

# National influences inside the ECB : an assessment from central bankers' statements

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## Abstract

This paper aims at unveiling the national influences inside the Governing Council (GC) of the ECB. We assess the concerns of European central bankers expressed through content media. We make a textual analysis of national newspaper articles related to each European central banker to derive their preferences and verify the existence of coalitions among national central bankers in the GC. Finally, we assess the weight of these coalitions on monetary policy decisions. The results reveal a more than proportional weight for a coalition of Northern countries, detrimental to Greece and France, while Germany has a weight proportional to its economic size.

*Keywords:* Taylor rule, European Central Bank, monetary policy, cluster analysis, decision making process, coalition formation.

*JEL classification:* D78, E52, E58

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## Introduction

Since the eighties, there is a growing need for central banks to communicate, a process Blinder et al. (2008) have termed a “revolution of thinking”. Central banks nowadays communicate about the economic outlook and the future path of their policy rates. For the FOMC, the “revolution of thinking” was translated into reality by the adoption of the federal funds rate target in February 1994, the publication of fuller statements (the Monetary Policy Report to the Congress) and the voting records of the committee members. Other central banks became more effective in their communication, among them, the Bank of England, the Riksbank and the Norges Bank. Overall, they use the following forms to convey their messages: press releases and reports, such as the Inflation Report of the Bank of England.

Concerning the European Central Bank, we can describe its transparency as more limited (De Haan et al., 2010). It uses the traditional tools of communication by making a press conference after every meeting, “the Introductory Statement of the President” and by publishing monthly reports, “the Monthly Bulletin”. However, the ECB has never published voting records nor minutes. This policy has repercussions on financial actors’ views about the ECB: De Haan et al. (2004) show survey evidence suggesting that private-sector economists do not consider the ECB as transparent. Therefore, unlike the other central banks, empirical studies did not use the ECB communication to understand its inner working e.g., to detect dissenting behaviors among the GC members<sup>1</sup>. However, there are many pieces of evidence to think that dissent may occur inside the GC of the ECB.

First, the institutional framework of the ECB may promote dissenting votes: as a two-tier institution, its GC is currently made up of the 6 members of the Executive Board and the 17 Presidents of national central banks. However, unlike the Fed, each European central banker has a permanent seat in the ECB GC and holds one vote in the decision-making process. The weight of national representatives is then very high within the GC. They hold 17 votes out of 23 (more than 70%). This mode of governance can then promote the presence of national considerations. Second, the existence of asymmetries among euro area members may likewise generate dissent. Three types of asymmetries have been identified (Mayes and Viren, 2002): the speed and the size of the propagation of monetary policy changes, the different preferences of central bankers and the different position in the business cycle of the members states.

Moreover, countries like Belgium, the Netherlands, Finland and Ireland have strong trade links with non-euro area countries, meaning that they are more sensitive to foreign shocks. The asymmetry problems are obvious in small open economies where monetary policy has a different impact on the tradable sector from the non-tradable ones.

According to the literature on the optimum currency areas, the instruments that can overcome the asymmetries problem in a monetary union are labour mobility, wage and price adjustments

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<sup>1</sup>The literature about dissent inside the Fed, the UK’s MPC and other central banks is abundant, see Belden (1989), Meade (2005), Meade and Sheet (2005), Chappell et al. (2007), Spencer et al. (2011) and Horvath et al. (2012).

and fiscal policy (Mongelli, 2002). However the potential for these tools is limited in the Euro area.

These difficulties in adjustment processes may create tensions in the decision-making of the ECB: member states can be affected by adverse impacts. As a consequence, most existing studies<sup>2</sup> suggest that the appropriate policy requires that the monetary authorities should react to national developments and that individual countries will vote for the policy that would be best suited to their own needs.

This is exemplified by the experience of the Fed where differences in regional economic developments lead to differences in voting behavior in the FOMC. Indeed, Meade and Sheet (2005) find that Fed policymakers take into account regional unemployment when setting the interest rate, and conclude that this result may also be relevant for the ECB in light of the regional differences within the euro area. Therefore, it is more than likely that dissent may exist inside the GC. Hence, analyzing dissent is an important step for understanding monetary policy and its implications (Riboni and Ruge-Murcia, 2011).

This paper proposes to fill the gap in the literature using a new method to detect dissenting behaviors inside the GC of the ECB. We follow the methodology developed by Schonhardt-Bailey and Bailey (2009): the authors make a textual analysis of FOMC transcripts to understand the preferences of policymakers from 1979 to 1999. Thereby, we analyze European central bankers' communication through the media to determine if the GC members have common preferences and may create coalitions of central bankers. Second, we estimate a Taylor rule for each coalition of central bankers to determine their desired interest rate, thus their respective influence on the decision-making process of the ECB.

The remainder of the paper is organized as follows: Section 1 reviews the literature about European Central Bank communication. In section 2, we describe the methodology and the data. Section 3 analyzes the results and finally section 4 integrates the results in a Taylor rule, while section 5 concludes.

## I Background literature

Regarding the existing literature on the European Central Bank communication, empirical studies can be grouped into three main trends. The first one consists of studies examining differences in communication strategies. This literature is summarized in Blinder et al. (2008), who distinguish three types of committees: individualistic, genuinely collegial and autocratically collegial, and characterize the ECB's GC as genuinely collegial.

The second group consists of studies assessing the predictive ability of ECB's officials words for future interest rate changes. Indeed, it is well known that the effectiveness of central bank policy depends on how transparent its communication policy with the market is. Sturm and De Haan (2011) and Wilhelmsen and Zaghini (2011) find that communication by the ECB add information

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<sup>2</sup>De Grauwe et al. (1999), De Grauwe and Piskorski (2001), Angelini et al. (2008)

that helps predict the next policy decision.

The last group is the large literature that emphasizes the impact of communication on financial market variables like exchange rates or interest rates (Ehrmann and Fratzscher, 2003). In the case of the ECB, the issue is to assess to what extent its statements influence market expectations. Rosa and Verga (2005) find that the signals sent by the ECB can influence the money market interest rates using just words. On the other hand, Jansen and De Haan (2003) find that the effects of ECB statements on the level of the exchange rate are small and not persistent.

A fourth stand of literature has to be signaled even if it has never been related to the communication policy of the ECB. This literature deals with the issue of dissent inside the GC of the ECB. Given the absence of minutes from GC meetings, this issue is obviously an almost blank point in the literature on the ECB. However, existing studies have tried to detect dissenting behaviors using a Taylor rule. The aim was to check the significance of national aggregates in the monetary decision-making of the ECB. Among the empirical findings, Heinemann and Huefner (2004) propose a monetary policy reaction function which allows for the influence of regional divergences. Their results offer weak support for an impact of regional divergence in the ECB decision making. Following the same scheme, Ullrich (2006) includes country-specific variables of the euro zone member states in a Taylor-type reaction function for the period 1999-2005. She does not find evidence that country-specific economic developments influence the decisions of the ECB GC. Finally, Hayo and Méon (2011) construct a Taylor rule for each member of the council and for the euro area as a whole. They find that the most plausible scenario inside the GC is the one in which individual members follow national objectives and bargain over the interest rate. However, and despite these results, dissent has never been truly assessed inside the GC. As a consequence of the method we use, we will be able to detect the potential for dissent and measure its importance inside the GC. Moreover, instead of making possibly risky assumptions as in the previous studies, we use the European central bankers' communication through the media to build the appropriate framework for a Taylor decision rule.

## II Methodology

### II.1 Central bankers statements

The particular case of the Euro area, where a unique monetary policy is implemented in a multi-cultural and multi-lingual context, gives the national media a prominent role to convey information about the ECB's policy. Indeed, despite the economic integration of the euro area, a pan-European newspaper and a pan-European public still do not exist.

With the exception of the institutional communication tools (press statements and reports), an important part of the ECB communication takes place through newspaper articles and is generally aimed to the broad public. However, European central bankers are mostly quoted in their home country's media. For example, statements of a governor from France or Spain are rarely cited in German newspapers, while the opinion of the president of Bundesbank is

highly considered in German media. This suggests that national public opinion about the ECB in the home country may matter for a European central banker, for reappointments purposes or career concerns. In this context, we suppose that national newspapers are a strong tool for European central bankers to convey their personal views about the monetary policy, the economic outlook and their preferences to their national public. Moreover, we consider that this communication tool does not have the shape of the official speech of the institutional statements: in other words, the talk of the European central bankers may be more sincere.

Following this reasoning, we collect national newspaper articles where the names of the European central bankers are quoted (e.g. “El País” for the Spanish central banker, “Le Monde” for the French central banker), as most of the articles report statements made by central bankers. We use Factiva database and Europresse database for this purpose. National newspapers were chosen according to the following criteria : their large coverage and their seriousness (see the appendix A).

However, it must be noted that media reports on the ECB’s members statements may be influenced. A large literature has emphasized this bias. Heinemann and Ullrich (2007) show that the coverage of the ECB policy in the print media is more negative when inflation is relatively high. According to the authors, the media assumes a monitoring role by evaluating the performance of the central bank. Moreover, the ideological bias or political partisanship may play an important role in conveying information, as was shown by Groseclose and Milyo (2005), who exhibit a strong liberal bias among the American media. Turning to the supply side, Baron (2004) presents a theory in which bias originates when journalists have career interests. Mullainathan and Shleifer (2005) interpret this as a slant towards the biases of their own audiences. This is shown by the paper of De Haan et al. (2004): while it is well known that the German audience is very sensitive to inflation matter, these authors have emphasized that between 1999 and 2000, the Financial Times paid little attention to money growth, in contrast to the Frankfurter Allgemeine Zeitung, for which money should be given a prominent role in the strategy of the ECB.

## II.2 Textual analysis

The approach of this paper consists in providing a textual analysis of the national newspaper articles for three periods, a test for the period 1999-2012 and for the subperiods 1999-2007 and 2007-2012. The reason for this sampling is that we consider 2008 as a crucial year. Not only did four countries joined the euro area since that year (Cyprus, Malta, Slovakia and Estonia), but the global financial crisis was at its peak as well.

Using the dedicated ALCESTE software (see the appendix B), the aim of this analysis is to exhibit the opinions of the European central bankers about the economic outlook and to check if there are significant differences among their views and the topics they care about. Indeed, researchers in political science have already used this method to measure the policy positions of political actors from their speeches (Gabel and Huber, 2000; Laver et al., 2003).

Unlike most of the textual analysis softwares, ALCESTE does not need any pre-coding reference document with fixed parameters. In this way, it overcomes the difficulties that may emerge from problems of sampling and coding. This software uses a Hierarchical Decreasing Classification (HDC) by relying upon co-occurrence analysis, which is the analysis of frequent word pairs in a text corpus. This method carries out by successive splits of the text. It finds the strongest vocabulary opposition and then it extracts categories of the most representative statements, while being insensitive to meaning. The goal is to quantify a text so as to extract the most significant structures. Research has shown that these structures are closely linked to the distribution of the words in a text (Benzécri, 1982). In our case, it allows to associate to each European central banker a set of topics and to show his tendency to focus on particular economic topics. It is worth noting that ALCESTE generates categories of word lists automatically, but the topics are a subjective construction of the author, following the meaning of the keywords. We start to classify the topics obtained, our premise being that they are common for the GC members. As word lists are ranked in terms of their statistical significance, we allocate to each of the topics a percentage depending on their respective presence (using  $\chi_2$  values) in the newspaper articles. We consider that this percentage reflects the priority that the central banker has for the topic.

It must be noted that all European central bankers and the ECB presidents are concerned with this analysis, except the Executive Board members, for whom the appointment procedures dispersed across time constitute an obstacle for this analysis.

### III Results

#### III.1 Results of the Hierarchical Decreasing Classification

After processing ALCESTE, the Hierarchical Decreasing Classification allows us to obtain the following topic categories for which all European central bankers have expressed position:

- ECB Gov. : Governance Framework of the ECB
- Econ. News: Economic and Financial news
- National: Explicitly National Considerations
- Policy: Economic Policies
- Crisis: Euro Area Crisis
- Monet. Pol.: Monetary Policy Indicator
- Pol. Sys.: National or European Political System

Table 1: Results for the period 1999-2012

Country of the CB	ECB Gov.	Econ. News	National	Policy	Crisis	Monet. Pol.	Pol. Sys.
Austria	0%	27%	24%	0%	0%	36%	13%
Belgium	0%	27%	40%	0%	0%	9%	24%
Cyprus	0%	21%	31%	14%	15%	0%	19%
Finland	0%	19%	7%	0%	0%	0%	27%
France	0%	32%	37%	0%	11%	10%	10%
Germany	0%	27%	4%	7%	23%	0%	35%
Greece	0%	28%	15%	33%	0%	0%	24%
Ireland	0%	30%	12%	19%	13%	0%	17%
Italy	12%	23%	24%	5%	4%	0%	28%
Luxembourg	0%	49%	8%	0%	22%	0%	21%
Malta	17%	59%	0%	24%	0%	0%	0%
Netherlands	9%	46%	0%	0%	0%	0%	18%
Portugal	0%	45%	10%	13%	0%	0%	33%
Slovenia	0%	17%	37%	0%	0%	0%	46%
Spain	0%	42%	23%	12%	0%	0%	24%
Slovakia	0%	43%	25%	0%	0%	0%	32%
Estonia	0%	14%	0%	25%	32%	0%	29%
ECB president	0%	36%	0%	0%	36%	15%	13%

Table 2: Results for the subperiod 1999-2007

Country of the CB	ECB Gov.	Econ. News	National	Policy	Monet. Pol.	Pol. Sys.
Austria	0%	19%	26%	0%	13%	0%
Belgium	0%	23%	12%	0%	0%	26%
Finland	0%	25%	10%	11%	0%	26%
France	0%	34%	31%	9%	9%	17%
Germany	0%	53%	19%	20%	0%	8%
Greece	0%	40%	0%	22%	18%	21%
Ireland	0%	27%	46%	0%	9%	18%
Italy	0%	21%	29%	22%	6%	16%
Luxembourg	23%	41%	0%	0%	11%	25%
Netherlands	0%	15%	37%	0%	0%	0%
Portugal	0%	19%	24%	0%	0%	58%
Spain	0%	25%	24%	10%	0%	41%
ECB president	0%	49%	0%	0%	17%	35%

Table 3: Results for the subperiod 2007-2012

Country of the CB	ECB Gov.	Econ. News	National	Policy	Crisis	Monet. Pol.	Pol. Sys.
<b>Austria</b>	0%	58%	11%	0%	0%	0%	32%
<b>Belgium</b>	0%	31%	26%	0%	0%	0%	13%
<b>Cyprus</b>	0%	21%	31%	14%	15%	0%	19%
<b>Finland</b>	18%	57%	0%	0%	0%	0%	25%
<b>France</b>	0%	26%	0%	0%	40%	0%	17%
<b>Germany</b>	0%	14%	16%	0%	18%	0%	52%
<b>Greece</b>	0%	12%	0%	21%	20%	0%	47%
<b>Ireland</b>	0%	20%	16%	15%	23%	0%	25%
<b>Italy</b>	12%	10%	20%	18%	10%	0%	17%
<b>Luxembourg</b>	-	-	-	-	-	-	-
<b>Malta</b>	17%	59%	0%	24%	0%	0%	0%
<b>Netherlands</b>	7%	43%	9%	0%	0%	0%	20%
<b>Portugal</b>	0%	10%	38%	13%	10%	0%	32%
<b>Slovenia</b>	0%	17%	37%	0%	0%	0%	46%
<b>Spain</b>	0%	24%	45%	0%	11%	0%	21%
<b>Slovakia</b>	0%	43%	25%	0%	0%	0%	32%
<b>Estonia</b>	0%	14%	0%	25%	32%	0%	29%
<b>ECB president</b>	0%	26%	0%	18%	15%	0%	31%

Tables 1-3 above show the percentages allocated to each of the identified topics by each central banker for the three samples. It is worth noting that a percentage of 0% for a topic does not mean that it does not exist in the articles, but that its presence is not significant. Therefore, the latter does not appear after the classification process.

Interestingly, it appears that the European central bankers care about the same topics. However, it is important to remind that ALCESTE makes a clear distinction between each topic e.g., it may seem confusing that Economic Policies and Euro area Crisis are in different categories, as central bankers may talk about some monetary policies to disentangle the euro crisis, but the HDC process distinguishes the general monetary operations and the specific policies related to the euro debt crisis (rescue package, bailout...). The distribution of topics is not uniformly distributed across the speeches of central bankers and across time. For example, the test for the period 1999-2012 shows that the topic “Economic Policies” represents 33% of the articles related to the Greek central banker, while this topic represents only 7% of the articles related to the German one. This distribution differs depending on the sample as well, thus, the same topic “Economic policies” represents 22% of the articles related to the Greek central banker and 20% for the German one for the subperiod 1999-2007.

We suppose that if the topics are distributed with a close proportion among two central bankers across the samples, it means that they may have the same economic concerns. For example, considering the topic “Explicitly National Consideration” as an indicator of the asymmetry consequences in the euro area, for the period 1999-2012, it represents 15% of the articles related to the Greek central banker and 4% for the German one, as some central bankers may give more weight to national aggregates than others. The core of this paper remains on this idea, given that some central bankers may have more national views than others as it is shown in the results



above, they may form a coalition to weigh inside the GC. Their aim would be to have national aggregates taken into account during the decision-making process, at least more than the euro ones. However, this assumption does not mean that this group of central bankers supports the same monetary policy or have the same policy position (a tightening or an easing), but given that they may share common economic concerns (e.g. national considerations, euro area crisis), they may decide to collude so that these concerns are taken into account when deciding for the interest rate to fix. Thus, the central bankers that have the closest distribution of the percentages across the samples are the most prone to form a coalition, considering that they may have the same priorities, as revealed by their statements.

Next, the aim is to check if the different percentages obtained with the classification allow us to detect the presence of coalitions of central bankers inside the GC.

### III.2 Cluster analysis results

Since it seems improbable that a single central banker imposes its decision inside the GC, we can consider that if a group of them share common economic concerns, they may form a coalition in order to have more weight inside the GC and to create a winning majority. To identify groups of central bankers that may form coalitions, we use cluster analysis with the percentages of the topics obtained from the Hierarchical Decreasing Classification. Cluster analysis allows to define coalitions that share the same characteristics i.e., with a close distribution of topics among European central bankers' statements. This process calculates first the Euclidean distance between the topics of each central banker to determine the closest ones.

If we consider that there are  $n$  topics, the Euclidean distance between two central bankers  $x$  and  $y$  is:

$$\sqrt{\sum_{i=topic(1)}^{topic(n)} (x_{topic(i)} - y_{topic(i)})^2 + \dots + (x_{topic(n)} - y_{topic(n)})^2}$$

Then, we use the single linkage hierarchical method to determine the distance between the coalitions. This method calculates the distance between two coalitions as the distance between the two closest elements in the two coalitions (Sibson, 1973):

$$D(X, Y) = \min_{x \in X, y \in Y} d(x, y)$$

Where  $X$  and  $Y$  are two coalitions and  $d(x, y)$  is the distance between the two elements in the two coalitions.

Table 4 details the results of the cluster analysis.

Table 4: Results of cluster analysis

	<b>1999-2012</b>	<b>1999-2007</b>	<b>2007-2012</b>
<b>Northern European coalition</b>	FI-BE-FR-NL	BE-FI-NL	NL-FI-BE
<b>Peripheral European coalition</b>	GR-IE-IT	FR-GR-IT-IE	IE-PT-ECB Pr-ES-IT-GR
<b>Southern European coalition</b>	ES-PT	ES-PT	-
<b>Isolated Central Bankers</b>	ECB Pr-DE	ECB Pr-DE	DE-FR

According to the results obtained, there are three stable coalitions of central bankers for all the samples.

-Northern European coalition: The Belgian central banker, the Finnish and the Dutch ones.

-Peripheral European coalition: The Greek central banker, the Irish and the Italian ones.

-Southern European coalition: The Spanish central banker and the Portuguese one.

Moreover, two central bankers seem not to belong to any stable coalition across time.

First, the German central banker seems to be isolated. Indeed, this central banker is distant from the identified coalitions for all the samples. Second, the French central banker seems to be unstable as well. For the sample 1999-2012, he belongs to the Northern European coalition, as its country shares many economic characteristics with the countries composing this coalition. Then, when we proceed to the same analysis for the first subperiod 1999-2007, we notice that the French central banker is rather linked to the Southern European coalition. For the second subperiod 2007-2012, the French central banker is isolated from all the identified coalitions. The particular economic situation at this time may explain this result: as France (like Germany) plays a major role inside the euro area, it seems intuitive that its central banker does not need to belong to any coalition.

A number of central bankers from small countries (Cyprus, Estonia, Slovakia and Slovenia) have unstable positions as well (see Table 10 in the appendix C). They take part to different coalitions according to the period of the sample. However, there may be a data bias for those central bankers for the period 1999-2012. Indeed, while the data collection for most of the central bankers started in 1999, it starts in 2007-2008 for those ones (when they joined the euro area). Therefore, we must be careful with the interpretation of their positions across the samples.

Finally, the case of the ECB president is very interesting. For the period 1999-2012, he has an independent behavior by being isolated from the other coalitions, thus respecting the statutes of the ECB by having a euro area wide view. However, the subsamples deliver different results. For the subperiod 1999-2007, the ECB president is very close to the German central banker, this may be due to the particular German position inside the GC and its potential influence on the rest of the board members. But for the period 2007-2012, the ECB president belongs to the Southern European coalition. The particular case of those countries after the economic crisis may explain this result. Indeed, the ECB president may have expressed the same concerns as those central bankers during this period.

From the data, we identified the percentages allocated to the different topics for each European central banker. From the cluster analysis, we have defined a number of stable coalitions according

their common economic concerns. The aim is to assess coalitions' monetary preferences and their impact on the decision-making process of the ECB.

## IV The Text-Augmented Taylor rule

### IV.1 The Data

The quarterly data used to estimate the Taylor rule of each coalition cover the period from the first quarter of 1999 to the fourth quarter of 2011. The interest rate variable is proxied by the three-month Eonia. The inflation rate is measured by the Harmonized Index of Consumer Prices, the output variable is captured by real GDP (for quarterly data). Given that we have a finite sample of 49 observations, we don't consider the possible problem of unit roots in the time series, as these procedures are known to have limited power against alternative hypothesis<sup>3</sup>(Levin et al., 2002).

Unlike most of the empirical studies that use ex-post data for setting the Taylor rule, we use survey data. This comes after the critique of Orphanides (2001) who suggests that the appropriate policy function should use real-time data instead of ex-post data. However, as central bankers form expectations to fix the interest rate, the use of survey data seems more reliable as the monetary policy needs some lags to be effective. Indeed, it is widely recognised that it takes several quarters for a policy change to have its full effects on the real economy and actual inflation rates, we take 6 lags for the inflation rate and 6 lags for the output gap. However, forward-looking variables may be correlated with the error term, leading to biased estimates. Therefore, these variables must be instrumented. Moreover, the instruments used should signal future prices and output developments, while being uncorrelated with the error term. We follow the literature, by using a constant and the lagged independent variables as instruments, lags 1 to 3 of the inflation gap and the output gap. We also consider the lags of some instruments that the ECB may take into account in its monetary policy:

-The money growth M3, as the monetary condition in the euro area is explicitly considered as one pillar by the ECB to set its strategy. Money growth is measured by the quarterly percentage change of M3 in the euro area.

-The exchange rate variable is also important, as the ECB targets "long-run inflation", a measure of inflation adjusted to remove effects of exchange rate movements for the open economies in the euro area. As exchange rate variable we use the quarterly growth rate of the nominal dollar exchange rate with the euro.

We use the General Method of Moments (GMM) estimator, as it accounts for endogeneity biases and non-spherical errors (Clarida et al., 1999; Siklos and Bohl, 2009). The condition for the validity of the instruments is their exogeneity with respect to the central bank decisions, hence,

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<sup>3</sup>For robustness purposes, we test the null hypothesis of non stationarity of our regressors with the ADF test and use first differences in case the null hypothesis is not rejected, in order to exclude the possibility of spurious regressions, we find that the estimations deliver approximately the same results.

their uncorrelatedness with the disturbances. We make a Hansen-Sargan test on over-identifying restrictions as we have more instruments than parameters to estimate (Shea, 1997). The null hypothesis is that the instruments are valid (i.e. they are orthogonal to the error term) and the model is correctly specified. The instruments appear to be robust as the null hypothesis of the validity of instruments cannot be rejected for all the estimations. Moreover, research shows that the use of weak instruments can lead to substantial biases. Stock and Yogo (2002) propose a test of weak instruments based on the F-test value of the first stage regression in a two-stage least square procedure to identify the weak instruments. The instruments seem to be highly relevant regarding the values of the F-test obtained in the estimations.

The inflation rate and the output gap of the countries composing the coalitions are extracted from the European Economy publication from the Directorate General for Economic and Financial Affairs (ECFIN) of the European Commission. Series are published twice a year (in spring and autumn), and include forecasts of output gap and inflation rate with a quarterly profile for each country of the euro area. In this way, European central bankers have real time forecasts for every following period with the corresponding lag used in our model (18 months). Finally, the exchange rate and the monetary aggregate M3 for the euro area are extracted from the Eurostat database.

Concerning the final estimation (eq. 8), we use the Ordinary least squares method. We make a Chow test for each quarter of 2007 and 2008 to check if there is a structural break during that time regarding the euro debt crisis, the null hypothesis of no structural break cannot be rejected for all the estimations. This is confirmed by the CUSUM test that shows the constancy of the coefficients in our model (Figure 1 in the appendix D). Moreover, both the null hypothesis of normal distribution (Figure 2 in the appendix D) and homoscedasticity cannot be rejected as well. Therefore, the OLS method seems to be the most reliable one.

## IV.2 The model

The Taylor rule is a policy rule developed by Taylor (1993) and has become a popular tool for evaluating monetary policy of central banks. The initial aim was to describe the monetary policy of the Federal Reserve in the US :

$$i_t = r^* + \Pi_t + \beta(\Pi_t - \Pi^*) + \gamma y_t \quad (1)$$

Taylor (1993) suggested the value of  $\beta$  and  $\gamma$ , the relative weights associated by the central bank to inflation and output stabilization respectively, to be equal to 0.5 for the Fed. He obtained the following Taylor rule:

$$i_t = r^* + \Pi_t + 0.5(\Pi_t - \Pi^*) + 0.5y_t = (r^* - 0.5\Pi^*) + 1.5\Pi_t + 0.5y_t \quad (2)$$

where  $i_t$  is the policy interest rate,  $r^*$  the equilibrium real rate,  $\Pi_t$  the rate of inflation,  $\Pi^*$  the inflation target and  $y_t$  the output gap.

According to Svensson (1999), this rule is the optimal reaction function for a central bank with a backward-looking model. However, Sauer and Sturm (2003) show that a successful stabilization policy needs to be forward-looking. The augmented Taylor rule with forward-looking specification was set by Clarida et al. (2000) within a New Keynesian framework. This function allows us to take into account the prospective behavior of central bankers. Currently considered as an important tool for evaluating the monetary policy, it takes the following form:

$$i^* = i + \beta(E_t[\Pi_{t+k}] - \Pi^*) + \gamma E_t[y_{t+q}] \quad (3)$$

where  $i^*$  is the desired short-term nominal interest rate and  $i$  its long-run equilibrium value.  $E_t[-]$  is the expectation operator conditional on all the information available at time  $t$ . Furthermore, at least since the nineties, central banks worldwide tend to smooth their policy rates. In that case, it is generally considered necessary for the central bank to smooth the variability of its interest rate through time as abrupt changes can induce troubles in bond markets. Hence, the actual short-term nominal interest rate has to be modeled as a weighted average of the lagged interest rate and the desired interest rate:

$$i_t = \rho i_{t-1} + (1 - \rho) i^* \quad (4)$$

Where the parameter  $\rho$  measures the degree of interest rate smoothing.

If we substitute the second formula in the first one, we obtain:

$$i_t = \rho i_{t-1} + (1 - \rho) i + (1 - \rho) \beta (E_t[\Pi_{t+k}] - \Pi^*) + (1 - \rho) \gamma E_t[y_{t+q}] \quad (5)$$

In this paper, we set a Taylor rule for each stable coalition of central bankers<sup>4</sup> and the isolated ones<sup>5</sup> found in the cluster analysis<sup>6</sup>:

$$i_t = \rho i_{t-1} + (1 - \rho) i + (1 - \rho) \tilde{\beta}_x (E_t[\Pi_{x,t+k}] - \Pi^*) + (1 - \rho) \tilde{\gamma}_x E_t[y_{x,t+q}] \quad (6)$$

where  $x = \{1, \dots, 5\}$  corresponds to the coalitions and the isolated central bankers.  $\Pi_{x,t+k}$  and  $y_{x,t+q}$  are respectively the expected inflation gap and the expected output gap of the countries of the central bankers that compose the coalition. The aim is to estimate the value of the parameters  $\tilde{\beta}_x$  and  $\tilde{\gamma}_x$  for each coalition using the expected data. Those parameters represent the response of the coalitions to a move of their expected inflation gap and their expected output gap respectively.

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<sup>4</sup>Northern European coalition, Peripheral European coalition and Southern European coalition

<sup>5</sup>France and Germany

<sup>6</sup>The reason for this sampling is that the position of the other central bankers (Cyprus, Estonia, Slovakia and Slovenia) is too unstable through the different periods, mainly because of data bias. It is then better not to take them into account in this analysis.

Next, we determine the desired interest rate of each coalition  $\bar{i}_x$  using the parameters  $\tilde{\beta}_x$  and  $\tilde{\gamma}_x$  found in the previous regressions, this time with the actual data as explanatory variables.

$$\bar{i}_{x,t} = \rho i_{t-1} + (1 - \rho)i + (1 - \rho)\tilde{\beta}_x(E_t[\Pi_{x,t}] - \Pi^*) + (1 - \rho)\tilde{\gamma}_x E_t[y_{x,t}] \quad (7)$$

At last, we make a final estimation, with the Eonia as a dependant variable, and the desired interest rate of each coalition and isolated central banker as independent variables. The goal is to quantify their respective share in setting the actual interest rate.

$$i_t = \alpha \bar{i}_{1,t} + \delta \bar{i}_{2,t} + \theta \bar{i}_{3,t} + \lambda \bar{i}_{4,t} + \sigma \bar{i}_{5,t} \quad (8)$$

We consider that the parameters  $\alpha$ ,  $\delta$ ,  $\theta$ ,  $\lambda$  and  $\sigma$  represent the contribution of each coalition and isolated central banker for setting the interest rate.

### IV.3 Estimation results

We start by estimating the value of the parameters linked to the inflation gap ( $\beta$ ) and the output gap ( $\gamma$ ) for the stable coalitions and the isolated central bankers. Table 5 below gives the results of the GMM regression.

Table 5: GMM estimation for the period 1999-2012

Explanatory variable	Parameter	NEC	PEC	SEC	France	Germany
c		-0,13 (0,10)	0,12 (0,16)	-0,23 (0,14)*	0,01 (0,19)	0,12 (0,10)
$i_{t-1}$	$\rho$	0,91 (0,05)***	0,75 (0,05)***	0,85 (0,04)***	0,90 (0,03)***	0,94 (0,02)***
$E_t[\Pi_{t+6}]$	$\beta$	0,33 (0,09)***	0,27 (0,11)***	0,27 (0,12)**	0,41 (0,17)**	0,63 (0,06)***
$E_t[y_{t+6}]$	$\gamma$	0,64 (0,15)***	0,54 (0,80)***	1,04 (0,31)***	0,67 (0,33)**	0,49 (0,17)***
No. of observations		49	49	49	49	49
J-statistic ( $\rho$ value)		0,54	0,57	0,55	0,44	0,69

(1)NEC: Northern European Coalition/PEC: Peripheral European Coalition/SEC: Southern European Coalition.

(2)Note that GMM estimates \*/\*\*/\*\* denote significance at the 10%, 5% and 1% level, standard errors in parenthesis.

The results of the GMM estimation show that the parameters  $\beta$  and  $\gamma$  linked to the inflation gap and the output gap respectively have the expected sign and are highly significant for most of the explicative variables. Moreover, the inflation parameter does not exceed 1 i.e., the so-called Taylor principle is not fulfilled: the GC moves to accommodate changes in inflation, but does not increase it sufficiently to keep the real interest rate from declining. This may be due to the Eurozone crisis period, the ECB had an accommodating behavior towards the inflation rate and the output gap during that time<sup>7</sup>. Overall, we can conclude that a rise in the expected inflation

<sup>7</sup>As this result may seem surprising at first glance, we make a regression for the subperiods 1999-2007 and

gap or output gap leads to a rise of the interest rate inside the GC.

Next, the aim is to estimate the desired interest rate of each coalition and isolated central banker, using the equation (7) and the parameters  $\beta$  and  $\gamma$  found in the previous regression with actual data as explanatory variables, instead of the expected data as in the previous one. The results are detailed in the appendix E (Table 11). The objective is to show the proximity between the desired interest rate of each group of central bankers with the actual interest rate.

Table 6 below shows the results.

Table 6: Average of the difference between the desired interest rate and the actual one

	NEC	PEC	SEC	France	Germany
<b>Average of the difference</b>	0,09	0,52	0,27	0,10	0,04

(1)NEC: Northern European Coalition/PEC: Peripheral European Coalition/SEC: Southern European Coalition.

As the results show, the difference between the desired interest rate and the actual one differs depending on the central bankers. While the difference has a very low value for Germany, France and some Northern countries, the latter is greater for the Peripheral and the Southern European coalition. This observation gives a first idea about the potential influence of the central bankers inside the GC: the leading position of the German central banker, the French one and the Northern European coalition of CBs, as their desired interest rate is very close to the actual one, whereas others central bankers from the South and the Periphery do not seem to influence in their favor the monetary policy of the GC. **However, a better way** to show the weights of the central bankers would be to use the Ordinary least squares method, with the Eonia as a dependant variable and the desired interest rate of each group of central bankers as independent variables.

2007-2012, we find that the parameters  $\beta$  and  $\gamma$  have a higher value in the first subperiod than in the second one.

Table 7: OLS regression

Explanatory variables	Parameter	(1)
Constant		0,26 (0,09)***
Northern European coalition	$\alpha$	0,41 (0,28)*
Peripheral European coalition	$\delta$	0,20 (0,22)
Southern European Coalition	$\theta$	0,24 (0,30)
France	$\lambda$	0,30 (0,69)
Germany	$\sigma$	0,54 (0,19)***
N of observations		51
R squared		0,96

(1)Note that OLS estimates \*/\*\*/\*\* denote significance at the 10%, 5% and 1% level, standard errors in parenthesis.

The results show that all the coalitions and the isolated central bankers have a certain influence inside the GC for setting the interest rate, their parameters are positive and significant for Germany and the Northern European coalition. In this analysis, the value of each parameter linked to a group of central bankers reveals its respective influence. As Table 7 shows, all coalitions do not have the same weight. In Table 8, we compare (after normalizing the coefficients so that they sum to 1) the normalized value of the coefficients to the economic weight of each coalition.

Table 8: Comparison between the parameters and the economic weight of the coalitions

	NEC	PEC	SEC	France	Germany	Total
Contribution in setting the interest rate	20,7%	10,34%	12%	16%	28%	86,4%
Economic weight	12,07%	21,25%	12,61%	21,26%	28,52%	95,70%
Difference	8,64%	-10,91%	-0,61%	-5,26%	-0,52%	-8,73%

The results first reveal that Germany and the Northern European coalition have the largest weight, the sum of their respective weights is almost 50%. It is worth noting that Germany has almost twice the weight of France. Second, the results show that the Northern European coalition has a weight inside the GC more than its economic weight, it is the only coalition that have a positive difference. Germany has a weight in the decision rule of the GC almost equal to its economic weight, the Southern European Coalition is also in this case. This is not the case for France and the Peripheral European coalition. The method thus reveals that contrary to the official view, each country (or coalition of countries) does not have the same influence in the GC of the ECB, thus, the German central bankers and others from the North have the leadership in



the decision making process. Moreover, the theoretical literature about ECB governance admits this finding as it is recognized that the ECB received the institutional legacy of the Deutsche Bundesbank and its followers from the Northern countries, and the fact that “Bundesbank council members are probably as close as one can get to being a fly on the ECB’s wall”<sup>8</sup>.

## Conclusion

Since it is recognized that the ECB lacks transparency (De Haan et al., 2010), the literature about the inner working of the GC is scarce due to the absence of voting records and minutes from meetings. It is then a challenge to try to understand and quantify the decision making process of the ECB by relying on economic and statistical tools. We then see one major contribution from this paper. We introduce textual analysis to the literature on ECB communication, a process frequently used in political science and sociology. From a methodological point, this method enables us to extract the preferences of European central bankers’ expressed through the national media, as the media channel play an important role in building knowledge about ECB’s monetary policy. The statistical tools used afterwards allow us to regroup the European central bankers according to their expressed concerns and to weigh their influences inside the GC. Not surprisingly, the results suggest a strong position of the German central banker and some central bankers from the North, corroborating the previous empirical and theoretical findings about the decision rule in the ECB. Thus, the different countries or coalitions of countries do not have an influence proportional to their economic size inside the GC.

However, given the future integration of new countries in the euro area in the upcoming years and the euro debt crisis that led to a crisis of governance and has questioned the fairness of the decision rule of the ECB; the decision-making process in the GC will be confronted to deep changes in the near future, and it is without doubts that the current “leaders” inside the GC will face difficulties to maintain their leadership. Therefore, if the GC keeps the voting records secrets the coming years, it will be interesting to apply the same methodology to verify if the concerns of central bankers lead to different potential coalitions and the weight of these coalitions in the decision making process, thus, to check if there is a move of the center of gravity inside the GC through the years.

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<sup>8</sup>Source: Bloomberg, 1 August 2001

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# APPENDIX

## APPENDIX A

Table 9: National newspapers selected

<b>National newspaper</b>	<b>Country of origin</b>	<b>Political alignment</b>
De Telegraaf	Netherlands	Liberalism
Le Monde	France	Center-left
Corriere della Serra	Italy	Social liberalism
El país	Spanish	Center-left
Süddeutsche Zeitung	Germany	Liberal-conservative
Diário de Notícias	Portugal	Centrist
Suomen Tietotoimisto	Finland	Neutral
Der Standard	Austria	Social liberalism
De Standaard	Belgium	Neutral
Athens news	Greece	-
The Irish Times	Ireland	Social liberal
Postimees	Estonia	-
Cyprus mail	Cyprus	Independant
Luxemburger Wort	Luxembourg	Centre-right
Times of Malta	Malta	Centre-right
Slovenka tiskovna agencija	Slovenia	Centre-right
SITA Slovenska Tlacova Agentura	Slovakia	Centre-right



## APPENDIX B

### ALCESTE Methodology

ALCESTE was developed by Max Reinert in 1983 and was mainly used in human and social sciences like sociology, psychology and political science (Reinert et al., 1995; Lahlou, 1996; Schonhardt-Bailey, 2005). This software combines textual and statistical features, it identifies a speaker's association of ideas and main arguments following his discourse. This can be correlated with others characteristics (political affiliation...). For this purpose, the software relies upon co-occurrence analysis, which is the statistical analysis of frequent word pairs in a text corpus, in order to realize a Hierarchical Decreasing Classification (HDC) process: this process uses a methodology that combines different statistical methods like segmentation, hierarchical classification and dichotomization.

ALCESTE starts by classifying words distribution within a text, to obtain a classification of simple statements and to reveal the keywords, which in turn are distinguished as word classes that reveal different forms of discourses in the speech. ALCESTE uses its dictionary to distinguish the forms of the words and uses the "content words" that carry all the information about the meaning of the discourse. It creates a data matrix to quantify the presence of these content words in the corpus. Then, it uses a Hierarchical Decreasing Classification to identify word classes using these content words. It is worth noting that ALCESTE cannot analyze corpora with multiple discrete topics, therefore the textual data must be consistent and large enough. Following an iterative process, the HDC process decomposes the classes until the iteration fails to result in further divisions.

## APPENDIX C

Table 10: Detailed results of cluster analysis

	1999-2012	1999-2007	2007-2012
<b>Northern European coalition</b>	FI-BE-FR-NL	BE-FI-AT-NL	SI-AT-NL-FI-SK-BE
<b>Peripheral European coalition</b>	GR-IE-CY-IT	FR-GR-IT-IE	
<b>Southern European coalition</b>	ES-SK-PT	PT-ES	CY-IE-PT-ECB Pr-ES-IT-EE-GR
<b>Fourth coalition of CBs</b>	DE-EE-LU-SI		
<b>Isolated Central Bankers</b>	ECB Pr-AT-MT	LU-ECB Pr-DE	DE-FR-MT

## APPENDIX D

Figure 1: The Cusum test with the OLS residuals

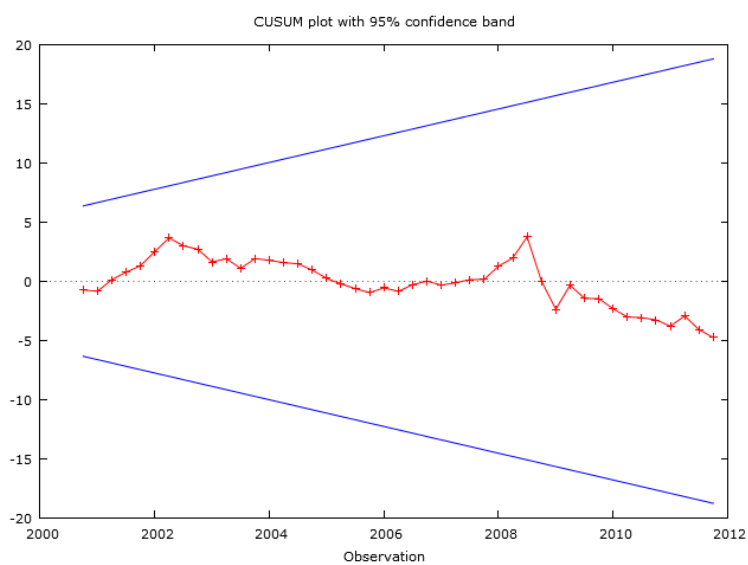
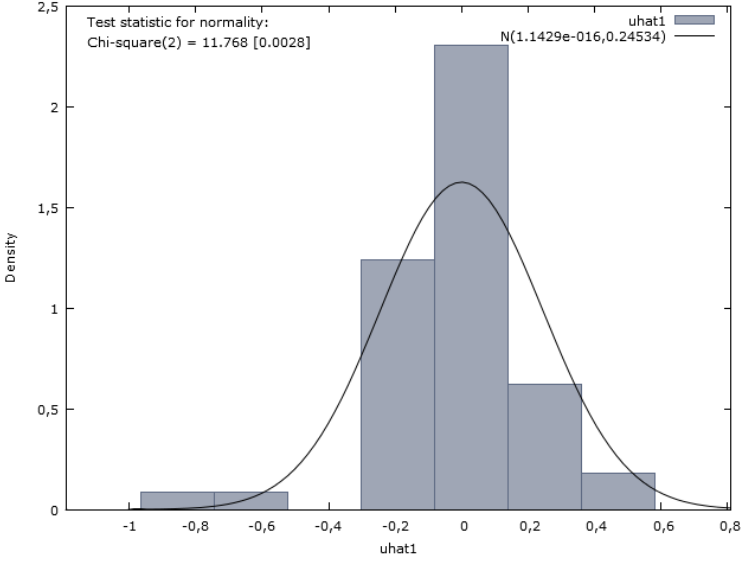


Figure 2: Normality test of residuals



## APPENDIX E

Table 11: The desired interest rate of each coalition and isolated country

	<b>Eonia</b>	<b>NEC</b>	<b>PEC</b>	<b>SEC</b>	<b>France</b>	<b>Germany</b>
<b>1999 Q1</b>	3,06	3,29	2,86	3,15	3,29	3,31
<b>1999 Q2</b>	2,61	2,95	2,59	2,74	2,97	2,96
<b>1999 Q3</b>	2,46	2,51	2,18	2,45	2,55	2,55
<b>1999 Q4</b>	2,83	2,41	2,17	2,25	2,44	2,42
<b>2000 Q1</b>	3,28	2,76	2,42	2,89	2,78	2,78
<b>2000 Q2</b>	3,97	3,17	2,86	2,86	3,22	3,25
<b>2000 Q3</b>	4,44	3,84	3,35	3,92	3,85	3,89
<b>2000 Q4</b>	4,81	4,28	3,80	4,13	4,35	4,35
<b>2001 Q1</b>	4,84	4,62	4,20	4,19	4,69	4,74
<b>2001 Q2</b>	4,75	4,58	3,91	4,40	4,65	4,72
<b>2001 Q3</b>	4,33	4,49	3,93	4,29	4,53	4,61
<b>2001 Q4</b>	3,61	4,06	3,57	3,94	4,06	4,19
<b>2002 Q1</b>	3,28	3,37	2,82	3,21	3,41	3,47
<b>2002 Q2</b>	3,33	3,16	2,68	2,92	3,14	3,19
<b>2002 Q3</b>	3,30	3,17	2,73	2,88	3,16	3,24
<b>2002 Q4</b>	3,23	3,15	2,53	2,81	3,08	3,20
<b>2003 Q1</b>	2,77	3,03	2,43	2,75	2,98	3,09
<b>2003 Q2</b>	2,44	2,62	1,99	2,33	2,54	2,66
<b>2003 Q3</b>	2,07	2,30	1,69	2,06	2,25	2,34
<b>2003 Q4</b>	2,01	1,96	1,79	1,79	1,89	1,98
<b>2004 Q1</b>	2,02	1,97	1,52	1,85	1,86	1,92
<b>2004 Q2</b>	2,04	1,95	1,56	1,74	1,85	1,92
<b>2004 Q3</b>	2,05	1,96	1,49	1,72	1,85	1,93
<b>2004 Q4</b>	2,08	1,95	1,62	1,68	1,91	1,94
<b>2005 Q1</b>	2,07	1,94	1,50	1,84	1,91	1,98
<b>2005 Q2</b>	2,07	1,95	1,69	1,89	1,91	1,99
<b>2005 Q3</b>	2,07	1,95	1,48	1,65	1,91	1,99
<b>2005 Q4</b>	2,15	1,96	1,65	1,78	1,95	1,98
<b>2006 Q1</b>	2,40	2,10	1,71	1,88	2,03	2,09
<b>2006 Q2</b>	2,64	2,31	1,86	2,06	2,30	2,34
<b>2006 Q3</b>	2,94	2,56	2,17	2,32	2,49	2,58
<b>2006 Q4</b>	3,37	2,89	2,42	2,79	2,88	2,90
<b>2007 Q1</b>	3,61	3,31	3,07	3,25	3,28	3,29
<b>2007 Q2</b>	3,86	3,50	2,93	3,36	3,52	3,52
<b>2007 Q3</b>	4,05	3,77	3,23	3,61	3,75	3,77
<b>2007 Q4</b>	3,95	3,90	3,37	3,73	3,84	3,92
<b>2008 Q1</b>	4,05	3,72	3,07	3,53	3,72	3,85
<b>2008 Q2</b>	4,00	3,77	3,05	3,55	3,73	3,90
<b>2008 Q3</b>	4,25	3,70	3,09	3,44	3,72	3,87
<b>2008 Q4</b>	3,15	3,82	3,07	3,64	3,85	4,03
<b>2009 Q1</b>	1,38	2,65	2,26	2,50	2,74	2,85
<b>2009 Q2</b>	0,77	1,20	1,16	1,25	1,25	1,27
<b>2009 Q3</b>	0,36	0,77	0,77	0,78	0,68	0,71
<b>2009 Q4</b>	0,36	0,32	0,39	0,29	0,29	0,30
<b>2010 Q1</b>	0,34	0,28	0,16	0,28	0,22	0,29
<b>2010 Q2</b>	0,35	0,30	-0,12	0,17	0,21	0,31
<b>2010 Q3</b>	0,45	0,20	-0,28	0,08	0,21	0,28
<b>2010 Q4</b>	0,60	0,34	-0,29	0,11	0,31	0,38
<b>2011 Q1</b>	0,67	0,41	-0,03	0,11	0,47	0,52
<b>2011 Q2</b>	1,04	0,49	0,24	0,27	0,51	0,59
<b>2011 Q3</b>	0,97	0,80	0,38	0,57	0,84	0,93
<b>2011 Q4</b>	0,79	0,87	0,26	0,37	0,93	0,84