The policy-mix in the Euro Area: The Role of Financial Stability

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Abstract: This paper analyses the impact of monetary and fiscal policies’ interaction on the financial stability of the eurozone. Based on the construction of a financial stability index for the entire euro area, we assess the impact in terms of the stability of different configurations of policy-mix using a static Keynesian model in a closed monetary union. Mainly following the nature of fiscal spillovers, we show that fiscal coordination may be useful to improve the quality of the European Monetary Union financial stabilisation. The explicit consideration by the European Central Bank of the aggregate euro area financial stability as one of its macroeconomic objectives makes the non-cooperative game efficient. This configuration allows for a better macroeconomic and financial stabilisation at the aggregate level, which also has a positive effect at an individual level.

Keywords: economic policy, financial stability, fiscal coordination, euro area

JEL Classification Codes: E52, E58, E61, E63, G28
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Introduction

The current global economic crisis causes us to question the mechanisms of the interaction of economic policies within a currency area. Regarding the eurozone, recent events have clearly demonstrated the inadequacy of its system of economic governance and therefore, bring to light the necessity to reform it. In this context, the present paper aims to put forward a new policy-mix configuration capable of bringing together the objectives of macroeconomic and financial stability, based on a positive analysis of the interactions of economic policies within the euro area.

Since the creation of the eurozone, the literature on the policy-mix configuration has been largely organised around two axes. The first axis concerns the credibility problems raised by the articulation between economic policies, and involves possible discrepancies relative to macroeconomic objectives between the national governments and the European Central Bank (ECB). The second axis focuses on macroeconomic stabilisation against different types of shocks that could affect the economies of member countries. The analysis of the macroeconomic stabilisation has to take into account a specific institutional context defined by the independence of the ECB and by the constraints of the fiscal discipline imposed on governments by the Stability and Growth Pact.

This paper is part of the second category, adding financial aspects to the dimension of macroeconomic stabilisation. Given their importance for the stability of the euro area, these financial aspects should be considered explicitly during the implementation of the policy-mix configuration.

With regard to the macroeconomic stabilisation, the results observed in the literature are rather contradictory because of the use of different theoretical frameworks. Thus, Uhlig (2002) shows that the highest quality of macroeconomic stabilisation is achieved when the central bank stabilises the symmetric supply shocks, while governments deal with national demand shocks. This specialisation in the stabilisation of shocks becomes less obvious in Catenaro and Tirelli’s (2000) analysis, in which the strategic coordination of fiscal policies can improve the effectiveness of shock stabilisation.

Other recent studies on the subject of macroeconomic stabilisation emphasise the presence of economic externalities that can justify the economic policy coordination. In this way, Ferré (2008) shows that in a monetary union where the monetary policy is implemented by the central bank and the fiscal policy is implemented by national governments, fiscal instruments, such as net expenditure, can be designed in order to provide an immediate

2 See Uhlig (2002), Mundschenk and Von Hagen (2003), Beetsma et al. (2001), and Engwerda et al. (2002).
benefit to a country at the expense of the partner countries which suffer the associated costs. At the same time, the coordination of fiscal policies can have differentiated effects depending on the type of shocks affecting the economy. Beetsma et al. (2001) show that, while fiscal coordination is fruitful for the stabilisation of asymmetric shocks, it may nevertheless prove to be counterproductive as regards symmetric shocks. Laskar (2003) confirms these results and identifies an optimal degree of asymmetry of shocks at the level of which the fiscal coordination in the European Monetary Union (EMU) begins to be more efficient than in a flexible exchange rate system. However, Villieu (2000) states that on the contrary, with the enlargement of the EMU, fiscal coordination becomes less efficient if the degree of shock asymmetry grows.

Finally, in the recent literature on the impact of the policy-mix configuration on macroeconomic stabilisation, a special role is assigned to monetary and fiscal policy rules. Chadha and Nolan (2007) analyse the defining features of certain simple common rules used for the economic stabilisation. They demonstrate the important role played by fiscal stabilisers as well as by monetary policy rules.

Nevertheless, there is an important limitation to these studies concerning the fact that none of them takes into account the close link between macroeconomic stabilisation and systemic financial stability. Imbalances appearing in the financial system quickly spread, and, as a result, public authorities (the central bank and national governments) had to implement intervention strategies to stabilise economic activity during the economic and financial crisis.

In a first step, their actions were represented by the provision of market liquidity, as lender of last resort. Subsequently, a reform of the institutional regulation and supervision framework, focusing on policy coordination, was implemented. To achieve this goal, central banks, governments and regulators set up financial stability committees. Their mission is to promote financial stability by strengthening the coordination of economic policies. Recently, the debates have focused on the question of fiscal consolidation by adopting new regulations like the Six-Pack and the Treaty on Stability, Coordination and Governance (TSCG).

In this context, based on the estimation of a stability index for the eurozone, we will consider the impact in terms of the financial stabilisation of an enhanced cooperation between the economic policymakers within the EMU.

The remainder of the paper is as follows. The first section describes the construction method of the stability index and presents the estimations at the euro area level. The second

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3 Regarding the importance of fiscal consolidation for the stabilization of economic activity, see Dabrowski (2010), Marattin et al. (2011) and Bi and Kumhof (2011).
4 See Appendix A for a presentation of these stability committees at EU level.
5 By promoting a macroeconomic surveillance, through the respect of a structural deficit limit and the implementation of explicit financial sanctions, these regulations are undoubtedly an improvement of the system of European economic governance. Nevertheless, since they focus on fiscal discipline, these measures do not address directly the issues of financial stability or the relation between financial and macroeconomic stability. It is an important drawback of the actual EMU’s institutional architecture that we will deal with in this article.
section presents the model used to describe the macroeconomic mechanisms and the loss functions of public authorities (governments and central bank). The third section presents the main results in terms of financial stability, according to different policy-mix configurations.

1. The construction of the financial stability aggregate index

This section is largely based on the work of Albulescu (2012), which showed that, beside the expansionary monetary policy, the budgetary deficit conducted to the financial stability deterioration in the euro area in the last years.

Assessing the level of financial stability is problematic. For this purpose, we usually resort to different macroprudential methods, like for example, stress-tests or early warning systems. However, these techniques do not allow for a dynamic assessment of the stability level. Moreover, their use at the level of the entire eurozone can become extremely complicated. As an alternative, a different method has emerged in the last years, namely the aggregate index method. The construction of the aggregate financial stability index represents an effective method for estimating the level of financial stability. An important advantage of continuous stability indicators is that they may reveal periods of small-scale stress that did not result in full-blown crisis and were neglected in studies based on binary crisis variables.

Aggregate stability/stress indexes have been used in many studies, such as those of Illing and Liu (2003), Nelson and Perli (2005), Gersl and Hemanek (2006), and Čihák (2007), and the method became popular with the studies of the IMF (2008) and the ECB (2010). In principle, there are several ways of constructing an aggregate index, but the steps are similar: the choice of the individual indicators, the normalisation of the values, and the weighting procedure.

In order to construct the financial stability index for the entire euro area, we will first identify the individual indicators. They are calculated on a quarterly basis covering the period 1999:Q1 to 2011:Q1. The financial stability indicators, largely employed in the literature on this subject, are presented in Table 1. The individual indicators refer to the financial markets, banking sector and foreign exchange. This classification was also used by the IMF (2008) in order to construct the “financial stress index”.

6 The financial stability indexes represent the opposite of the well-known financial stress (or instability) indexes and are based on the same aggregation idea. As Baxa et al. (2013) state, the use of a composite index presents several benefits, because it approximates the evolution of the financial stability/stress caused by different factors and because the composition of the index allows breaking down the reactions of the central bank with respect to different stress sub-components.

7 See Albulescu (2010) for a review of the literature.

8 Where the quarterly data are missing, we have used the linear interpolation to obtain quarterly data from annual data (for an important part of the banks financial soundness indicators).
Table 1. Financial instability indicators

<table>
<thead>
<tr>
<th>Individual indicators</th>
<th>Contribution to financial instability</th>
<th>Database</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Financial market indicators</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Volatility of the stock index return</td>
<td>+</td>
<td>Yahoo finance</td>
</tr>
<tr>
<td>Short-term interest rate volatility</td>
<td>+</td>
<td>OECD and Eurostat</td>
</tr>
<tr>
<td>Economic sentiment indicator</td>
<td>-</td>
<td>European Commission</td>
</tr>
<tr>
<td><strong>Banks’ financial soundness indicators</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bank nonperforming loans to total loans</td>
<td>+</td>
<td>OECD and IMF</td>
</tr>
<tr>
<td>Bank regulatory capital to risk-weighted</td>
<td>-</td>
<td>OECD and IMF</td>
</tr>
<tr>
<td>assets</td>
<td></td>
<td></td>
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<tr>
<td>ROE</td>
<td></td>
<td>OECD and IMF</td>
</tr>
<tr>
<td>Liquid assets to total assets (liquidity ratio)</td>
<td>-</td>
<td>OECD and IMF</td>
</tr>
<tr>
<td>Interest rate spread: 3 month Euribor rate -</td>
<td></td>
<td>Eurostat and ECB</td>
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<tr>
<td>Monetary key rate in t-1</td>
<td></td>
<td></td>
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<tr>
<td><strong>Foreign exchange</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>REER excessive depreciation or appreciation</td>
<td>+</td>
<td>Eurostat</td>
</tr>
<tr>
<td>Current account deficit to GDP</td>
<td>+</td>
<td>OECD and Eurostat</td>
</tr>
</tbody>
</table>

In order to normalise and aggregate the individual indicators, we use the IMF methodology that we adapt to our analysis. First of all, our aim is to build an aggregate stability index instead of the IMF’s financial stress index. The normalisation procedure is based on the standard deviation, associated with a high financial instability. Consequently, we are forced to construct an instability index \( afii \) and afterwards to calculate the aggregate stability index as its opposite. After rescaling, the \( afii \) will take values in the interval \( [1; 10] \), where 10 represents a high level of financial stress. As a result, the \( afsi \) retained in our study represents the difference between the maximum value which can be registered by the \( afii \) and the observed value \( afsi = 10 – afii \).

The difference between our methodology and the IMF’s relies on the use of market data but also balance sheet data, which generates a reduction of the volatility of the indicator, which is very high during the crisis period. Consequently, our stability index represents a level indicator, contrary to a risk indicator construct by the IMF. Furthermore, the IMF does not provide information about the eurozone financial stability. Conversely, our index is meant to capture the entire area stability and not the stability of the individual EU members. Additionally, we speak about an ex-post index, and not about a forward-looking one. The index captures the financial instability once the disequilibrium manifests itself, and not during the construction period of the disequilibrium.

As observed in Table 1, we have also included in the analysis, indicators with a negative impact in terms of instability (“-“). In order to normalise them according to the IMF technique, we are forced to consider their reversed value \( (1 / \text{value of the indicator})^9 \).

Coming back to the normalisation procedure, the values of each indicator for each member country of the eurozone are normalised using the following formula:

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\(^9\) Economic climate, capital adequacy, ROE and liquidity ratio.
where: $X^n_{ic}$ is the normalised value of the indicator, in the quarter $i$, for the country $c$; $\bar{X}_t$ represents the average value of the indicator $X$ during the period $t$; and $\sigma_t$ is the indicator $X$ standard deviation during the period $t$.

After the computation of the normalised values, we have calculated the $afii$ for each country of the eurozone, based on the formula:

$$afii_{ic} = \frac{\sum_{i=1}^{10} X^n_{ic}}{10}$$

where: $afii_{ic}$ is the aggregate financial instability index for the country $c$ in the $i$ quarter.

Calculated in this manner, the $afii$ values can be either positive or negative, which negatively affect the possibility of their aggregation. That is why, in order to have a clear picture of the $afii$ dynamics and to facilitate the individual indicators aggregation, it is necessary to use a rescaling method for repositioning the index values in the interval $[1;10]$.

$$afii_{icr} = \frac{afii_{ic} + \text{abs} \left[ \min( X^n_{1c}, X^n_{2c}, X^n_{3c}, \ldots ) \right]}{\text{max}(afii_{ic}) + \text{abs} \left[ \min( X^n_{1c}, X^n_{2c}, X^n_{3c}, \ldots ) \right]} \times 10$$

where: $afii_{icr}$ is the rescaled aggregate financial instability index, for the country $c$ in the quarter $i$; $afii_{ic}$ are the values of the aggregate financial instability index, for the country $c$ during the entire period $t$ (1999:Q1 to 2011:Q1), and $X^n_i$ (with $i = 1$ to 49) are the normalised values of the individual instability indicators, for each considered period.

The last step of the methodology is represented by the construction of the $afii$ for the entire eurozone. The $afii$ for each country was weighted with the country GDP-to-eurozone GDP ratio (a weighted mean was then calculated, based on the importance of each country in the eurozone GDP). This choice was due to the fact that the governments of economically important countries, such as Germany or France, have an important influence in the EU structures. However, the results obtained with the weighted mean are similar to the results obtained with the arithmetic mean. The aggregate financial instability index for the entire euro area is calculated as follows:

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10 A similar approach is used by the IMF (2008).
11 We have 49 observations in the sample.
12 Each country was included in the euro area aggregate index after its accession to the EMU.
\[ afii_{EUR} = \sum_{c=1}^{17} afii_{icr} \times \frac{GDP_{ic}}{GDP_{EUR}} \]  

where: \( afii_{EUR} \) is the eurozone aggregate instability index for the quarter \( i \); \( GDP_{ic} \) is the GDP of the country \( c \) for the quarter \( i \); and \( GDP_{EUR} \) is the GDP of the eurozone for the quarter \( i \).

Finally, as mentioned at the beginning of this section, we estimate an aggregate financial stability index, based on the aggregate instability index for the eurozone (\( afsi_{EUR} = 10 - afii_{EUR} \)). Its trend is presented in Figure 1 below:

**Figure 1. Euro area financial stability index dynamics**

NB: A high level of financial stability is associated with a high score of the \( afsi_{EUR} \) and the opposite case is also valid (according to this figure, the smallest level of financial stability in the EMU was recorded in 2009:Q2).

We can observe that financial stability fluctuated a lot during the analysed period. The peak of the financial crisis was recorded in 2009. However, important periods of instability were registered in 2000 and 2003, associated with a considerable distress on the financial markets. Because of the recapitalisation of the banks, we can also observe an improvement of the financial stability in the second part of 2010. In addition, the volatility of the stock markets decreases considerably in this period. However, the financial instability returned in 2011, once the sovereign debt crisis manifested in the euro area (our analysis does not cover this last period).

The construction of the stability index is important not only to identify crisis episodes. The index can also be viewed as a quantitative assessment of the financial stability. Thus, authorities must consider the high values of the index as a quantitative target and therefore, they can assume the stability as a clear objective of their policies.

Nevertheless, the stability can be seen as an objective only if it does not interfere with the classic macroeconomic objectives of the authorities. Consequently, we have tested the relationship between financial stability (measured using an aggregate index of stability) and
economic growth, inflation, interest rates and budget deficit. We have shown that there is no trade-off between macroeconomic stabilisation and financial stabilisation (see Appendix B for the empirical results).

The results show that the coefficients reach the expected sign and that all the explanatory variables prove significant. As assumed, the economic growth and the interest rate have the most significant impact on financial stability. Having thus demonstrated the compatibility between financial stability and the macroeconomic objectives of the authorities, we can state that the systemic financial stability must become one of the explicit targets of the authorities. In what follows, we propose a theoretical framework which allows including the financial stabilization between the explicit objective of the ECB and/or the national governments.

2. The model

We use a static Keynesian model within a closed monetary union with two countries \((i, j)\). The macroeconomic equilibrium are described by demand and supply functions (Oros, 2012) and, as we focus on the issue of the financial stability at the euro area aggregate level, we consider that the EMU is entirely homogeneous, both structurally and from the standpoint of economic shocks affecting the country members. All the variables (except the interest rate) are expressed in logarithms. Thus, the demand function is represented by a standard IS function, widely used in the literature:

\[
y_i = a g_i + b g_j - \delta r + \varepsilon^d
\]  

(6)

where: \(0 < a < 1; |b| < 1; \delta > 0; y_i, g_i, g_j, r, \varepsilon^d\) stand for the output (as deviation from the natural output) and the budget deficit respectively of the country \(i\); \(g_j\) represents the budget deficit of the country \(j\); \(r\) represents the short-term interest rate; and \(\varepsilon^d\) is the demand shock affecting the countries of the EMU with zero mean and finite variance \(\sigma_{\varepsilon^d}^2\).

The national demand of the country \(i\) depends positively on its national budget deficit according to a sensitivity below the unit \((a < 1)\) because of the crowding-out effect, and depends negatively on the interest rate according to sensitivity \(\delta\). At the same time, the national output of the country \(i\) is influenced by the budget deficit of the other EMU members in a proportion \(b\). The sign of the parameter \(b\) can be positive or negative according to whether it is the output channel or the common interest rate channel, respectively, that plays the major part in the transmission of the fiscal spillovers. Finally, the national output is influenced by a demand shock.

\[13\] We have opted for this category of models due to their simplicity and their capacity to illustrate the macroeconomic theoretical ideas. As the paper does not intend to quantitatively apply the proposed model in order to describe economic decisions, this choice seems to be appropriate.
Regarding the supply equation, we use a Lucas function. We consider that the expected inflation is zero, as we are only investigating the issue of the macroeconomic stabilisation, and therefore leave aside any questions of credibility.

\[ \pi_i = \mu y_i, \]  

(7)

where: \( \mu > 0 \), and \( \pi_i \) represents the inflation of the country \( i \). For any variable \( x \), we define the aggregate component, \( x = (x_i + x_j) / 2 \) and the difference component, \( \bar{x} = (x_i - x_j) / 2 \). Regarding shocks, we consider \( \varepsilon \), the symmetric shocks affecting the EMU members.

Beyond these macroeconomic mechanisms, our model also introduces an aggregate financial stability indicator which has been constructed and estimated in the previous section:

\[ afsi = ky + d\pi - de - fg \]  

(8)

Having described the macroeconomic and financial framework, we will now analyse the behaviour of the policymakers. The ECB decides on the single monetary policy independently, using its interest rate as a policy instrument in order to minimise its loss function \( L^M \). The central bank is mainly interested in price stabilisation at the aggregate level of the EMU (with a weight \( \beta_0 \)), but also in the interest rate smoothing (with a weight \( \beta_2 \))\(^{14}\).

\[ L^M = \frac{1}{2} \left[ \beta_0 \pi^2 + \beta_2 r^2 \right] \]  

(9)

where: \( \beta_0, \beta_2 > 0 \).

The governments are in charge of the implementation of the fiscal policies using the budget deficit as a policy instrument. Their aim is to minimise a loss function \( L^i_f \) which depends on the evolution of national output and budget deficit (the relative weight of these objectives is \( \alpha_i \) and \( \alpha_2 \), respectively).

\[ L^i_f = \frac{1}{2} \left[ \alpha_i y_i^2 + \alpha_2 g_i^2 \right] \]  

(10)

where: \( \alpha_1, \alpha_2 > 0 \).

\(^{14}\) The target values of the macroeconomic variables in the policymakers’ loss functions are normalised to zero.
3. Efficiency of policy-mix configuration on financial stability

We consider a simultaneous game between governments and the central bank, and we analyse the relative effectiveness in terms of financial stability of different configurations of policy-mix. The first situation corresponds to the current context and it is defined by a non-cooperative game between the authorities and by the absence of an explicit objective of financial stability in the loss functions of the players. This configuration will serve as a benchmark to compare the impact on the aggregate financial stability indicator of the other three policy-mix configurations: fiscal coordination without explicit consideration of the objective of financial stability by the authorities; non-cooperative game among authorities, with an explicit financial stability objective defined by the central bank; and non-cooperative game with an explicit financial stability objective defined by all the public authorities (governments and ECB).

3.1. Non-cooperative equilibrium

In this Nash game between the policymakers, the optimal values of the intervention instruments can be written as follows:

\[
\begin{align*}
\rho^N &= \frac{z[(a + b)g + \varepsilon]}{\delta} \\
g^N &= \frac{a\alpha_1(\delta r - \varepsilon)}{\alpha_2 + a\alpha_1(a + b)} \quad \text{with: } z = \frac{\beta_0\mu^2}{\beta_0\mu^2 + \frac{\beta_2}{\delta^2}}
\end{align*}
\]

(11)

Using the Equations (11), we obtain the following values for the budget deficit and the equilibrium interest rate:

\[
\begin{align*}
g^N &= -\frac{a\alpha_1(1-z)}{D^N}\varepsilon \\
\rho^N &= \frac{z\alpha_2}{\beta D^N}\varepsilon \quad \text{with: } D^N = \alpha_2 + a\alpha_1(a + b)(1-z)
\end{align*}
\]

(12)

The Equations (12) allow us to observe that, for stabilising symmetric demand shocks, the stabilisation efforts of governments and of the central bank are convergent. For example, in the case of a negative demand shock, authorities will apply expansive policies: increased public deficit and lower interest rates, in order to stimulate the demand and to boost the activity.

Using Equations (12) we determine the equilibrium values of the production, inflation and aggregate financial stability indicator:
\[
\begin{align*}
\gamma^N &= \frac{\alpha_2 (1-z) \varepsilon}{D^N} \\
\pi^N &= \frac{\mu \alpha_2 (1-z) \varepsilon}{D^N} \\
afst^N &= \frac{1}{D^N} \left[ \alpha_2 (1-z)(k + d\mu) - \frac{e \alpha_2 z}{\delta} + fa \alpha_1 (1-z) \varepsilon \right]
\end{align*}
\] 

(13)

3.2. Fiscal coordination equilibrium

In this case, the decisions of the governments are coordinated and the new collective loss function will be determined by the sum of all the national loss functions.

\[
L^C = L_i^G + L_j^G = \frac{1}{2} \left[ \alpha_1 (y_i^2 + y_j^2) + \alpha_2 (g_i^2 + g_j^2) \right]
\]

(14)

The aggregate values of budget deficit, interest rates, production and inflation become:

\[
\begin{align*}
g^C &= -\frac{(a+b)\alpha_1}{D^C} (1-z) \varepsilon \\
p^C &= \frac{z \alpha_2}{\delta D^C} \varepsilon \\
y^C &= \frac{\alpha_2 (1-z) \varepsilon}{D^C} & \text{with: } & D^C = \alpha_2 + \alpha_1 (a+b)^2 (1-z). \\
\pi^N &= \frac{\mu \alpha_2 (1-z) \varepsilon}{D^C}
\end{align*}
\]

(15)

Using Equation (15), the aggregate indicator of financial stability is:

\[
afst^N = \frac{1}{D^C} \left[ \alpha_2 (1-z)(k + d\mu) - \frac{e \alpha_2 z}{\delta} + fa \alpha_1 (1-z) \varepsilon \right]
\]

(16)

At the aggregate level, the relative efficiency in terms of macroeconomic stabilisation mainly depends on the sign of the fiscal spillovers \((b)\). Thus, if the fiscal spillovers are positive, the fiscal coordination is more effective to stabilise the production and the inflation \((y^C < y^N\) and \(p^C < p^N\)). The explanation lies in the fact that the governments are more reactive in this configuration \(\left| g^C \right| > \left| g^N \right| \)\(^{15}\) and that this reactivity is not thwarted by the

\(^{15}\) In the presence of symmetric shocks, a positive sign for fiscal spillovers allows each government to benefit from the stabilisation efforts of its partner. In order to maximise the intensity of the stabilisation efforts, the governments must coordinate their fiscal reactions.
intervention of the central bank. Indeed, as demand shocks generate convergent actions of stabilisation from both the governments and the central bank, the reactivity of the latter will be smaller in this case ($r^c < r^N$). On the contrary, a negative sign for the fiscal spillovers causes a more active fiscal policy in the case of a non-cooperative equilibrium ($g^c < g^N$), making this game configuration more efficient in terms of output and inflation stabilisation ($y^c > y^N$ and $\pi^c > \pi^N$), and allows the central bank to reduce its stabilisation efforts ($r^c > r^N$).

Regarding the financial stability indicator, the relative impact of this game configuration manifests itself through two divergent channels, respectively that of the production and inflation and that of the budget deficit and interest rates. Thus, the financial stability indicator will be better protected against the symmetrical shocks by a fiscal cooperative configuration if, in the presence of positive fiscal spillovers, the surplus of efficiency related to the production and inflation stabilisation (induced by this configuration compared to a non-cooperative equilibrium), is not compensated by the additional cost of stabilisation accepted by public authorities in using their intervention instruments in a fiscal cooperative game ($afsi^C > afsi^N \Rightarrow [(a+b)(1-z)(k+d\mu)] > [f + (a+b)ez])$. However, when fiscal spillovers are negative, fiscal coordination is more efficient in absorbing the impact of demand shocks on the financial stability indicator if the above condition is reversed ($[(a+b)(1-z)(k+d\mu)] < [f + (a+b)ez]$)\(^{16}\).

3.3. The ECB is explicitly concerned with financial stability

We consider a policy-mix configuration in which public authorities make individual and simultaneous decisions (Nash equilibrium), but where the ECB changes its loss function by explicitly taking into account the financial stability indicator ($afsi^C$)\(^{17}\). The new loss function is:

\[
L^M = \frac{1}{2} \left[ \beta_0^F \pi^2 + \beta_2^F r^2 + \beta_3^F afsi^2 \right], \quad \text{with: } \beta_0^F, \beta_2^F, \beta_3^F > 0
\]  \hspace{1cm} (17)

In the construction of this augmented loss function, we consider that the relative importance bestowed by the central bank upon its initial objectives (price stability and interest rate smoothing) has not been modified by the existence of an additional objective. In

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\(^{16}\) If we look at the individual government level, the relative impact on welfare is not directly identifiable. Thus, irrespective of the nature of the fiscal spillovers, a better stabilisation of the output implies stronger fiscal cost, so, in terms of loss function, the final impact will be conditioned by the relative importance paid by governments to stabilising the economic activity and the budget deficit.

\(^{17}\) The current debates triggered by the crisis in the eurozone focus on financial stability as an ECB goal. The need to reform the system of the EMU economic governance, with particular attention given to financial indicators, is obvious. This policy-mix configuration can be associated with a form of cooperation between the authorities, in that the financial stability affects the individual welfare of all member countries of the EMU and not only that of the ECB.
other words, the balance between the preference for price stability and the preference for interest rate smoothing remains the same ($\frac{\beta_0}{\beta_2} = \frac{\beta_0^{F}}{\beta_2^{F}}$).

Applying the same approach as before, the equilibrium values of budget deficit, interest rate, output and inflation become:

$$
\begin{align*}
g_{afsi} &= \frac{-\alpha_1}{V} \left( \frac{\beta_2^{F}}{\delta^2} + \frac{\beta_3^{F}}{\delta^2} \psi e \right) \varepsilon \\
r_{afsi} &= \frac{\alpha_1}{V} \left( \beta_0^{F} \mu^2 + M + \alpha_1 \frac{\beta_3}{\delta} \psi \right) \\
y_{afsi} &= \frac{\alpha_1}{V} \left( \frac{\beta_2^{F}}{\delta^2} + \frac{\beta_3^{F}}{\delta^2} \psi e \right) \varepsilon \\
\pi_{afsi} &= \frac{\mu \alpha_1}{V} \left( \frac{\beta_2^{F}}{\delta^2} + \frac{\beta_3^{F}}{\delta^2} \psi e \right) \varepsilon
\end{align*}
$$

Using Equations (18), the aggregate financial stability indicator takes the following value:

$$
a_{fsi/afsi} = \frac{1}{\delta V} \left( \frac{\alpha_1}{V} \left( \alpha_2 \frac{\beta_2^{F}}{\delta^2} (k + d \mu) \right) - \alpha_2 \frac{\beta_2^{F}}{\delta^2} \mu e + \frac{\alpha_1 \beta_3^{F}}{\delta} f \right) \varepsilon 
$$

(19)

with:

$$
V = \alpha_2 T + \alpha_1 \left( \frac{\beta_2^{F}}{\delta^2} (a + b) + \frac{\beta_3^{F}}{\delta^2} \psi \left( (a + b) + f \delta \right) \right), \quad T = \frac{\beta_2^{F}}{\delta^2} + \frac{\beta_0^{F}}{\delta^2} \mu^2 + \frac{\beta_3^{F}}{\delta^2} \psi e^2,
$$

$$
M = \frac{\beta_3}{\delta} \psi (k + d \mu) \quad \text{and} \quad \psi = (k + d \mu) \delta + e
$$

When comparing the relative stabilisation effectiveness of this game configuration with the initial baseline situation (non-cooperative equilibrium and absence of explicit financial stability objective), several factors can be underlined. First, we observe a better stabilisation of the output and inflation as compared to the initial configuration ($y > y_{afsi}$, $\pi > \pi_{afsi}$). The explanation lies on the fact that taking into account the $afsi$ indicator, the central bank increases the relative importance given to output stabilisation and inflation. Therefore, the stabilisation efforts made by the monetary authority to absorb the impact of the economic shocks on these two macroeconomic objectives are amplified. Following this reasoning and having in mind the convergence of efforts undertaken by the fiscal and monetary authorities
to stabilise the output and inflation, the strengthening of the monetary activism encourages the governments to reduce their own efforts of stabilization \(|g| > |g_{afsi}|\). In this context, from the governments’ point of view, in a homogeneous monetary union their individual welfare will be improved by the introduction of a financial stability objective in the loss function of the ECB, due to its positive effect in stabilising the domestic output, allowing also to smooth the fiscal activism.

Second, the introduction of the \(afsi\) indicator in the objective function of the ECB generates an enhanced monetary activism compared to the initial situation \((r < r_{afsi})\) if \(\alpha_{z} \beta_{z}(k + d\mu) + a\alpha_{s}f\beta_{z} > \epsilon\delta\alpha_{z}\beta_{0}\mu^{2}\). The explanation is based on the appearance of a possible divergence in the implementation of the governments and the central bank’s economic policy instruments, due to the existence of a stability objective in the loss function of the latter. Thus, if governments are mainly interested in the stabilisation of the activity (high \(\alpha_{s}\)), the fiscal policies will be highly reactive, which could reinforce the financial stability zone imbalance in the presence of a financial stability indicator highly sensitive to the fiscal instrument (high \(f\)). The ECB would then strengthen its monetary activism in order to alleviate this imbalance. This mechanism can be described using the previous example related to the negative demand shock affecting the EMU, a shock which generates expansive policies on the part of the authorities to stabilise the macroeconomic variables. If the indicator \(afsi\) is particularly sensitive to the fiscal developments, it may experience a significant deterioration after a strong fiscal activism, reflecting a strong interest of the governments in the stabilisation of the output. Under these circumstances, the ECB is tempted to increase its expansionary intervention in order to approach the financial stability indicator of its target set in the objective function of the monetary authority.

Another mechanism that could explain the strengthening of the monetary activism following the explicit concern of the ECB for the euro area financial stability, is the high sensitivity of the \(afsi\) indicator to output and to inflation developments (high \(k\) and \(d\)), and therefore to the shocks affecting the EMU. In this case, a negative demand shock may significantly deteriorate the quality of the indicator, hence the need for the ECB to strengthen its monetary activism in order to absorb this destabilising effect. Its intervention will be all the more strong, as the demand will be little influenced by the evolution of the interest rate (low \(\delta\)), which will limit the stabilising effects on the \(afsi\) indicator.

Third, if we compare the relative effectiveness in terms of financial stability of the two policy-mix configurations, the fact that the ECB takes into account this objective has a positive effect if \(\alpha_{z} \beta_{z}(k + d\mu) + a\alpha_{s}f\beta_{z} > \epsilon\delta\alpha_{z}\beta_{0}\mu^{2}\). We thus find the same condition allowing the strengthening of the monetary activism in this game configuration as in the baseline situation, supposing that there is no financial stability objective in the loss functions of the authorities. The objective of financial stability in the EMU follows perfectly the evolution of the economic policy implemented by the authority which is in charge of it. This
result is quite significant since it confirms the effectiveness of the intervention of the ECB in
the field of financial stability, provided that the monetary authority is willing to assume such
a responsibility. In other words, the single central bank can manage the evolution of the
aggregate indicator of financial stability in the EMU.

In institutional terms, this is a result that can have a major impact on the eurozone’s
economic system of governance. By agreeing to expand its prerogatives, the ECB could
succeed in controlling the evolution of the EMU financial stability, which would have
important consequences for the credibility and cohesion of the EMU. This raises obvious
corns related to the implementation of this system. It requires a thorough reform of the
current institutional context structured around the independence of the ECB and of the
Stability and Growth Pact. In this institutional context, the governments’ objectives of growth
and employment, defined at the national level, are submitted to the objective of price stability
at the aggregate level, which is specific to the ECB. Given the rigidity of this governance
system, the reform seems necessary as it is no longer adapted to the current context,
characterised by growing concerns related to the eurozone’s financial stability and
accompanied by low inflation and rather weak performance in terms of economic growth,
with wide disparities among the member countries. Thus, the fact that the ECB takes into
account the financial stability could offer a solution to reform the economic governance of
the eurozone and to better respond to the macroeconomic and financial situation in the EMU.

3.4. The ECB and the governments are explicitly concerned with financial stability

In this section, we describe a policy-mix configuration in which all the authorities (central
bank and national governments) explicitly take into account in their individual loss functions,
the financial stability objective \( (a_f s) \). This game configuration fits into the current debate
triggered by the crisis\(^{18}\) and highlights the need to reform the EMU economic governance,
with particular attention to financial indicators.

The new loss function of the governments can be written as follows:

\[
L^G_i = \frac{1}{2} \left[ \alpha_1^F y_i^2 + \alpha_2^F g_i^2 + \alpha_3 (a_f s)^2 \right], \text{with: } \alpha_1^F, \alpha_2^F, \alpha_3 > 0
\]

(20)

As in the previous case, we consider that the introduction of an additional objective in the
loss function of a public authority does not change the relative weight assigned to its
traditional objectives. Thus, in the case of the governments, we have:

\[
\frac{\alpha_1}{\alpha_2} = \frac{\alpha_1^F}{\alpha_2^F}
\]

\(^{18}\) We can mention the current suggestions to create Financial Stability Committees made by the governments
and the national central banks, and which could be in charge of setting up a common action to reinforce the
financial stability within the EMU.
In this game configuration, the equilibrium values of budget deficit, interest rate, output and inflation become:

\[
g_{G_{\text{afsi}}} = -\frac{a\alpha^F}{V^G} \left( \frac{\beta^F \mu^2 + \beta_2 \psi e}{\delta^2 + \delta^2 V^G} \right) e + \frac{\alpha_3}{2} \left( \frac{(a+b)(k+d\mu) - f}{\beta^F \mu^2 e} \right) V^G - \frac{\beta^F}{\delta^2 V^G} (k+d\mu) e
\]

\[
r_{G_{\text{afsi}}} = \frac{\alpha^F}{\delta V^G} \left( \frac{\beta^F \mu^2 + M}{\delta^2} + a\alpha^F \frac{\beta_3 \psi f}{\delta^2} \right) e - \frac{\alpha_3}{2} \left( \frac{(a+b)(k+d\mu) - f}{\beta^F \mu^2 f} \right) \frac{\beta^F}{\delta^2 V^G} e
\]

\[
y_{G_{\text{afsi}}} = \frac{\alpha^F}{V^G} \left( \frac{\beta^F \mu^2 + \beta_3 \psi e}{\delta^2 + \delta^2 V^G} \right) e - \frac{\alpha_3}{2} \left( \frac{(a+b)(k+d\mu) - f}{\beta^F \mu^2 f} \right) \frac{\beta^F}{\delta^2 V^G} e
\]

\[
\pi_{G_{\text{afsi}}} = \frac{\mu\alpha^F}{V^G} \left( \frac{\beta^F \mu^2 + \beta_2 \psi e}{\delta^2 + \delta^2 V^G} \right) e - \frac{\mu\alpha_3}{2} \left( \frac{(a+b)(k+d\mu) - f}{\beta^F \mu^2 f} \right) \frac{\beta^F}{\delta^2 V^G} e
\]

The aggregate financial stability indicator becomes:

\[
a_{\text{afsi}}_{G_{\text{afsi}}} = \frac{1}{\delta V^G} \left( \frac{\alpha^F \beta^2 (k+d\mu) - \alpha^F \beta^F \mu^2 e + a\alpha^F \beta_2 \mu^2}{\delta} \right) e
\]  

with:  
\[
V^G = \alpha^F T + a\alpha^F \left( \frac{\beta^F \mu^2}{\delta^2} (a+b) + \frac{\beta_2 \psi ((a+b) + f\delta)}{\delta^2} \right) + \frac{\alpha_3}{2} \left( \frac{(a+b)(k+d\mu) - f}{\beta^F \mu^2 f} \right) H
\]

\[
H = \frac{\beta^F}{\delta} (a+b)(k+d\mu) - f - \beta^F \mu^2 ((a+b)\mu + f\delta)
\]

If we analyse the efficiency of this game configuration in terms of financial stability, a first important element is the relative influence of the aggregated macroeconomic variables on the financial stability indicator. Thus, when \((a+b)(k+d\mu) - f < 0\), the presence of a common financial stability objective for all the public authorities is beneficial compared to the case where financial stability is an exclusive concern of the ECB \((a_{\text{afsi}} > a_{\text{afsi}} G_{\text{afsi}})\). In this case, in order to analyse the financial stabilisation optimality, it is necessary to compare the initial configuration (supposing that there is no stability objective for the authorities) with the configuration in which financial stability is a common goal for the ECB and governments. By comparing these two configurations, we have found the same condition as in the previous section allowing a surplus of efficiency when there is no explicit stabilising objective for the authorities \((\alpha^F \beta_2 (k+d\mu) + a\alpha_1 \beta^F \mu^2 < e\delta\alpha_2 \beta^F \mu^2)\). In other words, the presence of a common financial stability objective, even beneficial compared to the intermediate case (only the ECB
focuses on this objective), does not guarantee the optimality of the financial stabilisation at
the EMU level.

In the opposite case, supposing that \((a + b)k + d\mu - f > 0\), the first element to high-
light relates to the fact that the existence of a common objective is not beneficial compared
to the case where only the central bank assumes the financial stability objective if
\((a_2\beta_2(k + d\mu) + a_1f\beta_2 + e\beta_2\beta_0\mu^2)\). Thus, the optimum situation in terms of financial
stability corresponds to the current situation where there is no explicit objective of financial
stability for public authorities. In other words, the important concern of the central bank over
price stability (\(\beta_0\) high), together with its large autonomy in the use of its instrument of
intervention (\(\beta_2\) low), does not require an explicit objective of financial stability in the loss
function of the monetary authority, provided that the indicator of financial stability is
sensitive to the monetary reactions (\(e\) high).

On the contrary, it is possible to identify a situation where the simultaneous presence of
an objective of financial stability in the loss functions of the authorities can prove effective:
\((a + b)\left(\frac{\beta^F}{\delta}(k + d\mu) - \beta^F_0\mu^2e\right) > f\left(\frac{\beta^F_2}{\delta} + \beta^F_0\mu^2\delta\right)\). In this case, the ECB must reduce the
relative importance of price stability, whereas a monetary stimulus must have a limited
impact on both the financial stability indicator (\(e\)) and on the activity and inflation (\(\delta\)). If this
condition is not satisfied \((a + b)\left(\frac{\beta^F}{\delta}(k + d\mu) - \beta^F_0\mu^2e\right) < f\left(\frac{\beta^F_2}{\delta} + \beta^F_0\mu^2\delta\right)\), the definition
of a common objective of financial stability for the ECB and the national governments is
counterproductive. The optimal situation requires that the ECB specialises exclusively in
dealing with this objective.

Conclusions

Starting with the construction and estimation of a financial stability indicator at the eurozone
aggregate level, this paper has aimed to analyse the impact of different configurations of
policy-mix between national governments and the ECB in terms of financial stability.
Currently, this is a problem of real concern because, under the effects of the crisis, the reform
of the EMU economic governance system is more legitimate than ever. Given its fundamental
role in the overall stability and cohesion of the euro area, the issue of financial stability plays
an important part in the debates about the direction of the governance of the EMU.

The impact on the financial stability indicator was evaluated in four policy-mix
configurations. The first corresponds to the situation before the crisis, a non-cooperative

\^{19} We note that, based on the results of our estimates, this is empirically more plausible in the case of the euro
area.

\^{20} The trade-off between price stability and financial stability appears in this context.
game between authorities and the lack of the financial stability objective in their loss functions. As a consequence of the current crisis, the issue of cooperation between authorities has gained ground, as shown by the recent establishment of financial stability committees in the EMU. In response to this evolution, the second policy-mix configuration proposes the coordination between fiscal policies within the eurozone. The third configuration involves the introduction of an explicit goal of financial stabilisation in the ECB loss function. The last configuration analyses the opportunity to consider financial stability as a common objective of the ECB and national governments.

Using, as reference and benchmark, the non-cooperative equilibrium configuration without any explicit financial stability objective set by the authorities, we have shown that fiscal coordination can improve the quality of financial stability at the aggregate level. This is true, mainly if fiscal spillovers are positive and if the stability indicator is more sensitive to changes in the output and inflation than to budget deficit and interest rate. On the contrary, if the ECB is explicitly concerned with financial stabilisation, it is able to better absorb the impact of symmetric shocks, with positive effects in terms of aggregate and individual welfare. The simultaneous presence of a financial stability objective for all public authorities may be counterproductive, thus triggering the policy-mix configuration towards the specialisation of economic policies. The central bank would be in the best position to take into account the evolution of the financial stability indicator in achieving its economic policy objectives.

In institutional terms, the results show the limitations of the EMU current governance system and confirm the necessity to reform it. The current governance principles, justified at the time of their introduction (about twenty years ago) by the concern to build and defend the credibility of the EMU and of the single currency, must be improved, and the eurozone must evolve. Its future depends on it.

The analysis that we have made here can be further developed mainly by including in our model the supply shocks. The supply shocks can have opposite effects on the output and inflation, and therefore a conflict of interests can emerge between the governments and the central bank when it comes to neutralizing the impact of these shocks. The convergence of the stabilisation efforts made by the fiscal and monetary authorities in the case of the demand shocks could be replaced, in the case of the supply shocks, by a divergence of the stabilisation efforts made by these policymakers (Oros (2008)). The opposition convergence-divergence in the efforts of stabilising the demand and supply shocks will very likely influence the macroeconomic equilibriums and thus the outcomes in terms of financial stability of the monetary union.
References


## Appendix A- Financial Stability Committees in the European Union

<table>
<thead>
<tr>
<th>Country</th>
<th>Establishment date</th>
<th>Name</th>
<th>Composition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spain</td>
<td>2006</td>
<td>Financial Stability Committee</td>
<td>Central bank, Financial supervision agencies, Ministry of Economy and Finance</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>2006</td>
<td>Financial Market Committee</td>
<td>Central bank, Ministry of Finance, Budget Committee of the Chamber of Deputies</td>
</tr>
<tr>
<td>Romania</td>
<td>2007</td>
<td>National Committee for Financial Stability</td>
<td>Central bank, Financial supervision agencies, Ministry of Finance</td>
</tr>
<tr>
<td>Portugal</td>
<td>2007</td>
<td>National Financial Stability Committee</td>
<td>Central bank, Financial supervision agencies, Ministry of Finance and Public Administration</td>
</tr>
<tr>
<td>Austria</td>
<td>2008</td>
<td>Financial Market Committee</td>
<td>Central bank, Financial supervision agencies, Ministry of Economy and Finance</td>
</tr>
<tr>
<td>Poland</td>
<td>2008</td>
<td>Financial Stability Committee</td>
<td>Central bank, Financial supervision agency, Ministry of Finance</td>
</tr>
<tr>
<td>Italy</td>
<td>2008</td>
<td>Financial Stability Committee</td>
<td>Central bank, Financial supervision agencies, Public Treasury</td>
</tr>
<tr>
<td>Greece</td>
<td>2008</td>
<td>Financial Stability Committee</td>
<td>Central bank, Financial supervision agencies, Ministry of Economy and Finance</td>
</tr>
<tr>
<td>Finland</td>
<td>2008</td>
<td>Memoranda of Understanding (MoU)</td>
<td>EU and central banks from Nordic countries, Supervisory authorities, Ministries of finance</td>
</tr>
<tr>
<td>Denmark</td>
<td>2008</td>
<td>Danish Act on Financial Stability</td>
<td>Government, Parliament, Banking association</td>
</tr>
<tr>
<td>World - Europe</td>
<td>2009</td>
<td>Financial Stability Board</td>
<td>Central banks, Financial supervision agencies and national governments, International institutions</td>
</tr>
<tr>
<td>Hungary</td>
<td>2010</td>
<td>Financial Stability Board</td>
<td>Ministry of Finance, Central bank, Hungarian Financial Supervisory Authority</td>
</tr>
<tr>
<td>Belgium</td>
<td>2010</td>
<td>Committee for Systemic Risks and System-relevant Financial Institutions</td>
<td>Central bank, Banking, Finance, and Insurance Commission, Ministry of Finance</td>
</tr>
<tr>
<td>England</td>
<td>2011</td>
<td>Financial Policy Committee</td>
<td>Central bank, Financial Services Authority</td>
</tr>
<tr>
<td>Sweden</td>
<td>2011</td>
<td>Financial stability cooperation arrangements</td>
<td>Central bank, Financial supervision agency, Ministry of Finance, National Debt Office</td>
</tr>
</tbody>
</table>

Source: Internet site of central banks, ministries of finances, supervision authorities, Financial Stability Board and International Monetary Fund
Appendix B – The econometric validation of the AFSI

In order to validate the AFSI, we perform a simple OLS regression where the AFSI is the dependent variable and the classic objectives of the central bank are the explanatory variables (for more details see Albulescu, 2012).

The description of the explanatory variables is presented in the next table.

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Description</th>
<th>Database</th>
<th>Expected sign</th>
<th>Explanations</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP (y)</td>
<td>Economic growth rate (quarterly basis, compared to the same period of the previous year)</td>
<td>Eurostat</td>
<td>+</td>
<td>The economic growth rate has a positive impact on the financial stability. The deterioration of the real economy negatively affects the financial sector.</td>
</tr>
<tr>
<td>Inflation (i)</td>
<td>The inflation rate (quarterly basis, compared to the same period of the previous year)</td>
<td>Eurostat and OCDE (starting with 2003:Q2)</td>
<td>+/-</td>
<td>A general increase in consumer’s prices is associated with a higher demand on the market. This higher demand is supported by the economic growth and it favours financial stability. In this case, we observe a short-term trade-off between financial stability and price stability. At the same time, inflation is associated with a macroeconomic disequilibrium which impacts upon the financial stability.</td>
</tr>
<tr>
<td>Euribor (r)</td>
<td>Euribor at 3 months, the average of the period (a proxy for the key interest rate which presents a big inertness)</td>
<td>ECB</td>
<td>-</td>
<td>A decrease in the interest rate encourages the financial stability by boosting the credit activity. The periods of instability are characterised by an increase of interest rate and important risks on the market. Nevertheless, the authorities make efforts to solve liquidity problems and to stimulate the economic growth towards the decrease of the interest rate, even if an inflationary pressure appears on the short run. This behaviour reinforces the financial stability.</td>
</tr>
<tr>
<td>Deficit (g)</td>
<td>Budgetary deficit (calculated as the difference between public expenses and budgetary incomes)</td>
<td>ECB</td>
<td>-</td>
<td>An large public deficit has a negative influence on the investors’ perception and, as a result, on the financial stability (see currency depreciation). Even if it is hard to demonstrate that a higher deficit produces a deterioration of the financial system stability in an automatic manner, we can observe that, during crisis periods, the deficit increases.</td>
</tr>
</tbody>
</table>

Source: Albulescu (2012)

The tested equation is the following (in brackets we have the \( t \)-statistic values and the associated \( p \)-values):

\[
afsi = 2.84 + 0.16 \, y + 0.37 \, i - 0.37 \, r - 0.10 \, g + \varepsilon_i
\]

(5)

where: \( R^2 = 0.40 \) and \( F = 7.43 \) (\( p < 0.0001 \)).