the following expression for home relative long run output:

$$\widetilde{\widetilde{y}} - \widetilde{\widetilde{y}}^* = -\frac{1}{2}\left[\frac{1}{1-n}\bar{r}\widetilde{\widetilde{B}} - (\widetilde{\widetilde{G}} - \widetilde{\widetilde{G}}^*)\right]$$

Using the above equations knowing that $\widetilde{\widetilde{y}}^w = 0{,}5\widetilde{\widetilde{G}}^w$ and $\overline{\widetilde{C}}^w = -0{,}5\widetilde{\widetilde{G}}^w$ as implied by (A3c) and (A4a and b), we can derive the impact of fiscal policy on long run home and foreign consumption and output given in (B6a and b) and (B7a and b) according to the Aoki method.

References

Andersen, T.M. Spange, M. (2006), "International interdependencies in fiscal stabilization Policies", *European Economic Review,* 50, 1169-1195.

Aoki, M. (1981), *Dynamic analysis of open economics,* Academic Press, New York.

Barro, R.J., Gordon, D.B. (1983), "A positive theory of monetary policy in a natural-rate model", *Journal of Political Economy,* 91(3), 589-610.

Baxter, M., King R. (1993), "Fiscal policy in general equilibrium", *The American Economic Review,* 83(3), 315-334.

Beetsma, R.M.W.J., Jensen, H. (2005), "Monetary and fiscal policy interactions in a micro-founded model of monetary union", *Journal of International Economics*, 67(2), 320-352.

Bems, R., Dedola, L., Smets, I. (2007), "US imbalances: the role of technology and policy", *Journal of International Money and Finance*, 26, 523-545.

Bergin P. (2006), "How well can the new open economy macroeconomics explain the exchange rate and the current account", *The Journal of International Money and Finance*, 25 (5), 675-701.

Betts, C., Devereux, M. (2000), "Exchange rate dynamics in a model of pricing-to-market", *Journal of International Economics*, 50, 215-244.

Betts, C., Devereux, M. (2001) "International effects of monetary and fiscal policy in a two-country model". In: Calvo, G., Dornbush, R., Obstfeld, M. (eds.), *Money, capital mobility and trade: Essays in honor of R.A. Mundell*, MIT Press, Cambridge, 9-52.

Blanchard, O.J. (1985), "Debt, deficits and finite horizons", *Journal of Political Economy*, 93, 121-138.

Blanchard, O., Perotti, R. (2002), "An empirical characterization of the dynamic effects of changes in government spending and taxes on output", *The Quarterly Journal of Economics*, 67, 1329-1368.

Botman, D, Laxton, D,.Muir, D, Romanov,A (2006), "A new-open-macro model for fiscal policy evaluation", *IMF Working Paper,* 06/45.

Burnside C., Eichenbaum, M., Fisher, J. (2004), "Fiscal shocks and their consequences", *Journal of Economic Theory*, 115(1), 89-117.

Bussière, M., Fratzshe, M., Müller, G.J. (2005), "Productivity shocks, budget deficits and the current account", *ECB Working Paper,* 509.

Calvo, G. (1983), "Staggered contracts in a utility-maximizing framework", *Journal of Monetary Economics,* 12, 383-398.

Canzoneri, M.B., Cumby, R.E., Diba, B.T. (2005), "The need for international policy coordination: What's old, what's new, what's yet to come", *Journal of International Economic*, 66, 363-384.

Carré, M., Collard, F. (2003), "Monetary union: A welfare based approach", *European Economic Review,* 47, 521-552.

Caselli, P. (2001), "Fiscal consolidation under fixed exchange rates", *European Economic Review*, 45, 425-450.

Chari, V., Kehoe, P.J. (2008), "Time consistency and free-riding in a monetary union", *Journal of Money Credit and Banking,* 40(7), 1329-1355.

Cole, H., Obstfeld, M. (1991), "Commodity trade and international risk sharing: How much do financial markets matter", *Journal of Monetary Economics,* 28, 3-24.

Corsetti, G., Pesenti, P. (2001), "Welfare and macroeconomic interdependence", *Quarterly Journal of Economics*, 66, 421-445.

Corsetti, G., Müller, G. (2006), "Twin deficits: A squaring theory, evidence and common sense", *Economic Policy*, 599-638.

Coutinho, L. (2005), "Fiscal policy in NOEM and prospects for fiscal policy coordination", *Journal of Economic Surveys*, 19(5), 789-822.

Coutinho, L. (2008), "Fiscal Policy and Macroeconomic Stabilizations: What are the Gains from Cooperation?", *Open Economic Review*, 19, 81-120.

Dixit, A., Lambertin, L. (2001), "Monetary –fiscal policy interactions and commitment versus discretion in a monetary union", *European Economic Review,* 45, 977-987

Dotsey, M., King, R.G. (2006), "Pricing, production and persistence), *Journal of the European Economic Association*, 4, 893-928.

Engel, C. (2002), "The responsiveness of consumer prices to exchange rates: a synthesis of some New Open- Economy Macro models", *The Manchester School,* 70, Supplement, 1-15.

European Central Bank, (2001), "Fiscal policy and economic growth. European Central Bank", *Monthly Bulletin*, 8, 39-54.

European Central Bank (2007), *Financial Integration in Europe. European Central Bank,* Report ISSN 1830-7159.

Fatas, A., Mihof, I. (2001), "The effects of fiscal policy on consumption and employment: theory and evidence", *CEPR Discussion paper,* 2760.

Finn, M.G. (1998), "Cyclical effects of governments employment and goods purchases", *International Economic Review,* 39 (3), 635-657.

Frenkel, J.A., Razin, A., Yuen, C-W. (2002), *Fiscal policies and growth in the world economy*, MIT Press, Cambridge.

Gali, J, Vallès, J., Lopez-Salido, J.D. (2007), "Understanding the effects of government spending on consumption", *Journal of the European Economic Association* ,5(1), 227-270.

Ganelli, G. (2003), "Useful government spending, direct crowding-out and fiscal policy interdependence", *Journal of International Money and Finance*, 22(1), 87-103.

Ganelli, G. (2005), "The NOEM of government debt", *Journal of International Economics*, 65(1), 167-184.

Ganelli, G. (2010), "The international effects of government spending composition", *Economic Modelling*, 27(3), 631-640.

Ganelli, G. (2008), "Public spending management and macroeconomic interdependence", *Open Economic Review*, 19(2), 241-259

Ganelli, G., Lane, P. (2003), "Dynamic general equilibrium analysis: the open economy dimension" In: Altug, S.,Chadha, J.S., Nolan, C (eds.), *Dynamic macroeconomic analysis*, Cambridge University Press, Cambridge, pp.308-333.

Ganelli, G., Tervala, J. (2010), "Public infrastructures, public consumption, and welfare in a New-Open-Economy-Macro model", *Journal of Macroeconomics, 32(3), 827-837.*

Ghironi, F. (2006), "Macroeconomic interdependence under incomplete markets", *Journal of International Economics*, 70, 428-450.

Heijdra, B., Lighart, J.E. (1997) "Keynesian multipliers, crowding out, and optimal provision of public goods", *Journal of Macroeconomics*, 19 (4), 803-826.

Helliwell, J. (1996), "Do national borders mater for Quebec's trade?", *Canadian Journal of Economics*, 29(3), 507-522.

Kim, J., Kim, S.H. (2003) "Welfare effects of tax policy in open economies: Stabilization and cooperation", *Board of Governors of the Federal Reserve System, Finance and Economics. Discussion Paper,* 2003-51.

Kim, S., Roubini, N. (2008), "Twin deficit or twin divergence? Fiscal policy, current account, and real exchange rate in the US", *Journal of International Economics*, 74 (2), 362-383.

Kydland, F.E., Presott, E.C. (1977), "Rules rather than discretion: the inconsistency of optimal plans", *Journal of political Economy*, 85,473-492.

Lambertini, L. (2007), "Optimal fiscal policy in monetary union" *Center for Fiscal Policy Working Paper*, 1/07.

Lombardo, G., Sutherland, A. (2004), "Monetary and fiscal interactions in open Economies", *Journal of Macroeconomics*, 26, 319-347.

Lucas, R.E., Stokey, N.L. (1983), "Optimal fiscal and monetary policy in an economy without capital", *Journal of Monetary Economy*, 12, 55–93.

McCallum, J. (1995) "National border matter: Canada-US regional trade patterns", *American Economic Review,* 85, 615-623.

Montford, A., Uhlig, H. (2008), "What are the effects of fiscal policy shocks" *NBER Working Paper*, 14551.

Obstfeld, M., Rogoff, K. (1995) "Exchange rate dynamics redux", *Journal of Political Economy*, 100 (3), 624-660.

Obstfeld, M., Rogoff, K. (1996), *Foundations of international macroeconomics,* The MIT Press

Obstfeld, M., Rogoff, K. (2000), "New directions for stochastic open economy models", *Journal of International Economics*, 50, 117-153.

Obstfeld, M., Rogoff, K. (2002a) "Risk and exchange rates", In: Helpman, E., Sadka E. (Eds.). *Contemporary Economic Policy: Essays in Honor of Assaf Razin,* Cambridge University Press, Cambridge.

Obstfeld, M., Rogoff, K. (2002b), "Global implications of self-oriented national monetary rules", *Quarterly Journal of Economic* , 117, 503-536.

Pierdzioch, C. (2004a), "Capital mobility and the effectiveness of fiscal policy in open economies", *Journal of Macroeconomics,* 26, 465-479.

Pierdzioch, C. (2004b), "Financial integration and business cycle volatility in a monetary union" *Scottish Journal of Political Economy*, 51(3), 422-442.

Pierdzioch, C. (2005) "Home-product bias, capital mobility, and macroeconomic volatility" *Oxford Economic Papers,* 57(1), 142-156.

Ravn, M.O., Schmitt-Grohé, S.,Uribe, M. (2007) "Explaining the effects of government spending shocks on consumption and the real exchange rate", *NBER Working paper*, 13328.

Schmitt-Grohé, S., Uribe, M. (2004) "Optimal fiscal and monetary policy under sticky prices" *Journal of Economic Theory,* 114, 198-230.

Senay, O. (1998), "The effects of goods and financial market integration on macroeconomic volatility", *The Manchester School Supplement*, 39-61.

Spange, M. (2007) "Do structural asymmetries increase the gains from international fiscal policy coordination?", *The Manchester school,*75(1),131-150.

Steffen, D. (2005) Fiscal policy under alternative exchange rate regimes: On the specification of money demand in new open economy macroeconomics, *Inaugural-Dissertation,* University of Tübingen.

Sutherland, A. (1996), "Financial market integration and macroeconomic volatility", *Scandinavian Journal of Economics*, 98(4), 521-39.

Tille, C. (1999), The role of consumption substitutability in the international transmission of shocks, Federal Reserve Bank of New-York Staff Report, 67.

Trionfetti, F. (2001), "Public procurement, market integration and income inequalities.", *Review of International Economics*, 9(1), 29-41.

Warnock, F. (1998), "Idiosyncratic tastes in a two-country optimizing model: Implications of standard presumption", *Board of Governors of Federal Reserve System International Finance Discussion Papers,* 631.

Weil, P. (1989), "Overlapping families of infinitely lived agents", *Journal of Public Economics*, 38, 183-198.

Documents de travail du BETA

___

2010–**01**   *The Aggregation of Individual Distributive Preferences through the Distributive Liberal Social Contract : Normative Analysis*
Jean MERCIER-YTHIER, janvier 2010.

2010–**02**   *Monnaie et Crise Bancaire dans une Petite Economie Ouverte*
Jin CHENG, janvier 2010.

2010–**03**   *A Structural nonparametric reappraisal of the CO_2 emissions-income relationships*
Theophile AZOMAHOU, Micheline GOEDHUYS, Phu NGUYEN-VAN, janvier 2010.

2010–**04**   *The signaling role of policy action*
Romain BAERISWYL, Camille CORNAND, février 2010.

2010–**05**   *Pro-development growth and international income mobility: evidence world-wide*
Jalal EL OUARDIGHI, mars 2010.

2010–**06**   *The determinants of scientific research agenda: Why do academic inventors choose to perform patentable versus non-patentable research?*
Caroline HUSSLER, Julien PENIN, mars 2010.

2010–**07**   *Adverse Selection, Emission Permits and Optimal Price Differentiation*
Mourad AFIF, Sandrine SPAETER, mars 2010.

2010–**08**   *The impact of ambiguity on health prevention and insurance*
Johanna ETNER, Sandrine SPAETER, mars 2010.

2010–**09**   *Equité du plaider coupable : une analyse économétrique dans trois tribunaux de grande instance français.*
Lydie ANCELOT, mars 2010.

2010–**10**   *Networks, Irreversibility and Knowledge Creation.*
Patrick LLERENA, Muge OZMAN, mars 2010.

2010–**11**   *Les clusters et les réseaux comme fondements de la dynamique d'innovation dans l'industrie biopharmaceutique*
Marc Hubert DEPRET, Abelillah HAMDOUCH, avril 2010.

2010–**12**   *Large-scale risks and technological change: What about limited liability?*
Julien JACOB, Sandrine SPAETER, avril 2010.

2010–**13**   *Innovation and Development. The Evidence from Innovation Surveys*
Francesco BOGLIACINO, Giulio PERANI, Mario PIANTA, Stefano SUPINO, avril 2010.

2010–**14**   *Cooperative provision of indivisible public goods*
Pierre DEHEZ, juin 2010.

2010–**15**   *Implications de l'imperfection des marchés financiers pour la politique monétaire*
Meixing DAI, juin 2010.

2010–**16**   *Bank lending networks, experience, reputation and borrowing costs.*
              Christophe J. GODLEWSKI, Bulat SANDITOV, Thierry BURGER-HELMCHEN, juin 2010.

2010–**17**   *Les déterminants individuels des absences au travail : une comparaison européenne.*
              Sabine CHAUPAIN-GUILLOT, Olivier GUILLOT, juin 2010.

2010–**18**   *Fiscal policy efficiency and coordination : The New Open Economy Macroeconomics Approach.*
              Gilbert KOENIG, Irem ZEYNELOGLU, juillet 2010.

—————————————————————————————

La présente liste ne comprend que les Documents de Travail publiés à partir du 1er janvier 2010. La liste complète peut être donnée sur demande.
This list contains the Working Paper writen after January 2010, 1rst. The complet list is available upon request.

—————————————————————————————