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Gender and Monetary Policymaking: Trends and Drivers

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Gender and Monetary Policymaking: Trends, Drivers and Effects[1]

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This paper analyses the gender representation in monetary policy committees, offering three contributions. We propose the first index to evaluate the gender representation in monetary policymaking - i.e. the GMP Index – for a sample of 112 countries as of 2015. Second, we investigate the drivers of gender diversity in monetary policy committees. Our results show that, besides legal (Common Law), religious (Orthodox), historical (French colony) and socio-economic (female labour force) drivers, the gender representation is more likely to be relevant in countries characterized by a well-defined central bank governance, i.e. more independent central banks and less involved in supervision. Finally, we test whether gender diversity in central bank boards affects the conduct of monetary policy and hence macroeconomic outcomes. We find that gender diversity is inversely associated with inflation rates and money growth. The presence of women in central bank boards seems to be associated with a more hawkish approach to monetary policy making.

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1. Introduction

Women are increasingly represented in central banks. As of January 2015, 16 central banks were headed by women, either on an interim or full-time basis, the most known being Janet Yellen in the US and Elvira Nabiulina in Russia. In general women's representation in monetary policy committees seems to have increased in the last years. Then two natural questions arise: What influences the gender composition of monetary policy committees? And, are women in central banks affecting monetary policy?

The literature on monetary policy (MP) acknowledges that monetary policy is conducted by committees. It has also been claimed that committees can make more efficient monetary decisions via heterogeneity and diversity. At the same time, members' heterogeneity can trigger regularities in the monetary action. Gender diversity, a specific type of heterogeneity, is a potential relevant trait in the monetary policymaking. However, we know very little about the drivers of gender diversity in monetary policy committee, as well as about its effects. In parallel, the literature on gender and corporate governance has been rarely focused on central bank boards. A general conclusion of this literature is that the presence of women in commercial bank boards is associated with higher risk aversion, while the effects of a larger share of women on banking performances is under debate.

The aim of this paper is to intertwine these two strands of the literature, offering new evidence on gender diversity in monetary policymaking. The paper brings three contributions: i) the construction of the first index of gender diversity in monetary policymaking (GMP Index) for an extensive sample of 112 countries; then the index is used in cross-section analyses aimed at investigating ii) the drivers and iii) the effects of the presence of women in monetary policy committees.

Regarding the drivers, our results show that, besides legal (Common Law), religious (Orthodox), historical (French colony) and socio-economic (female labour force) drivers, the gender representation is more likely to be relevant in countries characterized by a well-defined central bank governance, i.e. more independent central banks and less involved in supervision. When we move to the effects, we find that gender diversity is inversely related to inflation rates and money growth. Therefore the presence of women in central bank boards seems to be associated with a more hawkish approach to monetary policy making.

We organize the paper as follows. Paragraph 2 briefly presents the literature review, Paragraph 3 delivers the index description, while Paragraphs 4 and 5 present the results of the empirical analysis and its results. Paragraph 6 concludes.

2. Monetary Policy, Boards and Gender: The State of the Art

Our work is related to two strands of the literature: that on MP committees and that on gender and corporate governance. The first one regards the economics and political economy of MP committees. Nowadays, the monetary policymaking is designed and implemented using committees. Fry et al. (2000), Pollard (2004) and Lybek and Morris (2004) documented that the

large majority of central banks use committees. This feature of the central bank governance deeply affects the definition of the MP stance. Ultimately, MP decisions become the endogenous result of a – sometimes complex – interaction between the rules of the game and the preferences of the players, i.e. the board members and the politicians.

The existing literature that looks at the link between monetary policy decisions and board members' diversity zooms essentially on two issues: i) how the monetary policy committees work, and ii) how the specific composition of committees can shape monetary policy outcomes, where the more disputed issue is related to the degree of activism, i.e. the dovish attitude of MP decisions. The conclusions of this literature are rather heterogeneous.

Using an experimental approach, Blinder (2007) and Blinder and Morgan (2005, 2008) have argued that committees can take more efficient monetary policy decisions via heterogeneity and diversity. Moving beyond, Besley et al. (2008), Hansen and McMahon (2008), Gerlach-Kristen (2009), Hix et al. (2010) and Eijffinger et al. (2013a; 2013b; 2015) have claimed that heterogeneity can even trigger regularities in monetary policy actions, making it theoretically possible to alter a board's composition in order to drive future monetary policy decisions. As a result, the evaluation of monetary policy through board's composition has mostly become a political economy issue, taking into account the role of preferences in defining the stance of the monetary policy. Therefore, the relevant preferences that have to be investigated are both political – i.e. the choices of the policymakers – and bureaucratic – i.e. the decisions adopted by the board members –, together with their possible interconnections.

In a seminal paper, Chappell et al. (1993) suggested how the appointment process of committee members was the primary mechanism to generate partisan implications in monetary policy. Thereafter, it has become quite usual to apply political economy tools, using either spatial voting models or the study of reaction functions. Spatial voting patterns mostly differentiates between internally and externally appointed members (Hansen and McMahon, 2008; Bhattacharjee and Holly, 2010) and assign significant importance to the stages of committee design and monetary policy conduct. Harris and Spencer (2009) obtain similar results via reactions functions, showing that outsiders of the Bank of England staff reacted differently to forecasts of inflation and output than insiders. All these results are reinforced by the findings that insiders are more likely to vote as a block, choose higher interest rates and are often featured on the winning side of policy decisions. Harris and Spencer's (2009) work also supports the idea that board heterogeneity matters. At the same time, Patra and Samantaraya (2007) create an index of monetary policy committee empowerment and show that higher empowerment is associated with better inflation results. However they do not focus on personal characteristics.

Board composition has been also associated with monetary policy performances. Gohlmann and Vaubel (2007) test the hypothesis that inflation preferences of central bankers depend on their educational and occupational background. Performing a panel data analysis for the euro area and eleven countries since 1973, they find that former members of central bank staff are more prone to lower inflation rates than former politicians do. Farvaque et al. (2006), on the other hand, link inflation record in a selected sample of countries with the biographical features of the board

members. They use a well-structured panel data comprising 13 countries and a five years period, from 1999 to 2003, and find that the age of board members appears to be the most important factor. More recently, Farvaque et al. (2014) perform a similar analysis focused on inflation and output volatility. They find that the size of the board matters, except in crisis times, while personal background influences the performances, with a positive role for board members coming from academia, central banks and the financial sector.

It is worth noting that against this background Harris et al. (2011) reshaped some of these previous findings. They firstly showed how the effects of members' career backgrounds and the political influence on voting behavior were negligible. Moreover, they suggested that the entire literature on voting behavior based on members' internal or external status was overly simplistic, laying the groundwork of accounting for possible unobserved heterogeneity.

Notwithstanding this contingency, the general insight from this literature highlighted the importance of the relationships between board composition and monetary policy decisions. More precisely, the role of preferences has been explored by focusing on the degree of activism in designing and implementing monetary policy actions. High inflation performances are usually correlated with active (Keynesian) monetary policies (Eijffinger and Masciandaro, 2014). Policymakers tend to use monetary tools with an anti-cyclical perspective, using the inflation tax to smooth different kinds of macroeconomic shocks – i.e. real (Barro and Gordon, 1983) and/or fiscal (Sargent and Wallace, 1981) unbalances – thus trying to exploit the trade-off between real gains and nominal (inflationary) costs.

In this literature, a specific jargon has been coined: a "dove" is a policymaker that likes to implement active monetary policies, while a "hawk" is a policymaker that dislikes them (Chappell et al. 1993, Jung 2013, Jung and Kiss 2012, Jung and Latsos 2014, Eijjfinger et al. 2013a and 2013b, Neuenkirch and Neumeier 2013, Wilson 2014, Eijffinger et al. 2015). Throughout time, the dovish/hawkish attitude has probably become one of the main focus of the analysis of monetary policy board decisions.

Here the gender diversification finally came in. Chappell and McGregor (2000) were among the first ones to draw the attention to gender. Using voting records and board transcripts, their study documents the voting behavior of individual FOMC members over the 1966-1996 period, providing a ranking by preference for ease – dovishness – of 84 individuals who served on the FOMC. During this period, seven women have served on the FED board, and six of them are ranked among the thirteen most dovish members. In other words, this study shows that female members of the FOMC could more often be qualified as doves rather than hawks.

Recently, the interest on the link between gender and dovishness has revived. Farvaque et al. (2010) study the impact of the composition of monetary policy committees on the inflation performances of nine central banks from major OECD countries and 175 central bankers, over the period 1999-2008. Their study considers gender as an important demographic feature. Among the 175 board members, only 20 were women (11.4%), with a slight temporal increase: from 7 (out of 70) in 1999 to 9 (out of 74) in 2008. The board with the highest share of female members was in Sweden, with 50% of members being women since 2003, while inflation targeting countries tended to have a

higher presence of women on their boards. In their sample, lower inflation levels are associated with a higher share of female members; therefore, women seem to be more hawkish, and the gender issue is more important in inflation targeting countries. The authors explained these results noting the general trend in the period towards more conservative central banks; therefore, in order to be appointed, women needed stronger credential, and, in this case, a hawkish reputation would qualify, both before the appointment and during their board service. Therefore, gender preferences can be considered to be endogenous with respect to the overall structural and institutional settings. This is exactly the perspective that we will investigate in the empirical part.

It is interesting to note that the dovish attitude in the actions and/or in the representation of the women behavior has been already analyzed in political sciences. A prominent line of research has shown that voters tend to view female candidates as associated with a dovish behavior, i.e. being more competent in social welfare policies, while men are perceived to be more hawkish, focusing more on other policy areas, such as national security, defense and crime (Leeper, 1991; Alexander and Andersen, 1993; Huddy and Terkildsen, 1993a and 1993b; Burrell, 1994; Matland, 1994; Kahn, 1996; Sanbonmatsu, 2002; Lawless, 2004; Dolan, 2010; Thomsen 2011). Therefore, dovishness can be considered a gender trait. In general, if women care more about social problems, in the field of monetary policy this may imply that women are more likely to use monetary tools to fix cyclical macroeconomic problems.

Recently, gender has also been used to explain the dissenting voting behavior in monetary policy committees, but without any theoretical explanation. The dissenting attitude of a MP committee member measures his/her degree of disagreement, which can be positive – signaling a degree of hawkishness – or negative – signaling dovishness. In explaining the degree of disagreement in the definition of the FED monetary policy decisions over the period 1994-2008, Bennani et al. (2014) find that, during the 121 considered meetings, female members appeared to have a high dissenting attitude, whatever the sign of the degree of disagreement. Furthermore, Lahner (2015) analyses the inconsistent voting behavior – voiced disagreement jointed with formal agreement and vice versa – in FED meetings during 1989-2008 and finds that female FOMC members have a significantly higher probability of casting inconsistent votes than male ones.

All in all, the recent literature on MP boards is concerned with the role of heterogeneity in explaining the monetary policy stance, with a particular attention to the dovish and/or hawkish attitude. So far, however, the role of gender heterogeneity has not been explored in a deep and systematic way.

The relevance of board diversity is also stressed in the second strand of the literature our paper relates to: the link between gender diversity and corporate governance. Three main features from this academic debate are relevant in our context: i) what makes it more difficult for women to achieve top positions; ii) the relationship between gender and risk aversion; and iii) the impact of women's representation on boards and firm performances.

We start from the still open debate on the importance of women's presence in corporate boards. Women are underrepresented in corporate boards all over the world, in particular in banks. Several researchers have investigated the so-called "glass ceiling", i.e. the obstacles encountered by women

to reach top positions. Focusing on banks, Arfken et al. (2004) examine the State of Tennessee as a case study and discuss the reasons for the limited representation of women on boards. They conclude suggesting "women are a critical but over-looked resource". Considering a sample of European Union countries, Mateos de Cabo et al. (2009) find evidence of discrimination in banks' board of directors. Some banks preferred a friendly board without women directors, while others showed signs of discrimination, with no women in more risky banks. Finally, for some banks they also find results in line with Becker's theory of discrimination, i.e. that banks in more dynamics and competitive markets have less incentives to discriminate and are therefore characterized by a greater presence of women on boards.

To increase the presence of women on boards of directors, many European countries are introducing gender quotas for listed and large companies (see Profeta et al., 2014). Research based on the introduction of quotas is very useful, because it allows to take into account issues of endogeneity (is it the presence of women on boards which deliver better outcomes or are better performing firms the ones who select more women?) and thus identify causal effects from female leadership and performance. Most of the existing studies focus on Norway, the pioneering country that introduced gender quotas on boards in 2003 (Machold et al., 2013; Engelstad and Teigen, 2012). Recent empirical studies focused on Norway find mixed results. Ahern and Dittmar (2012) show that there may be negative markets reactions if investors expect young and less-expert members to serve on boards. However, Nygaard (2011) shows that this effect depends on asymmetric information between independent members of the boards and the companies' managers. As other countries such as Italy, France and Germany started following this practice of introducing gender quotas on boards, a better understanding of introducing such policies is needed. For the Italian case, for example, Del Prete and Stefani (2013) use a rich dataset of Italian banks to investigate the determinants of gender gaps in top positions. Their results lean-to the presence of a "second glass ceiling" for women in top decision-making positions.

Why is it so important to assess and understand the phenomenon of the underrepresentation of women in banks boards? A possible answer relies on the relationship between gender and risk aversion. A large literature based on experiments provides evidence that women are more risk averse than men (Gneezy et al., 2003; Niederle and Vesterlund, 2007). Men tend to be overconfident, while women do not only avoid risky choices, but also shy away from competition, especially when this occurs in a mixed-gender context. Whether risk aversion and attitudes towards competition depend on nature or nurture is a challenging question. In a sample of 15 year old English students, Booth and Nolen (2015) find that girls are more risk averse than boys in mixed gender contexts, while differences disappear in single-sex school, suggesting that nurture plays a relevant role. However, Sapienza et al. (2009) show the importance of nature: gender has an impact on financial performance through different levels of testosterone, which has both organizational and activational effects on risk-sensitive financial decisions. Different risk aversion and attitudes towards competition may help explain the underrepresentation of women in high-earning occupations that are typically highly competitive areas. Greater financial risk aversion could thus explain women's generally lower levels of wealth. Focusing on a sample of 461 large banks from OECD countries, Gulamhussen and Fonte Santa (2010) find an inverse relationship between women

in boardrooms and risk-taking measures (loan loss reserves, loan loss provisions and impaired loans ratio). Palvia et al. (2014) study whether the gender of banks' CEOs and board chairpersons are in some way linked to banks capital ratios and default risks. They show that female CEOs and board chairs assess risks more conservatively. More recently, Adams and Ragunathan (2013) investigate the existence of the so-called "Lehman Sisters hypothesis", i.e. the possibility that, if Lehman Brothers had been Lehman Sisters, the recent financial crisis would have been less a disaster. Their results show that on one side banks with more women directors have not been more risk averse, while, on the other side, they find evidence that during critical situations women have better abilities to monitor the crisis. Therefore, banks with more female directors might be characterized by better performances. One of the possible answers to the "Lehman Brothers/Sisters" dilemmas is that brothers and sisters might together represent the best organizational structure for maximizing bank's performance.

Finally, the literature on gender and corporate governance asks whether the gender imbalance in decision-making, which may matter for the level of risk of the decisions taken, has important consequences in terms of profits. The findings obtained are generally not consistent. Studies based on cross-sectional analyses find a positive relationship between gender diversity and firm profitability, while those replying on panel data mostly point to a negative or neutral effect (Sapienza et al. 2009, Dobbin and Jung, 2011). For example, Campbell and Mìnguez-Vera (2008) find that gender diversity had a positive effect on firm value, with no evidence of a reverse causal relationship. They study the Spanish financial market where investors did not seem to penalize firms with a higher percentage of women on board. The same findings apply to Singaporean firms (Kang et al., 2010) and in cases where greater gender diversity might generate economic gains (see also Ntim, 2015).

Beck et al. (2009) focus on normal banking positions rather than on board members and compare monitoring versus screening capabilities. They find that loans screened and monitored by women had a lower probability to turn problematic due to the higher abilities of women in monitoring. Gulamhussen and Fonte Santa (2010) also assess the role of women in bank boardrooms for a sample of 461 banks in OECD countries. Controlling for a possible endogeneity, they find that both the presence and the percentage of women are positively associated with the return equity, the return on assets and the operating income ratio. Dezső and Ross (2012) deepen the analysis, finding that female representation in top management improves firm performances but only when firm's strategy is centered on innovation.

Despite this evidence supporting the benefits of women inclusion, many empirical works still find negative or neutral links between board gender composition and firm's profitability. For example, Chapple and Humphrey (2014) do not find any correlation between diversity (including gender) and performance. Ahern and Dittmar's (2012) results are even more extreme. Using pre-quota board variations to instrument for exogenous post-quota changes, they find a consistent and negative relationship between quota constraints, stock prices and the Tobin's Q. Therefore, they claim that the introduction of quota led to less capable boards: younger, less experienced, less coordinated, with an increase in leverage, and with a deterioration of operating tasks. Similarly, Adams and

Kirchmaier (2012) suggest that the average effect of gender diversity on firm performance is negative, leaning towards a resolute neglect of pro women integration policies in bank boards.

Overall, the review of the two strands of the literature devoted to monetary policy committees and to the role of gender on boards, respectively, highlights not only the importance of this issue for research and policy alike, but also the need for systematic research given the divergence in previous findings.

The gender representation can be relevant if associated with the monetary policymaking, where a crucial aspect is the dovish attitude in MP decisions. In parallel, the literature highlighted the risk aversion as another gender trait that can be relevant in shaping economic decisions. How empirically relevant are these traits in monetary policy? In order to start the exploration we need a metrics; the aim of the next section is to provide it.

3. Gender in Monetary Policymaking: the GMP Index

Monetary policy (MP) boards all over the world share a special common feature: they are very restricted and elitist bodies. In order to investigate issues related to MP committees' membership, the best approach would be to count on micro data. Indeed, not only the size or the composition of the board can foster different kinds of composition, but also personal characteristics and background can shape the board identity.

Following this assumption and looking for the drivers of women presence in MP boards worldwide, it would be useful to have a complete database including both micro and macro data. In particular, a detailed description of each single member in terms of her personal features and background - marital status, family situation, educational background, work experience - could provide a great contribution in specifying the reasons of her membership.

Unfortunately working on micro data is difficult. There are very few central banks websites that integrate the board composition with exhaustive bibliographies of their board members and no specialized books that comprehend the amount of information we need. Hence, given the data availability, we decided to rely on macro data, performing a systematic analysis of 112 heterogeneous countries.

To that end, we construct a new index that captures the gender diversity of monetary policy boards. We dub this index the GMP Index, which measures the share of women in MP committees. To the best of our knowledge, this represents the first systematic attempt to quantify the number of women having official power in monetary policy boards for such a large set of countries.

The rationale of the GMP Index is straightforward: the GMP ratio simply relies on the quotient between the number of women on the board and the total number of its members. Indeed, we decide to keep the ratio in its raw shape, considering all kind of possible corrections (for GDP levels, for special roles inside the board etc.) misleading to our scope The GMP ratio has been constructed using several sources including the Central Bank Directory 2015, central banks' websites and other official documents. The Central Bank Directory provides us with core information about central

banks' board members and women involvement in monetary policy. Information directly from the websites aim at enriching the dataset. We present the complete list of the GMP ratios constructed for the full set of 112 countries in Appendix Table 1. The average share of women in MP committees in our sample of 112 countries is 16%, however the variability among countries is quite high, with a standard deviation of 0.17.

Figures 1 to 4 present a detailed characterization of our indicator across countries and regions. Figure 1 provides a graphical representation on the number of MP committee members and the number of women in the board of the analyzed countries. Even if it does not allow to make generalizations, at least two elements can be highlighted: 1) the size of monetary policy boards all over the world varies within a restricted range; 2) our sample includes two monetary unions that simultaneously share the same central bank - the ECB for 19 countries in Europe and the BCEAO for 8 countries in West Africa - and limit the variability of the GMP ratio.

Figure 2 presents the geographical distribution of our index using as a benchmark the World Bank identification of different world geographical areas. The distribution of the GMP Index shows geographical peculiarities: positive outliers are countries in the Caribbean, North America and Africa, while negative outliers are countries in South and Central America. Overall, it seems unlikely to extrapolate strong geographical regularities from the GMP distribution.

Figures 3 and 4 split the sample respectively by country income and official religion. Figure 3 shows how low income economies involve more women in their monetary policy activity than higher income ones. This evidence appears quite counterintuitive since it is generally considered that, in advanced economies, women have relative more opportunities. The descriptive result deserves a closer investigation that we will perform in the econometric section. Figure 4 highlights another interesting pattern: women's share in monetary policy boards is relatively high in countries in which the official religion is Protestant or Lutheran but also in those Orthodox Christians. Instead, it is definitely under the sample average in Roman Catholic countries. In addition, the possible existence of a religious bias is tested in the next section.

Finally, Figure 5 proposes a temporal comparison between two average values of the GMP Index, respectively in 2015 and 2010. In the last 5 years, the percentage of women in monetary policy boards has risen by less than one percent and in a very heterogeneous way, with some countries even experiencing reductions in their quotas. This result seems to be counterintuitive if associated with the recent appearance of a consistent number of women as presidents of relevant central banks, such as the FED or the Central Bank of Russia.

The overall descriptive analysis of the presence of women in the central bank committees seems to signal some regularities, i.e. the gender representation seems to be more likely if the country: i) is part of a well identified geographical area; ii) has a relatively low income and iii) has a Protestant or Lutheran official religion. However, how robust are these findings? In the next section, we check their consistency using econometric tests.

4. Gender and Monetary Policymaking: Which Drivers?

Discovering descriptive regularities, a set of questions naturally emerge: In general, are there common drivers in determining the role of gender shape in monetary policymaking? And, more specifically, is the gender representation correlated with the dovish attitude? In other words we wonder if the level of women representation in central bank boards can depend on specific and common structural factors – i.e. it is an endogenous variable – deserving particular attention to the dovish attitude; alternatively, it has to be considered a completely random variable.

Our starting point to answer the above questions is based on two crucial hypotheses. First of all, we assume that gains and losses of the gender representation in MP committees are variables calculated by the policymakers in charge, who directly or indirectly decide the shape of the central bank board. In other words, given the general assumption that the lawmakers are politicians (Alesina and Tabellini, 2007) and the specific application of this assumption in central banking rules (Masciandaro, 2007 and 2009), we explore the drivers of a well-defined central bank feature, i.e. its gender diversification. Secondly, political decisions, whatever their own specific goals, are likely to be influenced by structural variables, that may vary from country to country. Among these structural variables, we wonder if the dovish attitude of the national policymaker – if any - is associated with gender diversity in MP committees. The third assumption is that economic agents have no information on the true preferences of the policymaker: the latter's optimal degree of gender representation is a *hidden variable*.

However, how can we identify dovish (activism) attitude in a country? On this respect, some insights from the economic literature turn out to be useful. The performance of the monetary policy actions matters: a dovish attitude is likely to be associated with relatively high levels of inflation. Regarding the monetary policy tools, it is clear that the more the MP is tied using inflation and/or monetary targets, the less the dovish attitude is likely to be present. While regarding the interest rate policies, the association with the dovish attitude is more ambiguous: a dovish attitude can mean lower interest rates, but, given the correlation with higher inflation, the overall effect is far from being easy to be identified.

Moreover, central bank governance can matter: a more dovish attitude is likely to be associated with less independent central banks. Almost all the existing literature stresses the relationship between monetary policy and central bank independence (for a review, see De Haan et al., 2008; Eijffinger and Masciandaro, 2014). Interestingly, it has been shown (Hayat and Farvaque, 2011) that women are less passionate about central bank independence.

Similarly, the interconnection between monetary policy and the central bank involvement in supervision can also matter. In the literature two positions emerged (for a review see Masciandaro and Quintyn, 2014): the integration view, i.e. if the central bank controls also the banking policy tools, the effectiveness of the monetary policy is likely to be higher; and the separation view, where the opposite is true. The integration view is consistent with the dovish view.

Finally, also the exchange rate rules can be relevant. Two positions emerge from the literature (for a review, see Dalla Pellegrina et al., 2014): managing exchange rates increase the tools in the hands of the monetary policymaking institution, thus increasing the possibility of activism; the opposite is

true when exchange rates are floating (following the "Washington Consensus"). Thus, managed exchange rate regimes are more consistent with a dovish attitude.

Therefore, in the remaining part of this paragraph, we aim at uncovering econometrically if indicators of the dovish attitude, as well as other common structural drivers, are relevant in explaining the level of the GMP Index, assumed here as the dependent variable of our estimation.

The crucial element in considering the policymaker's objective as a factor in the design of the gender share in MP boards is the identification of his/her preferences. The first approach to identify the policymaker's function could be the so-called *narrative approach*, in which official documents and statements are interpreted to gauge the choices of policymakers. One drawback of this approach is that there is often substantial room for differences between the pronouncements of policymakers and their actual preferences. One more shortcoming is that it is uncommon that the policymaker expresses his/her preferences on a very specific issue as the gender representation in the monetary policymaking. To the best of our knowledge, no reliable documentation to implement a narrative approach exists for such a large set of countries, also given the differences in central bank transparency around the world.

We thus follow an alternative approach, which is to consider the actual choices of policymakers in determining the GMP level (*factual approach*). At each point in time, we observe the policymaker's decision to maintain or change the gender representation. In other words, we consider that policymakers face discrete choices. According to the factual approach, we can investigate if any structural driver plays any role in determining the actual level of the GMP Index.

To assess empirically the issue, we estimate a model of the GMP level calculated in 2015 as a function of a set of exogenous structural variables. Weaving a cross-country perspective into an empirical analysis consistent with this discrete choice process involves claiming the existence of unobservable policymaker utilities U_{ij}, where each U_{ij} is the utility received by the i^{th} national policymaker from the j^{th} level of the GMP Index. Since the utility U_{ij} is unobservable, we represent it as a random quantity, assuming that it is composed of a systematic part U and a random error term, ε_{ij}. Furthermore, we claim that the utilities U_{ij} are a function of the attributes of the alternative levels of the GMP Index and of the structural characteristics of the policymaker's country.

By combining these two hypotheses, we have a utility framework for the unobservable degree of gender representation in the MP boards. As usual, we assume that the error terms ε_{ij} are independent for each national policymaker and institutional alternative, and are normally distributed. The independence assumption implies that the utility derived by one national policymaker is not related to the utility derived by a policymaker in any other country, and that the utility that a policymaker derives from the choice of a given GMP level is not related to the utility provided by the other alternatives.

Let y^* be the level of the GMP Index, given a set of K explanatory variables x, including indicators of dovish attitude, we assume that y^* is determined by:

$$y^* = \beta' x + \varepsilon, \qquad (1)$$

where ε is a random disturbance uncorrelated with the regressors, and β is a 1 x K vector of regressors.

Regarding the set of the explanatory variables and following the general insights of the existing literature, we firstly identify possible indicators for the dovish attitude, and then different categories of control variables. We describe in more detail the definition of these variables and sources of data used in this and in the following paragraph in Appendix Table 2, while Appendix 3 provides some summary statistics for these variables.

The dovish attitude can be proxied using different indexes concerning specifically the central bank governance and in general the internal and external monetary rules.

Firstly we take into account the level of the central bank independence (CBI), assuming that higher independence is associated with lower gender representation. Dealing with the choice of the proper index for measuring CBI, we opted for the one constructed by Grilli et al. (1991) (GMT index) and subsequently updated by Arnone et al. (2007) and Romelli (2015), mainly for its empirical robustness (Maslowska, 2008). We worked separately on its individual components: the political and the economic independence, i.e. the central bank autonomy in setting respectively its goals and its tools.

Secondly, we consider the central bank involvement in supervision. The sign of this variable is not "a priori" clear. Central banks' supervisory responsibilities are generally associated with a dovish attitude and should thus be associated with more female participation in boards. Similarly, a large literature on the relationship between women board representation and firm performance finds that female board representation is related to one main board responsibility, namely monitoring (Post and Byron, 2013). Thus, central banks involved in supervision may also be associated to a higher share of female representation. In measuring the central bank perimeter in supervision we use both the Central Bank as Banking Supervisory Authority Index (CBSS Index) and the Central Bank as Financial Authority Index (CBFA Index) proposed by Masciandaro and Quintyn (2009) and Dalla Pellegrina et al. (2013) and updated by Masciandaro and Romelli (2015). In particular, the CBFA Index ranges between 1 and 4, with higher value indicating a higher concentration of financial sector supervisory powers in the hand of the central bank. Indeed, this variable takes value 1 if the central bank is not assigned the main responsibility for banking supervision, value 2 if the central bank has the main (or sole) responsibility for banking supervision, value 3 if the central bank has responsibility for banking together with insurance or securities markets supervision. Finally, this index assumes value 4 if the central bank has supervisory responsibilities for these three financial sectors.

Thirdly we test the possible relationship with monetary and inflationary targets: the expected sign is negative, i.e. more internal monetary rules are associated with lower level of women representation.

Finally, we have to consider also the external monetary rules, i.e. the features of the exchange rate regimes, where the assumption is that less activism in the exchange rate management – i.e. more flexibility – is negatively associated with the women representation. In order to capture the role of the external monetary rules we used a complete set of dummy variables identifying the adopted

exchange rate regime. In that respect, we follow the International Monetary Fund categories, distinguishing between nine different exchange rate regimes: 1) free floating; 2) floating; 3) other managed; 4) crawl-like arrangement; 5) crawling peg; 6) stabilized arrangement; 7) conventional peg; 8) currency board; 9) no separate legal tender. Finally, with the aim of parsimony, we also generate three aggregate measures for hard pegging (8-9), soft pegging (4-5-6-7) and floating (1-2).

Regarding additional control variables, a first group relates to several macroeconomic aspects. For example, we take into account the average level of inflation during the period 2009-2013, given that it is likely that a dovish attitude is associated with higher inflation. But we also include a proxy for countries' level of economic development, i.e. a dummy that assumes value one for countries characterized by high income levels, and the log of a country's population, to discount for its dimension.

The second set of control variables is represented by "national institutional arrangements" and comprises indicators that have been already proposed in the literature as proxies for the role of institutions in shaping the policymaker's preferences. First, in order to take into account the impact of culture and tradition on the GMP Index, we include a proxy for the country's legal origins (Acemoglu et al. 2000, Tabellini 2007). In particular, we split our set of countries between economies characterized by Common and non-Common Law systems. Using the CIA World Factbook database, we also collect data for another important aspect of the country's daily life: its official religion. In particular, we identify five different religious groups: Buddhist, Catholic, Muslim, Orthodox and Other religions. Using the Worldwide Governance Index of the World Bank (Kaufmann et al., 2003), we also include a measure of good governance in the country. In particular, we use the Voice and Accountability measure that captures the perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media. We conclude the set of institutional characteristics with the inclusion of a dummy variable able to capture whether a county has been or not a French colony, since colonial origins might have a long lasting effect on the country's culture and social life.

Finally, the last set of control variables includes two measures able to capture female labor force participation and the percentage of women in parliament. Indeed, the level of gender diversity in MP committees might be driven by women's inclusion in the country's daily life.

Table 1. GMP Index and its Drivers

The dependent variable is the GMP index as of 2015. GMPEcon is an index of central bank economic independence and GMPPol is an index of central bank political independence from Romelli (2015). CBSS Index is the Central Bank Supervisor Share Index and CBFA Index is the Central Bank as Financial Authority Index. Inflation is the average value of inflation over the period [*t-4, t*], Inflation Targeting is a dummy variable for inflation targeting countries, while high-income is a dummy for countries belonging to the high-income group. Columns (2), (4), (6) exclude countries members of a monetary union. Robust standard errors in parentheses. ***, **, * represent significance at a 1%, 5% and 10% level, respectively.

Dependent variable: GMP Index	(1)	(2)	(3)	(4)	(5)	(6)
GMTEcon	0.2432***	0.3042***				
	(0.088)	(0.095)				
GMTPol	-0.1405*	-0.1162				
	(0.076)	(0.079)				
CBSS Index			-0.0971*	-0.1455**		
			(0.051)	(0.072)		
CBFA Index					-0.0307*	-0.0507**
					(0.016)	(0.024)
Inflation	0.0023	0.0008	0.0013	-0.0012	0.0013	-0.0013
	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)	(0.004)
Inflation Targeting Regime	0.0118	-0.0096	0.0062	-0.0343	0.0039	-0.0349
	(0.040)	(0.050)	(0.038)	(0.044)	(0.037)	(0.044)
High-income	0.0429	0.0480	0.0253	0.0350	0.0236	0.0326
	(0.037)	(0.040)	(0.041)	(0.050)	(0.040)	(0.049)
Legal system	0.1417**	0.1636**	0.1451**	0.1510*	0.1449**	0.1546*
	(0.065)	(0.078)	(0.071)	(0.081)	(0.071)	(0.081)
Female labor force	0.0024	0.0025	0.0038*	0.0041*	0.0037*	0.0041*
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Women in parliament	-0.0008	-0.0017	-0.0022	-0.0035	-0.0020	-0.0036
	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.003)
Buddhist	0.1479**	0.1398**	0.0614	0.0112	0.0618	0.0068
	(0.066)	(0.062)	(0.069)	(0.071)	(0.069)	(0.072)
Catholic	-0.0648	-0.0874	-0.0326	-0.0326	-0.0318	-0.0336
	(0.040)	(0.060)	(0.039)	(0.056)	(0.039)	(0.056)
Orthodox	0.1980***	0.2457***	0.1658***	0.2171***	0.1649***	0.2179***
	(0.073)	(0.079)	(0.059)	(0.071)	(0.060)	(0.071)
Muslim	0.0088	-0.0162	0.0449	0.0313	0.0491	0.0358
	(0.068)	(0.080)	(0.070)	(0.082)	(0.070)	(0.081)
French colony	0.1869	0.2194*	0.1770*	0.2064*	0.1745*	0.2012*
	(0.113)	(0.113)	(0.100)	(0.104)	(0.097)	(0.102)
ln Population	-0.0140	-0.0267	-0.0155	-0.0338	-0.0145	-0.0330
	(0.012)	(0.017)	(0.013)	(0.021)	(0.013)	(0.021)
Voice and Accountability	0.0313	0.0143	0.0185	-0.0054	0.0223	-0.0025
	(0.034)	(0.040)	(0.039)	(0.050)	(0.038)	(0.049)
Exchange regime	-0.0053	0.0529	-0.0174	0.0569	-0.0173	0.0563
	(0.044)	(0.055)	(0.048)	(0.061)	(0.048)	(0.061)
Constant	0.1072	0.2767	0.2268	0.5537	0.2381	0.6008
	(0.208)	(0.292)	(0.214)	(0.350)	(0.214)	(0.359)
Observations	77	60	76	59	76	59
R-squared	0.424	0.478	0.379	0.434	0.379	0.440

Table 1 presents the results of the estimations of the drivers of gender diversity in MP committees, using equation (1) Columns (1) and (2) provide the baseline regressions, which include the political and economic index of central bank independence. In particular, Column (1) looks at the full sample of countries for which all data are available, while in Column (2) we propose the same estimates excluding the euro area countries, given that these countries are characterized by the same GMP Index and degree of central bank independence. We find a positive and statistically significant correlation between the GMP Index and the level of economic central bank independence, while the measure of political independence is only negatively correlated with gender diversity in Column (1). Columns (3) to (6) test the robustness of our results by looking at the dummy for the involvement of the central bank in banking supervision (CBSS Index in Columns (3) and (4)) and at the index of the central bank involvement in financial sector supervision (CBFA Index in Columns (5) and (6)). Similarly, to the baseline specifications, Columns (3) and (5) look at the overall sample of countries, while Columns (4) and (6) exclude euro area countries.

These results do not confirm our expectations on the dovish attitude in countries characterized by a higher level of women participation. Interestingly, we find that higher gender representation is associated with higher levels of central bank independence and lower involvement of the central bank in both banking and financial sector supervision. Indeed, higher levels of central bank independence are usually associated with more hawkish monetary policies. In particular, higher economic independence corresponds to less political (partisan) control on the monetary policy stance, which is associated with less inflationary monetary policies (Grilli et al. 1991). The low involvement in supervision signals that central bank bodies with higher female representation are more likely to occur in countries where the policymakers prefer to avoid to face over powerful central banks, i.e. involved in both monetary policies and supervisory activities (Masciandaro 2007 and 2009).

Looking now at the results obtained for the additional control variables, we do not find evidence of a correlation between the GMP Index and either the monetary policy targets or the exchange rate regime. Similarly we do not find evidence on the fact that inflation is more likely to be associated with more women's participation in the monetary policymaking. Furthermore, both the country's income level and the log of the population of the country do not show any link with the degree of women's participation.

Our results do show a positive correlation between the GMP Index and Common Law systems that can be easily explained: Anglo-Saxon systems are characterized by higher gender equality. At the same time the positive correlation between Orthodox religion and the GMP Index can be explained taking hints from the strand of literature which highlights how countries characterized by Roman Catholic religion considers the family and the role of woman in a particular way that might restrict women's opportunities and put constraints on the development of their professional career.

Female labor force participation and the percentage of women in parliament are the two proxies for "women and society". While the latter is not significant, the former is significant in most

estimations and positively related with the GMP Index. Therefore, we have evidence that higher female participation in labor force seems to better promote gender equality.

Finally, we find that French colonial origins matter. The data suggest that the specific French institutional setting during the years of colonialism might have created that particular milieu in which cultural and social elements have firstly proliferated and then merged in order to set up the proper environment for women to have more and better professional opportunities.

5. Gender and Monetary Policymaking

In this section, we test whether gender diversity in central bank boards affects the conduct of monetary policy and hence macroeconomic outcomes. To that end, we augment several classical models of monetary economics by introducing our newly created index of gender diversity.

The crucial challenge of this empirical strategy is the choice of the dependent variable. Over the past few decades, central banks around the world have narrowed their focus on price stability, which is generally steered through short-term interest rates. In an ideal setting, we should be able to associate board members' decisions on setting policy rates with their gender. However, limited access to members' personal votes and our large cross-section of countries render this task unattainable. The alternative, meaning focusing on annual averages in short-term interest rates, is also limited by the lack of a consistent dataset for a large cross-section of countries.

We thus focus our attention on two outcome variables of monetary policy making. inflation rates and money growth. Consider first the impact of gender diversity on inflation rates. Our main empirical strategy relates the newly created index of gender diversity with the average inflation rate dynamics over a 5 years intervals following a large literature on the impact of central bank independence on inflation rates (see Arnone et al., 2007, for an overview). More specifically, we estimate the following model:

$$\pi_{i,t,t-4} = \beta_0 + \beta_1 GMP_{i,t} + \beta_2 \pi_{i,t-5,t-9} + \beta_3 OutputGap_{i,t,t-4} + \beta_4 \boldsymbol{X}_{i,t-4} + \varepsilon_{i,t} , \qquad (2)$$

where $\pi_{i,t,t-4}$ is the average inflation rate in the last 5 years in country *i*, $GMP_{i,t}$ is the share of female in monetary policy committees in country *i* in year *t*, $\pi_{i,t-5,t-9}$ is the lagged average inflation in the period [*t*-5, *t*-9] in country *i*, $OutputGap_{i,t,t-4}$ is the average output gap in the previous 5 years in country *i* and $\boldsymbol{X}_{i,t}$ is a vector of country specific characteristics, such as the level of central bank independence, the degree of openness to trade, OECD membership and inflation targeting regime dummies. Data sources and additional details are provided in Appendix Table 2. Several assumptions underpin this empirical strategy. First, we consider the gender composition of monetary committees as a structural characteristic of a country which is relatively stable over time. This is confirmed by the descriptive statistics presented in previous sections. As a result, we relate past inflation performance with the GMP index computed at two different dates. We further validate

this assumption by checking the robustness of our results when looking at the level of GMP only in 2015. Second, we control for the level of central bank independence despite the risk of multicollinearity suggested by the explanatory power of the GMT index in the regressions determining the degree of gender composition in Table 1. The importance of central bank independence for inflation dynamics has reached a consensus in the central banking literature and hence it is an important control variable in our specification. Our goal is to show that the degree of gender diversity in boards matters, even after taking into account the level of CBI.

Table 2: Inflation rates and women in monetary policy boards

The dependent variable is the average inflation rate over 5 years intervals, [*t-4, t*], where *t* is the year of calculation of the GMP index, namely 2010 and 2015. GMP is the share of women members in monetary policy committees. GMT is an index of central bank independence from Romelli (2015). Lagged Average Inflation Rate is the average value of inflation over the period [*t-5, t-9*], Average Output gap is the output gap over the period [*t-4, t*]. Columns (2), (4), (6) and (7) exclude countries members of a monetary union, while Column (7) does not include OECD members. Robust standard errors in parentheses. ***, **, * represent significance at a 1%, 5% and 10% level, respectively.

Dependent variable: Average Inflation Rate	(1)	(2)	(3)	(4)	(5)	(6)	(7)
GMP	-2.5624***	-2.3342***	-1.0774	-1.6405**	-1.8092**	-2.2319**	-1.5277*
	(0.872)	(0.872)	(0.795)	(0.644)	(0.838)	(0.867)	(0.858)
GMT			-2.0434**	-0.8607	-2.7179***	-2.6055***	-3.4279***
			(0.853)	(0.933)	(0.700)	(0.700)	(1.075)
Lagged Average Inflation Rate	0.4138***	0.3692***	0.3709***	0.3745***	0.4568***	0.4334***	0.4232***
	(0.066)	(0.068)	(0.062)	(0.069)	(0.062)	(0.069)	(0.069)
Average Output gap			30.6087***	40.3226**	8.3488	-3.9413	10.9421
			(10.561)	(16.724)	(14.593)	(16.306)	(17.366)
Inflation Targeting Regime	-0.1779	-1.1641**	-0.3634	-0.7657	-0.0932	-0.1751	-0.2519
	(0.362)	(0.559)	(0.392)	(0.495)	(0.305)	(0.439)	(0.551)
Trade (% of GDP)	-0.0051*	-0.0070*	-0.0048*	-0.0064*	-0.0055*	-0.0070	-0.0069
	(0.003)	(0.004)	(0.003)	(0.004)	(0.003)	(0.005)	(0.004)
OECD Member Dummy	-1.9318***	-1.6215***	-1.2650***	-0.9888*	0.1819	-0.1566	
	(0.412)	(0.587)	(0.401)	(0.535)	(0.370)	(0.482)	
Constant	4.0052***	5.1719***	4.8565***	4.5892***	3.8415***	4.1763***	4.7226***
	(0.709)	(0.857)	(1.029)	(1.144)	(0.744)	(0.891)	(1.141)
Observations	158	109	120	86	58	42	30
R-squared	0.510	0.486	0.606	0.586	0.770	0.759	0.739

The result pertaining to Model (2) are presented in Table 2. Column (1) presents our baseline specification that relates the new index of GMP with the average inflation rate. We find a negative and highly significant link between the gender composition of monetary policy boards and average inflation rates, after controlling for the usual determinants of inflation dynamics such as the output gap, past inflation, trade openness, and a dummy for inflation targeting countries and for OECD members. This result suggests that a higher membership of women in monetary policy committees is associated with better performance in terms of inflation. This evidence suggests that gender representation can be a signal of prudence in implementing the monetary policy action. In other words, the presence of women in central bank boards can be associated with a more hawkish approach to monetary policy making.

We are cautious in making any inferences about a causal link between the gender composition of central bank boards and monetary policy outcomes. While we control for the usual determinant of inflation, potential omitted correlates can bias our results. We thus do quantify the magnitude of our

estimates and simply limit the discussion on the sign and significance of the relationship between the variables of interest.
The robustness of this result is confirmed in the subsequent specifications in Table 2. In Column (2) we exclude countries members of a monetary union since they are characterized by the same GMP index, but may have different inflation performance over the periods considered. In columns (3) and (4) we control for the inclusion of an index of central bank independence. Our index is no longer significant in the full sample, but it is still strongly significant in the restricted sample where we exclude monetary union member countries (Column (4)). Furthermore, as mentioned above, we check the robustness of our results when considering only the 2015 GMP index in Columns (5) and (6). Finally, in Column (7), we estimate Model (2) only for the sample of developing countries (non-OECD members). Our results are robust across all these specifications, suggesting the strong correlation between women's participation in central bank boards and inflation dynamics.

Further sensitivity checks for this result are presented in Appendix Table 4. Here, we use a different specification for the dependent variable in Equation (2), as the difference between the inflation rate in country *i,* in year *t*, and the weighted average world inflation rate in the same year. This approach allows to take into account world's inflation trends. The results in Appendix Table 4 are qualitatively the same and confirm our previous finding of a negative link between women's participation in central bank boards and inflation rates.

Our second empirical strategy related the GMP index to money growth as an alternate proxy for monetary policy making. The testable hypothesis remains the same: if higher women presence in central bank boards is associated with lower money growth dynamics, then female board members are associated with a more hawkish attitude. We estimate a model similar to the previous one, where we relate the average of money growth over a 5-year window with our index of GMP:

$$M_{i,t,t-4} = \beta_0 + \beta_1 GMP_{i,t} + \beta_2 M_{i,t-5,t-9} + \beta_3 OutputGap_{i,t,t-4} + \beta_4 LendingRate_{i,t,t-4} + \beta_5 X_{i,t-4} + \varepsilon_{i,t} \quad (3)$$

where $M_{i,t,t-4}$ is the average money growth (M2) in the last 5 years, $GMP_{i,t}$ is the share of female in monetary policy committees in year *t*, $M_{i,t-5,t-9}$ is the lagged average money growth in the period [*t-5, t-9]*, $OutputGap_{i,t,t-4}$ is the average output gap in the previous 5 years, $LendingRate_{i,t,t-4}$ is the average lending rate over the same time frame and $X_{i,t}$ is a vector of country specific characteristics, such as the level of central bank independence and OECD membership.

Table 3 presents these additional findings. Again, the coefficient of interest is highly significant across all models and negatively associated with money growth, suggesting that countries with higher women's participation in board central banks experience lower growth in monetary base, controlling for other usual determinants of money growth. Similar to the previous specifications, we

control for the exclusion of monetary union countries (Columns (2), (4) and (6)), controlling for the level of CBI (Columns (3)-(6)) and taking into account only 2015 data for the GMP index (Columns (5) and (6)).

Table 3: Money growth and women in monetary policy boards

The dependent variable is the money growth rate over 5 years intervals, *[t-4, t]*, where *t* is the year of calculation of the GMP index, namely 2010 and 2015. GMP is the share of women members in monetary policy committees. GMT is an index of central bank independence from Romelli (2015). Lagged Average Money Growth is the average value of the money growth rate over the period *[t-5, t-9]*, Average Lending interest rate and Average Output gap are the averages over the period *[t-4, t]* of the lending rate and output gap, respectively. Columns (2), (4) and (6) exclude countries members of a monetary union. Robust standard errors in parentheses. ***, **, * represent significance at a 1%, 5% and 10% level, respectively.

Dependent variable: Average Money Growth	(1)	(2)	(3)	(4)	(5)	(6)
GMP	-6.1414**	-6.9873***	-5.9185**	-6.4773**	-13.9744**	-13.9884**
	(2.338)	(2.208)	(2.865)	(2.757)	(6.255)	(6.450)
GMT			-3.8008	-1.0796	-5.7605	-4.8728
			(3.920)	(3.946)	(7.365)	(7.673)
Lagged Average Money Growth	0.1595**	0.1690**	0.1843*	0.1838*	0.0129	0.0047
	(0.073)	(0.073)	(0.107)	(0.107)	(0.158)	(0.164)
Average Lending interest rate (%)	0.2112*	0.1879*	0.3094*	0.2575	0.4682	0.4640
	(0.112)	(0.104)	(0.182)	(0.163)	(0.301)	(0.301)
Average Output gap	0.9447	1.0680	-7.1919	-3.8474	-103.9567	-105.1752
	(26.021)	(26.267)	(66.069)	(69.595)	(127.197)	(133.023)
OECD Member Dummy	-4.9892***	-4.8792***	-3.7265**	-3.9542***	-5.1433**	-4.8158*
	(1.266)	(1.082)	(1.444)	(1.209)	(2.550)	(2.570)
Constant	10.5120***	11.2398***	10.4613***	10.1394***	11.3040**	10.9795**
	(2.011)	(1.730)	(2.840)	(2.788)	(4.796)	(4.828)
Observations	109	105	85	81	44	42
R-squared	0.358	0.362	0.352	0.350	0.372	0.349

6. **Conclusion**

In this paper, we analyse the gender representation in monetary policy committees, offering three main contributions. Firstly, we built the first index of gender composition – the GMP Index – for a large sample of 112 country. The rationale of the GMP Index is quite intuitive: the GMP ratio simply relies on the quotient between the number of women on the board and the total number of its members. We describe our index with data as of 2015, uncovering some regularities and testing their robustness.

Secondly, we explore the existence of common drivers that could explain women's representation in central banks boards. Besides legal (Common Law), religious (Orthodox), historical (French colony) and socio-economic (female labour force) drivers, gender representation is more likely to be relevant in countries characterized by better central bank governance (less dovish attitude), i.e. more independent central banks, less involved in banking supervision.

Finally, we test whether gender diversity in central bank boards is related to the conduct of monetary policy and hence macroeconomic outcomes. We find that gender diversity is inversely related with inflation rates and money growth. The presence of women in central bank boards seems to be associated with a more hawkish approach in monetary policy making.

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Appendix

Table 1. The GMP Index

This table provide information on the average share of women in MP committees (GMP index) in our sample of 112 countries. In particular, Total members is the number of members of the monetary policy committee of the country and Female members is the number of female present in the monetary policy committee of the country. GMP Index is the percentage of female in each monetary policy committee, obtained as the ratio between Female and Total members.

Country	Monetary Policy board	Total members	Female members	GMP Index (%)
Albania	Supervisory Council	9	5	55,56
Angola	Board of directors	10	2	20,00
Argentina	Board of Directors	5	0	0,00
Australia	Reserve bank board	9	3	33,33
Austria	ECB Governing Council	25	2	8,00
Bahamas	The Board	1	1	100,00
Bahrain	Governor and Minister of Finance	2	0	0,00
Barbados	Board of Directors	7	3	42,86
Belarus	The Board	10	2	20,00
Belgium	ECB Governing Council	25	2	8,00
Benin	BCEAO Comité de Politique Monétaire	14	4	28,57
Bolivia	Directorio	6	0	0,00
Bosnia and Herzegovina	Governing Board	5	0	0,00
Botswana	The Board	8	3	37,50
Brazil	Monetary Policy Committee	8	0	0,00
Bulgaria	Governing Council	7	2	28,57
Burkina Faso	BCEAO Comité de Politique Monétaire	14	4	28,57
Canada	Governing Council	6	3	50,00
Chile	Central Bank board	5	0	0,00
China	Monetary Policy Committee	15	1	6,67
Colombia	Board of Directors	7	1	14,29
Costa Rica	Board of Directors	7	2	28,57
Cote d'Ivoire	BCEAO Comité de Politique Monétaire	14	4	28,57
Croatia	CNB Council	8	0	0,00
Cyprus	ECB Governing Council	25	2	8,00
Czech Republic	Bank board	7	0	0,00
Denmark	Board of Governors	3	0	0,00
Dominican Republic	Monetary Board	10	1	10,00
Ecuador	Junta de Politica y Regulacion	8	1	12,50

	Monetaria y Financiera			
Estonia	ECB Governing Council	25	2	8,00
Ethiopia	Board of Directors	6	0	0,00
Fiji Islands	Board of directors	6	0	0,00
Finland	ECB Governing Council	25	2	8,00
France	ECB Governing Council	25	2	8,00
Germany	ECB Governing Council	25	2	8,00
Ghana	Monetary Policy Committee	7	2	28,57
Greece	ECB Governing Council	25	2	8,00
Guatemala	Junta Monetaria	9	1	11,11
Guinea Bissau	BCEAO Comité de Politique Monétaire	14	4	28,57
Haiti	Conseil d'Administration	9	2	22,22
Honduras	Directorio	4	0	0,00
Hungary	Monetary Council	9	1	11,11
Iceland	Monetary Policy Committee	5	1	20,00
Ireland	ECB Governing Council	25	2	8,00
Israel	Monetary Committee	5	2	40,00
Italy	ECB Governing Council	25	2	8,00
Jamaica	Board of Directors	8	2	25,00
Japan	Policy Board	9	1	11,11
Jordan	Open Market Operations Committee	8	1	12,50
Kazakhstan	Management Board	9	1	11,11
Kenya	Monetary Policy Committee	7	1	14,29
Korea	Monetary Policy Committee	7	0	0,00
Kyrgystan	The Board	7	3	42,86
Latvia	ECB Governing Council	25	2	8,00
Lebanon	Central Council	7	1	14,29
Lithuania	ECB Governing Council	25	2	8,00
Luxembourg	ECB Governing Council	25	2	8,00
Macedonia	National Bank Council	8	2	25,00
Madagascar	Conseil d'Administration	8	3	37,50
Malawi	Monetary Policy Committee	11	2	18,18
Maldives	Board of Directors	7	3	42,86
Mali	BCEAO Comité de Politique Monétaire	14	4	28,57
Malta	ECB Governing Council	25	2	8,00
Mauritius	Monetary Policy Committee	7	1	14,29
Mexico	Junta de gobierno	5	0	0,00
Montenegro	Council	7	0	0,00
Morocco	Bank Board	8	2	25,00
Namibia	Monetary Policy Committee	6	0	0,00
Netherlands	ECB Governing Council	25	2	8,00
New Zealand	Governor	1	0	0,00

Nicaragua	Consejo Directivo	6	0	0,00
Niger	BCEAO Comité de Politique Monétaire	14	4	28,57
Nigeria	Monetary Policy Committee	12	2	16,67
Norway	Executive board	7	3	42,86
Pakistan	Central Board of Directors	10	1	10,00
Papua New Guinea	Governor	1	0	0,00
Paraguay	Directorio	5	0	0,00
Peru	Board of Directors	7	0	0,00
Philippines	Monetary Board	7	0	0,00
Poland	Monetary Policy Council	10	2	20,00
Portugal	ECB Governing Council	25	2	8,00
Russia	Board of Directors	12	4	33,33
Sao Tome Principe	Board of Directors	6	3	50,00
Saudi Arabia	Senior Management	7	0	0,00
Senegal	BCEAO Comité de Politique Monétaire	14	4	28,57
Serbia	Board of Directors	5	3	60,00
Seychelles	Board of Directors	8	3	37,50
Sierra Leone	Board of Directors	6	0	0,00
Singapore	Board of Directors	11	0	0,00
Slovak Republic	ECB Governing Council	25	2	8,00
Slovenia	ECB Governing Council	25	2	8,00
South Africa	Monetary Policy Committee	6	0	0,00
Spain	ECB Governing Council	25	2	8,00
Sri Lanka	Monetary Board	5	1	20,00
Sudan	Board of Directors	6	1	16,67
Sweden	Executive board	6	2	33,33
Switzerland	Governing Board	3	0	0,00
Tajikistan	The Board	7	0	0,00
Tanzania	Board of Directors	11	2	18,18
Thailand	Monetary Policy Committee	7	1	14,29
Togo	BCEAO Comité de Politique Monétaire	14	4	28,57
Trinidad and Tobago	Monetary Policy Committee	5	1	20,00
Tunisia	Conseil d'Administration	9	3	33,33
Turkey	Monetary Policy Committee	7	0	0,00
Uganda	Board of Directors	8	1	12,50
Ukraine	Council	12	3	25,00
United Arab Emirates	Board of Directors	7	0	0,00
United Kingdom	Monetary Policy Committee	9	2	22,22
USA	Board of Governors and FOMC	10	2	20,00
Uruguay	Directorio	3	0	0,00
Uzbekistan	The Board	9	0	0,00
Venezuela	Directorio	7	1	14,29

Figure 1

Source: Author's own elaboration based on Central Bank Directory 2015 and central bank websites.

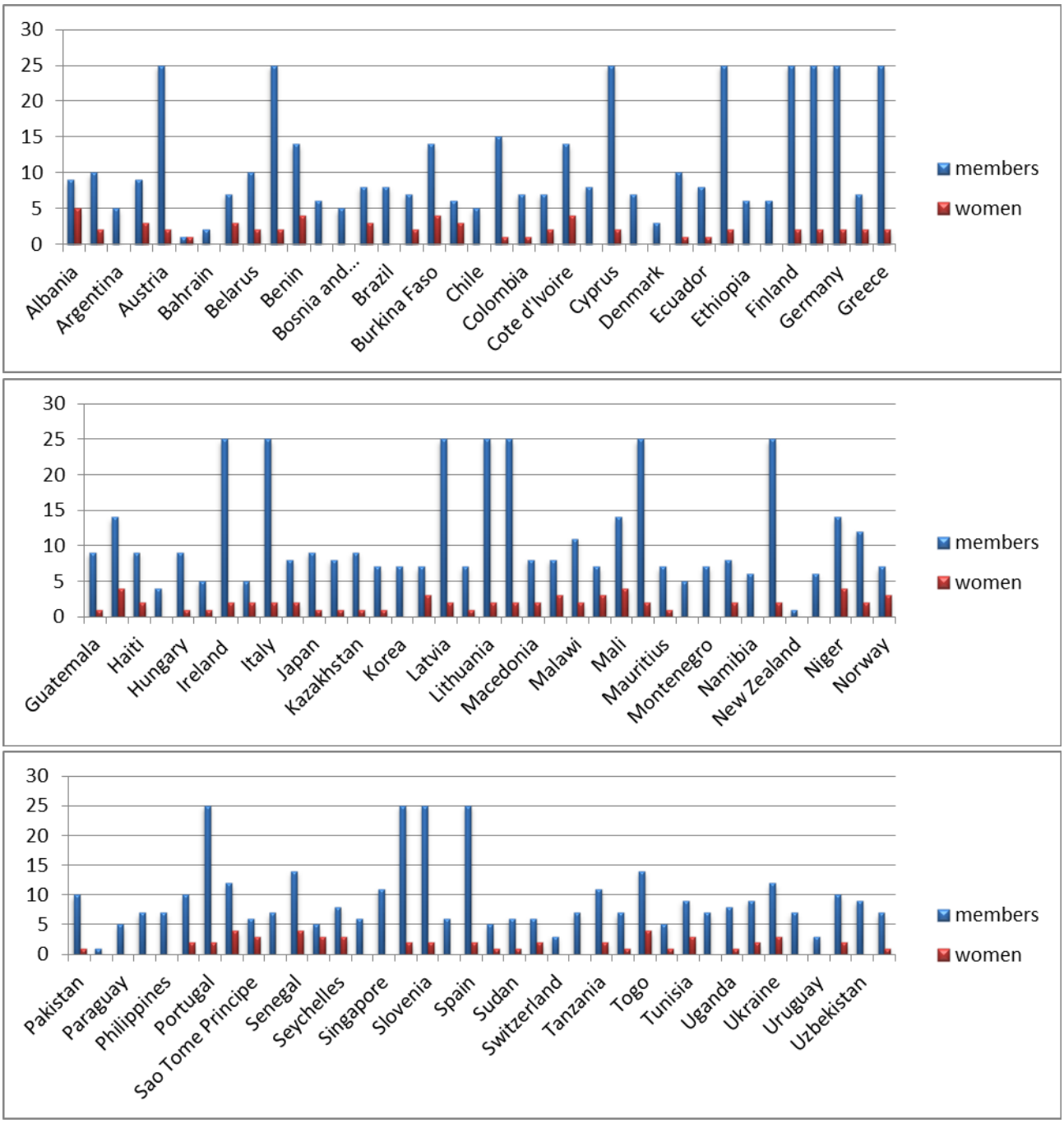

Figure 2

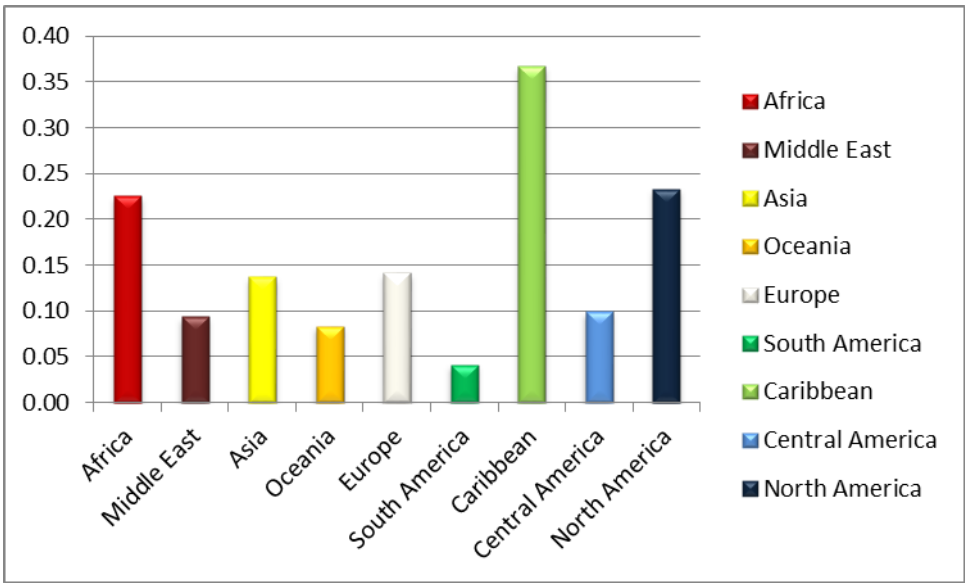

Figure 3

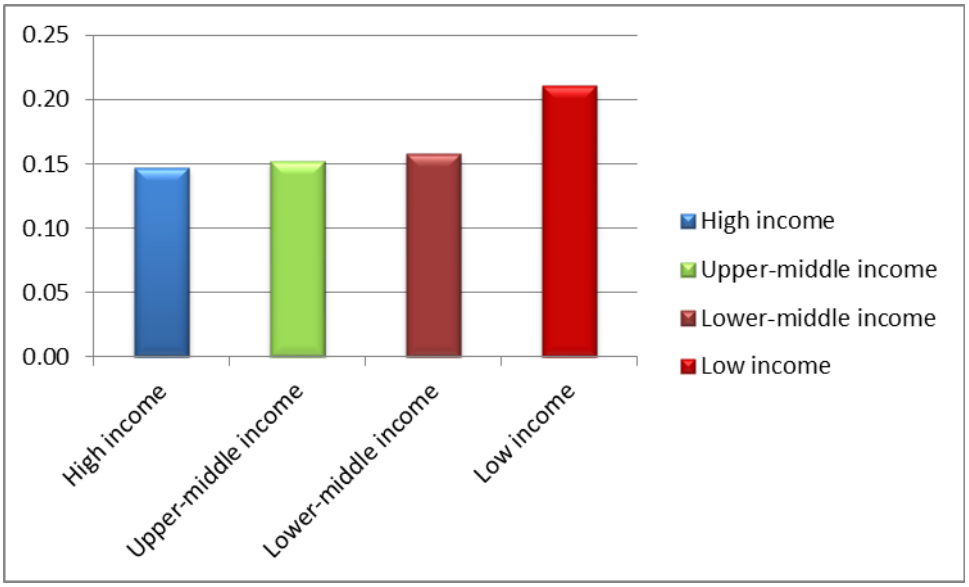

Figure 4

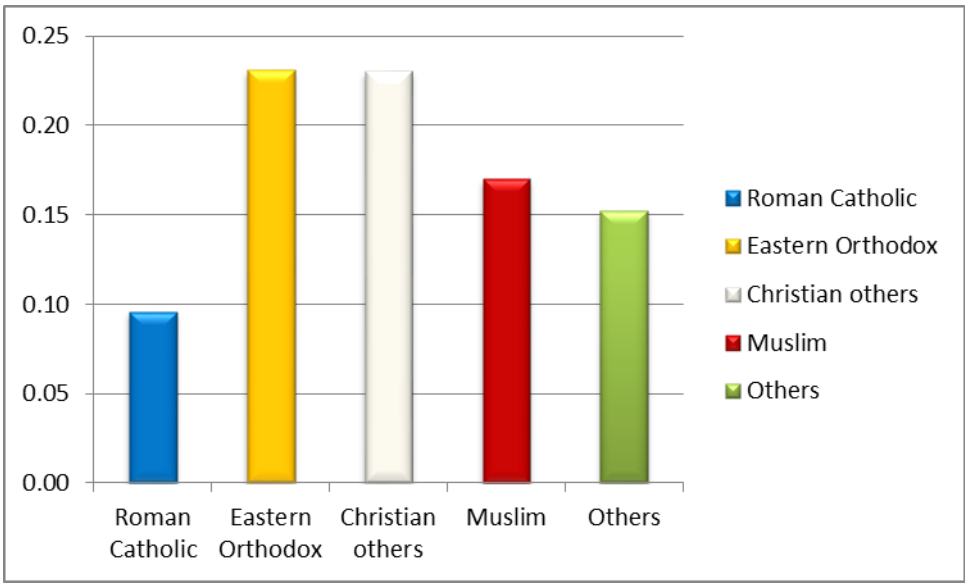

Figure 5

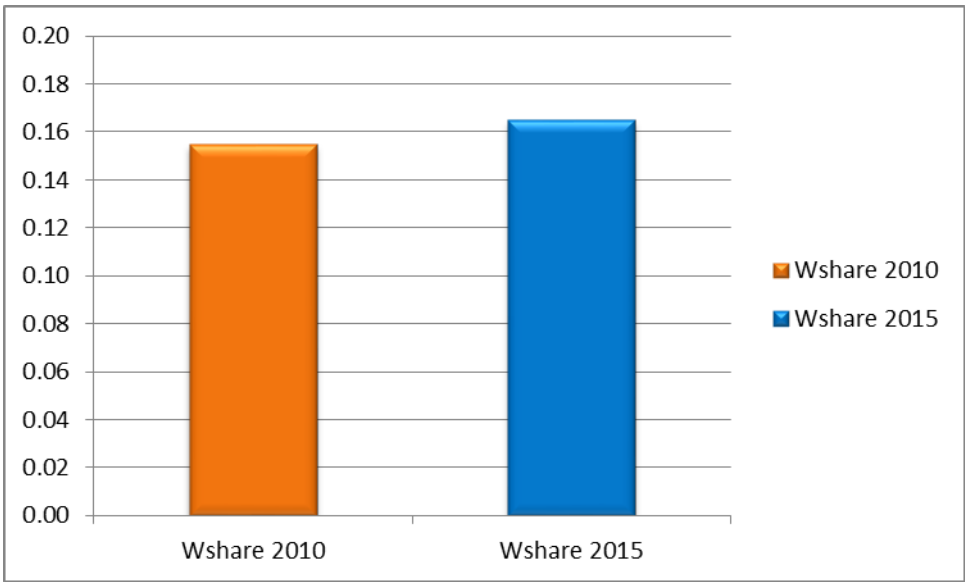

Table 2. Variable definitions and sources

Variable	Definition	Source
GMP Index	Percentage of women in monetary policy committees.	Authors
GMTEcon	The index is calculates as the sum of central bank's fulfilment of 7 criteria for economic independence. Central Bank Economic Independence (GMTEcon) is the central bank's operational independence based on seven criteria: (1) there is no automatic procedure for the government to obtain direct credit from the central bank; (2) when available, direct credit facilities are extended to the government at market interest rates; (3) this credit is temporary; (4) and for a limited amount; (5) the central bank does not participate in the primary market for public debt; (6) the central bank is responsible for setting the policy rate; and (7) the central bank has no responsibility for overseeing the banking sector (two points) or shares responsibility (one point).	Grilli et al. (1991) and Romelli (2015)
GMTPol	The index is calculates as the sum of central bank's fulfilment of 8 criteria for political independence. Central Bank Political Independence (GMTPol) is defined as the ability of central bank to select the final objectives of monetary policy, based on the following eight criteria: (1) governor is appointed without government involvement; (2) governor is appointed for more than five years; (3) board of directors is appointed without government involvement; (4) board is appointed for more than five years; (5) there is no mandatory participation of government representative(s) in the board; (6) no government approval is required for formulation of monetary policy; (7) central bank is legally obliged to pursue monetary stability as one of its primary objectives; and (8) there are legal provisions that strengthen the central bank's position in the event of a conflict with the government.	Grilli et al. (1991) and Romelli (2015)
GMT	The index is calculates as the sum of central bank's fulfilment of 15 criteria, 8 for political independence (GMTPol) and 7 for economic independence (GMTEcon).	Grilli et al. (1991) and Romelli (2015)
CBSS Index	Variable that involvement of the central bank in the micro supervision of the entire financial system. It takes values from 0 to 1 and increases with the involvement of central bank.	Masciandaro and Romelli (2015)
CBFA Index	The Central Bank as Financial Authority Index ranges from 1 to 4. A higher value indicates a higher concentration of supervisory powers in the hand of the Central Banks. The variable takes value =1 if the central bank is not assigned the main responsibility for banking supervision, =2 if the central bank has the main (or sole) responsibility for banking supervision, =3 if the central bank has responsibility in any	Masciandaro and Romelli (2015)

	two sectors, =4 if the central bank has responsibility in all three sectors.	
Inflation Targeting Regime	Dummy for Inflation Targeting countries: =1 for countries adopting an Inflation Targeting Regime; =0 otherwise.	Authors
Exchange regime	Dummy that takes value =1 for countries which have adopted a floating exchange rate regime; =0 otherwise.	Authors
Inflation	Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly. The Laspeyres formula is generally used.	World Bank (2015)
High-income	Dummy that takes value =1 for high-income countries; =0 otherwise.	World Bank (2015)
ln Population	Logarithm of the total population of the country.	World Bank (2015)
Legal system	Dummy for Common Law legal roots: 1= Anglo-Saxon Law; 0 = non-Anglo-Saxon Law.	La Porta et al. (1999)
Buddhist, Catholic, Orthodox and Muslim dummies	Dummy that signals whenever or not Buddhism / Roman Catholicism / Orthodoxy / Muslim religion is the most practiced religion in the country.	"The World Religion Dataset, 1945–2010" Maoz and Henderson (2013)
Voice and Accountability	Voice and accountability captures perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media.	"The Worldwide Governance Indicators, 2013 Update" Kaufmann et al. (2010)
French colony	Dummy that assume value =1 if the country has been colonized by France; =0 otherwise.	Mayer and Zignago (2011)
Female labor force	Female labor force as a percentage of the total show the extent to which women are active in the labor force. Labor force comprises people ages 15 and older who meet the International Labour Organization's definition of the economically active population.	World Bank (2015)
Women in parliament	Percentage of parliamentary seats in a single or lower chamber held by women.	World Bank (2015)
Output gap	Measure of the difference between the actual output of an economy and its potential output. We estimated potential output and the output gap by applying the HP filter to the yearly real GDP series for 1995–2014.	Authors
Trade (% of GDP)	Ratio of exports plus imports to GDP.	World Bank (2015)
OECD Member	Dummy for OECD member countries: =1 OECD member; =0	Authors

Dummy	non-OECD member.	
Money Growth	Average annual growth rate in money and quasi money. Money and quasi money comprise the sum of currency outside banks, demand deposits other than those of the central government, and the time, savings, and foreign currency deposits of resident sectors other than the central government. This definition is frequently called M2; it corresponds to lines 34 and 35 in the International Monetary Fund's (IMF) International Financial Statistics (IFS). The change in the money supply is measured as the difference in end-of-year totals relative to the level of M2 in the preceding year.	World Bank (2015)
Lending interest rate (%)	Lending rate is the bank rate that usually meets the short- and medium-term financing needs of the private sector. This rate is normally differentiated according to creditworthiness of borrowers and objectives of financing.	World Bank (2015)

Table 3. Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
GMP	197	0.158	0.169	0	1
GMTEcon	77	0.700	0.244	0.125	1
GMTPol	77	0.627	0.312	0.125	1
GMT	200	0.647	0.235	0.125	1
CBSS Index	76	0.328	0.331	0	1
CBFA Index	76	2.053	1.031	1	4
Inflation Targeting Regime	498	0.108	0.311	0	1
Exchange regime	77	0.571	0.498	0	1
Average Inflation (5 years)	412	5.337	4.213	-0.079	35.631
Average Inflation Gap (5 years)	412	-5.300	4.564	-11.898	23.732
High-income	77	0.519	0.503	0	1
lnPopulation	77	16.271	1.691	12.559	21.029
Legal system	77	0.156	0.365	0	1
Buddhist Dummy	77	0.039	0.195	0	1
Catholic Dummy	77	0.416	0.496	0	1
Orthodox Dummy	77	0.078	0.270	0	1
Muslim Dummy	77	0.130	0.338	0	1
Voice and Accountability	77	0.459	0.911	-1.801	1.754
French colony	77	0.039	0.195	0	1
Female labor force	77	51.294	11.374	15.6	71.9
Women in parliament	77	24.044	10.150	5.8	45.0
Average Output gap (5 years)	365	0.005	0.044	-0.238	0.236
Trade (% of GDP)	374	88.835	49.574	21.657	439.200
OECD Member Dummy	498	0.137	0.344	0	1
Average Money Growth (5 years)	334	13.913	9.424	-5.718	50.975
Average Lending interest rate (%) (5 years)	259	12.642	7.467	0.500	56.300

VARIABLES	(1) GMP	(2) GMP	(3) GMP	(4) GMP	(5) GMP	(6) GMP
GMTEcon	0.2432***	0.3042***				
	(0.088)	(0.095)				
GMTPol	-0.1405*	-0.1162				
	(0.076)	(0.079)				
CBSS Index			-0.0971*	-0.1455**		
			(0.051)	(0.072)		
CBFA Index					-0.0307*	-0.0507**
					(0.016)	(0.024)
Inflation Targeting Regime	0.0118	-0.0096	0.0062	-0.0343	0.0039	-0.0349
	(0.040)	(0.050)	(0.038)	(0.044)	(0.037)	(0.044)
Exchange regime	-0.0053	0.0529	-0.0174	0.0569	-0.0173	0.0563
	(0.044)	(0.055)	(0.048)	(0.061)	(0.048)	(0.061)
Average Inflation (2009-2013)	0.0023	0.0008	0.0013	-0.0012	0.0013	-0.0013
	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)	(0.004)
High-income	0.0429	0.0480	0.0253	0.0350	0.0236	0.0326
	(0.037)	(0.040)	(0.041)	(0.050)	(0.040)	(0.049)
ln Population	-0.0140	-0.0267	-0.0155	-0.0338	-0.0145	-0.0330
	(0.012)	(0.017)	(0.013)	(0.021)	(0.013)	(0.021)
Legal system	0.1417**	0.1636**	0.1451**	0.1510*	0.1449**	0.1546*
	(0.065)	(0.078)	(0.071)	(0.081)	(0.071)	(0.081)
Buddhist	0.1479**	0.1398**	0.0614	0.0112	0.0618	0.0068
	(0.066)	(0.062)	(0.069)	(0.071)	(0.069)	(0.072)
Catholic	-0.0648	-0.0874	-0.0326	-0.0326	-0.0318	-0.0336
	(0.040)	(0.060)	(0.039)	(0.056)	(0.039)	(0.056)
Orthodox	0.1980***	0.2457***	0.1658***	0.2171***	0.1649***	0.2179***
	(0.073)	(0.079)	(0.059)	(0.071)	(0.060)	(0.071)
Muslim	0.0088	-0.0162	0.0449	0.0313	0.0491	0.0358
	(0.068)	(0.080)	(0.070)	(0.082)	(0.070)	(0.081)
Voice and Accountability	0.0313	0.0143	0.0185	-0.0054	0.0223	-0.0025
	(0.034)	(0.040)	(0.039)	(0.050)	(0.038)	(0.049)
French colony	0.1869	0.2194*	0.1770*	0.2064*	0.1745*	0.2012*
	(0.113)	(0.113)	(0.100)	(0.104)	(0.097)	(0.102)
Female labor force	0.0024	0.0025	0.0038*	0.0041*	0.0037*	0.0041*
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Women in parliament	-0.0008	-0.0017	-0.0022	-0.0035	-0.0020	-0.0036
	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.003)
Constant	0.1072	0.2767	0.2268	0.5537	0.2381	0.6008
	(0.208)	(0.292)	(0.214)	(0.350)	(0.214)	(0.359)
Observations	77	60	76	59	76	59
R-squared	0.424	0.478	0.379	0.434	0.379	0.440

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 4. Inflation rate and GMP

The dependent variable is the average inflation differential over 5 years intervals, [*t-4, t*], where t is the year of calculation of the GMP index, namely 2010 and 2015 and the inflation differential is computed as the inflation in country *i* in year *t* less the weighted average world inflation rate in year *t*. GMP is the share of women members in monetary policy committees. GMT is an index of central bank independence from Romelli (2015). Lagged Average Inflation Rate is the average value of inflation over the period *[t-5, t-9*], Average Output gap is the output gap over the period [t-4, t]. Columns (2), (4), (6) and (7) exclude countries members of a monetary union, while Column (7) does not include OECD members. Robust standard errors in parentheses. ***, **, * represent significance at a 1%, 5% and 10% level, respectively.

Dependent variable: Average Inflation Rate	(1)	(2)	(3)	(4)	(5)	(6)	(7)
GMP	-2.6771**	-2.5773**	-1.0640	-1.6399	-3.4219*	-4.6776*	-8.5533*
	(1.122)	(1.111)	(1.122)	(1.061)	(1.981)	(2.567)	(4.641)
GMT			-3.1215**	-2.0602	-7.6354*	-6.8977*	-11.3740*
			(1.519)	(1.592)	(4.143)	(3.714)	(5.757)
Lagged Average Inflation Rate	0.5026***	0.4405***	0.4728***	0.4633***	0.4068***	0.3529**	0.3334**
	(0.085)	(0.082)	(0.091)	(0.092)	(0.098)	(0.133)	(0.148)
Average Output gap			24.8065	18.2100	-74.2508	-104.5424	-144.7125
			(25.915)	(40.065)	(65.822)	(75.936)	(91.671)
Inflation Targeting Regime	-0.6136	-1.8186**	-0.8916	-1.5185*	-1.2895	-1.7427	-2.8650
	(0.459)	(0.699)	(0.710)	(0.834)	(1.112)	(1.468)	(1.991)
Trade (% of GDP)	-0.0064	-0.0087	-0.0022	-0.0029	-0.0095*	-0.0113	-0.0180
	(0.005)	(0.007)	(0.004)	(0.006)	(0.005)	(0.007)	(0.012)
OECD Member Dummy	-1.7478***	-1.1967*	-0.9033**	-0.5168	-0.0972	-0.3645	
	(0.491)	(0.648)	(0.401)	(0.529)	(0.729)	(0.989)	
Constant	-2.1785**	-1.3352	-1.3078	-1.4397	-0.1341	-0.3153	3.2974
	(0.836)	(0.985)	(1.497)	(1.534)	(2.912)	(2.743)	(4.452)
Observations	160	111	121	87	59	43	31
R-squared	0.384	0.347	0.434	0.374	0.483	0.520	0.561