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**Fiscal Policy and Welfare under Different
Exchange Rate Regimes**

by

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Abstract

The article analyses how government spending is determined under different exchange rate regimes in the context of a small open economy. Assuming nominal wage contracts which last for one period and assuming a benevolent government which determines government spending to optimise a representative individual's utility, it is demonstrated that there are differences between exchange rate regimes with respect to the level of government spending. These differences arise first because a rise in government spending affects macroeconomic variables differently under different exchange rate regimes, and second because the government's inclination to expand government spending is affected by inflation which depends on the exchange rate regime. At low rates of inflation, the government is inclined to set a higher level of government spending under a fixed exchange rate regime than under a floating exchange rate regime in which the monetary authority optimises preferences which include an employment target and an inflation target. As government spending affects the representative individual's utility, the choice of exchange rate regime has an impact on welfare.

Keywords: exchange rate regimes; fiscal policy; monetary union; inflation targeting.

JEL classicification: E42, E61, E62, F33.

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1 Introduction

This article examines in the context of a small open economy the relationship between on the one side the exchange rate regime and on the other side the design of fiscal policy. The point of departure is an equilibrium where the interaction between economic agents is repeated in all time periods. The analysis is based on optimising foundations and on the presence of a short-term nominal rigidity which takes the form of one-period nominal wage contracts.[1] Fiscal policy is determined by a benevolent government which optimises a representative individual's utility. In line with Kydland and Prescott (1977) and with Barro and Gordon (1983), economic policy decisions are made after nominal wage contracts have been pre-set at the beginning of the period. The nominal wage is determined by representative individuals who have full foresight regarding subsequent policy decisions. Fiscal policy takes the form of decisions on the level of government spending which is financed through a tax on labour and capital income. There is a balanced government budget.

The analysis suggests two channels which cause government spending to lie at different levels under different exchange rate regimes. First, as the nominal wage is pre-set through contracts prior to the policy setting, a benevolent government's inclination to expand government spending is determined by the effects which government spending has on macroeconomic variables in an economic framework characterised by nominal wage rigidity. In such a model based on nominal wage rigidity, there are different effects of government spending on macroeconomic variables under different exchange rate regimes. These differences with respect to the effects of government spending on macroeconomic variables mean that the government faces different incentives to expand government spending under different exchange rate regimes. As a second channel which causes government spending to depend on the exchange rate regime, the analysis points to the effect which government spending has on inflation. A benevolent government takes into account how government spending affects the price level. Thus, if there is a high rate of inflation, fiscal policy is to a larger extent determined by the consideration to reduce inflation than if there is a low inflation. As the inflation rate depends on the exchange rate regime, it again that a benevolent government faces different incentives to expand government spending under different exchange rate regimes.

The first of these two channels - i.e. the impact of the exchange rate regime on the effect which government spending has on macroeconomic variables given a pre–set nominal wage - should come as no surprise. It is well-known from fix-price or fix-wage models of the open economy that the effect of fiscal policy on macroeconomic variables

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[1]This corresponds to the body of theory known as the 'New Open-Economy Macroeconomics' which analyses short-term nominal rigidities in an economic framework based on optimising foundations. The pioneering contribution is Obstfeld and Rogoff (1995). The early literature is surveyed by Lane (2001). Most analyses are based on nominal price rigidity. The analyses in Hau (2000) and in Obstfeld and Rogoff (2000, 2002) assume nominal wage contracts.

depends on the exchange rate regime. Thus, in the standard Mundell-Fleming model production is unaffected by fiscal policy under a floating exchange rate regime while there is an impact on production under a fixed exchange rate. It is natural that such differences between exchange rate regimes with respect to the effects of fiscal policy on macroeconomic variables have an impact on the incentive to expand government spending.

The analysis demonstrates that government spending affects a representative individual's utility. This means that welfare lies at different levels under different exchange rate regimes. This finding is important because it implies that the exchange rate regime should be chosen not only from the perspective of lowering inflation and reducing output variability but also from the perspective of bringing about an optimal level of government spending.[2] As the analysis takes its perspective in an equilibrium which is repeated in all periods, the different welfare levels persist in the long term, implying that the choice of monetary regime has permanent implications for welfare.

Two exchange rate regimes are compared: (i) a floating exchange rate regime where the monetary authority optimises preferences which include an employment target and an inflation target, and (ii) a fixed exchange rate regime where the exchange rate is tied to that of another country with no possibility of exchange rate adjustment. We refer to the first of these exchange rate regimes as inflation targeting while we refer to the second of the regimes as a monetary union. It is demonstrated that a benevolent government at low rates of inflation is inclined to set a higher level of government spending in the monetary union than under inflation targeting. The converse holds when inflation lies above a certain level. It is further demonstrated that inflation targeting is superior to a monetary union seen from a welfare perspective at low rates of inflation. At low rates of inflation it is thus possible to increase welfare by switching from a fixed exchange rate to a floating exchange rate regime where monetary policy is used to pursue an employment target and an inflation target.

The connection between the exchange rate regime and fiscal policy has been a central issue of discussion in the literature and among policy makers, not least in connection with the European Monetary Union. The analysis in this article is most related to Agell, Calmfors and Jonssson (1996) who analyse fiscal policy in a Barro-Gordon model framework where the nominal wage is pre-set for one time period. There are three major differences relative to Agell, Calmfors and Jonsson (1996). First, the point of departure in this article is a comparison between on the one side a floating exchange rate regime with inflation targeting and on the other side a monetary union

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[2]The choice of monetary regime in the open economy is usually seen in the context of minimising output fluctuations and of reducing inflation. Other macroeconomic considerations include the loss of inflation tax/seignorage and the possibility of providing finance to troubled financial institutions. At the microeconomic level, the reduction of exchange rate uncertainty and the saving of transaction costs are usually seen as important elements. Recent discussions are found in Alesina, Barro and Tenreyo (2002), Frankel (2003), and Tenreyo and Barro (2003).

while Agell, Calmfors and Jonsson (1996) compare a monetary union to a monetary regime where the authorities use the exchange rate instrument discretely to optimise preferences. Second, the difference with respect to the use of fiscal policy across exchange rate regimes is due in Agell, Calmfors and Jonsson (1996) to the possibility of using exchange rate adjustments as an additional instrument under a fixed-but-adjustable regime. This channel is different from the channels which in this analysis cause differences between exchange rate regimes with respect to government spending, i.e. the difference between exchange rate regimes concerning the effects of government spending on macroeconomic variables and the impact of inflation on a benevolent government's fiscal decisions. A third difference concerns the model framework. While fiscal policy in Agell, Calmfors and Jonsson (1996) is determined on the basis of preferences that are specified ad hoc, it is assumed in this analysis that fiscal policy is determined to optimise a representative individual's utility.[3]

A number of studies highlight other factors which may cause differences with respect to fiscal policy under different monetary regimes. The Delors Report argues that there is an inclination to pursue a more restrictive fiscal policy under a fixed-but-adjustable exchange rate in order to reduce the risk of currency crises. It is further discussed in the Delors Report how government behaviour may be influenced by the expectation that other members in a monetary union will come to the rescue of a government which experiences difficulties with respect to the re-payment of loans.[4] Dixit and Lambertini (2001) consider the strategic interaction between monetary and fiscal policies in a model framework with pre-set prices where production and inflation are affected by monetary and fiscal policies. In this model set-up, fiscal policy is determined by the exchange rate regime which determines the monetary policy reaction to shocks.[5] Tornell and Velasco (2000) examine how a more restrictive fiscal policy is pursued under a floating exchange rate regime because a lax fiscal policy under this regime has immediate negative effects in the form of higher inflation. Several studies consider the effects which arise for fiscal policy because the authorities in a monetary union lose the ability to control inflation, thus causing a loss of government revenue

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[3] The analysis in Agell, Calmfors and Jonsson (1996) is based on the assumption of a cost associated with using fiscal policy. No justification is given for this assumption. The analysis in Ostrup (2000) is also based on the assumption of an exogenously determined cost associated with deviations of fiscal policy from its optimal level.

[4] The Delors Report (Committee for the Study of Economic and Monetary Union, 1989) sparked a large body of literature concerning fiscal policy rules in the European Monetary Union, see e.g. Buiter, Corsetti and Roubini (1993), Chari and Kehoe (2004), de Grauwe (1990), Eichengreen (1993), Levine and Brociner (1994), and Masson and Taylor (1992, 1993). The Delors Report has formed the basis for the provisions on fiscal policy in the 1992 Maastricht Treaty and in the Stability and Growth Pact which was adopted in 1997 as an attempt to prevent countries from pursuing an expansive fiscal policy after the introduction of the euro.

[5] See also Dixit (2001).

from inflation tax/seignorage.[6] Other studies analyse how the incentive to pursue an expansive fiscal policy may change in a monetary union by the creation of a scheme for fiscal transfers which makes it possible for countries to counter asymmetric shocks.[7] It has finally been demonstrated that there are differences between exchange rate regimes with respect to the fiscal policy stance in an economic framework where the price level is determined to ensure the long-term solvency of governments which issue debt.[8]

The impact of fiscal policy in a model based on the 'New Open-Economy Macroeconomics' has previously been studied by Caselli (2001). The analysis in Caselli (2001) diverges from the analysis in this article in several respects. Most importantly, fiscal policy is Caselli (2001) is determined exogenously. There is thus no analysis of the different incentives which face the fiscal authorities under different monetary regimes.

Section 2 specifies the model. *Section 3* derives natural employment. *Section 4* discusses the determination of government spending. *Section 5* examines how government spending is determined under inflation targeting while *section 6* considers government spending in a monetary union. *Section 7* compares the two exchange rate regimes. *Section 8* analyses government spending under the two exchange rate regimes relative to the optimal level. *Section 9* gives a summary and a conclusion.

2   The model

The analysis concerns a small open economy. We refer to this economy as the 'home country' while the rest of the world is represented by a large economy termed the 'foreign country'. Variables relating to the foreign country are denoted by asterisks and are exogenous to the analysis. The large foreign economy has a structure which is

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[6]Sibert (1992) finds that the loss of seignorage in a monetary union distorts the choice between income tax and segnorage due to spill-over effects in other countries. Jensen (1994) suggests that the natural unemployment may rise in a monetary union because the authorities have to increase the tax rate on labour income due to the possible loss of inflation tax/seigniorage in the monetary union. Obstfeld and Rogoff (1996) observe that the natural unemployment is unaffected by the authorities' loss of seignorage/inflation tax in a monetary union insofar as seigniorage/inflation tax is a tax on consumption when money is held prior to consumption expenditure. Beetsma and Bovemberg (1998) and Cooper and Kempf (2000) analyse the strategic interaction between a common central bank in a monetary union and the fiscal authorities that arise when part of the budgetary deficit is financed through seignorage. In the context of a closed-economy, Alesina and Tabellini (1987) analyse the interaction between monetary and fiscal policies when inflation tax/seignorage affect the authorities' budgetary constraint.

[7]Beetsma and Bovenberg (2001) analyse how a monetary union may weaken the incentive of national policy makers to bring about fiscal discpline because a monetary union may lead to the establishment of fiscal transfer schemes to alleviate the costs for single countries associated with asymmetric shocks. The Delors Report argues that fiscal policy may be laxer in a monetary union because it may be expected in a monetary union that other participants will bail out a country in payments difficulties.

[8]See Canzoneri, Cumby and Diba (2001).

similar to that of the small country except for size. We consider, to simplify, a single time period. Time indications are deleted.

Decisions concerning economic variables are made by four types of agents: (i) a representative firm which optimises profit under perfect competition, (ii) a representative individual who optimises utility, (iii) the government which makes fiscal decisions, and (iv) the monetary authority which controls monetary policy. The representative firm and the representative individual operate at the microeconomic level, taking prices and economic policy variables as given in their optimisation, while the authorities operate at the macroeconomic level.

A distinction is made between on the one side private consumption and on the other side public consumption. Both private and public consumption bring utility to the representative individual. Private consumption consists of those goods which the individual purchases directly from firms. Public consumption consists of goods - e.g. education and welfare services - which are bought by the government from firms and which are placed at the free disposal of the individuals. The size of public consumption is decided by the government.

At the beginning of the period, the nominal wage is pre-set through a contract between individuals and firms. The nominal wage is set at such a level that it brings about equilibrium on the labour market in the course of the contract period.[9] Subsequently, in the course of the time period and on the basis of the pre-set nominal wage, the firm makes decisions on employment and production while the individual determines the private consumption of home country and foreign goods and the size of money balances. Also subsequent to the wage setting, the government decides on government spending while the monetary authority determines the money supply. Under the floating exchange rate regime, the monetary authority adjusts the money supply to optimise preferences which include an employment goal and a goal of price stability while in a monetary union the money supply is adjusted to maintain the fixed exchange rate.

Firms operate in competitive markets. The representative firm uses the labour input to produce a good which can be used both for private and public consumption. The production function is

(1) $Y = L^{\alpha}, \quad 1 > \alpha > 0,$

where Y is production, and L labour. α is the output elasticity with respect to labour.

The firm optimises profit given the production function specified by (1). It results that production is negatively affected by a rise in the real wage, determined as the

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[9]It is not important to the conclusions in the analysis whether the nominal wage is determined by the representative individual, by the firm, or as the level which brings about equilibrium between demand and supply in the labour market. To simplify, the latter assumption has been used in the analysis.

nominal wage divided by the producer price. The condition for the firm's optimisation with respect to labour is

$$(2) \quad y = -\left(\frac{\alpha}{1-\alpha}\right)(w-p) + \left(\frac{\alpha}{1-\alpha}\right)\log(\alpha),$$

where w is the nominal wage (logarithmic value), and p the producer price (logarithmic value). y is the log of production Y.

A representative individual derives utility from the private consumption of goods produced in the home country and in the foreign country. In addition, the individual derives utility from public consumption, consisting of goods which are placed at the individual's free disposal by the government, cf. above. There is further utility from real money balances while there is disutility from work and from a rise in consumer prices. The individual's utility is

$$(3) \qquad U = \log(C) + \vartheta \log(G) + \rho \log\left(\frac{M}{P}\right) - \frac{\kappa}{\nu}L^{\nu} - \frac{1}{2}\chi\pi^2,$$

$$C \equiv \left[(1-\varphi)^{\frac{1}{\theta}}H^{\frac{\theta-1}{\theta}} + \varphi^{\frac{1}{\theta}}F^{\frac{\theta-1}{\theta}}\right]^{\frac{\theta}{\theta-1}}, \quad \pi \equiv p^C - p^C_{-1}, \quad p^C_{-1} \equiv 0,$$

$$\vartheta > 0, \quad \rho > 0, \quad \kappa > 0, \quad \nu > 1, \quad \chi > 0, \quad 0 < \varphi < 1, \quad \theta > 1,$$

where U is the representative individual's utility, C an index which represents the individual's private consumption of home country and foreign goods, G public consumption, M money balances, π inflation, defined as the rise in consumer prices, H the private consumption of goods produced in the home country, F the private consumption of goods produced in the foreign country, and p^C the consumer price (logarithmic value). The parameter ϑ represents the utility of public consumption, ρ the utility from real money balances, κ and ν the disutility from work, and χ the disutility associated with inflation. θ is the elasticity of substitution across different goods in private consumption. φ reflects the utility of foreign goods relative to home country goods. p^C_{-1} is the consumer price in the previous period, normalised at zero (logarithmic value). P is the non-logarithmic level of p.

The individual receives income from work and from dividends. Dividends are distributed lump-sum with an equal amount to each individual. Labour income and dividends are taxed at the same rate. The real cost associated with money balances is equal to inflation. In order to abstract from the effects of inflation tax/seignorage, it is assumed that the individual receives a lump-sum transfer payment from the government which compensates for the real cost of money balances. This gives the budget constraint as

$$(4) \qquad \frac{W}{P}L(1-\tau) + \psi(1-\tau) + \varpi = H + XF + \pi\frac{M}{P},$$

$$\varpi = \pi\frac{M}{P}, \quad \psi = Y - \frac{W}{P}L, \quad X \equiv \frac{SP^*}{P}, \quad 0 \le \tau \le 1,$$

where τ is the tax rate on labour income and dividends, ψ dividends, ϖ a lump-sum transfer from the government, X the real exchange rate, defined as the price level of foreign goods relative to home country goods expressed in the home country currency, and S the nominal exchange rate (number of domestic currency units per foreign currency unit). W is the non-logarithmic value of the nominal wage. P^* is the price on foreign goods.

The representative individual optimises (3) under the constraint of (4) with respect to the private consumption of home country goods H and of foreign goods F, with respect to employment L, and with respect to money balances M. This gives:

(5) $\qquad H = \dfrac{1 - \varphi}{1 - \varphi + \varphi X^{1-\theta}} Q, \quad Q \equiv H + XF,$

(6) $\qquad F = \dfrac{\varphi X^{-\theta}}{1 - \varphi + \varphi X^{1-\theta}} Q,$

(7) $\qquad L = \left(\dfrac{1}{\kappa}\right)^{\frac{1}{\nu-1}} \left(\dfrac{1}{Q}\right)^{\frac{1}{\nu-1}} \left(\dfrac{W}{P}\right)^{\frac{1}{\nu-1}} (1 - \tau)^{\frac{1}{\nu-1}},$

(8) $\qquad \dfrac{M}{P} = Q\left(\dfrac{\rho}{\pi}\right),$

where Q is real private consumption expenditure, defined as the expenditure for private consumption deflated by the price on home country goods.

Equations (5) and (6) represent the individual's demand for respectively home goods and foreign goods used for private consumption. These demands are functions of the real exchange rate X and of real private consumption expenditure Q. (7) specifies the labour supply as a function of private consumption expenditure Q and of the real after-tax wage income $(W/P)(1 - \tau)$. (8) gives the demand for real money balances as a function of real private consumption expenditure Q and of inflation π.

The consumer price is defined as the smallest expenditure which buys one unit of utility. Given the specification of utility shown by (3), the consumer price is

(9) $\quad P^C = P\left[1 - \varphi + \varphi X^{1-\theta}\right]^{\frac{1}{1-\theta}},$

where P^C is the non-logarithmic value of the consumer price.

There is equilibrium on the government budget. All government spending is used for public consumption. It is assumed that public consumption consists exclusively of goods produced in the home country. As lump-sum transfers from the government equal the real cost related to money balances, equilibrium on the government budget implies that revenue from the taxation of labour and dividends is equal to government spending

(10) $\quad g = \tau, \quad g \equiv \dfrac{G}{Y},$

where g shows government spending relative to production.

Combining the individual's budget constraint (4) with the demand for home country and foreign goods shown by respectively (5) and (6) and with the condition for government budget balance (10), gives real private consumption expenditure as

(11) $Q = (1 - g)Y.$

It follows from (11) that real private consumption expenditure is equal to production with the deduction of government spending.

There is equilibrium on the market for goods produced in the home country. The condition for goods market equilibrium is

(12) $Y = Z \equiv H + gY + F^*,$

where Z is the demand for goods produced in the home country, and F^* is the foreign demand for home country goods.

Equation (12) shows the demand for home country goods, represented by Z, as being equal to (i) the demand for home country goods originating from private consumption in the home country, represented by H, (ii) public consumption, shown by gY, and (iii) the demand for home country goods from the foreign country, given by F^*.

The individuals in the foreign economy have preferences which correspond to those of the individuals in the home country, shown by (3), except for those changes in parameter values which result from the larger size of the foreign economy. Correspondingly, foreign firms have the same structure as home country firms and the foreign authorities have the same incentives to set policy instruments as the home country authorities. Using this, the foreign demand for home country goods can be found by analogy to (6) as

(13) $F^* = \dfrac{\varphi^* X^\theta}{1 - \varphi^* + \varphi^* X^{-(1-\theta)}} Q^*, \quad \varphi^* = \dfrac{1}{N}\varphi, \quad Q^* = NQ,$

where Q^* is foreign real private consumption expenditure, and φ^* the preference for imported goods relative to non-imported goods in the foreign economy. N is the size of the foreign economy relative to the home economy. It follows from the assumption of a small open economy that N is large, implying that $1/N \sim 0$.

Combining (5) with (11)-(13), the condition for goods market equilibrium can be written as

(14) $Y = Z \equiv \dfrac{1 - \varphi}{1 - \varphi + \varphi X^{1-\theta}} Q + gY + \dfrac{\varphi^* X^\theta}{1 - \varphi^* + \varphi^* X^{\theta-1}} Q^*.$

The first term on the right-hand side of (14) represents the demand for home country goods which derives from private consumption in the home country while the second

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term is the demand for home country goods which originates from public consumption in the home country. The third term on the right-hand side of (14) is the demand for home country goods that originates from private consumption in the foreign economy. It follows that the demand for home country goods is a function of (i) real private consumption expenditure in the home country and in the foreign country, (ii) home country government spending, and (iii) the real exchange rate.

Combining (14) with (11), and further using the assumption that the structure of the foreign economy is similar to the structure of the home economy except for size, the condition for goods market equilibrium expressed by (14) can be written as[10]

$$(15) \qquad y = z = z(y, x, g),$$

$$z_y \equiv \frac{\partial z}{\partial y} = 1 - \varphi(1 - g), \quad 0 < z_y < 1,$$

$$z_x \equiv \frac{\partial z}{\partial x} = \varphi(1 - g)A > 0, \quad A \equiv \theta + (\theta - 1)(1 - \varphi) > 1,$$

$$z_g \equiv \frac{\partial z}{\partial g} = \varphi > 0,$$

where A is a term. z_y, z_x, and z_g represent the demand elasticities with respect to respectively production, the real exchange rate, and government spending relative to production. z is the log of Z while x is the log of X.

It follows from (15) that the demand for home country goods is increased by (i) a rise in production y, (ii) a real depreciation, represented by a rise in x, and (iii) a rise in government spending relative to production g. A rise in production increases the demand for domestic goods because it increases real private consumption expenditure and public consumption. A real depreciation makes home country goods cheaper relative to foreign goods, thus inducing individuals to increase the private consumption of home goods relative to foreign goods. Finally, a rise in government spending relative to production increases the demand for home country goods because public consumption consists only of home country goods while private consumption consists of both home goods and foreign goods.

Combining (8) with (10) and (11) gives the condition for equilibrium in the money

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[10] The derivation of demand elasticities can explained as follows. In the case where the economies are uniform except for size, it follows that $X = 1$. Using this we derive from (11) and (12): $(\partial z/\partial y) = (\partial z/\partial Z)(\partial Z/\partial Y)(\partial Y/y) = (Y/Z)(\partial Z/\partial Y) = (\partial Z/\partial Y)$. We further have: $(\partial Z/\partial Y) = (1 - \varphi)(1 - g) + g$. It similarly follows that $(\partial z/\partial g) = (\partial z/\partial Z)(\partial Z/\partial g) = (1/Y)(\partial Z/\partial g)$. The term $(\partial Z/\partial g) = (1 - \varphi)(-Y) + Y$. We have finally got: $(\partial Z/\partial X) = (1 - \varphi)\varphi(\theta - 1)(1 - g)Y + \theta\varphi^* Y^*(1 - g^*) - \varphi^* Q^*(1 - g^*)\varphi^*(\theta - 1)$. Assuming that the foreign economy is N times larger than the domestic economy and has a similar economic structure, it follows that $\varphi^* = \frac{1}{N}\varphi$ while $Q^* = NQ$, implying that $\varphi^* Q^* = \varphi Q = \varphi Y(1 - g)$. When N is large, it results that the last term in $\partial Z/\partial X$ is approximately equal to 0. We finally use in the derivation that $z_x = (X/Y)(\partial Z/\partial X) = (1/Y)(\partial Z/\partial X)$.

market as

(16) $m = p + y + \log(1 - g) + \log(\rho) - \log(\pi),$

where m is the log of money balances M.

It follows from (16) that the money demand is determined by the price on home country goods, production, government spending relative to production, and by inflation which represents the opportunity cost associated with money balances.

3   The natural employment

At the beginning of the period, the nominal wage is set through a contract at such a level that the demand for labour equals the labour supply in the course of the contract period. Individuals and firms have perfect foresight concerning the subsequent policy setting when the nominal wage is determined. We refer to the employment which is realised in the course of the wage contract period, as the natural employment. Combining the production function (1) and the firm's labour demand given by (2) with the condition for the individual's supply of labour shown by (7) and the specification of real private consumption expenditure (11), we derive

(17) $L = L' = \left(\dfrac{\alpha}{\kappa}\right)^{\frac{1}{\nu}},$

where L' is the natural level of employment, defined as the employment level which is realised in the course of the wage contract period.

It follows from (17) that natural employment is determined only by the economic structure, being unaffected by economic policies.[11]

4   The fiscal regime

We consider a benevolent government which determines government spending to optimise the representative individual's utility given by (3). To simplify, we assume that the government in its optimisation neglects the utility derived from real money balances.[12] Government spending is thus determined to optimise

(18) $V^g = \log(C) + \vartheta \log(G) - \dfrac{\kappa}{\nu} L^\nu - \dfrac{\chi}{2} \pi^2,$

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[11] This results from the logarithmic specification of the utility which the representative individual derives from private consumption. In the case where an assumption is made of non-logarithmic utility, the natural employment is affected by the tax rate and thus by government spending relative to production.

[12] This is in line with the 'New Open-Economy Macroeconomics' literature based on Obstfeld and Rogoff (1995).

where V^g expresses the government's preferences.

Combining (18) with (3), (5)-(6), and (10)-(11), the government's preferences can be expressed as

$$(19) \quad V^g = (1+\vartheta)y + \log(1-g) + \frac{1}{\theta-1}\log\left(1-\varphi+\varphi X^{1-\theta}\right) + \vartheta\log(g) - \frac{\kappa}{\nu}L^\nu - \frac{\chi}{2}\pi^2.$$

The preferences shown by (19) are optimised with respect to government spending relative to production, represented by g. In the optimisation we use the definition of the consumer price given by (9). We further use that $X = 1$ in the case of countries with uniform structures except for size. This gives the condition for the setting of government spending as

$$(20) \quad \frac{\partial V^g}{\partial g} = -\frac{1}{1-g} + \vartheta\frac{1}{g} + \left(\frac{\partial y}{\partial g}\right)\left[1+\vartheta-\frac{\kappa}{\alpha}L^\nu\right] - \varphi\left(\frac{\partial x}{\partial g}\right) - \chi\pi\left(\frac{\partial p^C}{\partial g}\right) = 0,$$

$$\left(\frac{\partial p^C}{\partial g}\right) = \left(\frac{\partial p}{\partial g}\right) + \varphi\left(\frac{\partial x}{\partial g}\right).$$

Equation (20) expresses that the government expands government spending until the point where the marginal utility from a further rise falls to zero. The terms in $\partial V^g/\partial g$ reflect the effects on marginal utility which arise from an increase in government spending. The first term in $\partial V^g/\partial g$ shows the reduction in utility which results because a rise in government spending reduces private consumption. The second term in $\partial V^g/\partial g$ reflects the increase in utility which follows because a rise in government spending increases public consumption. The third term in $\partial V^g/\partial g$ reflects the change in utility which results when government spending affects production, a rise in production creating more room for private and public consumption but raising the disutility associated with work. The fourth term in $\partial V^g/\partial g$ shows how a rise in government spending affects marginal utility through an impact on the real exchange rate, a real appreciation (reflected by a reduction in x) increasing the purchasing power of home country individuals with respect to foreign goods. Finally, the fifth term in $\partial V^g/\partial g$ reflects the impact of government spending on inflation. A change in government spending affects the consumer price through an impact on the producer price and on the real exchange rate, a real appreciation causing a reduction in the domestic price level relative to the foreign price level and thus tending to reduce the consumer price.

It follows from the condition for the labour supply given by (17) that $(\kappa/\alpha)L^\nu = 1$. Combining (20) with (17), the condition for the setting of government spending can be specified as

$$(21) \quad g = \vartheta\left(\frac{1}{1+\vartheta-\Psi}\right),$$

$$\Psi \equiv \left(\frac{\partial y}{\partial g}\right)(1-g) - \chi\pi\left(\frac{\partial p}{\partial g}\right)(1-g) - \varphi(1+\chi\pi)(1-g)\left(\frac{\partial x}{\partial g}\right),$$

where Ψ is a function which depends on the effects of government spending on macro-economic variables and on inflation.

Equation (21) gives the condition for the determination of government spending. The function Ψ represents the effects which a given change in government spending has on macroeconomic variables. It follows from (21) that government spending relative to production is increased when there is a rise in Ψ. The first term in Ψ shows how a given change in government spending affects marginal utility through an impact on production. The second and third terms in Ψ reflect how government spending affects marginal utility through an impact on the producer price and on the real exchange rate. It follows that Ψ is affected by the rate of inflation.

The government acts on the basis of the pre-set nominal wage when it determines government spending. Given a pre-set nominal wage, equation (2) specifies a relationship between on the one side production and on the other side the price on home country goods. It follows from (2) that $\partial p / \partial g = [(1 - \alpha)/\alpha](\partial y / \partial g)$. It further results from the goods market equilibrium shown by (15) that $\partial x / \partial g = [(1 - z_y)/z_x](\partial y / \partial g) - (z_g/z_x) = (1/A)(\partial y / \partial g) - (1/A)(1 - g)^{-1}$. Using this in (21) gives

$$(22) \qquad g = \vartheta \left(\frac{1}{1 + \vartheta - \Psi} \right), \quad \Psi \equiv \vartheta B + \left(\frac{\varphi}{A} \right) - \chi \pi D,$$

$$B \equiv \left(\frac{\partial y}{\partial g} \right)(1 - g), \quad D \equiv \left(\frac{\partial p^C}{\partial g} \right) = B \left[\left(\frac{1 - \alpha}{\alpha} \right) + \left(\frac{\varphi}{A} \right) \right] - \left(\frac{\varphi}{A} \right),$$

where B and D express the effects of government spending on respectively production and the consumer price.

Equation (22) shows government spending to depend on three factors: (i) the impact of government spending on production, reflected by $\partial y / \partial g$ and thus by B, (ii) the rate of inflation π, and (iii) the impact of government spending on inflation, represented by D which again is determined by B and thus by the impact of government spending on production ($\partial y / \partial g$).

The condition for the determination of government spending shown by (22) is central in the analysis. It is demonstrated below that the exchange rate regime affects (22) - and thus government spending relative to production - through two channels. First, as the government acts on the basis of a pre-set nominal wage, the exchange rate regime determines the impact which a given rise in government spending has on production. Second, the exchange rate regime determines the inflation rate.

5   Government spending under inflation targeting

We consider in this section a floating exchange rate regime where monetary policy is used to optimise preferences which include an employment target and an inflation

target. In line with the literature, the monetary authority's preferences are specified as

$$(23) \quad V^m = -\frac{1}{2}(l - l'')^2 - \frac{1}{2}\chi^m \pi^2, \quad \chi^m > 0, \quad l'' - l' \equiv h > 0, \quad h = \bar{h},$$

where l'' expresses the monetary authority's desired employment level (logarithmic value), and χ^m is the weight which the monetary authority attaches to inflation. h expresses the difference between the employment which is desired by the monetary authority and the natural employment. l and l' show the logarithmic values of respectively employment and natural employment.

It follows from (23) that the monetary authority desires to reach an employment level, shown by l'', which is higher than the natural level. It further follows that the monetary authority wants to reduce inflation.

The preferences shown by (23) are optimised after the nominal wage has been pre-set through contracts. The monetary authority thus acts on the basis of an equation system which is given by (2) and (15) and by the money market equilibrium which is specified by (16). Combining (2), (15), and (16) gives the condition for the monetary authority's optimisation as

$$(24) \quad \pi^{IT} = -(l - l'')\left(\frac{1}{\alpha\chi^m}\right)\left[\frac{1-\alpha}{\alpha} + \frac{\varphi}{A}\right]^{-1} > 0,$$

where the superscript IT denotes inflation targeting.

Equation (24) represents the monetary authority's reaction function under inflation targeting. Inflation - reflected by the rise in consumer prices - is a negative function of employment. A rise in the weight attached to inflation, expressed by an increase in χ^m, lowers inflation at each given level of employment. The money supply is adjusted so that (24) is met.

The government knows that the monetary authority acts on the basis of the reaction function shown by (24) which represents a relationship between on the one side the consumer price and on the other side employment. As the consumer price is a function of the price on home country goods and of the real exchange rate, cf. (9), and as employment is a function of production, cf. (1), it follows that (24) represents a relationship between (i) production, (ii) the price on home country goods, and (iii) the real exchange rate. Given the pre-set nominal wage, the government thus acts on the basis of an equation system which consists of (2), (15), and (24). This equation system determines production, the price on home country goods, and the real exchange rate. Combining (22) with (2), (15), and (24) it results that government spending is

determined as

$$(25) \qquad g^{IT} = \vartheta \left(\frac{1}{1 + \vartheta - \Psi^{IT}} \right), \qquad \Psi^{IT} \equiv \vartheta B^{IT} + \left(\frac{\varphi}{A} \right) - \chi \pi^{IT} D^{IT},$$

$$B^{IT} \equiv \left(\frac{\partial y}{\partial g} \right)^{IT} \left(1 - g^{IT} \right) =$$

$$\left(\frac{\varphi}{A} \right) \left(\frac{1 - \alpha}{\alpha} + \frac{\varphi}{A} \right) \left[\left(\frac{1 - \alpha}{\alpha} + \frac{\varphi}{A} \right)^2 + \left(\frac{1}{\chi^m} \right) \left(\frac{1}{\alpha} \right)^2 \right]^{-1} > 0,$$

$$D^{IT} \equiv \left(\frac{\partial p^C}{\partial g} \right)^{IT} = B^{IT} \left(\frac{1 - \alpha}{\alpha} + \frac{\varphi}{A} \right) - \left(\frac{\varphi}{A} \right) < 0.$$

It follows from (25) that a rise in government spending increases production and reduces the level of consumer prices. This can be explained as follows. It follows from the relationship for goods market equilibrium given by (15) that a rise in government spending raises the demand for home country goods and thus works to create a real appreciation, the price on domestic goods being lowered relative to the price of foreign goods expressed in the same currency. This real appreciation tends to reduce the consumer price. Given the monetary authority's reaction function shown by (24), this reduction in the level of consumer prices creates more room for the monetary authority to pursue an expansive monetary policy which raises employment and production. A rise in government spending thus increases production.

As firms and individuals have perfect foresight concerning the authorities' policy setting during the wage contract period, employment lies at the natural level. It thus results from (24) in combination with (23) that inflation under inflation targeting is determined as

$$(26) \quad \pi^{IT} = \left(\frac{1}{\chi^m} \right) \left(\frac{h}{\alpha} \right) \left[\left(\frac{1 - \alpha}{\alpha} \right) + \left(\frac{\varphi}{A} \right) \right]^{-1} > 0.$$

Equation (26) shows inflation to be determined by the economic structure and by the monetary authority's preferences, reflected by h and χ^m. Government spending has no effect on inflation.[13]

6 Government spending in a monetary union

In a monetary union, the nominal exchange rate lies at an unchanged level in each time period. The money supply is adjusted to maintain the nominal exchange rate. This gives the following constraint on monetary policy:

$$(27) \quad S = \overline{S}.$$

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[13]This determination of inflation corresponds to Rogoff (1985).

As individuals set the nominal wage to reach an exogenously determined natural employment, cf. (17), it results that inflation in the home country is equal to inflation in the foreign country against which the country ties its currency. This gives

$$(28) \quad \pi^{MU} = \pi^*,$$

where the superscript MU denotes a monetary union.

The government determines government spending on the basis of the pre-set nominal wage. Given a pre-set nominal wage and using the assumption of a fixed nominal exchange rate shown by (27), the level of production and the price level on home country goods are determined by the condition for the firms' optimisation with respect to labour (2) and by the condition for goods market equilibrium expressed by (15). Combining (22) with (2), (15), and (27) government spending is thus determined as

$$(29) \qquad g^{MU} = \vartheta \left(\frac{1}{1 + \vartheta - \Psi^{MU}} \right), \quad \Psi^{MU} = \vartheta B^{MU} + \left(\frac{\varphi}{A} \right) - \chi \pi^* D^{MU},$$

$$B^{MU} \equiv \left(\frac{\partial y}{\partial g} \right)^{MU} \left(1 - g^{MU} \right) = \left[1 + A \left(\frac{1 - \alpha}{\alpha} \right) \right]^{-1} > 0,$$

$$D^{MU} \equiv \left(\frac{\partial p^C}{\partial g} \right)^{MU} = B^{MU} \left(\frac{1 - \alpha}{\alpha} + \frac{\varphi}{A} \right) - \left(\frac{\varphi}{A} \right) > 0.$$

It results from (29) that a rise in government spending in a monetary union increases production and the consumer price.

7 Effects of exchange rate regimes on government spending

Two exchange rate regimes have been analysed: (i) a floating exchange rate regime where monetary policy is used to optimise preferences that include an employment target and an inflation target, and (ii) a monetary union with a fixed exchange rate relative to a foreign country. Equations (25) and (29) express how government spending relative to production - and thus also the tax rate - is determined under these two exchange rate regimes. It results that government spending lies at different levels, reflected by the different conditions specified by (25) and (29).

Two factors account for the difference between exchange rate regimes concerning the size of the government budget.

First, there are differences between exchange rate regimes with respect to the impact of government spending on the macroeconomic variables which affect the individuals' utility, i.e. production, the price on home country goods, and the real exchange

rate, when the government acts on the basis of a pre-set nominal wage. Under the floating exchange rate, the effect of government spending on macroeconomic variables is determined on the basis of the goods supply function (2), the goods market equilibrium specified by (15), and the monetary authority's reaction function given by (24). In a monetary union the effect of government spending on macroeconomic variables is determined by the condition of the fixed nominal exchange rate relative to the foreign country - represented by (27) - together with the goods supply function (2) and the goods market equilibrium specified by (15).

Second, the rate of inflation affects fiscal decisions. As there are differences between exchange rate regimes with respect to the rate of inflation, this also creates differences with respect to the government's inclination to expand government spending. Under inflation targeting, inflation is determined by the economic structure and by the monetary authority's preferences corresponding to (26) while inflation in a monetary union equals inflation in the country against which the country ties its currency, corresponding to (28).

Comparing the effects of government spending on production under the two regimes, it results from (25) and (29) that

$$(30) \quad B^{MU} \equiv \left(\frac{\partial y}{\partial g}\right)^{MU} \left(1 - g^{MU}\right) > B^{IT} \equiv \left(\frac{\partial y}{\partial g}\right)^{IT} \left(1 - g^{IT}\right).$$

It follows from (30) that government spending has a larger effect on production in a monetary union than under inflation targeting. This conclusion is similar to the standard Mundell-Fleming model where a more expansive fiscal policy in a monetary union has a larger effect on production in a monetary union than under a floating exchange rate regime.

Using (30) in (25) and (29), it follows that $\Psi^{MU} > \Psi^{IT}$ when inflation is lower than $(\vartheta/\chi)\{(\varphi/A) + [(1 - \alpha)/\alpha]\}$. The converse holds when inflation is higher than $(\vartheta/\chi)\{(\varphi/A) + [(1 - \alpha)/\alpha]\}$. This gives

$$(31) \quad \begin{aligned} g^{MU} &> g^{IT}, \quad \text{if} \quad \pi^z > \pi^{IT}, \quad \wedge \quad \pi^z > \pi^{MU}, \\ g^{IT} &> g^{MU}, \quad \text{if} \quad \pi^{IT} > \pi^z, \quad \wedge \quad \pi^{MU} > \pi^z, \\ \pi^z &\equiv \left(\frac{\vartheta}{\chi}\right)\left[\left(\frac{1-\alpha}{\alpha}\right) + \left(\frac{\varphi}{A}\right)\right], \end{aligned}$$

where π^z is a specific inflation rate.

It results from (31) that the government for relatively low levels of inflation - i.e. inflation rates lying below π^z - is inclined to set a higher level of government spending in a monetary union than under inflation targeting. The converse holds when inflation rises above π^z. The reason for this is first that a given rise in government spending has a stronger impact on production in a monetary union than under inflation targeting, cf. (30), and second that government spending affects the consumer price differently under

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the two regimes. Under inflation targeting, it is possible through a rise in government spending to reduce the consumer price while in a monetary union a rise in government spending raises the consumer price. A higher inflation under inflation targeting thus creates an incentive for the government to expand government spending while higher inflation in a monetary union strengthens the incentive to reduce government spending.

8   Welfare implications

It results from the analysis above that there are different levels of government spending - and thus different tax rates - under different exchange rate regimes. This has welfare implications as government spending and taxation affect the representative individual's utility.

The optimal government spending is realised when the government is able to pre-commit, implying that it can make decisions on government spending prior to the wage setting. It follows from (17) that government spending has no effect on employment which lies at the natural level. It further results from (26) and (28) that government spending has no impact on inflation. It is, however, possible through an expansion of government spending to reach a real appreciation which increases welfare due to a rise in the purchasing power for home country individuals relative to foreign individuals. The optimal setting of government spending is thus determined on the basis of the condition specified by (21) where $\partial y/\partial g = 0$ while $\pi = 0$. This gives the condition for the optimal government spending as

$$(32) \quad g'' \equiv \vartheta \frac{1}{1 + \vartheta - \Psi''}, \quad \Psi'' = \frac{\varphi}{A},$$

where g'' is the optimal level of government spending relative to production.

It follows from the condition for the setting of government spending under inflation targeting - specified by (25) - that $\Psi^{IT} > \Psi'' = (\varphi/A)$ for all non-negative rates of inflation. This means that government spending under inflation targeting lies at a higher level than the optimal level for all rates of inflation, i.e.

$$(33) \quad g^{IT} > g''.$$

It results from (25) that government spending under inflation targeting is increased when there is a higher inflation. A rise in inflation thus moves government spending away from the optimal level under inflation targeting. This means that reforms which increase the weight attached by the monetary authority to inflation, e.g. the creation of an independent central bank or the appointment of conservative central bankers, work to improve welfare not only due to the resulting reduction in inflation but also because government spending is brought closer to the optimal level.

In a monetary union, we derive from (29) and (32) the following relationship between government spending and optimal government spending:

$$(34) \qquad g^{MU} > g'', \quad \text{if} \quad \left(\frac{\vartheta}{\chi}\right)\left(\frac{1-\alpha}{\alpha}\right)(1-\varphi) > \pi^*,$$

$$g^{MU} = g'', \quad \text{if} \quad \left(\frac{\vartheta}{\chi}\right)\left(\frac{1-\alpha}{\alpha}\right)(1-\varphi) = \pi^*,$$

$$g^{MU} < g'', \quad \text{if} \quad \left(\frac{\vartheta}{\chi}\right)\left(\frac{1-\alpha}{\alpha}\right)(1-\varphi) < \pi^*.$$

It results from (34) that government spending in a monetary union at low rates of inflation is too high relative to the optimal level. A higher inflation induces, however, the government to reduce government spending, cf. (29). Below a certain level of inflation, a higher inflation thus brings government spending closer to the optimal level. Above this level of inflation, government spending is lower than the optimal level.

The authorities thus face a trade-off when they design the institutional set-up in a monetary union. Up to a certain level, a higher inflation increases welfare seen from the perspective of bringing government spending closer to the optimal level. The policymakers should weigh this positive effect arising from higher inflation against the negative effect on welfare which results because inflation by itself reduces welfare, e.g. due to an increase in shopping time and a rise in information costs.

As government spending lies at a lower level under inflation targeting than in a monetary union at rates of inflation below π^z, cf. (31), it is possible at relatively low rates of inflation - inflation being below π^z - to increase welfare by switching from a monetary union to inflation targeting if the same inflation can be maintained under the two regimes.

9   Summary and conclusion

Using an economic framework based on optimising foundations and making the assumption of nominal wages which are pre-set through contracts for one period, the article has examined how the exchange rate regime affects government spending. Assuming a balanced government budget, decisions on government spending - and thus on taxation - are made by a benevolent government which optimises a representative individual's utility. Decisions on government spending are made subsequent to the wage setting. Two exchange rate regimes have been examined: (i) inflation targeting, defined as a floating exchange rate regime where the monetary authority optimises preferences which include an employment target and an inflation target, and (ii) a monetary union where the exchange rate is tied to that of another country with no possibility of adjustment. It has been demonstrated that the exchange rate regime

affects government spending through two channels. First, as the government acts on the basis of a pre-set nominal wage, the exchange rate regime determines how a change in government spending affects macroeconomic variables. Second, the exchange rate regime determines the rate of inflation which in turn affects the government's inclination to expand government spending because changes in government spending can be used to reduce inflation. It has been demonstrated that the government at low rates of inflation is inclined to set a higher level of government spending in a monetary union than under a floating exchange rate regime. This is because a given rise in government spending has a bigger impact on production in a monetary union than under inflation targeting. It has further been demonstrated that welfare for low rates of inflation is higher under inflation targeting than in a monetary union due to the lower level of government spending. A rise in inflation induces the government to increase government spending under inflation targeting while government spending is reduced by higher inflation in a monetary union. With a rise in inflation, a monetary union thus becomes more attractive relative to inflation targeting as government spending is brought closer to its optimal level in a monetary union while it is distanced from the optimal level under inflation targeting.

REFERENCES

Agell, J., L. Calmfors and G. Jonsson (1996). Fiscal Policy when Monetary Policy is Tied to the Mast. *European Economic Review*, 40, 1413–1440.

Alesina, A., R. J. Barro and S. Tenreyo (2002). Optimal Currency Areas. *National Bureau of Economic Research*, Working Paper 9072.

Alesina, A. and G. Tabellini (1987). Rules and Discretion with Noncoordinated Monetary and Fiscal Policies . *Economic Inquiry*, XXV, 619–630.

Barro, R. J. and D. B. Gordon (1983). A Positive Theory of Monetary Policy in a Natural Rate Model. *Journal of Political Economy*, 91, 589–610.

Beetsma, R.M. W. J. and A. L. Bovenberg (1998). Monetary Union without Fiscal Coordination May Discipline Policymakers. *Journal of International Economics*, 45, 239-258.

Beetsma, R. M. W. J. and A. L. Bovenberg (2001). The Optimality of a Monetary Union without a Fiscal Union. *Journal of Money, Credit, and Banking*, 33(2), 179-204.

Buiter, W., G. Corsetti and N. Roubini (1993). Excessive Deficits: Sense and Nonsense in the Treaty of Maastricht. *Economic Policy*, 57-100.

Buiter, W. H. and K. M. Kletzer (1991). The Welfare Economics of Cooperative and Noncooperative Fiscal Policy. *Journal of Economic Dynamics and Control*, 15, 215-244.

Canzoneri, M. B., R. E. Cumby and B. T. Diba (2001). Fiscal Discipline and Exchange Rate Systems. *The Economic Journal*, 111, 667-690.

Caselli, P. (2001). Fiscal Consolidation under Fixed Exchange Rates. *European Economic Review*, 45, 425-450.

Chari, V. V. and P. J. Kehoe (2004). On the Desirability of Fiscal Constraints in a Monetary Union. *National Bureau of Economic Research*, Working Paper 10232.

Committee for the Study of Economic and Monetary Union (1989). *Report on Economic and Monetary Union in the European Community.*

Cooper, R. and H. Kempf (2000). Designing Stabilization Policy n a Monetary Union. *National Bureau of Economic Research*, Working Paper 7607.

De Grauwe, P. (1990). Fiscal Discipline in Monetary Unions. *Centre for European Policy Studies*, Working Paper No. 50.

Dixit, A. (2001). Games of Monetary and Fiscal Interactions in the EMU. *European Economic Review*, 45, 589-613.

Dixit, A. and L. Lambertini (2001). Monetary-Fiscal Policy Interactions and Commitment versus Discretion in a Monetary Union. *European Economic Review*, 45, 977-987.

Eichengreen, B. (1993). European Monetary Unification. *Journal of Economic Literature*, 31, 1321-1357.

Frankel, J. A. (2003). Experience of and Lessons from Exchange Rate Regimes in Emerging Economies. *National Bureau of Economic Research*, Working Paper.

Hau, H. (2000). Exchange Rate Determination: The Role of Factor Price Rigidities and Nontradables. *Journal of International Economics*, 50, 421-448.

Jensen, H. (1994). Loss of Monetary Discretion in a Simple Dynamic Policy Game. *Journal of Economic Dynamics and Control*, 18, 763–779.

Kydland, F. E. and E. C. Prescott (1977). Rules Rather than Discretion: The Inconsistency of Optimal Plans. *Journal of Political Economy*, 85, 473–493.

Lane, P. R. (2001). The New Open Economy Macroeconomics: A Survey. *Journal of International Economics*, 54, 235-266.

Levine, P. and A. Brociner (1994). Fiscal Policy Coordination and EMU: A Dynamic Game Approach. *Journal of Economic Dynamics and Control*, 18(3/4), 699-729.

Masson, P. R. and M. P. Taylor (1992). Issues in the Operation of Monetary Unions and Common Currency Areas. In M. Goldstein, P. Isard, P. R. Masson and M. P. Taylor (eds.), *Policy Issues in the Evolving International Monetary System*. Washington, D.C.: IMF Occassional Papers 96, 37-72.

Masson, P. R. and M. P. Taylor (1993). Fiscal Policy within Common Currency Areas. *Journal of Common Market Studies*, 31, 29-44.

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

Obstfeld, M. and K. Rogoff (1996). *Foundations in International Macroeconomics*. Cambridge, Mass.: The MIT Press.

Obstfeld, M. and K. Rogoff (2000). New Directions.for Stochastic Open Economy Models. *Journal of International Economics*, 50, 117-153.

Obstfeld, M. and K. Rogoff (2002). Global Implications.of Self-Oriented National Monetary Rules. *The Quarterly Journal of Economics*, CXVII(2), 503-535.

Ostrup, F. (2000). *Money and the Natural Rate of Unemployment*. Cambridge: Cambridge University Press.

Rogoff, K. (1985). Can International Monetary Policy Cooperation be Counterproductive? *Journal of International Economics*, 18, 199-217.

Sibert, A. (1992). Government Finance in a Common Currency Area. *Journal of International Money and Finance*, 11, 567-578.

Tenreyo, S. and R. J. Barro (2003). Economic Effects of Currency Unions. *National Bureau of Economic Research*, Working Paper 9435.

Tornell, A. and A. Velasco (2000). Fixed versus Floating Exchange Rates: Which Provides More Fiscal Discipline? *Journal of Monetary Economics*, 45, 399-436.

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