Bureau
d'économie
théorique
et appliquée
(BETA)
UMR 7522

Documents de travail

« Financial Integration and Fiscal Policy Efficiency in a Monetary Union »

Auteurs

Gilbert KOENIG, Irem ZEYNELOGLU

Document de Travail n° 2007–**13**

Mars 2007

Faculté des sciences économiques et de gestion
Pôle européen de gestion et d'économie (PEGE)
61 avenue de la Forêt Noire
F-67085 Strasbourg Cedex

Secétariat du BETA
Christine DEMANGE
Tél. : (33) 03 90 24 20 69
Fax : (33) 03 90 24 20 70
demange@cournot.u–strasbg.fr
http://cournot.u-strasbg.fr/beta

CNRS CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE

NANCY 2 UNIVERSITE

ulp UNIVERSITÉ LOUIS PASTEUR STRASBOURG

Efficacité Budgétaire dans une union monétaire en cas d'intégration financière imparfaite

Gilbert Koenig - İrem Zeyneloglu

Résumé

Cet article se place dans le cadre de la nouvelle macroéconomie internationale en proposant un modèle d'équilibre général en concurrence imparfaite. Ce modèle décrit une union monétaire qui, comme l'UEM, n'a pas réalisé une intégration financière complète malgré l'adoption d'une monnaie unique. Il est utilisé pour analyser l'impact du degré d'intégration financière sur l'efficacité et sur les canaux de transmission des chocs budgétaires. A cette fin on introduit une intégration financière imparfaite dans la version du modèle de Obstfeld et de Rogoff (1995, 1996) décrivant des pays soumis à un régime de changes fixes et on l'adapte à la description d'une union monétaire. On se place ainsi dans le prolongement des travaux initiés par Sutherland (1996) et destinés à décrire les cas des économies en régime de changes flexibles. Mais on se distingue de ces travaux en substituant à leurs résultats numériques des solutions analytiques.

Les résultats montrent que dans le cas d'une expansion budgétaire financée par impôts dans un pays membre de l'union, une hausse du degré d'intégration financière réduit la volatilité du taux d'intérêt et de la consommation à court terme dans les deux pays. Cet effet est inversé à long terme. Par contre, le bien-être est indépendant du degré d'intégration financière.

Classification JEL: F41, E44, E62

Mots-clés: Nouvelle macroéconomie internationale, politique budgétaire, intégration financière, union monétaire.

Financial Integration and Fiscal Policy Efficiency in a Monetary Union

Gilbert Koenig - İrem Zeyneloglu

Abstract

The gap between the interest rates of different members of the European Monetary Union (EMU) points out to an imperfect degree of financial integration despite the common currency. This paper develops a two-country New Open Economy Macroeconomics (NOEM) model with imperfect financial integration in a monetary union in order to analyze fiscal policy efficiency and the impact of financial integration on the international transmission of fiscal policy shocks. For this, we introduce imperfect financial integration into the fixed exchange rate version of Obstfeld-Rogoff (1995, 1996). We show that a higher degree of financial integration decreases short run consumption and interest rate volatility in both countries while it increases the volatility in the long run following a balanced-budget increase in government spending in one of the countries. In terms of welfare, the degree of financial integration is irrelevant since it has no effect on the utility of the members.

JEL Classification: F41, E44, E62

Keywords: New open economy macroeconomics, fiscal policy, financial integration, monetary union

Financial Integration and Fiscal Policy Efficiency in a Monetary Union

Gilbert Koenig - İrem Zeyneloglu*

1. Introduction

According to the definition given by the European Central Bank (ECB), the market of a given set of instruments and services is fully integrated if all potential market participants face the same rules, have equal access to the market and are treated equally when they take action in the market (Schmiedel and Schönenberger (2005)).The existence of a common currency has allowed an important increase in financial integration between the members in the European Monetary Union. However, despite the common currency, not all the conditions are met in Europe in order to achieve full financial integration. This imperfect character of the financial market in EMU is reflected by the interest rate gaps between similar bonds (ECB (2003)).

The degree of financial integration matters mostly to monetary authorities as they consider the imperfect integration as an obstacle to the transmission of monetary policy. But it can also have implications on the conduction of fiscal policies in the member countries as well as on their welfare.

In the traditional Mundell-Fleming type models, fiscal policy analysis in a monetary union frame considers generally the perfect financial integration case. Indeed, the existence of a common currency is often thought to lead automatically to full financial integration. Nevertheless, the degree of financial integration is analyzed by the traditional literature under fixed exchange rates which is close to monetary union case. In the fixed exchange rate setup, an increase in the degree of financial integration improves fiscal policy efficiency.

The intertemporal general (dis)equilibrium models, developed beginning from the 80s (Van der Ploeg (1994), Frenkel et Razin (2002)), have paid little attention on the relation between fiscal policy and financial integration in a two country setup. One exception is Glick and Hutchinson (1990) according to which, a higher financial integration in Europe reduces the impact of fiscal policy in the implementing country while increasing its effects on the other country.

* Nous remercions F. Dufourt et E. Spyrimitros pour leurs commentaires d'une première version de cet article.

The relation between fiscal policy and financial integration has been reconsidered, in a new open economy macroeconomics (NOEM) setup, by Sutherland (1996) and Pierdzioch (2004). However, they analyze this relation in a flexible exchange rate framework providing only numerical solutions. A limited number of research considering a monetary union or fixed exchange rates assume, generally, full financial integration (Koenig and Zeyneloglu (2006)).

The paper presents a two-country NOEM model with imperfect competition on goods markets where the fiscal policy efficiency criterion is considered to be the welfare. It aims to analyze the impact of financial integration on the effects of fiscal policy, implemented in one of the union's members, on the union's welfare. For this, we extend the fixed exchange rate version of Obstfeld and Rogoff (1995, 1996) analyzed by Caselli (2001) and Coutinho (2005) by introducing imperfect financial integration. We adapt their fixed exchange rate setup to a monetary union framework and extend their full financial integration setup to the imperfect financial integration framework. In designing the imperfection of financial market integration, we follow Sutherland (1996) whose setup inspired also Senay (1998), Pierdzioch (2004, 2005) and Cenesiz and Pierdzioch (2006). In contrast to these papers where the exchange rate is considered to be flexible, we offer analytical solutions which allow to specify the impact of financial integration on fiscal policy efficiency as measured by its capacity to increase welfare rather than its capacity to improve national income.

The paper is organized as follows: section 2 describes the setup while sections 3 and 4 derive log-linear versions of the model in the long run and in the short run. Sections 5 and 6 give, respectively, the short run and long run effects of fiscal policy on real and financial sectors. Section 7 analyses the welfare effects of fiscal policy. Finally section 8 concludes.

2. The Model

There are two identical countries of equal size, which we will call as home and foreign, inhabited by a continuum of infinitely lived agents with perfect foresight. Agents in home country are indexed by $j \in [0, ½]$ while foreign agents are indexed by $j \in (½, 1]$. Each agent produces a single differentiated good that is an imperfect substitute to other goods and consumes a basket of all home and foreign goods. The two countries form a monetary union with a common currency.

2. 1. Consumer Preferences

All agents in the world have identical preferences so that we will focus on the representative agent in each country. The preferences of the representative home agent j are given by the following utility function:

$$U_s^j = \sum_{s=t}^{\infty} \beta^{s-t} \left[\log C_s^j + \chi \log \frac{M_s^j}{P_s} - \frac{\kappa}{2} (y_s^j)^2 \right] \quad ; \quad \chi, \kappa > 0 \quad ; \quad 0 < \beta < 1 \tag{1}$$

The function (1), where β denotes the subjective discount factor, implies that a representative domestic agent *j* derives utility in period $s = t$ from private consumption C_t^j and from individual real money balances defined by M_t^j / P_t where P_t is the aggregate home currency price index while the last component represents the disutility the agent bears because of labour effort.

The consumption index in equation (1) is a CES type aggregation of all available goods in the world:

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

where $c_t^j(z)$ is agent *j*'s consumption of good *z* and θ is the elasticity of substitution between goods produced in the world.

The corresponding price index is defined as the minimum expenditure required for consuming one unit of the composite consumption good *C* and is given as:

$$P_t = \left[\int_0^1 p_t(z)^{1-\theta} dz \right]^{\frac{1}{1-\theta}} \tag{3}$$

where $p(z)$ is the price of good *z*.

Without impediments to international trade, the price of each good is equalized across countries by the law of one price. Knowing that preferences are identical across countries and assuming a common currency, we can rewrite equation (3) and its foreign analogue as follows:

$$P_t = P_t^* = \left[\int_0^{½} p_t(z)^{1-\theta} dz + \int_{½}^1 p_t^*(z)^{1-\theta} dz \right]^{\frac{1}{1-\theta}} = \left[\tfrac{1}{2} p_t(h)^{1-\theta} + \tfrac{1}{2} p_t^*(f)^{1-\theta} \right]^{\frac{1}{1-\theta}} \tag{4}$$

where $h \in [0, ½]$ and $f \in (½, 1]$. In equation (4), P_t^* and $p_t^*(f)$ denote respectively, the foreign overall price index and the foreign currency price of a foreign good at time *t*.

We assume the same price rigidity as in Obstfeld and Rogoff (1996). All prices are fixed during the actual period but they adjust to their flexible price level in the following period, without a new shock.

The relations concerning the foreign country are identical with asterisks denoting foreign variables.

2. 2. Goods Demand

Each producer satisfies the private and public demand addressed to his own good. The domestic consumer maximizes equation (2) under the simple fixed nominal budget constraint for consumption which gives the individual demand for a typical good *z* as follows:

$$c_t^j(z) = \left[\frac{p_t(z)}{P_t}\right]^{-\theta} C_t^j \tag{5a}$$

We assume that government has the same composition of real per capita consumption index G_t as the private agents' given in equation (2) so that there is no home bias. Then the public demand for a single good *z* is given by:

$$g_t(z) = \left[\frac{p_t(z)}{P_t}\right]^{-\theta} G_t \tag{5b}$$

The demand by foreign public and private agents are similar.

Aggregating (5a) and (5b) along with foreign analogues gives the total demand $y_t^d(z)$, faced by the producer of a single home good *z* where we dropped the index *j* assuming that all agents are symmetric:

$$y_t^d(z) = \left[\frac{p_t(z)}{P_t}\right]^{-\theta} (C_t^w + G_t^w) \tag{6}$$

where the upper index *w* indicates union aggregates: $C_t^w = \frac{1}{2}C_t + \frac{1}{2}C_t^*$, and $G_t^w = \frac{1}{2}G_t + \frac{1}{2}G_t^*$. The demand addressed to a typical producer of a foreign good is similar.

2.3. Financial Market Structure

We assume that domestic agents hold three types of assets: domestic money balances, domestic real bonds *D* paying return *r*, and foreign real bonds *F* paying return r^*. Foreign agents can also hold three types of assets: foreign money balances, real bonds of their own country F^* and real bonds of the other country D^*.

In order to characterize the imperfect financial integration, we simply assume that home and foreign agents are not treated equally when buying the bonds of the other country. All agents in all countries have free access to the foreign financial market but the residents of one country must bear a cost when buying the bonds of the other country whereas the purchases of national bonds do not include any costs. We know that, in reality, agents incur additional costs even when buying the bonds of their own country but since these costs are negligible compared to the costs born when buying foreign bonds, we can assume, without loss of

generality, that the costs for foreign bond purchases are positive while home bonds require no additional costs[1].

Following Sutherland, we define the transaction costs incurred by the domestic and foreign agents, denoted by Z and Z^* respectively, by the following relations :

$$Z_t = \tfrac{1}{2}\gamma\left(I_t\right)^2 \tag{7a}$$

$$Z_t^* = \tfrac{1}{2}\gamma(I_t^*)^2 \tag{7b}$$

In the above expressions, a positive value of the parameter γ implies imperfect financial integration. I_t and I_t^* denote respectively the funds, in real terms, transferred from domestic to foreign financial market and from foreign to domestic financial market. In other words, they denote, respectively, the variations in home country's claims on the foreign country and the variations in foreign country's claims on home country:

$$I_t = F_{t+1} - (1+r_t^*)F_t \tag{8a}$$

$$I_t^* = D_{t+1}^* - (1+r_t)D_t^* \tag{8b}$$

We assume that the transaction costs born by domestic (foreign) agents are collected by a domestic (foreign) institution in the form of profits so that the assumption of intermediation costs does not alter the resource constraint of the home (foreign) country.

2. 4. Comsumer's Maximisation

Home individual maximizes his utility given in equation (1) under the following budget constraint:

$$p_t y_t^j - P_t Z_t^j - P_t T_t - P_t C_t^j + M_{t-1}^j - M_t^j = P_t D_{t+1}^j - P_t(1+r_t)D_t^j + P_t^* F_{t+1}^j - P_t^*(1+r_t^*)F_t^j \tag{9}$$

where r_t is the real pay off of home bonds between t-1 and t, r_t^* is the real pay off of foreign bonds and T_t stands for lump-sum taxes. D_{t+1}^j and F_{t+1}^j denote home and foreign bond holdings in period t reaching maturity in period t+1.

We abstract from the possibility of government debt and assume that public spending is financed by lump-sum taxes. Then, public budget constraint can be written as:

$$G_t = T_t \tag{10}$$

Foreign private and public budget constraints are similar.

The maximization of utility (equation 1), under budget constraint (8) taking into account the goods demand given in equation (6) and the transaction cost given in (7a), with respect to

[1] See Sutherland (1996) for alternative explanations of the transaction costs.

C_t^j, M_t^j, D_{t+1}^j, y_t^j and F_{t+1}^j gives the following first order conditions where we dropped the index *j*:

$$\frac{M_t}{P_t} = \chi C_t \left(\frac{1+i_{t+1}}{i_{t+1}} \right) \tag{11a}$$

$$C_{t+1} = \beta(1+r_{t+1})C_t \tag{11b}$$

$$y_t^{\frac{\theta+1}{\theta}} = \frac{\theta-1}{\theta\kappa}(C^w + G^w)^{\frac{1}{\theta}} C_t^{-1} \tag{11c}$$

$$(1+r_{t+1})(1+\gamma I_t) = (1+r_{t+1}^*)(1+\gamma I_{t+1}) \tag{11d}$$

In equation (11a), home nominal interest rate i_{t+1} is defined by the following relation:

$$1+i_{t+1} = \frac{P_{t+1}}{P_t}(1+r_{t+1})$$

Equation (11a) is the usual money demand equation implying that agents must be indifferent between consuming a unit of consumption good and saving the same amount of money in the period, while deriving utility from cash holdings, in order to spend in the next period. Equation (11b) is the consumption Euler equation showing the consumption smoothing behaviour. Equation (11c) is the labor-leisure trade-off equation which simply states that the marginal disutility of producing an extra unit of output must equal the extra utility coming from spending the revenue that extra unit of production brings.

Equation (11d) expresses the international financial equilibrium condition with the transaction cost taken into account. Indeed, imposing $\gamma = 0$ leads to the equality of interest rates across countries as implied by the uncovered interest rate parity condition.

Foreign agents have similar relations with asterisks denoting foreign variables.

For the equilibrium we also need the following transversality condition:

$$\lim_{T\to\infty} \left(R_{t,t+T} D_{t+T} - R^*_{t,t+T} F_{t+T} + M_{t,t+T} \right) = 0 \tag{12}$$

where $R_{t,t+T}$ is defined as $\dfrac{1}{\prod_{v=t+1}^{t+T}(1+r_v)}$ with $R^*_{t,t+T}$ being the foreign analogue.

2.5. External Equilibrium and Money Supply

The external equilibrium conditions can be expressed in the following way for the two countries:

$$(F_{t+1} - F_t) - (D^*_{t+1} - D^*_t) = -r_t D^*_t + r^*_t F_t + \frac{p_t(h) y_t}{P_t} - C_t - G_t \tag{13a}$$

$$(D^*_{t+1} - D^*_t) - (F_{t+1} - F_t) = r_t D^*_t - r^*_t F_t + \frac{p^*_t(f) y^*_t}{P^*_t} - C^*_t - G^*_t \quad (13b)$$

According to (13a and b), external equilibrium is achieved when the current account balance (right-hand side of the equations above) is equal to the capital account balance (left-hand side of the equations above) in each country. The latter equals to the difference between the variation in foreign country's claims on home country ($D^*_{t+1} - D^*_t$) and the variation in home country's claims on foreign country ($F_{t+1} - F_t$).

Money supply stays constant on the union level while it adjusts to money demand in each country.

3. Long Run Equilibrium

In order to provide analytical solutions to this non-linear model, first, we have to define a steady-state where prices are flexible. Then, we will rewrite the variables in terms of logarithmic deviations from this steady-state.

3. 1. The Initial Steady State

We consider a symmetric steady-state where an overbar denotes the constant steady-state values and where we drop the indexes *t* and *j*.

In a steady state where all endogenous variables are constant, the consumption Euler equation given in (11b) implies $\bar{r} = \bar{r}^* = \frac{1-\beta}{\beta}$ where $\beta = \beta^*$ because of identical preferences.

In the steady state, total income coming from financial operations and from production must be equal to total consumption. Remembering that steady-state interest rates are equal across countries, the steady-state versions of equations (13) become:

$$\bar{C} = \bar{r}(\bar{F} - \bar{D}^*) + \frac{\bar{p}(h)\bar{y}}{\bar{P}} - \bar{G} \quad (14a)$$

$$\bar{C}^* = -\bar{r}(\bar{F} - \bar{D}^*) + \frac{\bar{p}^*(f)\bar{y}^*}{\bar{P}^*} - \bar{G}^* \quad (14b)$$

Another way to have equation (14a) is to integrate the individual budget constraint given in equation (9) over time and then to impose the government budget constraint given in equation (10) as well as the transversality condition in (12).

Assuming that, initially, countries' financial claims on each other as well as government spending in both countries are equal to zero, equations (14) imply $\frac{\overline{p}_0(h)}{\overline{P}_0} = \frac{\overline{p}_0^*(f)}{\overline{P}_0^*} = 1$ and hence $\overline{C}_0 = \overline{C}_0^* = \overline{C}^w = \overline{y}_0 = \overline{y}_0^*$ where the subscript 0 indicates the preshock initial steady state. Since there are no capital movements in this initial steady-state, transaction costs Z and Z^* are also absent.

Introducing this relation into the labor-leisure trade off equation in (11c) gives:

$$\overline{y}_0 = \overline{y}_0^* = \left(\frac{\theta - 1}{\theta \kappa}\right)^{\frac{1}{2}} \tag{15}$$

Note that this level of production is suboptimal because of monopoly power.

As the initial steady state level of consumption and production are equal, we can use equation (15) to derive the following initial steady state levels of money demand in both countries:

$$\frac{\overline{M}_0}{\overline{P}_0} = \frac{\overline{M}_0^*}{\overline{P}_0^*} = \frac{\chi}{1-\beta}\left(\frac{\theta - 1}{\theta \kappa}\right)^{\frac{1}{2}} \tag{16}$$

3. 2. Log-linearization of the Long run Equations

When a permanent fiscal shock hits the initial steady-state, the economy moves immediately to a new steady-state where prices are flexible. In order to determine the long run impact of this shock, we have to log-linearize the long run versions of the model's equations around the initial steady-state. The long run model consists of long run current account equations, price equations, goods and money demand and consumption-leisure trade-off equations.

The long run log deviation of a variable x from the initial steady state is indicated by an over bar and a tilde so that $\tilde{\overline{x}} \cong (\overline{x} - \overline{x}_0)/\overline{x}_0$. Since the initial value of public spending and foreign bond holdings are assumed to be zero, the deviations of these variables are defined with respect to the initial steady-state value of consumption so that $\tilde{\overline{G}} = d\overline{G}/C_0$, $\tilde{\overline{G}}^* = d\overline{G}^*/C_0^*$, $\tilde{I} = dI/C_0$, $\tilde{I}^* = dI^*/C_0^*$. Since the economy reaches its new steady state immediately after the shock hits, in what follows we can drop time subscripts.

Using the definition of the variation in home's claims on the foreign country given in equations (8), it is possible to write the log linear versions of the long run current account equations given in (13) which give the following expressions for the consumption deviation in the two countries:

$$\tilde{\bar{C}} = \bar{r}(\tilde{I} - \tilde{I}^*) + \tilde{\bar{p}}(h) + \tilde{\bar{y}} - \tilde{\bar{P}} - \tilde{\bar{G}} \tag{17a}$$

$$\tilde{\bar{C}}^* = -\bar{r}(\tilde{I} - \tilde{I}^*) + \tilde{\bar{p}}^*(f) + \tilde{\bar{y}}^* - \tilde{\bar{P}}^* - \tilde{\bar{G}}^* \tag{17b}$$

In the equations above $\tilde{I}$ and $\tilde{I}^*$ represent the short run deviations of the claims of each country on the other.

Assuming symmetry among each country's producers, the log linear version of the price index equation given in (4) and its foreign analogue is given by:

$$\tilde{\bar{P}} = \tilde{\bar{P}}^* = \tfrac{1}{2}\left[\tilde{\bar{p}}(h) + \tilde{\bar{p}}^*(f)\right] \tag{18}$$

The long run log linear version of goods demand equation given in (6) and its foreign analogue are given as:

$$\tilde{\bar{y}} = \theta\left[\tilde{\bar{P}} - \tilde{\bar{p}}(h)\right] + \tilde{\bar{C}}^w + \tilde{\bar{G}}^w \tag{19a}$$

$$\tilde{\bar{y}}^* = \theta\left[\tilde{\bar{P}}^* - \tilde{\bar{p}}^*(f)\right] + \tilde{\bar{C}}^w + \tilde{\bar{G}}^w \tag{19b}$$

Taking a population weighted average of equations (19a) and (19b) and adding them making use of equation (18) gives the world goods market equilibrium condition:

$$\tilde{\bar{y}}^w = \tilde{\bar{C}}^w + \tilde{\bar{G}}^w \tag{20}$$

The labour-leisure trade off given in equation (11c) and its foreign analogue become:

$$(\theta + 1)\tilde{\bar{y}} = -\theta\tilde{\bar{C}} + \tilde{\bar{C}}^w + \tilde{\bar{G}}^w \tag{21a}$$

$$(\theta + 1)\tilde{\bar{y}}^* = -\theta\tilde{\bar{C}}^* + \tilde{\bar{C}}^w + \tilde{\bar{G}}^w \tag{21b}$$

Note that equations (21a) and (21b) hold only in the long run because with monopoly power and sticky prices, supply will be demand determined in the short run and producers will meet extra demand violating the optimality condition for labour supply.

Money demand equation given in (11a) and its foreign analogue take the following form:

$$\tilde{\bar{M}} - \tilde{\bar{P}} = \tilde{\bar{C}} - \beta\tilde{\bar{r}} \tag{22a}$$

$$\tilde{\bar{M}}^* - \tilde{\bar{P}}^* = \tilde{\bar{C}}^* - \beta\tilde{\bar{r}}^* \tag{22b}$$

3.3. Union Aggregates and Country Differences for Long Run Consumption and Production

Union aggregates and country differences will turn out to be useful in solving for the individual variables. In order to define long run home and foreign consumption as well as long run home and foreign production, we begin by deriving the deviations in unionwide

consumption and production. Then, we proceed with relative home consumption and production.

The population weighed average of home and foreign labor-leisure trade off equations given in (21a) and (21b) implies:

$$(\theta+1)\tilde{\bar{y}}^{w} = (1-\theta)\tilde{\bar{C}}^{w} + \tilde{\bar{G}}^{w} \tag{23}$$

Combining equation (23) with log linear version of goods market equilibrium condition given in equation (20), we get:

$$\tilde{\bar{y}}^{w} = \tfrac{1}{2}\tilde{\bar{G}}^{w} \; ; \; \tilde{\bar{C}}^{w} = -\tfrac{1}{2}\tilde{\bar{G}}^{w} \tag{24}$$

According to (24), a permanent increase in unionwide public spending leads to a fall in long run world consumption while it increases long run world production.

Subtracting long run current account equations (17b) from (17a), the demand equation (19b) from (19a), labor-leisure trade off equations (21b) from (21a) gives respectively:

$$\tilde{\bar{C}} - \tilde{\bar{C}}^{*} = 2\bar{r}(\tilde{I} - \tilde{I}^{*}) + \tilde{\bar{p}}(h) - \tilde{\bar{p}}^{*}(f) + (\tilde{\bar{y}} - \tilde{\bar{y}}^{*}) - (\tilde{\bar{G}} - \tilde{\bar{G}}^{*}) \tag{25}$$

$$\tilde{\bar{y}} - \tilde{\bar{y}}^{*} = -\theta\left[\tilde{\bar{p}}(h) - \tilde{\bar{p}}^{*}(f)\right] \tag{26}$$

$$\tilde{\bar{y}} - \tilde{\bar{y}}^{*} = -\tfrac{\theta}{\theta+1}(\tilde{\bar{C}} - \tilde{\bar{C}}^{*}) \tag{27}$$

Introducing equations (26) and (27) into (25) gives:

$$\tilde{\bar{C}} - \tilde{\bar{C}}^{*} = \frac{\theta+1}{\theta}\bar{r}(\tilde{I} - \tilde{I}^{*}) - \frac{\theta+1}{2\theta}(\tilde{\bar{G}} - \tilde{\bar{G}}^{*}) \tag{28}$$

Combining equations (28) and (27) gives the long run relative production as follows:

$$\tilde{\bar{y}} - \tilde{\bar{y}}^{*} = -\bar{r}(\tilde{I} - \tilde{I}^{*}) + \tfrac{1}{2}(\tilde{\bar{G}} - \tilde{\bar{G}}^{*}) \tag{29}$$

As we will see in a while, the transaction cost will affect the long run relative consumption and production through the effect of net current account position on the interest rate gap. For that, we need to determine the short run equilibrium.

4. Short Run Equilibrium

In order to evaluate short run effects of a fiscal shock, we need to log-linearize the short run versions of the equations that make up the model. Then, as in the long run analysis, we will determine the deviations in union aggregates and relative consumption and production.

In the short run, individual prices are fixed. A fixed exchange rate implies that the overall price index is also fixed in the short run. Because prices are higher than the marginal costs due to monopoly power, producers are willing to meet extra demand for the same price. Therefore, supply will be demand determined in the short run.

4. 1. Log-linearization of the Short Run Equations

The short run model consists of goods demand, consumption Euler equations, money demand, short run current account equations and the international financial market equilibrium condition.

In what follows, the short run log deviation of a variable *x* from the initial steady state is indicated by a tilde so that $\tilde{x} \cong (x - \overline{x}_0)/\overline{x}_0$. Since we look only at one period changes in the economy, we can drop the time subscripts.

Because of price rigidity, the log-linearized goods demand in the home country given in equation (6) and its foreign analogue can be expressed as:

$$\tilde{y} = \tilde{y}^* = \tilde{C}^w + \tilde{G}^w \tag{30}$$

The intertemporal consumption Euler equation given in (11b) and its foreign analogue take the following log linear forms:

$$\tilde{\tilde{C}} = \tilde{C} + (1-\beta)\tilde{r} \tag{31a}$$

$$\tilde{\tilde{C}}^* = \tilde{C}^* + (1-\beta)\tilde{r}^* \tag{31b}$$

Short run money demand deviations in the two countries are defined as:

$$\tilde{M} = \tilde{C} - \beta\tilde{r} - \tfrac{\beta}{1-\beta}\tilde{\tilde{P}} \tag{32a}$$

$$\tilde{M}^* = \tilde{C}^* - \beta\tilde{r}^* - \tfrac{\beta}{1-\beta}\tilde{\tilde{P}}^* \tag{32b}$$

Since goods supply is demand determined, labor/leisure trade-off equation does not hold in the short run. Another difference between short run and long run concerns the current account equations. In contrast to the long run, in the short run current account need not be in equilibrium. Instead, home country may run a current account surplus or deficit which can be expressed as follows after log linearization using the definition given in equations (8):

$$\tilde{I} - \tilde{I}^* = \tilde{y} - \tilde{C} - \tilde{G} \tag{33a}$$

$$\tilde{I}^* - \tilde{I} = \tilde{y}^* - \tilde{C}^* - \tilde{G}^* \tag{33b}$$

In the cost-adjusted financial equilibrium condition (11d) and its foreign analogue, the long run deviations in home claims on foreign $\tilde{\tilde{I}}$ and foreign claims on home $\tilde{\tilde{I}}^*$ are zero[2]. Hence these two equations take the following form when log-linearized:

[2] This is because, the economy reaches the new steady-state in the immediate aftermath of a shock. Since foreign bond holdings do not change in the steady-state by definition, whatever net foreign asset stocks arise at the end of the first period become the new steady-state levels from period 2 on.

$$\tilde{r} - \tilde{r}^* = -\frac{\gamma \bar{C}_0}{1-\beta}\tilde{I} = \frac{\gamma \bar{C}_0}{1-\beta}\tilde{I}^* \tag{34a}$$

Equation (34) states that the interest rate differential across countries depends on the capital transferred to the international bond market in each country. Put differently, it depends on the net capital movement. The deviation of the gap can be positive or negative depending on that of foreign bond holdings of the two countries.

Equation (34a) implies :

$$\tilde{r} - \tilde{r}^* = -\frac{\gamma \bar{C}_0}{2(1-\beta)}(\tilde{I} - \tilde{I}^*) \tag{34b}$$

4.2. Union Aggregates and Country Differences for Short Run Consumption and Production

In a monetary union with an independent central bank, money market equilibrium requires that money supply in the union be equal to the sum of the money demand in the two member countries. Since we focus on fiscal policy, we will assume that the central bank pursues a passive monetary policy so that the unionwide money supply will remain unchanged both in the short and in the long run. Taking a population weighted average of long run money demand equations given in (22a and b) and plugging the result in the population weighted average of short run money demand equations (32a and b) to substitute for long run price levels gives a relationship between deviations of short run world consumption and average interest rate as follows:

$$\tilde{r} + \tilde{r}^* = \frac{2}{1-\beta}\tilde{\bar{C}}^w + 2\tilde{C}^w \tag{35a}$$

Another relation can be derived from the population weighted average of consumption Euler equations given in (31a and b):

$$\tilde{r} + \tilde{r}^* = \frac{2}{1-\beta}\left(\tilde{\bar{C}}^w - \tilde{C}^w\right) \tag{35b}$$

Combining the two relations implies that the short run deviation of world consumption from its initial steady state is zero. A fiscal expansion does not crowd out private consumption in the short run because output is completely demand driven. Private consumption is not undermined since there are no price changes due to extra demand. Then the short run equilibrium on goods market implies $\tilde{y}^w = \tilde{G}^w$.

For the country differences, we begin by subtracting foreign consumption Euler equation (31b) from home given in (31a):

$$\tilde{C} - \tilde{C}^* = (\tilde{\bar{C}} - \tilde{\bar{C}}^*) - (1-\beta)(\tilde{r} - \tilde{r}^*) \quad (36)$$

Equation (36) captures the effect of the degree of financial integration. When integration is perfect, the interest rate gap is zero and the long run home relative consumption deviation is equal to the short run deviation. The reason is that, with perfectly integrated markets agents in both countries face the same interest rate and hence the country consumption profiles are affected in the same way. However, when assets are imperfect substitutes, the interest rate differential tilts the home consumption profile relative to the foreign. If, for example, home interest rate increases more than the foreign, short run home consumption decreases more than short run foreign consumption because home agents are induced to save more with respect to foreign agents. In the long run, this leads to a higher increase in home consumption compared to the foreign. A positive interest rate differential decreases relative short run home consumption because home agents postpone consumption in time by adjusting current consumption downwards while the opposite is true abroad.

5. Short Run Effects of Fiscal Policy

In the short run, a balanced-budget increase in home public spending affects the consumption and production of the two countries, as well as the interest rates, international capital movements and monetary equilibrium.

5.1. The Effects of Fiscal Policy on Consumption and Output

In order to solve for individual variations of the relevant variables we use the Aoki method (1981) which relates a union aggregate $\widetilde{x}^w$ and a country difference $(\widetilde{x} - \widetilde{x}^*)$ to the actual level of a variable $\widetilde{x} = \widetilde{C}, \widetilde{y}$ or $\widetilde{x}^* = \widetilde{C}^*, \widetilde{y}^*$ by the following identities : $\tilde{x} = \tilde{x}^w + \frac{1}{2}(\tilde{x} - \tilde{x}^*)$ or $\tilde{x}^* = \tilde{x}^w - \frac{1}{2}(\tilde{x} - \tilde{x}^*)$.

In order to assess the effects of an increase in public spending, financed by lump-sum taxes, we need to express short run aggregate and relative deviations in consumption and production in terms of public spending deviation.

According to equations (35a) and (35b), the short run world consumption deviation is zero : $\widetilde{C}^w$=0. Then short run increase in world production is equal to the increase in world government spending: $\tilde{y}^w = \tilde{G}^w$

It is possible to solve for relative short run consumption deviation and for net capital inflow deviation using the following system of two equations with two unknowns:

$$(\tilde{I} - \tilde{I}^*) = -\tfrac{1}{2}\left[(\tilde{C} - \tilde{C}^*) + (\tilde{G} - \tilde{G}^*)\right] \quad (37)$$

$$(\tilde{I}-\tilde{I}^*)=\frac{2\theta}{2\bar{r}(\theta+1)+\theta\gamma\bar{C}_0}(\tilde{C}-\tilde{C}^*)+\frac{(\theta+1)}{2\bar{r}(\theta+1)+\theta\gamma\bar{C}_0}(\tilde{\bar{G}}-\tilde{\bar{G}}^*) \tag{38}$$

Equation (37) is obtained by subtracting short run foreign current account equation (33b) from (33a) taking into account that short run deviation of relative production is zero as implied by the goods demand equation (30).

To obtain equation (38), we first plug the differential consumption Euler equation given in (36) into equation (28) to eliminate long run consumption differential. Then, we make use of equation (34b) to eliminate the interest rate gap.

Solving the system consisting of equations (37) and (38) gives the following expression for short run relative consumption deviation:

$$\tilde{C}-\tilde{C}^*=-\frac{1}{2\Psi+\theta\gamma\bar{C}_0}\left[\left\{2\bar{r}(\theta+1)+\theta\gamma\bar{C}_0\right\}(\tilde{G}-\tilde{G}^*)+2(\theta+1)(\tilde{\bar{G}}-\tilde{\bar{G}}^*)\right] \tag{39}$$

Net capital inflow deviation $\tilde{I}-\tilde{I}^*$ will be defined later.

Since short run world consumption deviation is zero and relative short run consumption is given by (39), short run consumption deviations in each country are given as follows:

$$\tilde{C}=-\frac{1}{2\left[2\Psi+\theta\gamma\bar{C}_0\right]}\left[\left\{2\bar{r}(\theta+1)+\theta\gamma\bar{C}_0\right\}(\tilde{G}-\tilde{G}^*)+2(\theta+1)(\tilde{\bar{G}}-\tilde{\bar{G}}^*)\right] \tag{40a}$$

$$\tilde{C}^*=\frac{1}{2\left[2\Psi+\theta\gamma\bar{C}_0\right]}\left[\left\{2\bar{r}(\theta+1)+\theta\gamma\bar{C}_0\right\}(\tilde{G}-\tilde{G}^*)+2(\theta+1)(\tilde{\bar{G}}-\tilde{\bar{G}}^*)\right] \tag{40b}$$

Short run relative production needs no calculation since equation (30) implies that $\tilde{y}-\tilde{y}^*=0$. Applying the Aoki formula gives:

$$\tilde{y}=\tilde{y}^*=\tfrac{1}{2}(\tilde{G}+\tilde{G}^*) \tag{41}$$

Following a temporary or permanent increase in home government spending, home consumption decreases and foreign consumption increases while production increases in the same way in both countries. The fall in home consumption is due to the negative welfare effect of the tax. Since government spending increases more than the fall in private consumption, domestic output increases. Because of the no home bias assumption, home public demand expansion has a positive effect on foreign output while the decrease in home private demand has a negative effect. However, the net effect is positive and foreign output also increases in the short run. Higher income in the foreign country leads to higher foreign consumption.

Note that, in contrast to the flexible exchange rate setup, the deviations of consumption and production are of the same magnitude in the two countries. This is because, with the same

currency across countries and sticky prices, the expenditure switching effect of the terms of trade is absent in the short run. The only effect is the expenditure shifting effect of home public spending which is symmetric across countries.

When the fiscal shock is permanent ($\tilde{G} = \tilde{\tilde{G}}$), agents anticipate a higher deviation in their future consumption compared to the temporary shock, which induces a higher adjustment of current consumption. Therefore, permanent fiscal expansion has a higher impact on short run consumption with respect to temporary fiscal expansion.

The effects of fiscal policy on short run consumption are higher when financial integration is imperfect. Indeed, an increase in γ, leading to a fall in the degree of financial integration, induces an increase in home interest rate with respect to foreign. Therefore, home (foreign) agents are induced to adjust their current consumption downwards (upwards) in the anticipation of higher (lower) future consumption.

Note that the degree of financial integration does not affect short run output because with fixed prices and a common currency, the short run supply block of the model is independent of the current account equation which includes the cost.

5.2. The Effects of Fiscal Policy on Capital Movements and Interest Rates

Introducing the short run relative consumption given in equation (39) in equation (37) gives the following result for the deviation in net capital inflow:

$$\tilde{I} - \tilde{I}^* = \frac{1}{2\Psi + \theta\gamma\bar{C}_0}\left[-2\theta(\tilde{G} - \tilde{G}^*) + (\theta + 1)(\tilde{\tilde{G}} - \tilde{\tilde{G}}^*)\right] \tag{42}$$

Equation (42) states that following a temporary or a permanent increase in home government spending, foreign bond holdings of home agents fall or domestic debt vis-à-vis the foreign country increases. In both cases, equation (42) implies that a fiscal shock leads to a net capital inflow towards the home country. This inflow is more pronounced when financial integration is high (γ is low). Fully integrated financial markets ($\gamma = 0$) lead to the same result as Coutinho (2005) for the fixed exchange rate version of Obstfeld and Rogoff (1996).

A permanent fiscal expansion has a lower effect on net capital movements with respect to a temporary shock, because a permanent shock induces a lower current account deficit due to its higher effect on home consumption given in equation (40a).

According to (42), a decrease in the degree of financial market integration, implying a higher γ, reduces the effect of fiscal policy on capital movements. Indeed, since lower financial integration amplifies the fall in home consumption according to (40a), it reduces the

increase in the domestic current account deficit. Therefore, the external equilibrium can be achieved through a lower deviation of foreign bond holdings.

In order to compute the interest rate response to a fiscal shock, we first plug equation (42) into equation (34b) to substitute for $\widetilde{I} - \widetilde{I}^*$. Then we introduce the value of short run world consumption deviation $\widetilde{C}^w$=0, derived from (35a et b), and that of long run world consumption deviation ($\widetilde{\bar{C}}^w = -0,5\widetilde{\bar{G}}^w$), given in equation (24), into equation (35b) which gives the sum of the interest rates. In this way we obtain two relations: one for the gap and one for the sum of the interest rates. Solving this system of two equations gives the interest rate response in both countries as follows:

$$\tilde{r} = \frac{\theta\gamma\bar{C}_0}{2(1-\beta)\left[2\Psi+\theta\gamma\bar{C}_0\right]}(\tilde{G}-\tilde{G}^*) - \frac{2\Psi+(2\theta+1)\gamma\bar{C}_0}{4(1-\beta)\left[2\Psi+\theta\gamma\bar{C}_0\right]}\tilde{\bar{G}} + \frac{\gamma\bar{C}_0-2\Psi}{4(1-\beta)\left[2\Psi+\theta\gamma\bar{C}_0\right]}\tilde{\bar{G}}^* \qquad (43a)$$

$$\tilde{r}^* = -\frac{\theta\gamma\bar{C}_0}{2(1-\beta)\left[2\Psi+\theta\gamma\bar{C}_0\right]}(\tilde{G}-\tilde{G}^*) + \frac{\gamma\bar{C}_0-2\Psi}{4(1-\beta)\left[2\Psi+\theta\gamma\bar{C}_0\right]}\tilde{\bar{G}} - \frac{2\Psi+(2\theta+1)\gamma\bar{C}_0}{4(1-\beta)\left[2\Psi+\theta\gamma\bar{C}_0\right]}\tilde{\bar{G}}^* \qquad (43b)$$

According to (43a) and (43b), a temporary home fiscal expansion increases home interest rate because it leads to a current account deficit and a debt accumulation in the home country. Foreign interest rate decreases by the same amount as the increase in home interest rate. The sum of the interest rates is zero in this case as implied by equation (35a) where long run consumption deviation is independent of temporary fiscal policy according to equation (24) and where temporary fiscal expansion has no effect on short run world consumption as implied by equations (40a) and (40b). A low degree of financial integration or a high value of γ increases the interest rate response to a home temporary fiscal expansion. Indeed, with low capital mobility, a higher increase in the interest rate is needed to induce the same amount of capital inflow.

When the home fiscal shock is permanent, interest rates fall in both countries. There are two mechanisms behind this effect on interest rates. The first acts through current account deficit and debt accumulation as in the temporary fiscal expansion case: home country debt accumulation increases home interest rate and decreases the foreign rate. The second mechanism acts through the long run world consumption. A temporary fiscal expansion, which reduces long run world consumption according to equation (24), leads to a fall in the sum of the interest rate deviation according to (35a). Hence, home interest rate falls. Overall, this negative effect coming from the consumption fall dominates the positive first effect caused by the debt accumulation and the net effect is a fall in the home interest rate. The

foreign interest rate also decreases following the reduction in world consumption, which magnifies the fall induced by the home country debt accumulation. Overall, foreign interest rate decreases more than home interest rate.

The effects of a home fiscal expansion on the interest rates increase with γ. In other words, when the degree of financial market integration is low, fiscal policy has higher effects on the interest rates. However, the impact of the degree of financial market integration on interest rates is less important when fiscal policy is permanent compared to the temporary shock case. When the assets are perfect substitutes so that financial integration is perfect ($\gamma = 0$), interest rates are equal across countries and we have only the second mechanism at work (the fall in world consumption). As in Obstfeld and Rogoff (1996), in this case, the interest rate is affected only by permanent shocks because world private spending is not crowded out in the short run. Specifically, the fall in home short run consumption decreases the home interest rate by the same amount the increase in foreign consumption increases foreign interest rate. At the end, the interest rate stays unaffected.

5.3. Fiscal Policy and the Monetary Equilibrium

Because of the common currency assumption money supply adjusts to money demand in each country. However, on the union level, short run money supply is constant in nominal and real terms. Short run union money supply deviation is derived, as follows, from equations (32a) and (32b):

$$\widetilde{M}^{w} = \widetilde{C}^{w} - \beta(\widetilde{r} + \widetilde{r}^{*}) - \frac{\beta}{1-\beta}\widetilde{\widetilde{P}}^{w} \tag{44}$$

Following a temporary or permanent fiscal shock, short run union wide consumption does not move as implied by equations (40a) and (40b). If the shock is temporary home real interest rate increases by the same amount as the fall in the foreign interest rate implying that $\widetilde{r} + \widetilde{r}^{*} = 0$ hence agents do not anticipate a variation in the average level of long run prices in the union.

If the fiscal shock is permanent, both interest rates fall which implies $\tilde{r} + \tilde{r}^{*} \prec 0$. The monetary equilibrium is achieved through the anticipation of a higher average price level in the union.

6. Long Run Effects of Fiscal Policy

In the long run, where prices are flexible, the economy reaches a new steady-state immediately in the aftermath of a balanced-budget increase in public spending. This fiscal

shock affects consumption and output in both countries, as well as prices and monetary equilibrium.

6.1. The Effects of Fiscal Policy on Long Run Consumption and Output

In order to assess the long run impact of a balanced-budget increase in home public spending on consumption and production in each country, we use the Aoki (1981) formula. For that we need to define the deviations of relative consumption and production in terms of public spending deviation.

Given the short run relative home consumption deviation, we can use the difference of consumption Euler equations given in (36) to compute long run relative home consumption deviation. For that, we first substitute equation (34b) into (36) to eliminate the interest rate gap. Then we introduce the expression for short run relative home consumption deviation given in equation (39) and the expression for the net capital inflow given in equation (42). This gives the following expression for the long run relative home consumption deviation:

$$\tilde{\bar{C}} - \tilde{\bar{C}}^* = -\frac{\bar{r}(\theta+1)}{2\Psi + \theta\gamma\bar{C}_0}\left[2(\tilde{G} - \tilde{G}^*) + \frac{4+\gamma\bar{C}_0}{2\bar{r}}(\tilde{\bar{G}} - \tilde{\bar{G}}^*)\right] \tag{45}$$

Now we can apply the Aoki formula, using equation (24) for the union aggregates and equation (45) for the country differences, to solve for the individual consumption in both countries as follows:

$$\tilde{\bar{C}} = -\frac{2(\Psi+2\theta+2)+(2\theta+1)\gamma\bar{C}_0}{4(2\Psi+\theta\gamma\bar{C}_0)}\tilde{\bar{G}} + \frac{4(\theta+1)-2\Psi+\gamma\bar{C}_0}{4(2\Psi+\theta\gamma\bar{C}_0)}\tilde{\bar{G}}^* - \frac{\bar{r}(\theta+1)}{2\Psi+\theta\gamma\bar{C}_0}(\tilde{G}-\tilde{G}^*) \tag{46a}$$

$$\tilde{\bar{C}}^* = \frac{4(\theta+1)-2\Psi+\gamma\bar{C}_0}{4(2\Psi+\theta\gamma\bar{C}_0)}\tilde{\bar{G}} - \frac{2(\Psi+2\theta+2)+(2\theta+1)\gamma\bar{C}_0}{4(2\Psi+\theta\gamma\bar{C}_0)}\tilde{\bar{G}}^* + \frac{\bar{r}(\theta+1)}{2\Psi+\theta\gamma\bar{C}_0}(\tilde{G}-\tilde{G}^*) \tag{46b}$$

Once the relative long run consumption is given, it is easy to derive the long run relative home output deviation from equation (27). Combining equations (45) and (27) gives:

$$\tilde{\bar{y}} - \tilde{\bar{y}}^* = \frac{\theta\bar{r}}{2\Psi + \theta\gamma\bar{C}_0}\left[2(\tilde{G} - \tilde{G}^*) + \frac{4+\gamma\bar{C}_0}{2\bar{r}}(\tilde{\bar{G}} - \tilde{\bar{G}}^*)\right] \tag{47}$$

Given the country differences for output defined in equation (47) and unionwide production defined in equation (24), we can make use of the Aoki formula to derive long run deviation of output in each country:

$$\tilde{\bar{y}} = \frac{\Psi+2\theta+\theta\gamma\bar{C}_0}{2\left[2\Psi+\theta\gamma\bar{C}_0\right]}\tilde{\bar{G}} + \frac{\bar{r}(\theta+1)}{2\left[2\Psi+\theta\gamma\bar{C}_0\right]}\tilde{\bar{G}}^* + \frac{\theta\bar{r}}{\left[2\Psi+\theta\gamma\bar{C}_0\right]}(\tilde{G}-\tilde{G}^*) \tag{48a}$$

$$\tilde{\bar{y}} = \frac{\bar{r}(\theta+1)}{2\left[2\Psi+\theta\gamma\bar{C}_0\right]}\tilde{\bar{G}} + \frac{\Psi+2\theta+\theta\gamma\bar{C}_0}{2\left[2\Psi+\theta\gamma\bar{C}_0\right]}\tilde{\bar{G}}^* - \frac{\theta\bar{r}}{\left[2\Psi+\theta\gamma\bar{C}_0\right]}(\tilde{G}-\tilde{G}^*) \tag{48b}$$

Equations (46a and b) and (48a and b) give the effects of temporary and permanent fiscal shocks on consumption and production in each country.

We already said that a temporary increase in home government spending induces a current account deficit at home, according to equation (42), and an increase in net liabilities of home agents. Hence, the interest burden increases at home while financial income increases in the foreign country. This, in turn, induces a fall in home consumption by the same amount as the increase in foreign consumption. Therefore, marginal utility of consumption increases at home and home agents shift out of leisure into work as implied by the labor-leisure trade-off equation. Home output increases, which allows to meet the extra foreign demand for home goods. In the foreign country, the increase in the foreign consumption decreases its marginal utility. Foreign agents increase their demand for leisure and foreign output decreases. This reduction stems from the fall in home private demand for foreign goods as well as the fall in foreign private demand due to the expenditure switching effect of the long run terms of trade.

Long run consumption and output deviations following a temporary fiscal expansion decrease as γ increases. In other words, as the degree of financial integration decreases, the impact of fiscal policy on long run consumption and output fades. Indeed, according to equation (43) an increase in γ reduces the short run effect of fiscal policy on $\tilde{I} - \tilde{I}^*$, which limits the fall in the long run disposable income at home and its increase abroad.

A permanent home fiscal expansion reduces home long run consumption and foreign output while it increases foreign long run consumption and home output.

The impact of a permanent fiscal shock on long run consumption is higher than that of a temporary shock. Indeed, home agents suffer not only from an increase in debt burden but also from permanently higher taxes in order to finance the public spending. In the foreign country, agents enjoy higher interest revenues along with higher demand for foreign goods. Since permanent public spending decreases home consumption more than when the spending is temporary, it leads to a higher increase in home output compared to the temporary shock case. However, foreign output decreases less following a permanent shock with respect to the temporary shock although its consumption increases more under the first case. This results from the effect of unionwide demand deviation on output as implied by equation (21b).

6.2. The Effect of Fiscal Policy on Monetary Equilibrium and the Terms of Trade

From equations (22a) and (22b), it is possible to derive an expression for the deviation in money supply and demand which achieves the monetary equilibrium in the union, where the long run interest rate deviations are considered to be equal to zero. Substituting the value of

long run unionwide consumption deviation given in equation (24) in the resulting expression gives the following relation between real money supply deviation and that of permanent public spending:

$$\tilde{\tilde{M}}^{w} - \tilde{\tilde{P}}^{w} = -\frac{1}{2}\tilde{\tilde{G}}^{w} \tag{49}$$

Since a permanent home fiscal expansion reduces the union consumption according to equation (24) and the union's nominal money supply remains unchanged, it has to induce an increase in the union's average price level in order to maintain the long run monetary equilibrium. Note that, a temporary fiscal shock does not affect union's real money supply since the union's average price level remains unchanged following temporary shocks.

In order to determine the effects of fiscal policy on the terms of trade, we plug labor-leisure trade-off equation given in (27) along with equation (28), which we use to eliminate $\tilde{I} - \tilde{I}^{*}$, into equation (25). In the resulting expression, we substitute the long run consumption differential given in equation (45). The result is the following expression giving the long run deviation of the terms of trade:

$$\tilde{\tilde{p}}(h) - \tilde{\tilde{p}}^{*}(f) = -\frac{\bar{r}}{2\Psi + \theta\gamma\bar{C}_0}\left[2(\tilde{G} - \tilde{G}^{*}) + \frac{4 + \gamma\bar{C}_0}{2\bar{r}}(\tilde{\bar{G}} - \tilde{\bar{G}}^{*})\right] \tag{50}$$

According to equation (50), a temporary home fiscal expansion deteriorates the terms of trade because of its effects on relative consumption and output as well as on net capital movements. Temporary fiscal policy reduces home prices $p(h)$ by the same amount it increases the foreign prices $p(f)$, which, as implied by the price index definition given in equation (18), leaves the average union price level constant ensuring the monetary equilibrium in the union.

The terms of trade deteriorates more when the shock is permanent with respect to the temporary shock case. However, foreign prices increase more than the decrease in home prices and average price level in the union increases, which re-equilibrates the union's money market.

The effects of fiscal policy decrease as γ increases. In other words, the impact of fiscal shocks on the terms of trade is lower under imperfect financial integration compared to the perfect integration case, which is consistent with its impact on consumption and output.

7. Welfare Effects of Fiscal Policy

In order to evaluate the effects of a fiscal expansion in one country on the welfare of both countries, we will consider, as it is now traditional in this literature, only the real part of utility neglecting the utility coming from real balances. Then the home utility function takes the following form:

$$U_t \equiv \sum_{s=t}^{\infty} \beta^{s-t} \left(\log C_s - \tfrac{\kappa}{2} y_s^2 \right) \qquad (1')$$

Totally differentiating the equation above and evaluating at the initial steady state gives:

$$dU = \tilde{C} - \kappa \bar{y}_0^2 \tilde{y} + \frac{1}{\bar{r}} \left[\tilde{\tilde{C}} - \kappa \bar{y}_0^2 \tilde{\tilde{y}} \right]$$

Substituting equation (48a) for long run output, (41) for short run output, (46a) for long run consumption, (42a) for short run consumption and plugging in the value of output in the initial steady state given in equation (16), we get:

$$dU = -\frac{2\theta - 1}{2\theta} \tilde{G} + \frac{1}{2\theta} \tilde{G}^* - \frac{4\theta - 1}{4\theta \bar{r}} \tilde{\tilde{G}} + \frac{1}{4\theta \bar{r}} \tilde{\tilde{G}}^* \qquad (51)$$

According to (51), a temporary or permanent balanced-budget home fiscal expansion decreases the welfare of domestic agents because of its negative impact on consumption and leisure in both short and long run. Hence, tax-financed fiscal policy is *beggar-thyself*.

The previous section shows that the lower financial integration accentuates the short run consumption decrease while it has no effects on short run production. This implies that short run home welfare is lower under imperfect financial integration with respect to full integration.

In the long run, higher saving due to the interest rate gap reduces the decrease in long run domestic consumption. Moreover, long run production increases less under imperfect financial integration because of the lower decrease in consumption and the lower increase in debt accumulation. Both of these effects improve long run welfare.

Equation (51) shows that welfare is not affected by the degree of financial integration. Indeed, this expression is the same with the one derived in Coutinho (2005) for the perfect mobility case under fixed exchange rate. This implies that the decrease in short run welfare due to lower financial integration exactly offsets the increase in the long run welfare.

According to (51), a foreign fiscal expansion increases home welfare because it increases consumption and decreases production in the short run. This positive effect is mitigated in the long run because of the lower increase in home leisure. A home fiscal expansion increases foreign welfare in the same way. Hence, tax-financed fiscal policy is *prosper-thy-neighbor*.

The following table resumes the fiscal policy impact on relevant variables under imperfect financial integration. The positive or negative sign is associated with the effect of fiscal policy on the variables while the letters *a* and *m* point out respectively to an amplification or a mitigation of the effects of fiscal policy following a decrease in financial integration (an increase in γ). The number 0 denotes that the effect of fiscal policy on the variable is not affected by the degree of financial integration. For example, a permanent home fiscal expansion decreases long run home consumption and the effect is mitigated as the degree of financial integration decreases while the effect on short run home consumption is a fall and this effect is amplified by the imperfect degree of financial integration.

Table 1: Effects of fiscal policy under imperfect financial integration

$dG-dG^*>0$	$\widetilde{C}$	$\widetilde{C}^*$	$\widetilde{y}$	$\widetilde{y}^*$	$\widetilde{\widetilde{C}}$	$\widetilde{\widetilde{C}}^*$	$\widetilde{\widetilde{y}}$	$\widetilde{\widetilde{y}}^*$	$\widetilde{r}$	$\widetilde{r}^*$	$\widetilde{I}-\widetilde{I}^*$	dU	dU^*
Temporary	-/a	+/a	+/0	+/0	-/m	+/m	+/m	-/m	+/a	-/a	-/m	-/0	+/0
Permanent	-/a	+/a	+/0	+/0	-/m	+/m	+/m	-/m	-/a	-/a	-/m	-/0	+/0

8. Conclusion

The paper aims to contribute to the NOEM literature by introducing imperfect financial integration in a two country general equilibrium model with optimizing agents. Much of the analysis in the NOEM literature is limited to perfect financial integration case. Some exceptions consider the degree of financial integration under flexible exchange rates. Moreover, they provide only numerical solutions. Since, one of the aims of the NOEM literature is to provide an alternative to the M-F type of models, we find it important to provide analytical solutions. In this aim, we extend the fixed exchange rate version of Obstfeld and Rogoff (1995), proposed by Caselli (2001) and Coutinho (2005), by introducing imperfect capital mobility. In this way, we also extend Sutherland (1996) and Pierdzioch (2001) by assuming fixed exchange rate and by providing analytical solutions.

The paper uses this setup to reconsider the implications of traditional models. Namely, we show the inefficiency of a balanced-budget fiscal expansion while the same policy proves to be efficient in M-F type of models. The contrast comes from the difference concerning the efficiency criterion between the traditional and new literature. In the NOEM literature, efficiency is measured by the welfare while in M-F models it is measured by the output or real income. In fact, the difference between the implications of M-F models and our results

depends on the impact of financial integration on the effects of fiscal policy. Indeed, fiscal policy efficiency measured by its effect on output is affected by the degree of financial integration while the efficiency measured by its effect on welfare is independent of the financial transaction costs. Therefore, the question of financial integration which is important for a central bank is not crucial for the fiscal authorities in a monetary union and for their future members. Fiscal authorities may nevertheless prefer to improve financial integration since higher financial integration decreases the volatility of short run consumption and interest rate following unanticipated fiscal shocks stemming from abroad.

We have to note that our assumption of pure waste nature of public spending is crucial for the inefficiency of fiscal policy. Useful government spending as in Ganelli (2003) or Corsett-Pesenti (2001) would probably lead to an increase in welfare following a fiscal expansion. However, welfare would be independent of the degree of financial integration even with useful public spending.

References

ECB (2003), "The integration of Europe's financial markets", Monthly Bulletin of ECB, n°10: 53-66

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

Cenesiz A. and C. Pierdzioch (2006), "Capital mobility; labor markets, and macroeconomic Policy", *MPRA Paper* n° 532.

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

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

Frenkel J.A. and A. Razin (2002), *Fiscal policies and growth in the world economy*, The MIT Press.

Ganelli G. (2003), "Useful government spending, direct crowding-out and fiscal policy interdependence", *Journal of international money and finance* 22: 87-103.

Koenig G. et I. Zeyneloglu (2006), "La politique budgétaire dans la nouvelle macroéconomie internationale ", *Documents de travail du BETA*, n°2006-35.

Obstfeld, M. and K. Rogoff (1995), “Exchange Rate Dynamics Redux”, *Journal of Political Economy* ,103: 624-60.

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

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

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

Schmiedel H. and A. Schönenberger (2005), “Integration of securities market infrastructure in the euro area”, *Occasional Paper* n°33.

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

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

Van Der Ploeg F.(1994), *Handbook of international macroeconomics*, Blackwell, chapter1.

Documents de travail du BETA

———

2000–**01** *Hétérogénéité de travailleurs, dualisme et salaire d'efficience.*
Francesco DE PALMA, janvier 2000.

2000–**02** *An Algebraic Index Theorem for Non–smooth Economies.*
Gaël GIRAUD, janvier 2000.

2000–**03** *Wage Indexation, Central Bank Independence and the Cost of Disinflation.*
Giuseppe DIANA, janvier 2000.

2000–**04** *Une analyse cognitive du concept de « vision entrepreneuriale ».*
Frédéric CRÉPLET, Babak MEHMANPAZIR, février 2000.

2000–**05** *Common knowledge and consensus with noisy communication.*
Frédéric KŒSSLER, mars 2000.

2000–**06** *Sunspots and Incomplete Markets with Real Assets.*
Nadjette LAGUÉCIR, avril 2000.

2000–**07** *Common Knowledge and Interactive Behaviors : A Survey.*
Frédéric KŒSSLER, mai 2000.

2000–**08** *Knowledge and Expertise : Toward a Cognitive and Organisational Duality of the Firm.*
Frédéric CRÉPLET, Olivier DUPOUËT, Francis KERN, Francis MUNIER, mai 2000.

2000–**09** *Tie–breaking Rules and Informational Cascades : A Note.*
Frédéric KŒSSLER, Anthony ZIEGELMEYER, juin 2000.

2000–**10** *SPQR : the Four Approaches to Origin–Destination Matrix Estimation for Consideration by the MYSTIC Research Consortium.*
Marc GAUDRY, juillet 2000.

2000–**11** *SNUS–2.5, a Multimoment Analysis of Road Demand, Accidents and their Severity in Germany, 1968–1989.*
Ulrich BLUM, Marc GAUDRY, juillet 2000.

2000–**12** *On the Inconsistency of the Ordinary Least Squares Estimator for Spatial Autoregressive Processes.*
Théophile AZOMAHOU, Agénor LAHATTE, septembre 2000.

2000–**13** *Turning Box–Cox including Quadratic Forms in Regression.*
Marc GAUDRY, Ulrich BLUM, Tran LIEM, septembre 2000.

2000–**14** *Pour une approche dialogique du rôle de l'entrepreneur/managerdans l'évolution des PME : l'ISO comme révélateur ...*
Frédéric CRÉPLET, Blandine LANOUX, septembre 2000.

2000–**15** *Diversity of innovative strategy as a source of technological performance.*
Patrick LLERENA, Vanessa OLTRA, octobre 2000.

2000–**16** *Can we consider the policy instruments as cyclical substitutes ?*
Sylvie DUCHASSAING, Laurent GAGNOL, décembre 2000.

2001–**01** *Economic growth and CO2 emissions : a nonparametric approach.*
Théophile AZOMAHOU, Phu NGUYEN VAN, janvier 2001.

2001–**02** *Distributions supporting the first–order approach to principal–agent problems.*
Sandrine SPÆTER, février 2001.

2001–**03** *Développement durable et Rapports Nord–Sud dans un Modèle à Générations Imbriquées : interroger le futur pour éclairer le présent.*
Alban VERCHÈRE, février 2001.

2001–**04** *Modeling Behavioral Heterogeneity in Demand Theory.*
Isabelle MARET, mars 2001.

2001–**05** *Efficient estimation of spatial autoregressive models.*
Théophile AZOMAHOU, mars 2001.

2001–**06** *Un modèle de stratégie individuelle de primo–insertion professionnelle.*
Guy TCHIBOZO, mars 2001.

2001–**07** *Endogenous Fluctuations and Public Services in a Simple OLG Economy.*
Thomas SEEGMULLER, avril 2001.

2001–**08** *Behavioral Heterogeneity in Large Economies.*
Gaël GIRAUD, Isabelle MARET, avril 2001.

2001–**09** *GMM Estimation of Lattice Models Using Panel Data : Application.*
Théophile AZOMAHOU, avril 2001.

2001–**10** *Dépendance spatiale sur données de panel : application à la relation Brevets–R&D au niveau régional.*
Jalal EL OUARDIGHI, avril 2001.

2001–**11** *Impact économique régional d'un pôle universitaire : application au cas strasbourgeois.*
Laurent GAGNOL, Jean–Alain HÉRAUD, mai 2001.

2001–**12** *Diversity of innovative strategy as a source of technological performance.*
Patrick LLERENA, Vanessa OLTRA, mai 2001.

2001–**13** *La capacité d'innovation dans les regions de l'Union Européenne.*
Jalal EL OUARDIGHI, juin 2001.

2001–**14** *Persuasion Games with Higher Order Uncertainty.*
Frédéric KŒSSLER, juin 2001.

2001–**15** *Analyse empirique des fonctions de production de Bosnie–Herzégovine sur la période 1952–1989.*
Rabija SOMUN, juillet 2001.

2001–**16** *The Performance of German Firms in the Business–Related Service Sectors : a Dynamic Analysis.*
Phu NGUYEN VAN, Ulrich KAISER, François LAISNEY, juillet 2001.

2001–**17** *Why Central Bank Independence is high and Wage indexation is low.*
Giuseppe DIANA, septembre 2001.

2001–**18** *Le mélange des ethnies dans les PME camerounaises : l'émergence d'un modèle d'organisation du travail.*
Raphaël NKAKLEU, octobre 2001.

2001–**19** *Les déterminants de la GRH des PME camerounaises.*
Raphaël NK AKLEU, octobre 2001.

2001–**20** *Profils d'identité des dirigeants et stratégies de financement dans les PME camerounaises.*
Raphaël NKAKLEU, octobre 2001.

2001–**21** Concurrence Imparfaite, Variabilité du Taux de Marge et Fluctuations Endogènes.
Thomas SEEGMULLER, novembre 2001.

2001–**22** *Determinants of Environmental and Economic Performance of Firms : An Empirical Analysis of the European Paper Industry.*
Théophile AZOMAHOU, Phu NGUYEN VAN et Marcus WAGNER, novembre 2001.

2001–**23** *The policy mix in a monetary union under alternative policy institutions and asymmetries.*
Laurent GAGNOL et Moïse SIDIROPOULOS, décembre 2001.

2001–**24** *Restrictions on the Autoregressive Parameters of Share Systems with Spatial Dependence.*
Agénor LAHATTE, décembre 2001.

2002–**01** *Strategic Knowledge Sharing in Bayesian Games : A General Model.*
Frédéric KŒSSLER, janvier 2002.

2002–**02** *Strategic Knowledge Sharing in Bayesian Games : Applications.*
Frédéric KŒSSLER, janvier 2002.

2002–**03** *Partial Certifiability and Information Precision in a Cournot Game.*
Frédéric KŒSSLER, janvier 2002.

2002–**04** *Behavioral Heterogeneity in Large Economies.*
Gaël GIRAUD, Isabelle MARET, janvier 2002.
(Version remaniée du Document de Travail n°2001–**08**, avril 2001).

2002–**05** *Modeling Behavioral Heterogeneity in Demand Theory.*
Isabelle MARET, janvier 2002.
(Version remaniée du Document de Travail n°2001–**04**, mars 2001).

2002–**06** *Déforestation, croissance économique et population : une étude sur données de panel.*
Phu NGUYEN VAN, Théophile AZOMAHOU, janvier 2002.

2002–**07** *Theories of behavior in principal–agent relationships with hidden action.*
Claudia KESER, Marc WILLINGER, janvier 2002.

2002–**08** *Principe de précaution et comportements préventifs des firmes face aux risques environnementaux.*
Sandrine SPÆTER, janvier 2002.

2002–**09** *Endogenous Population and Environmental Quality.*
Phu NGUYEN VAN, janvier 2002.

2002–**10** *Dualité cognitive et organisationnelle de la firme au travers du concept de communauté.*
Frédéric CRÉPLET, Olivier DUPOUËT, Francis KERN, Francis MUNIER, février 2002.

2002–**11** *Comment évaluer l'amélioration du bien–être individuel issue d'une modification de la qualité du service d'élimination des déchets ménagers ?*
Valentine HEINTZ, février 2002.

2002–**12** *The Favorite–Longshot Bias in Sequential Parimutuel Betting with Non–Expected Utility Players.*
Frédéric KŒSSLER, Anthony ZIEGELMEYER, Marie–Hélène BROIHANNE, février 2002.

2002–**13** *La sensibilité aux conditions initiales dans les processus individuels de primo–insertion professionnelle : critère et enjeux.*
Guy TCHIBOZO, février 2002.

2002–**14** *Improving the Prevention of Environmental Risks with Convertible Bonds.*
André SCHMITT, Sandrine SPÆTER, mai 2002.

2002–**15** *L'altruisme intergénérationnel comme fondement commun de la courbe environnementale* ***à la*** *Kuznets et du développement durable.*
Alban VERCHÈRE, mai 2002.

2002–**16** *Aléa moral et politiques d'audit optimales dans le cadre de la pollution d'origine agricole de l'eau.*
Sandrine SPÆTER, Alban VERCHÈRE, juin 2002.

2002–**17** *Parimutuel Betting under Asymmetric Information.*
Frédéric KŒSSLER, Anthony ZIEGELMEYER, juin 2002.

2002–**18** *Pollution as a source of endogenous fluctuations and periodic welfare inequality in OLG economies.*
Thomas SEEGMULLER, Alban VERCHÈRE, juin 2002.

2002–**19** *La demande de grosses coupures et l'économie souterraine.*
Gilbert KŒNIG, juillet 2002.

2002–**20** *Efficiency of Nonpoint Source Pollution Instruments with Externality Among Polluters : An Experimental Study.*
François COCHARD, Marc WILLINGER, Anastasios XEPAPADEAS, juillet 2002.

2002–**21** *Taille optimale dans l'industrie du séchage du bois et avantage compétitif du bois–énergie : une modélisation microéconomique.*
Alexandre SOKIC, octobre 2002.

2002–**22** *Modelling Behavioral Heterogeneity.*
Gaël GIRAUD, Isabelle MARET, novembre 2002.

2002–**23** *Le changement organisationnel en PME : quels acteurs pour quels apprentissages ?*
Blandine LANOUX, novembre 2002.

2002–**24** *TECHNOLOGY POLICY AND COOPERATION : An analytical framework for a paradigmatic approach.*
Patrick LLERENA, Mireille MATT, novembre 2002.

2003–**01** *Peut–on parler de délégation dans les PME camerounaises ?*
Raphaël NKAKLEU, mars 2003.

2003–**02** *L'identité organisationnelle et création du capital social : la tontine d'entreprise comme facteur déclenchant dans le contexte africain.*
Raphaël NKAKLEU, avril 2003.

2003–**03** *A semiparametric analysis of determinants of protected area.*
Phu NGUYEN VAN, avril 2003.

2003–**04** *Strategic Market Games with a Finite Horizon and Incomplete Markets.*
Gaël GIRAUD et Sonia WEYERS, avril 2003.

2003–**05** *Exact Homothetic or Cobb–Douglas Behavior Through Aggregation.*
Gaël GIRAUD et John K.–H. QUAH, juin 2003.

2003–**06** *Relativité de la satisfaction dans la vie : une étude sur données de panel.*
Théophile AZOMAHOU, Phu NGUYEN VAN, Thi Kim Cuong PHAM, juin 2003.

2003–**07** *A model of the anchoring effect in dichotomous choice valuation with follow–up.*
Sandra LECHNER, Anne ROZAN, François LAISNEY, juillet 2003.

2003–**08** *Central Bank Independence, Speed of Disinflation and the Sacrifice Ratio.*
Giuseppe DIANA, Moïse SIDIROPOULOS, juillet 2003.

2003–**09** *Patents versus ex–post rewards : a new look.*
Julien PÉNIN, juillet 2003.

2003–**10** *Endogenous Spillovers under Cournot Rivalry and Co–opetitive Behaviors.*
Isabelle MARET, août 2003.

2003–**11** *Les propriétés incitatives de l'effet Saint Matthieu dans la compétition académique.*
Nicolas CARAYOL, septembre 2003.

2003–**12** *The 'probleme of problem choice' : A model of sequential knowledge production within scientific communities.*
Nicolas CARAYOL, Jean–Michel DALLE, septembre 2003.

2003–**13** *Distribution Dynamics of CO_2 Emissions.*
Phu NGUYEN VAN, décembre 2003.

2004–**01** *Utilité relative, politique publique et croissance économique.*
Thi Kim Cuong PHAM, janvier 2004.

2004–**02** *Le management des grands projets de haute technologie vu au travers de la coordination des compétences.*
Christophe BELLEVAL, janvier 2004.

2004–**03** *Pour une approche dialogique du rôle de l'entrepreneur/manager dans l'évolution des PME : l'ISO comme révélateur …*
Frédéric CRÉPLET, Blandine LANOUX, février 2004.

2004–**04** *Consistent Collusion–Proofness and Correlation in Exchange Economies.*
Gaël GIRAUD, Céline ROCHON, février 2004.

2004–**05** *Generic Efficiency and Collusion–Proofness in Exchange Economies.*
Gaël GIRAUD, Céline ROCHON, février 2004.

2004–**06** *Dualité cognitive et organisationnelle de la firme fondée sur les interactions entre les communautés épistémiques et les communautés de pratique..*
Frédéric CRÉPLET, Olivier DUPOUËT, Francis KERN, Francis MUNIER, février 2004.

2004–**07** *Les Portails d'entreprise : une réponse aux dimensions de l'entreprise « processeur de connaissances ».*
Frédéric CRÉPLET, février 2004.

2004–**08** *Cumulative Causation and Evolutionary Micro–Founded Technical Change : A Growth Model with Integrated Economies.*
Patrick LLERENA, André LORENTZ, février 2004.

2004–**09** *Les CIFRE : un outil de médiation entre les laboratoires de recherche universitaire et les entreprises.*
Rachel LÉVY, avril 2004.

2004–**10** *On Taxation Pass–Through for a Monopoly Firm.*
Rabah AMIR, Isabelle MARET, Michael TROGE, mai 2004.

2004–**11** *Wealth distribution, endogenous fiscal policy and growth : status–seeking implications.*
Thi Kim Cuong PHAM, juin 2004.

2004–**12** *Semiparametric Analysis of the Regional Convergence Process.*
Théophile AZOMAHOU, Jalal EL OUARDIGHI, Phu NGUYEN VAN, Thi Kim Cuong PHAM, Juillet 2004.

2004–**13** *Les hypothèses de rationalité de l'économie évolutionniste.*
Morad DIANI, septembre 2004.

2004–**14** *Insurance and Financial Hedging of Oil Pollution Risks.*
André SCHMITT, Sandrine SPAETER, septembre 2004.

2004–**15** *Altruisme intergénérationnel, développement durable et équité intergénérationnelle en présence d'agents hétérogènes.*
Alban VERCHÈRE, octobre 2004.

2004–**16** *Du paradoxe libéral–parétien à un concept de métaclassement des préférences.*
Herrade IGERSHEIM, novembre 2004.

2004–**17** *Why do Academic Scientists Engage in Interdisciplinary Research ?*
Nicolas CARAYOL, Thuc Uyen NGUYEN THI, décembre 2004.

2005–**01** *Les collaborations Université Entreprises dans une perspective organisationnelle et cognitive.*
Frédéric CRÉPLET, Francis KERN, Véronique SCHAEFFER, janvier 2005.

2005–**02** *The Exact Insensitivity of Market Budget Shares and the 'Balancing Effect'.*
Gaël GIRAUD, Isabelle MARET, janvier 2005.

2005–**03** *Les modèles de type Mundell–Fleming revisités.*
Gilbert KOENIG, janvier 2005.

2005–**04** *L'État et la cellule familiale sont–ils substituables dans la prise en charge du chômage en Europe ? Une comparaison basée sur le panel européen.*
Olivia ECKERT–JAFFE, Isabelle TERRAZ, mars 2005.

2005–**05** *Environment in an Overlapping Generations Economy with Endogenous Labor Supply : a Dynamic Analysis.*
Thomas SEEGMULLER, Alban VERCHÈRE, mars 2005.

2005–**06** *Is Monetary Union Necessarily Counterproductive ?*
Giuseppe DIANA, Blandine ZIMMER, mars 2005.

2005–**07** *Factors Affecting University–Industry R&D Collaboration : The importance of screening and signalling.*
Roberto FONTANA, Aldo GEUNA, Mireille MATT, avril 2005.

2005–**08** *Madison–Strasbourg, une analyse comparative de l'enseignement supérieur et de la recherche en France et aux États–Unis à travers l'exemple de deux campus.*
Laurent BUISSON, mai 2005.

2005–**09** *Coordination des négociations salariales en UEM : un rôle majeur pour la BCE.*
Blandine ZIMMER, mai 2005.

2005–**10** *Open knowledge disclosure, incomplete information and collective innovations.*
Julien PÉNIN, mai 2005.

2005–**11** *Science–Technology–Industry Links and the 'European Paradox' : Some Notes on the Dynamics of Scientific and Technological Research in Europe.*
Giovanni DOSI, Patrick LLERENA, Mauro SYLOS LABINI, juillet 2005.

2005–**12** *Hedging Strategies and the Financing of the 1992 International Oil Pollution Compensation Fund.*
André SCHMITT, Sandrine SPAETER, novembre 2005.

2005–**13** *Faire émerger la coopération internationale : une approche expérimentale comparée du bilatéralisme et du multilatéralisme*.
Stéphane BERTRAND, Kene BOUN MY, Alban VERCHÈRE, novembre 2005.

2005–**14** *Segregation in Networks.*
Giorgio FAGIOLO, Marco VALENTE, Nicolaas J. VRIEND, décembre 2005.

2006–**01** *Demand and Technology Determinants of Structural Change and Tertiarisation : An Input–Output Structural Decomposition Analysis for four OECD Countries.*
Maria SAVONA, André LORENTZ, janvier 2006.

2006–**02** *A strategic model of complex networks formation.*
Nicolas CARAYOL, Pascale ROUX, janvier 2006.

2006–**03** *Coordination failures in network formation.*
Nicolas CARAYOL, Pascale ROUX, Murat YILDIZOGLU, janvier 2006.

2006–**04** *Real Options Theory for Lawmaking.*
Marie OBIDZINSKI, Bruno DEFFAINS, août 2006.

2006–**05** *Ressources, compétences et stratégie de la firme : Une discussion de l'opposition entre la vision Porterienne et la vision fondée sur les compétences.*
Fernand AMESSE, Arman AVADIKYAN, Patrick COHENDET, janvier 2006.

2006–**06** *Knowledge Integration and Network Formation.*
Müge OZMAN, janvier 2006.

2006–**07** *Networks and Innovation : A Survey of Empirical Literature.*
Müge OZMAN, février 2006.

2006–**08** *A.K. Sen et J.E. Roemer : une même approche de la responsabilité ?*
Herrade IGERSHEIM, mars 2006.

2006–**09** *Efficiency and coordination of fiscal policy in open economies.*
Gilbert KOENIG, Irem ZEYNELOGLU, avril 2006.

2006–**10** *Partial Likelihood Estimation of a Cox Model With Random Effects : an EM Algorithm Based on Penalized Likelihood.*
Guillaume HORNY, avril 2006.

2006–**11** *Uncertainty of Law and the Legal Process.*
Giuseppe DARI–MATTIACCI, Bruno DEFFAINS, avril 2006.

2006–**12** *Customary versus Technological Advancement Tests.*
Bruno DEFFAINS, Dominique DEMOUGIN, avril 2006.

2006–**13** *Institutional Competition, Political Process and Holdup.*
Bruno DEFFAINS, Dominique DEMOUGIN, avril 2006.

2006–**14** *How does leadership support the activity of communities of practice ?*
Paul MULLER, avril 2006.

2006–**15** *Do academic laboratories correspond to scientific communities ? Evidence from a large European university.*
Rachel LÉVY, Paul MULLER, mai 2006.

2006–**16** *Knowledge flows and the geography of networks. A strategic model of small worlds formation.*
Nicolas CARAYOL, Pascale ROUX, mai 2006.

2006–**17** *A Further Look into the Demography–based GDP Forecasting Method.*
Tapas K. MISHRA, juin 2006.

2006–**18** *A regional typology of innovation capacities in new member states and candidate countries.*
Emmanuel MULLER, Arlette JAPPE, Jean–Alain HÉRAUD, Andrea ZENKER, juillet 2006.

2006–**19** *Convergence des contributions aux inégalités de richesse dans le développement des pays européens.*
Jalal EL OUARDIGHI, Rabiji SOMUN–KAPETANOVIC, septembre 2006.

2006–**20** *Channel Performance and Incentives for Retail Cost Misrepresentation.*
Rabah AMIR, Thierry LEIBER, Isabelle MARET, septembre 2006.

2006–**21** *Entrepreneurship in biotechnology : The case of four start–ups in the Upper–Rhine Biovalley.*
Antoine BURETH, Julien PÉNIN, Sandrine WOLFF, septembre 2006.

2006–**22** *Does Model Uncertainty Lead to Less Central Bank Transparency ?*
Li QIN, Elefterios SPYROMITROS, Moïse SIDIROPOULOS, octobre 2006.

2006–**23** Enveloppe *Soleau et droit de possession antérieure : Définition et analyse économique.*
Julien PÉNIN, octobre 2006.

2006–**24** *Le territoire français en tant que Système Régional d'Innovation.*
Rachel LEVY, Raymond WOESSNER, octobre 2006.

2006–**25** *Fiscal Policy in a Monetary Union Under Alternative Labour–Market Structures.*
Moïse SIDIROPOULOS, Eleftherios SPYROMITROS, octobre 2006.

2006–**26** *Robust Control and Monetary Policy Delegation.*
Giuseppe DIANA, Moïse SIDIROPOULOS, octobre 2006.

2006–**27** *A study of science–industry collaborative patterns in a large european university.*
Rachel LEVY, Pascale ROUX, Sandrine WOLFF, octobre 2006.

2006–**28** *Option chain and change management : a structural equation application.*
Thierry BURGER–HELMCHEN, octobre 2006.

2006–**29** *Prevention and Compensation of Muddy Flows : Some Economic Insights.*
Sandrine SPAETER, François COCHARD, Anne ROZAN, octobre 2006.

2006–**30** *Misreporting, Retroactive Audit and Redistribution.*
Sandrine SPAETER, Marc WILLINGER, octobre 2006.

2006–**31** *Justifying the Origin of Real Options and their Difficult Evaluation in Strategic Management.*
Thierry BURGER–HELMCHEN, octobre 2006.

2006–**32** *Job mobility in Portugal : a Bayesian study with matched worker–firm data.*
Guillaume HORNY, Rute MENDES, Gerard J. VAN DEN BERG, novembre 2006.

2006–**33** *Knowledge sourcing and firm performance in an industrializing economy : the case of Taiwan in the 1990s.*
Chia–Lin CHANG, Stéphane ROBIN, novembre 2006.

2006–**34** *Using the Asymptotically Ideal Model to estimate the impact of knowledge on labour productivity : An application to Taiwan in the 1990s.*
Chia–Lin CHANG, Stéphane ROBIN, novembre 2006.

2006–**35** *La politique budgétaire dans la nouvelle macroéconomie internationale.*
Gilbert KOENIG, Irem ZEYNELOGLU, décembre 2006.

2006–**36** *Age Dynamics and Economic Growth : Revisiting the Nexus in a Nonparametric Setting.*
Théophile AZOMAHOU, Tapas MISHRA, décembre 2006.

2007–**01** *Transparence et efficacité de la politique monétaire.*
Romain BAERISWYL, Camille CORNAND, janvier 2007.

2007–**02** *Crowding–out in Productive and Redistributive Rent–Seeking.*
Giuseppe DARI–MATTIACCI, Éric LANGLAIS, Bruno LOVAT, Francesco PARISI, janvier 2007.

2007–**03** *Co–résidence chez les parents et indemnisation des jeunes chômeurs en Europe.*
Olivia ÉKERT–JAFFÉ, Isabelle TERRAZ, janvier 2007.

2007–**04** *Labor Conflicts and Inefficiency of Relationship–Specific Investments : What is the Judge's Role ?*
Bruno DEFFAINS, Yannick GABUTHY, Eve–Angéline LAMBERT, janvier 2007.

2007–**05** *Monetary hyperinflations, speculative hyperinflations and modelling the use of money.*
Alexandre SOKIC, février 2007.

2007–**06** *Detection avoidance and deterrence : some paradoxical arithmetics.*
Éric LANGLAIS, février 2007.

2007–**07** *Network Formation and Strategic Firm Behaviour to Explore and Exploit.*
Muge OZMAN, février 2007.

2007–**08** *Effects on competitiveness and innovation activity from the integration of strategic aspects with social and environmental management.*
Marcus WAGNER, février 2007.

2007–**09** *The monetary model of hyperinflation and the adaptive expectations : limits of the association and model validity.*
Alexandre SOKIC, février 2007.

2007–**10** *Best–reply matching in Akerlof's market for lemons.*
Gisèle UMBHAUER, février 2007.

2007–**11** *Instruction publique et progrès économique chez Condorcet.*
Charlotte LE CHAPELAIN, février 2007.

2007–**12** *The perception of obstacles to innovation. Multinational and domestic firms in Italy.*
Simona IAMMARINO, Francesca SANNA–RANDACCIO, Maria SAVONA, mars 2007.

2007–**13** *Financial Integration and Fiscal Policy Efficiency in a Monetary Union.*
Gilbert KOENIG, Irem ZEYNELOGLU, mars 2007.

La présente liste ne comprend que les Documents de Travail publiés à partir du 1er janvier 2000. La liste complète peut être donnée sur demande.
This list contains the Working Paper writen after January 2000, 1rst. The complet list is available upon request.

———