Monetary and Fiscal Unification in the EU:  
A Stylized Analysis

Bas van Aarle* and Florence Huart

The Economic and Monetary Union (EMU) implies a considerable change in monetary and fiscal policy design in the European Union. With the aid of a two-country version of the Alesina and Tabellini (1987) model, this paper provides a stylized analysis of monetary and fiscal policy interaction in the EMU. It is shown how macroeconomic outcomes are affected by common monetary and fiscal policies, and how outcomes depend on the commitment ability of the ECB when implementing its monetary policy. Moreover, it is analyzed how asymmetries between countries affect outcomes when entering the EMU. © 1999 Elsevier Science Inc.

Keywords: EMU; ECB; Monetary and fiscal policy

JEL classification: E58, E62, E63

I. Introduction

The countries of the European Union (EU) which will join the Economic and Monetary Union (EMU) will delegate the design of monetary policy from the former national central banks to the new common European Central Bank (ECB). Moreover, with the proceeding of economic integration, the efforts to increase fiscal convergence and integration have also gained importance. The Maastricht Treaty of 1991 on the EMU provides a blueprint for the establishment of a monetary union in the EU and a framework for fiscal integration, harmonization and convergence in the EU. EMU, therefore, implies a considerable change in the design and interaction of monetary and fiscal policy in the EU. This paper investigates the design and interaction of monetary and fiscal policy in a monetary union, and analyzes how the establishment of a monetary and fiscal union might affect macroeconomic variables.
We consider different policy regimes and focus upon the output and inflation performance and fiscal variables in the different regimes. The starting point is a setting with national autonomy in both monetary and fiscal policy. This setup is a stylized representation of the pre-EMU situation. Next, we analyze a setting where countries decide to replace national monetary autonomy and to form a monetary union with a centralized monetary authority, the ECB, which controls the supply of the common currency, the Euro. We first consider outcomes when national fiscal autonomy remains. We compare outcomes under a regime where the ECB can commit its monetary policies towards the private sector with the case where it cannot do so. In the first case, the ECB can be considered as having a high degree of independence, whereas in the second case, it has been unable to achieve a clear degree of independence. From this perspective, this paper complements earlier studies on ECB monetary policy and economic performance in the EMU by Alesina and Grilli (1993), von Hagen and Süppel (1994) and Martin (1995), which have been carried out in the context of the Barro and Gordon (1983) model.

Finally, a setting is considered where national fiscal autonomy vanishes and national fiscal authorities are replaced by a federal fiscal authority which controls taxation in the EU. Although fiscal autonomy is still high at the start of the EMU, it is conceivable that in the EU, federal fiscal policies will become increasingly important in the future. The European Commission (1993) studied in detail such fiscal federalism dimensions of the EMU. In our stylized representation of an EU with federal taxation and government spending, the federal fiscal authorities decide upon taxation in the EU. Fiscal transfers enable redistribution of resources in the EU to stimulate development in stagnating parts or, more generally, to promote any other policy goal which requires redistribution of resources.

To analyze the interaction of monetary and fiscal policies under EMU, the model of monetary and fiscal policy interaction of Alesina and Tabellini (1987) is extended to a two-country monetary union setting. In this manner, more insight results as to the interaction of monetary and fiscal policy under EMU. The versatility of the approach by Alesina and Tabellini (1987) also witnesses a number of recent studies which have extended the analysis to a two-country setting. vanHoose (1992) studied the institutional setting of a two-country European Monetary System (EMS). Agell et al. (1996) studied exchange rate and fiscal policy discretion and commitment in the case of a small country which participated in a managed exchange rate system like the EMS. In addition, it is shown how binding borrowing constraints—such as the one imposed by the Maastricht Treaty—affect the outcomes. Martin (1995) modeled a two-speed monetary union in which one country initially was outside EMU because it had positive inflation and output targets which, however, gradually converged to those of the EMU countries. Beetsma and Bovenberg (1995) studied the effects of EMU on the interaction of monetary and fiscal policy. Banerjee (1997) studied in detail the interaction of national fiscal authorities and the ECB, and considered a large number of alternative EMU scenarios.

Our paper aims to complement these studies and focuses on a few aspects of EMU which have been left unexplored or not studied in full detail previously. It remains closer to the original framework as pioneered by Alesina and Tabellini (1987) and vanHoose (1992) than the other studies mentioned, which all extended the original with additional features, interactions and mechanisms. Although interesting and certainly relevant, such extensions necessarily complicate these analyses significantly and require at some point a compromise between simplicity and transparency—as inherent in the original framework—and relevance. Our analysis adds two innovations to the existing literature. First,
we consider the consequences of fiscal unification under EMU when the countries which
form a monetary union also decide to centralize fiscal policy. In this manner, the analysis
contributes—albeit in a stylized manner—to the recurrent debates on the need to harmo-
nize tax systems and fiscal policies, and to develop federal fiscal policies in the EU.
Second, the effects of some asymmetries among the countries which form a monetary
union are analyzed. Two possible asymmetries are focused upon: 1) differences of
commitment ability of the former national monetary authorities; 2) differences in fiscal
preferences. The implications of these asymmetries, which also bear relevance in the
context of the EMU, are studied in Section V.

The structure of the paper is as follows: Section II extends the Alesina and Tabellini
(1987) closed-economy model to a two-country setting with national autonomy in mon-
etary and fiscal policy design. Section III analyzes outcomes when the countries decide to
form a monetary union, and compares the outcomes under EMU with the outcomes under
national monetary policy as derived in Section II. Section IV introduces fiscal federalism
in the EMU and considers its effects on macroeconomic performance. In Section V, we
consider the effects of structural asymmetries among the countries which have decided to
enter the EMU. A short conclusion summarizes our main results.

II. National Autonomy in Monetary and Fiscal Policy Design

To study the interaction between monetary and fiscal policy in the EMU, we have extended
the elegant framework of Alesina and Tabellini (1987) to a two-country EU. The Alesina and
Tabellini (1987) analysis studies the interaction of monetary and fiscal policy in the context of
a closed economy. It is shown how output, inflation and taxation are the outcomes of the
interactions among the monetary authority, who determines the rate of inflation, the fiscal
authority, who controls (distortionary) taxation of private sector output, and the private sector
with a centralized trade union that sets the nominal wage. A distinction is made between two
equilibria: in the equilibrium with discretionary monetary policy, the monetary player is unable
to credibly commit its policy towards the private sector. In the commitment equilibrium, on the
other hand, the monetary authority is able to commit its monetary policy.

The starting point of our analysis is the pre-EMU situation with national currencies and
national monetary policy autonomy.1 Consider an EU which consists of two parts or
countries, the relative sizes of which (e.g., in terms of trend output) are given by $g_1$ and $1 -
g_1$, respectively. As in Alesina and Tabellini (1987) and vanHoosse (1992), output, $y$, which
is taxed at a rate $\tau$, is produced by competitive firms which use labor input as the sole
variable input in the production process. With capital being fixed, aggregate supply in that
case is a function of relative real unit labor costs,2

$$y = \alpha(p - w - \tau);$$  \hspace{1cm} (1a)

$$y^* = \alpha(p^* - w^* - \tau^*),$$  \hspace{1cm} (1b)

---

1 Alternatively, we could interpret this regime as representing a two-speed monetary union which consists of
a core and a peripheral part of the EU. A two-speed monetary union in which EU countries retain national
monetary policy autonomy but engage in a process of monetary and economic convergence has been proposed
by a number of economists and politicians as an alternative to a too rapid unification process which may prove
unsustainable in the long run.

2 See also Alesina and Tabellini (1987). Both countries are assumed to have access to the same production
technologies, resulting in symmetric values for $\alpha$. Relaxing this assumption would considerably complicate the
analytical expressions in the remainder, without producing further insights.
in which \( \rho \) denotes the output price level, and \( w \), the nominal wage. Variables are expressed as deviations from the initial equilibrium where output is at its natural rate and has been normalized to zero for convenience. Foreign variables are indicated with an asterisk.

Nominal wages in both countries are set by national trade unions which try to minimize deviations of real wages from their real wage targets, \( \tilde{w} \) and \( \tilde{w}^* \),

\[
\min_w W^T - \frac{1}{2} (w - p - \tilde{w})^2;  \tag{2a}
\]

\[
\min_{w^*} W^{T^*} = \frac{1}{2} (w^* - p^* - \tilde{w}^*)^2.  \tag{2b}
\]

Losses, therefore, are minimized if:

\[
w = p + \tilde{w};  \tag{3a}
\]

\[
w^* = p^* + \tilde{w}^*,  \tag{3b}
\]

in which the superscript, \( e \), refers to the expectation of a variable.

Defining the inflation rates as \( \pi = dp/dt \) and \( \pi^* = dp^*/dt \), output in both countries can also be written as a function of inflation rates:

\[
y = \alpha(\pi - \pi^e - \tau - \tilde{\omega});  \tag{4a}
\]

\[
y^* = \alpha(\pi^* - \pi^{e*} - \tau^* - \tilde{\omega}^*).  \tag{4b}
\]

Equations (4a) and (4b) show two important sources of unemployment in the model: firstly, real wage claims by the trade unions, implying \( \tilde{\omega} > 0 \), drive a wedge between real wages and productivity of labor and output below the (zero) equilibrium level of output. Secondly, high taxes also drive down output and increase unemployment. Note that the inflation rates in both countries are linked by the assumption of purchasing power parity, implying \( x = \pi - \pi^* \).

In the absence of government debt,\(^3\) government expenditures are financed by ordinary taxes and seignorage revenues. The government budget constraints equate government spending, \( G \), with ordinary taxes, \( T \), plus seignorage revenues, \( M = dM/dt \), which the central bank receives when increasing the supply of base money, \( M \), in the economy. Expressed as fractions of domestic output, \( Y \), the government budget constraints read:

\[
\frac{G}{Y} = \frac{T}{Y} + \frac{M}{Y};  \tag{5a}
\]

\[
\frac{G^*}{Y^*} = \frac{T^*}{Y^*} + \frac{M^*}{Y^*}.  \tag{5b}
\]

Approximating, as in Alesina and Tabellini (1987), seignorage revenues as a fraction of output by the rate of inflation, and defining the government expenditures to output, \( g = G/Y \), and taxes to output, \( \tau = T/Y \), as ratios, we can rewrite equation (5) as:

\(^3\)As in Alesina and Tabellini (1987), our analysis ignores the intertemporal dimension of the government budget implied by government debt. The absence of government debt can alternatively be interpreted as a situation where policymakers wish to raise an amount, \( \tilde{g} \), of government expenditures in the form of either taxes or seignorage. See van Aarle et al. (1997) for the interaction between the ECB and national fiscal authorities, and the problem of government debt stabilization under EMU.
\[ g = \tau + \pi; \quad \text{(6a)} \]
\[ g^* = \tau^* + \pi^*. \quad \text{(6b)} \]

The fiscal authorities in both countries set the tax rate so as to minimize their loss functions, which are assumed to depend on inflation, output, and deviations of government spending from their exogenously given target values, \( \bar{g} \) and \( \bar{g}^* \).

\[
\min_{\tau} V^F = \frac{1}{2} \{ \pi^2 + \delta_1 y^2 + \delta_2 (g - \bar{g})^2 \} \quad \text{(7a)}
\]
\[
\min_{\tau^*} V^{F*} = \frac{1}{2} (\pi^2 + \delta_1^* y^2 + \delta_2^*(g^* - \bar{g}^*)^2). \quad \text{(7b)}
\]

Government expenditures are determined residually from the government budget constraints, defined in equation (6). Because the fiscal authorities are subject to electoral discipline, we assume in the remainder of the analysis that the preferences of the fiscal authorities in equation (7) also reflect the underlying social preferences. We also consider similar loss functions for the national monetary authorities,

\[
\min_{\pi} V^M = \frac{1}{2} \{ \pi^2 + \mu_1 y^2 + \mu_2 (g - \bar{g})^2 \}; \quad \text{(8a)}
\]
\[
\min_{\pi^*} V^{M*} = \frac{1}{2} \{ \pi^2 + \mu_1^* y^2 + \mu_2^*(g^* - \bar{g}^*)^2 \}. \quad \text{(8b)}
\]

We assume that the fiscal authorities care relatively more about output stabilization and the fiscal spending objective than the monetary authorities, implying that \( \delta_1 \gtrsim \mu_1, \delta_1^* \gtrsim \mu_1^* \), \( \delta_2 \gtrsim \mu_2 \), and \( \delta_2^* \gtrsim \mu_2^* \).

We derive the reaction functions of the fiscal authorities and monetary authorities in both countries by minimizing the loss functions of the monetary and fiscal authorities subject to the respective output [equation (4)] and government budget [equation (6)] constraints. Using the rates of inflation and taxation which result, we derive output and government spending, given in Figure 1a.

The inflation rates in Figure 1a were derived under the assumption that the monetary authorities were able to credibly commit ex ante their monetary policies towards the private sector. Monetary policy, however, is, in principal, subject to a time-inconsistency problem because the monetary authority is tempted to increase output by creating an unanticipated increase in the rate of inflation after wage contracts have been signed. The private sector, when realizing this time-inconsistency problem, will adjust its inflationary expectations such as to internalize this time-inconsistency problem in their decision-making process. With rational economic agents, the time-inconsistency problem, therefore, gives rise to an inflationary bias in the economy in case the monetary authority is unable to commit towards the private sector. Rogoff (1985) showed that conservative central bankers who attribute low value to output stabilization, i.e., who have a low \( \mu_1 \), on the one hand improve welfare, as conservativeness alleviates the inflationary bias in the economy. On the other hand, in the presence of random output shocks, some flexibility is
efficient and a too conservative central bank produces inefficient outcomes.\textsuperscript{4} Figure 1b
gives inflation, taxation, government spending, and output under monetary policy discre-

tion in both countries,

Under both monetary policy commitment (Figure 1a) and monetary policy discretion
(Figure 1b), we see that government spending is below its target. Moreover, output,
inflation, taxes, the rate of depreciation, and welfare losses are all directly related to the
deviation of government spending from its target. Comparing Figures 1a and 1b, we find
the first of the two main results from the Alesina and Tabellini (1987) analysis: inflation,
output and government spending are higher and taxes are lower under discretionary
monetary policies than under monetary policy commitment. The higher rate of inflation
under monetary policy discretion implies higher seignorage revenues which can be used
to increase government spending and to lower taxes, which in turn, increases output. It is
straightforward to show that from an initial position where $d_i \equiv \mu_i$, $i = \{1, 2\}$, welfare
losses are lower under monetary policy commitment than under monetary policy discretion,
because the positive welfare effect from lower inflation dominates the negative
effects from lower government spending and lower output. When lowering the values of
$\mu_i$, however, at some point welfare under monetary policy discretion starts to exceed
welfare under monetary policy commitment.

Upon partial differentiation of the expressions for government spending, output, inflation
and taxation w.r.t. the preference weights of the policymakers, the second main result of the

\begin{align*}
g - g &= \frac{\delta_1 \alpha^2}{\delta_1 \alpha(1 + \mu_2) + \delta_2 (\bar{\omega} + \bar{g})} \\
y &= -\frac{\delta_2}{\delta_1 \alpha} (\bar{g} - g) \\
\pi &= \mu_2 (\bar{g} - g) \\
\tau &= -\bar{\omega} + \frac{\delta_2}{\delta_1 \alpha} (\bar{g} - g) \\
\bar{g}^* - g^* &= \frac{\delta_1 \alpha^2}{\delta_1 \alpha(1 + \mu_2) + \delta_2 (\bar{\omega}^* + \bar{g}^*)} \\
y^* &= -\frac{\delta_2}{\delta_1 \alpha} (\bar{g}^* - g^*) \\
\pi^* &= \mu_2 (\bar{g}^* - g^*) \\
\tau^* &= -\bar{\omega}^* + \frac{\delta_2}{\delta_1 \alpha} (\bar{g}^* - g^*)
\end{align*}

\textbf{Figure 1a.} Outcomes with national monetary policies: monetary policy commitment.

\textsuperscript{4} In addition, as first argued by Jensen (1992), the fiscal authority may also face a time-inconsistency
problem in the present setup because unanticipated tax cuts increase output. Fiscal policy discretion, therefore,
produces lower taxes, lower government spending and higher inflation, while output is not affected ex post. Our
analysis ignores the fiscal time-inconsistency problem and focuses on the time-inconsistency problem of the
monetary authorities. Implicitly, we assume that the fiscal authorities always succeed in implementing their
policies with commitment. Banerjee (1997) studied monetary and fiscal policy discretion and commitment in the
EMU, and showed how outcomes are affected when considering different assumptions about the abilities of
monetary and fiscal authorities to commit monetary and fiscal policies towards the private sector.
Alesina and Tabellini (1987) analysis results show: with monetary policy discretion, a more conservative monetary authority, implying a decrease in \(m_1\), reduces inflation, government spending and output, and increases taxation. In addition, if \(d_i < m_i\), welfare losses are lower with a more conservative monetary authority, whereas welfare losses can be higher with a more conservative monetary authority if \(d_i > m_i\). Social welfare first increases with a more conservative monetary authority that attributes smaller weights to output and government spending. At some values of \(m_1\) and \(m_2\), the positive effect from lower inflation, however, starts to be outweighed by the loss of seignorage which has to be compensated by higher taxation which depresses output and/or lowers government spending.

### III. Establishing a Monetary Union

From a setting with national autonomy in monetary and fiscal policy design, we now shift our attention to a setting where both countries decide to form a monetary union, the EMU. Under EMU, national currencies cease to exist and exchange rate changes are ruled out by definition. National monetary policies are replaced by the common monetary policy of the ECB. Representatives of the participating countries have a (weighted) vote in the decision-making process inside the ECB and, in this way, on its monetary policies. Given our earlier assumption that the goods markets of both countries are highly integrated, a monetary union implies that a common price level, \(p^E\), prevails in both countries, which grows at the common rate of inflation. Defining the common rate of inflation, \(\pi^E = dp^E/dt\), we can rewrite aggregate supply in both countries as a function of inflation.

---

5 See in particular Alesina and Grilli (1993), and the text of the Maastricht Treaty, for a more detailed account of the internal decision-making process in the ECB.
inflation expectations of the trade unions, their real wage targets, and the level of
distortionary output taxation that the fiscal authorities choose:
\[ y = \alpha (\pi^E - (\pi^E) - \tau - \bar{\omega}); \quad (9a) \]
\[ y^* = \alpha (\pi^E - (\pi^E)^* - \tau^* - \bar{\omega}^*). \quad (9b) \]
The ECB sets the common rate of inflation such as to minimize its loss function, which
is assumed to depend on the common rate of inflation, average output, \( y^A \), and the
deviation of average government spending, \( g^A \), from its target level, \( \bar{g}^A \):
\[ \min_{\pi^E} V^{ECB} = \frac{1}{2} \{ (\pi^E)^2 + \mu_1 (y^A)^2 + \mu_2 (g^A - \bar{g}^A)^2 \}. \quad (10) \]
Average output and government spending (targets) are defined as \( y^A = \gamma y + (1 - \gamma) y^* \)
and \( g^A = \gamma g + (1 - \gamma) g^* \), where \( \gamma \) and \( 1 - \gamma \) denote, again, the relative sizes of both
countries. That the ECB is assumed to care about average output and average government
spending can be understood when considering the ECB as a coalition of the former
national central banks in the EU, the individual objectives of which are weighted by the
relative country sizes.

Under EMU, the government budget constraints relate government spending to ordi-
nary taxes plus seignorage revenues received from the ECB. Seignorage revenues of the
ECB equal the increase of the supply of Euro(pan) base money, \( M^E = dM^E/dt \). The ECB
redistributes its seignorage revenues to both countries according to their shares in the
ECB, which are denoted by \( u \) and \( 1 - u \). As fractions of domestic output, the dynamic
government budget constraints now read:
\[ \frac{G}{Y} = \frac{T}{Y} + \frac{\theta M^E}{Y}; \quad (11a) \]
\[ \frac{G^*}{Y^*} = \frac{T^*}{Y^*} + \frac{(1 - \theta) M^E}{Y^*}. \quad (11b) \]
Denoting again fractions of GDP by lower case variables, and approximating ECB
seignorage as a fraction of EU GDP by the European rate of inflation, implying that
\( \pi^E = M^E/Y^E \), and noting that EU output \( Y^E = Y + Y^* \) and \( \gamma = Y/Y^E \), we rewrite equation (11) as:
\[ g = \tau + \frac{\theta}{\gamma} \pi^E; \quad (12a) \]
\[ g^* = \tau^* + \frac{1 - \theta}{1 - \gamma} \pi^E. \quad (12b) \]
To relate the fractions of the ECB seignorage which both countries receive to the size of
their economies, we have to scale them down by the fractions, \( \gamma \) and \( 1 - \gamma \), which
measure the relative sizes of both countries in the EU economy. If countries receive a

---

\footnote{The Protocol belonging to the Maastricht Treaty determines in Article 33 that seignorage of the ECB is
redistributed to the EU countries in proportion to their shares in the ECB capital. Article 29 determines the shares
of the EU countries in the capital of the ECB to be weighted averages of the shares of the EU countries in total
EU population and the shares of the EU countries in total EU GDP.}
share in ECB seignorage according to their size, \( \theta \) equals \( \gamma \) and \( 1 - \theta \) equals \( 1 - \gamma \); other distribution functions, however, are also conceivable.\(^7\)

The monetary policy of the ECB has both a stabilization dimension, as inflationary surprises affect output in both economies according to equation (9), and a revenue dimension, as higher inflation implies higher seignorage revenues for both countries, according to equation (12). Like the (former) national monetary authorities, the ECB may face time-inconsistency problems with the implementation of its monetary policy. In the context of the EMU, it is often argued that the ECB might be subject to additional commitment problems if the no-bail out provision of highly-indebted countries is not credible. In that case, the ECB will be effectively forced to monetize partly the deficits of these countries, such as to prevent an EMU-wide financial crisis. To strengthen the credibility of no bail out of undisciplined and insolvent governments by the ECB, a high degree of ECB independence and the fiscal stringency criteria were put into the Maastricht Treaty. To analyze such time-inconsistency problems in EMU, we compare outcomes under a regime where the ECB is able to commit its monetary policy towards the EU private sector with outcomes under the time-consistent discretionary regime where it cannot do so. An independent ECB is more likely to establish credibility and to sustain a commitment equilibrium, whereas a dependent ECB may not be able to implement its monetary policy with commitment.

Monetary policy of the ECB is found when minimizing equation (10) subject to the output equations (9) and the government budget constraints (12). Fiscal policies are found when minimizing the respective loss functions [equation (7)] subject to their individual output [equation (9)] and government budget [equation (12)]. With the use of these policy reaction functions, the equilibrium in the commitment case can be written as:

\[
\Delta^C = (\delta_1 \alpha^2 + \delta_2)(\delta_1^2 \alpha^2(1 + (1 - \theta)\mu_1^2) + \delta_2^2 + \delta_1 \alpha^2 \theta(\delta_1^2 \alpha^2 + \delta_2^2)\mu_2^2).
\]

Figure 2a gives the outcomes under EMU when the ECB can commit its monetary policy. As mentioned, binding agreements or reputational forces enable the ECB to sustain the commitment equilibrium. If such features are absent, the case arises where the ECB is unable to commit its monetary policy towards the private sector. It is straightforward, as well, to calculate the equilibrium with discretion in which the ECB fails to commit itself. Solving, as before, the first-order conditions of all players, we can derive the reaction functions of the fiscal authorities in both countries and the ECB in the no-commitment case. Figure 2b gives the outcomes under EMU when the ECB implements monetary policy with discretion.

A comparison between outcomes under ECB monetary policy commitment (Figure 2a) and discretion (Figure 2b) does not provide an unambiguous picture on the differences between both regimes for the individual countries. From the perspective of the individual countries, outcomes under a monetary union, moreover, can be compared with outcomes under national monetary policy autonomy, by comparing Figures 1 and 2. It is seen that outcomes under a monetary union are, in principal, quite different from those under national monetary policy autonomy because the change from national monetary policy to a common monetary policy affects not only inflation but also

\(^7\) An example might illustrate equation (12). Consider an EU in which country 1 is larger than country 2, e.g., \( \gamma = 2/3 \). When ECB seignorage is equally distributed, implying \( \theta = 1/2 \), \( \theta \gamma \) equals \( 3/4 \) and \( 1 - \theta(1 - \gamma) \), \( 3/2 \). Seignorage revenues in that case are redistributed from country 1 to country 2 because its ECB share is smaller than its size, implying that \( \theta \gamma < 1 \).
national fiscal policies and, thereby, output and welfare of the individual countries. Outcomes under EMU depend not only on national fiscal preferences and real wage targets—as is the case under national monetary policy autonomy—but also on those of the foreign economy. In addition, preferences of the ECB, rather than those of the national monetary authorities, determine outcomes under EMU. An important role is also played by the seignorage redistribution channel, which depends on the distribution and size parameters, \( u \) and \( g \).

Calculating EU averages, however, provides a clearer picture in the case where we assume that \( d_i = d_i^* \), \( i = \{1, 2\} \). It is straightforward to show that in that case the basic results of the closed economy of Alesina and Tabellini (1987) apply also to the monetary union case. In particular, EU-wide inflation, average output and average government spending are lower, and average taxes are higher, under ECB monetary policy commitment than under monetary policy discretion. Also, it is straightforward to show that a more conservative ECB—implying a decrease in \( \mu_i^E \)—reduces EU-wide inflation, average output and average government spending, and increases average taxation with discretionary monetary policy. Also, from an initial position where \( \mu_i^E = \delta_i = \delta_i^* \), \( i = \{1, 2\} \), average welfare losses are lower with a more conservative monetary authority. Welfare losses, however, can be higher with a more conservative monetary authority in an initial position where \( \mu_i^E \neq \delta_i = \delta_i^* \), \( i = \{1, 2\} \). A more conservative ECB implies lower inflation and, therefore, higher average taxes, lower average output, and average government spending under EMU. From an initial position where \( \mu_i^E = \delta_i = \delta_i^* \), \( i = \{1, 2\} \), the positive welfare effects from lower inflation exceed the welfare costs from lower average output and average government spending. When decreasing \( \mu_i^E \), however, at some point the balance reverses and a more conservative ECB starts to deteriorate average welfare in the EU. Therefore, the basic results of the closed economy analysis of Alesina and Tabellini (1987) also apply to a monetary union when we consider average government spending, output, taxation and welfare.

**Figure 2a.** Outcomes under monetary union: monetary policy commitment.

\[
\begin{align*}
\tilde{g} - g &= \frac{\delta_1 \alpha^2 (\delta_1^* \alpha^2 (1 + (1 - \theta) \mu_2^E) + \delta_2^2)}{\Delta^e} \tilde{\omega} - \frac{\delta_1 \alpha^2 (1 - \gamma) \theta \delta_1^* \alpha^2 \mu_2^E}{\Delta^e} \tilde{\omega} - \frac{\delta_1 \alpha^2 (1 - \gamma) \delta_1^* \alpha^2 \mu_2^E}{\Delta^e} \tilde{\omega}^* + \tilde{g}^*
\end{align*}
\]

\[
y = -\frac{\delta_2}{\delta_1} (\tilde{g} - g)
\]

\[
\tau = -\tilde{\omega} + \frac{\delta_2}{\delta_1} \alpha^2 (\tilde{g} - g)
\]

\[
\tilde{g}^* - g^* = \frac{\delta_1 \alpha^2 (\delta_1^* \alpha^2 (1 + \theta \mu_2^E) + \delta_2^2)}{\Delta^e} \tilde{\omega}^* + \frac{\delta_1 \alpha^2 (1 - \gamma) \theta \delta_1^* \alpha^2 \mu_2^E}{\Delta^e} \tilde{\omega}^* - \frac{\delta_1 \alpha^2 (1 - \gamma) \delta_1^* \alpha^2 \mu_2^E}{\Delta^e} \tilde{\omega}^* + \tilde{g}^*
\]

\[
y^* = -\frac{\delta_2^*}{\delta_1^*} (\tilde{g}^* - g^*)
\]

\[
\tau^* = -\tilde{\omega}^* + \frac{\delta_2^*}{\delta_1^*} \alpha^2 (\tilde{g}^* - g^*)
\]

\[
\pi = \pi^* = \pi^E = \mu_2^E (\gamma (\tilde{g} - g) + (1 - \gamma) (\tilde{g}^* - g^*))
\]
A growing degree of harmonization of tax rates and tax systems has been achieved in the EU, and it is likely that in the future, issues of fiscal federalism will become more important and pressing. In particular, the question has to be addressed, to what extent control over taxation and government spending will be centralized at the federal EU level rather than at a national and regional level, as currently. The arguments from the theory of fiscal federalism indicate that a higher degree of centralization of taxation and government spending than is currently seen in the EU is likely to be efficient because of important externalities and economies of scale and scope in raising tax revenues and providing public goods. At present, the EU budget only represents 1.2% of the EU GDP, whereas the federal budget in existing monetary unions (e.g., United States, Canada, Switzerland and Germany) amounts to 30% to 40% of GDP. A federal EU budget will perform three important functions: an allocative function, a redistributional function, and a stabilization function. Currently, a large share of the EU budget is devoted to control allocation in the agricultural sector. The remainder of the budget is largely directed to the EU Structural Funds, which are redistributive grant mechanisms designed to foster convergence and cohesion in the EU. Their redistributive power is currently fairly limited because of their small size, and a further increase in the EU budget will be necessary to...
foster real convergence in the EU. In addition, a more substantial EU budget will increase the importance of the EU budget as an automatic stabilizer of asymmetric shocks in the EMU, a role which is virtually absent currently.8

If the EU evolves into a true federation, the European Union institutions will control the European tax system and government spending. In an admittedly simplified manner, fiscal federalism can be analyzed in our simple model by introducing a European Fiscal Authority (EFA)9 which chooses a common output tax, \( \tau^E \), and redistributes the revenues from this common output tax to the two national fiscal authorities in a proportion, \( \{ \phi, 1 - \phi \} \). Under EMU and federal fiscal policies in the EU, a country, therefore, receives a share from the federal tax revenues, \( T^E \), and a share from the seignorage revenues of the ECB.

As fractions of output, the government budget constraints under monetary and fiscal unification in the EU become:

\[
\frac{G}{Y} = \frac{\phi T^E}{Y} + \frac{\theta M^E}{Y} \tag{13a}
\]

\[
\frac{G^*}{Y^*} = \frac{(1 - \phi) T^E}{Y^*} + \frac{(1 - \theta) M^E}{Y^*} \tag{13b}
\]

Denoting, again, fractions of GDP by lower case variables, and approximating ECB seignorage as a fraction of EU GDP by the European rate of inflation, we can rewrite equation (13) as:

\[
g = \frac{\phi}{\gamma} \tau^E + \frac{\theta}{\gamma} \pi^E; \tag{14a}
\]

\[
g^* = \frac{1 - \phi}{1 - \gamma} \tau^{E*} + \frac{1 - \theta}{1 - \gamma} \pi^E, \tag{14b}
\]

where \( \tau^E = \tau^E / Y^E \). With tax rates being determined by the EU rather than national fiscal authorities, output [equation (9)] changes to:

\[
y = \alpha (\pi^E - (\pi^E)^r - \tau^E - \bar{\omega}); \tag{15a}
\]

\[
y^* = \alpha (\pi^E - (\pi^E)^{r*} - \tau^E - \bar{\omega}^*). \tag{15b}
\]

Similar to the case of the ECB, it is assumed that the federal fiscal authority seeks to minimize its loss function, which is a function of inflation, average output, and average government spending in the EU:

\[
\min_{\tau^E} V^{EFA} = \frac{1}{2} \left( (\pi^E)^2 + \delta^f_1 (y^A)^2 + \delta^E_2 (g^A - g^*)^2 \right), \tag{16}
\]

---

8 See, in particular, European Commission (1993) and CEPR (1993) for a more detailed account of the many issues involved in fiscal federalism in the EU.

9 Much as the ECB might be looked upon as a coalition of the (former) national monetary authorities which coordinates and implements a common monetary policy, this European Fiscal Authority might be looked upon as a coalition of the national fiscal authorities which designs a common fiscal policy. In that perspective, it might be similar to the current ECOFIN, in which the ministers of finance and economic affairs of the EU countries regularly meet to coordinate fiscal and economic policies. As in the case of the ECB, the ultimate policies of the EFA are likely to involve an intricate bargaining process between the EU countries.
in which $\delta^E_1$ and $\delta^F_2$ denote the relative weights that the common fiscal authority attaches to reducing the output gap of the EU economy and the level of government spending in the EU, respectively. With the monetary policies of the ECB still resulting from minimizing its loss function in equation (10)—now subject to equations (14) and (15)—we can derive outcomes in the case where the ECB can commit its monetary policy:\footnote{C}\footnote{C}.

**Figure 3a.** Outcomes in a monetary and fiscal union: monetary policy commitment.

$$\bar{g} - g = \frac{\delta^E_1 \alpha^2((1 + (1-\theta)\mu^E_2) + (1-\phi)\delta^F_2)}{\Psi^C} \left( \frac{\phi \bar{w} + (1-\gamma)\phi}{\gamma} \bar{w}^* + \bar{g} \right)$$

with

$$\Psi^C = \delta^E_1 \alpha^2(1 + \mu^E_2) + \delta^F_2$$

$$\frac{1-\gamma}{\gamma} \delta^E_1 \alpha^2 \left( \frac{\delta^E_1 \alpha^2 \theta \mu^E_2 + \phi \delta^F_2}{\Psi^C} \right) \left( \frac{\gamma(1-\phi)}{1-\gamma} \bar{w} + (1-\phi)\bar{w}^* + \bar{g} \right)$$

$$y = \alpha(1-\gamma)(\bar{w}^* - \bar{w}) - \frac{\delta^E_1 \alpha^2(1-\theta)\mu^E_2 + (1-\phi)\delta^F_2}{\Psi^C} \left( \frac{\gamma(1-\phi)}{1-\gamma} \bar{w} + (1-\phi)\bar{w}^* + \bar{g} \right)$$

$$\bar{g}^* - g^* = \frac{\delta^E_1 \alpha^2((1 + (1-\theta)\mu^E_2) + (1-\phi)\delta^F_2)}{\Psi^C} \left( \frac{\phi \bar{w} + (1-\gamma)\phi}{\gamma} \bar{w}^* + \bar{g} \right)$$

$$\frac{1-\gamma}{\gamma} \delta^E_1 \alpha^2 \left( \frac{\delta^E_1 \alpha^2 \theta \mu^E_2 + \phi \delta^F_2}{\Psi^C} \right) \left( \frac{\gamma(1-\phi)}{1-\gamma} \bar{w} + (1-\phi)\bar{w}^* + \bar{g} \right)$$

$$y^* = \alpha(1-\gamma)(\bar{w}^* - \bar{w}^*) - \frac{\delta^E_1 \alpha^2(1-\theta)\mu^E_2 + (1-\phi)\delta^F_2}{\Psi^C} \left( \frac{\gamma(1-\phi)}{1-\gamma} \bar{w} + (1-\phi)\bar{w}^* + \bar{g} \right)$$

$$\pi^* = \pi^E = \mu^E_2(\gamma(\bar{g} - g) + (1-\gamma)(\bar{g}^* - g^*))$$

$$\tau = \tau^* = \tau^E = -\left( \gamma \bar{w} + (1-\gamma)\bar{w}^* \right) + \frac{\delta^E_1 \alpha^2(1-\theta)\mu^E_2 + (1-\phi)\delta^F_2}{\Psi^C} \left( \frac{\gamma(1-\phi)}{1-\gamma} \bar{w} + (1-\phi)\bar{w}^* + \bar{g} \right)$$

in which $\Psi^C = \delta^E_1 \alpha^2(1 + \mu^E_2) + \delta^F_2$. Similarly, we can also calculate the outcomes in a monetary and fiscal union in a case where the ECB implements the common monetary policy with discretion, in which $\Psi^D = \delta^E_1 \alpha^2(1 + \mu^E_2 + \mu^F_1 \delta^E_1 \delta^F_1 + \delta^F_2)$. A monetary union implies that a country can no longer control its inflation rate but instead adopts the common rate of inflation as determined by the ECB. Moreover, seignorage redistribution occurs if the ECB seignorage is not redistributed in proportion to the size of the countries which form the monetary union. A monetary and fiscal union implies that a country also no longer has control over its rate of output taxation but instead adopts a common tax rate which is set by the federal fiscal authority. In addition, fiscal revenues are redistributed if the revenue distribution is not proportional to the size of the countries which form the monetary union. Clearly, the instrument of fiscal redistribution is a very powerful instrument in the hands of the federal fiscal authority to pursue its fiscal policy objectives, and has a direct effect on macro-economic outcomes under EMU.
Figure 3b. Outcomes in a monetary and fiscal union: monetary policy discretion.

\[
\begin{align*}
\tilde{g} - g &= \frac{\delta_2^e \alpha^2 \left(1 + (1 - \theta) \left( \mu_2^e + \frac{\mu_1^e \delta_2^e}{\delta_1^e} \right) \right) + (1 - \phi) \delta_2^e}{\Psi^D} \left( \phi \bar{\omega} + \frac{(1 - \gamma) \phi}{\gamma} \bar{\omega}^* + \bar{g} \right) \\
1 - \frac{\gamma}{\delta_1^e \alpha^2} \left( \delta_1^e \alpha^2 \theta \left( \mu_2^e + \frac{\mu_1^e \delta_2^e}{\delta_1^e} \right) + \phi \delta_2^e \right) &\left( \frac{(1 - \phi) \gamma}{1 - \gamma} \bar{\omega} + (1 - \phi) \bar{\omega}^* + \bar{g}^* \right)
\end{align*}
\]

\[
y = \alpha(1 - \gamma)(\bar{\omega} - \tilde{\omega}) - \frac{\delta_2^e \gamma}{\delta_1^e \alpha} (\tilde{g} - g) - \frac{\delta_2^e (1 - \gamma)}{\delta_1^e \alpha} (\tilde{g}^* - g^*)
\]

\[
\tilde{g}^* - g^* = \frac{\delta_2^e \alpha^2 \left(1 + \theta \left( \mu_2^e + \frac{\mu_1^e \delta_2^e}{\delta_1^e} \right) \right) + \phi \delta_2^e}{\Psi^D} \left( \phi \bar{\omega} + \frac{(1 - \gamma) \phi}{\gamma} \bar{\omega}^* + \bar{g} \right)
\]

\[
y^* = \alpha \gamma(\bar{\omega} - \tilde{\omega}^*) - \frac{\delta_2^e \gamma}{\delta_1^e \alpha} (\tilde{g} - g) - \frac{\delta_2^e (1 - \gamma)}{\delta_1^e \alpha} (\tilde{g}^* - g^*)
\]

\[
\pi = \pi^* = \pi^e = \left( \mu_2^e + \frac{\mu_1^e \delta_2^e}{\delta_1^e} \right) (\gamma(\tilde{g} - g) + (1 - \gamma)(\tilde{g}^* - g^*))
\]

\[
\tau = \tau^* = \tau^e = -\left( \gamma \bar{\omega} + (1 - \gamma) \tilde{\omega}^* \right) + \frac{\delta_2^e \gamma}{\delta_1^e \alpha^2} (\tilde{g} - g) + \frac{\delta_2^e (1 - \gamma)}{\delta_1^e \alpha^2} (\tilde{g}^* - g^*)
\]

\[
\Psi^D = \delta_1^e \alpha^2 \left(1 + \mu_2^e + \frac{\mu_1^e \delta_2^e}{\delta_1^e} \right) + \delta_2^e
\]

A monetary union, and in particular a monetary union in addition to a fiscal union, implies a more complicated interaction between both countries, as compared to the case with national monetary policy autonomy in Section II. This is shown, for example, by the fact that we are no longer able to sign unambiguously the partial derivatives of the various variables w.r.t. the model parameters without imposing further restrictions. Under EMU, we find that compared with national monetary policy autonomy, not only do changes in the domestic real wage and government spending target affect domestic outcomes but also changes in the foreign targets affect the domestic economy. These spillovers result under EMU because monetary policy of the ECB reacts to changes in both domestic and foreign targets. Therefore, seignorage revenues are affected and by that, taxation, government spending and output in both countries. This interaction of monetary and fiscal policies in the EU is further intensified in a monetary and fiscal union. There, not only does the common monetary policy react to domestic and foreign wage and government spending targets, but so does the common fiscal policy.
V. Structural Asymmetries and Their Consequences on EMU

It is interesting to compare the three institutional configurations which were considered in Sections II–IV: the pre-EMU situation with national monetary policy autonomy, or alternatively a two-speed monetary union (Section II); a monetary union with national fiscal policy autonomy (Section III), and both a monetary and fiscal union in the EU (Section IV). In particular, we like to compare the outcomes of these regimes in the presence of structural asymmetries between the EU countries, as the EU countries are currently far from homogeneous regarding economic structure, macroeconomic performance, and policy preferences. These structural asymmetries are likely to show some degree of persistence in the transition towards a full monetary union in Europe. Here, we focus on the effects of two important asymmetries which could exist between the two countries participating in the EMU: 1) differences in the commitment ability of their national monetary authorities; 2) differences in fiscal preferences. The first asymmetry is of crucial importance when a monetary union is formed; the second, when a monetary and fiscal union is introduced.

Consider the formation of a monetary union between countries 1 and 2 in a situation where the monetary authorities of country 1 are able to credibly commit their monetary policies toward the private sector, whereas the monetary authorities in country 2 are not. As such, country 1 could represent a group of core countries around Germany which have established a strong low-inflation commitment in their monetary policies; country 2 could represent the group of peripheral Mediterranean countries which have a less solid low-inflation reputation. Consequently, with national monetary policy autonomy, country 2 features a higher inflation rate than country 1. Therefore, it relies relatively more on seignorage revenues and relatively less on ordinary taxes to finance government spending than country 1. From such an initial situation, it is interesting to study the effects for both countries of entering a monetary union. This asymmetry in commitment ability of the national monetary authorities can best be analyzed from an initial setting where the countries are symmetric in all other respects. Otherwise, the analysis is blurred by the effects of other differences between the countries. Also, the expressions become increasingly difficult to handle if more asymmetries are analyzed at the same time, and the effects when moving from national monetary policy autonomy to a monetary union can take any direction in principle. Therefore, we impose the following symmetry conditions:

\[
\begin{align*}
\delta_1 &= \delta_1^*, \\
\delta_2 &= \delta_2^*, \\
\mu_1 &= \mu_2^*, \\
\mu_2 &= \mu_2^*, \\
\omega &= \omega^*, \\
\bar{g} &= \bar{g}*, \\
\theta &= \gamma,
\end{align*}
\]

implying that policy weights, government spending targets and real wage targets coincide, and that ECB seignorage is redistributed according to the size of the EU countries.

For country 1, it is particularly interesting to compare outcomes under national monetary policy commitment with outcomes under a monetary union where the ECB implements the common monetary policy with discretion. It is, indeed, often asserted and feared in Germany that the ECB may suffer from commitment problems and will not have the high anti-inflation credibility of the Bundesbank. From the perspective of country 2, on the other hand, it is particularly interesting to analyze how it is affected when it enters a monetary union with an ECB which can implement the common monetary policy with

---

10 It is, indeed, often argued that a two-speed monetary union is preferable for the peripheral Southern European countries. For these countries, it is efficient to rely relatively more on seignorage revenues and relatively less on ordinary taxation according to the principles of optimal taxation, because of their relatively inefficient and distortionary tax system as compared to the core EU countries. See, in particular, Canzoneri and Rogers (1990) on this optimal taxation argument for a two-speed EMU.
commitment. It is straightforward\textsuperscript{11} from Figures 1 and 2 to calculate the effects when moving from national monetary policy autonomy to a monetary union for country 1 under the assumption that its (former) national monetary authority was able to implement its monetary policy with commitment, whereas the ECB fails to do so and relies on discretionary monetary policies. A monetary union with discretionary monetary policies of the ECB results in higher inflation in country 1, which is welfare deteriorating, but also in lower taxes, higher output and higher government spending which are welfare improving. The net welfare effect is, therefore, ambiguous. In this particular setting of otherwise symmetric countries, the effects for country 2, when moving from a setting with national monetary policy discretion to an EMU in which the ECB implements the common monetary policy with commitment, are exactly opposite to those of country 1 when moving from national monetary commitment to a monetary union with monetary policy discretion of the ECB. Therefore, government spending, output and inflation will all be lower in country 2 after entering the monetary union; taxation will be higher and the net welfare gain will be ambiguous. The asymmetry in the ability with which their national monetary authorities can commit the monetary policies toward the private sector is seen to have asymmetric effects on both countries when entering a monetary union.

A second asymmetry we are interested in is the differences in fiscal structures. The fiscal structures of both countries are summarized by the fiscal targets and preference weights \{\hat{g}, \hat{g}^*, \hat{d}, \hat{d}^*\}. Differences in these fiscal structures are important both when a monetary union is established and also when, in addition, fiscal unification is carried out in the EU. First, we consider the formation of a monetary union between the two countries, which are assumed to be symmetric in all respects, except that country 2 has a higher government spending target, implying that \(d_2 > d_1\), \(\mu_2 = \mu_1 = \mu_2^F\), \(\mu_2^* = \mu_1^*\), \(\omega = \omega^*\), \(\theta = \gamma\) and \(\hat{g} < \hat{g}^*\). Assume, moreover, that both countries do not differ in their commitment ability towards the private sector, and that the ECB also features the same commitment ability as the former national monetary authorities. It is straightforward to calculate the effects of this second asymmetry when EMU is implemented. The higher government spending target of country 2 implies more inflationary policies of the ECB. Therefore, inflation in country 1 is higher after entering the EMU. With the proportional redistribution of ECB seignorage, country 1 has more seignorage revenues than under national monetary policy autonomy. This enables an increase in government spending and a lowering of tax revenues which increases output in its turn. The effects of the differences in government spending targets are—aside from other parameters—a function of the size parameter, \(\gamma\); if \(\gamma\) gets larger, the importance of country 1 in the EU increases and the effects from entering a monetary union with country 2, which has a higher government spending target, decrease. Its larger size implies that its own preferences have a larger influence in the design of ECB monetary policy.

In the case where EMU evolves from a monetary union to a monetary and fiscal union, the preference weights of the federal fiscal authority \{\delta_1^F, \delta_2^F\} determine the outcomes, rather than the national preference weights. A third asymmetry can therefore be identified if the fiscal preferences differ. It is interesting to explore how the preference weights of the national and federal fiscal authorities affect outcomes under EMU. In particular, we assume that both countries are symmetric except that the fiscal authorities in country 2 attach a higher weight to government expenditure stabilization than the fiscal authorities.

\textsuperscript{11} The reader may reconstruct the results in this section with the aid of Figures 1–3 provided earlier. Details of all calculations in this paper are available for the interested reader upon request.
in country 1. Moreover, we assume that the common fiscal authority gives the same weight to government spending as the fiscal authority of country 2. Therefore, we consider the case where $\delta_1 = \delta_1^E = \delta_1^F$, $\mu_1 = \mu_1^F = \mu_1^E$, $\mu_2 = \mu_2^F = \mu_2^E$, $\omega = \omega^E$, $\theta = \gamma = \phi$, $\bar{g} = \bar{g}^E$ and $\delta_2^* = \delta_2^E > \delta_2^F$. It is important to realize that in this case, countries receive a proportional share in seignorage and tax revenues under fiscal union and there is no effective redistribution of seignorage and tax revenues.\footnote{Without this assumption, the effects on both countries from fiscal unification can take any direction, in principle.} A comparison between an EMU with national fiscal autonomy and an EMU which features also a fiscal union, then provides us with insight as to how fiscal unification could affect outcomes in both countries. It is relatively straightforward to calculate the effects on government spending, taxation, output and inflation in both countries from fiscal unification in this case. The effects are unambiguous and of the same direction both with and without commitment in the design of the common monetary policy by the ECB. The effects are, of course, strongest for country 1: under a fiscal union, taxes and government spending unambiguously increase and output declines, compared to a monetary union with national fiscal autonomy. This is because now relatively more weight is attached to government spending in country 1 than before under national fiscal autonomy. An interesting indirect effect is provoked: the ECB sets a lower rate of inflation as it reacts to the higher weight in the fiscal player(s) objective functions, which are now attached to government spending in country 1. The lower inflation under fiscal union has a negative side effect, as both countries will have less seignorage revenues available to cover government spending than before under monetary union with national fiscal autonomy. As a result of this secondary effect, country 2 is also affected: government spending declines, taxes increase and output decreases in country 2 to make up for the loss in seignorage revenues.

\section*{VI. Conclusions}

This paper studied the effects of monetary and fiscal unification in the European Union in the context of a highly-stylized model on the interaction of monetary and fiscal policy, proposed by Alesina and Tabellini (1987). The model was extended to a two-country monetary union in which a common central bank, the ECB, determines the common monetary policy. An important aspect of the study concerned the implications of whether or not the ECB could commit its monetary policy towards the EU private sector. The possibility to extend EMU to a fiscal union was considered. Undoubtedly, fiscal federalism issues will become increasingly important with the proceeding of economic and political integration and monetary unification, as entailed by EMU. A stylized interpretation of the fiscal federalism issues was considered by introducing a federal fiscal authority in the EU which operates a European tax system and redistributes the proceeds to the individual countries—or regions, if one likes. In an EMU which also features fiscal union, both seignorage and fiscal redistribution were seen to affect macroeconomic outcomes. Two possible asymmetries between EU countries were studied: 1) differences in the commitment ability of the national monetary authorities, and 2) differences in fiscal structures. It was shown how the first asymmetry affects both countries when they enter a monetary union where the ECB differs in commitment (in)ability from the (former) national monetary authorities. The second asymmetry proved to be important both when
the monetary union is entered and when the monetary union is complemented by a fiscal union in which taxation is centralized. If the federal fiscal authority features different preference weights than the national fiscal authorities, it will set a common tax rate which is (possibly much) different from the optimal national tax rates, with all the consequences for output and government spending in the EU countries.

We would like to thank David vanHoose, Jan Fidrmuc and two anonymous referees whose comments made it possible to improve our analysis significantly upon earlier versions. Necessarily, the usual disclaimer applies. A part of the paper was constructed when the first author stayed at the Center for Economic Studies of the University of Munich. Its support and hospitality are gratefully acknowledged.

References


