

The Value of a Seat: When are Women Elevated to Central Bank Boards? *

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V3. May 2017

Abstract

In this paper I investigate systematically the prevalence of women in the top echelons of leadership of central banks. This includes top positions as central bank governors or presidents, as well as membership in, what I call generically, the central bank boards. The percentage of women in leadership positions in boards at the central banks in the 114 countries I code is somewhere around 10-15% for 1998-2014, although there is an upward trend. I argue that, through the appointment process, the lack diversity of central bank leadership reflects a low priority attached to the gender ratio, given the high value of each seat in the central bank board. I link the comparative statics of the value of each seat in the central bank board to the size of the board, the existence (or lack thereof) of networks that support women's rise to influential positions and the governance of the central bank. I use country and year fixed effects models and find support for the key hypotheses that a larger share of women in the boards of central banks is more likely when: boards include more members; national legislatures include more women; corruption is low and the central bank has more independence. In terms of outcomes, women in leadership positions in central banks appear to be associated with higher rates of money growth, which are likely countercyclical, but not necessarily higher rates of inflation.

* The author can be reached at bodeaana@msu.edu. This is work in progress. Comments and suggestions are welcome. I benefited from suggestions from James Morrison, Sarah Bush, Carolina Garriga and comments at the University of Geneva Political Science Department Seminar and the LSE's IPE round-table. This version is prepared for ECPR's 5th European Conference on Politics and Gender, June 8-10 2017, University of Lausanne.

INTRODUCTION

Gender diversity and the gender gap in political office, declaring oneself as a candidate, earning a tertiary degree or being part of the boards of corporations are topics of increased concern. Countries address the gap with quotas reserving seats for women in parliaments or, even, the board of publicly traded firms. Political parties make pledges to include women on their candidate lists and universities pay attention to the graduation rates of women. Yet, gaps remain. In cabinet positions, women still hold fewer seats than men and these tend to be in positions with less prestige or usually associated with feminine characteristics (Krook and O'Brien 2012). Similarly, in 2014 the average international representation of women in national parliaments was at 22.3% (Lawless 2015). In the early 2010s companies' boards of directors included only 11.9% women in Europe and 9.9% in the Americas (Pande and Ford 2012). At the International Monetary Fund, while the having Christine Lagarde as the Managing Director, there are only three other women in leadership staff positions (out of 18).¹ Finally, women are underrepresented in the economics profession (Bayer and Rouse 2016) and, in the 2010s, only about a third of PhD degrees in economics were granted to women, the lowest percentage in social sciences.²

Given the gender gap, a large literature identifies the causes of more diversity, from a more equitable political representation, gender quotas and representation in company boards and the government agencies. In turn diversity more broadly, and gender heterogeneity, in particular, has proved consequential across a number of settings: More than just being about fairness, diversity in group decision-making likely increases creativity, innovation and productivity (Bayer and Rouse 2016). Diverse monetary policy committees are also argued to produce more efficient monetary policy decisions (Blider 2007)

This paper investigates the prevalence of women at the top echelons of leadership of central banks and the consequences of gender diversity. Monetary policy and, consequently, the leadership team at the helm of central banks are immensely important for the economic conditions in a particular country. A focus on inflation versus a more balanced focus both on inflation and economic growth can make a large difference on average unemployment, and, also, on the unemployment of particular socio-economic groups. Women in positions of leadership in parties, governments or national legislatures have been shown to focus on issues of interest to women, bringing them into the public policy arena. Are women making different decisions in monetary policy than men and are there particular conditions that make gender balance in central bank boards more likely? We simply do not know because there has not been systematic, panel data on the gender composition of the leadership of

¹ As of September 2016, these are Sharmini Coorey (Institute for Capacity Development), Antoinette Sayeh (African Department), Susan Swart (Information Technology). With the exception of Christine Lagarde, none of these women are responsible for key IMF departments. <http://www.imf.org/external/about/staff.htm>

² https://www.richmondfed.org/~media/richmondfedorg/publications/research/econ_focus/2013/q2/pdf/profession.pdf, also Bayer and Rouse (2016) The proportion of women is even lower in specializations like macroeconomics or finance, which are needed in many central banking positions, especially in developed countries, where relevant advanced degrees are expected.

central banks, that can allow to control for country specific conditions or address issues of endogeneity of appointments.

Central bank leadership includes top positions as central bank governors or presidents, as well as membership in, what I call generically, the central bank boards. To the extent possible, I code the institutional body responsible for monetary policy. At different points in time, for different countries this may include the central bank governor and the deputy governors; the governor and the board of directors; the management; or the monetary policy committee / board. My data covers 114 countries for years 1998-2014. I draw on theories explaining women appointment, representation and status to explore the underlying the gender balance in these central banks key positions.

I argue that the make-up of central bank's leadership is unlikely to be related to having a qualified pool of potential candidates. This supply side argument is unlikely to explain the complete lack of gender diversity across twenty countries in my sample, including Mexico, Switzerland, New Zealand or Singapore. Rather, the explanation lies on the demand side and comes from limited incentives to find and accommodate appropriate candidates. Through the appointment process, the lack diversity of central bank leadership reflects a low priority attached to the gender ratio, given the generally high value of each seat in the central bank board. I link the comparative statics of the value of each seat in the central bank board to the size of the board, the existence (or lack thereof) of networks that support women's rise to influential positions and the governance of the central bank.

Empirically, I use country and year fixed effects models and find support for the key hypotheses that a larger share of women in the boards of central banks is more likely when: boards include more members; national legislatures include more women; corruption is low and the central bank has more independence. On the other hand, surprisingly, I find that democracy, national income and women's labor force participation do not affect the share of women in leadership position in central bank boards. In addition, I explore some of the possible consequences of gender diversity on monetary policy. In terms of outcomes, women in leadership positions in central banks appear to be associated with higher rates of money growth that appear to come from a counter-cyclical policy, but not necessarily inflation.

The next sections provide evidence on the evolution the gender diversity at the helm of central banks; review the literature; derive theoretical expectations; discuss the data and methods; proceed to test the determinants of gender balance in central banks' leadership; and identify the effect of gender on money growth rates and inflation.

GENDER AND CENTRAL BANKING

Monetary policy and central banking tends to be a male dominated profession.³ The lack of gender diversity is a recognized issue in the central banking profession. For example, in 2013, the European Central Bank announced that it aimed to roughly double the share of

³ <http://www.ft.com/intl/cms/s/0/c79884ae-319c-11e3-817c-00144feab7de.html#axzz43qaovdzb>

women in high ranking administrative positions and has a gender diversity action plan.⁴ This followed cries for gender diversity in 2012⁵, when, until the appointment of Sabine Lautenschlager in 2014, the European Central Bank found itself with an all-male (six member) Executive Board. Similarly, the Bank of England, between 2010 and the 2014 appointments of Nemat Shafik and Kristin Forbes had no gender diversity in the nine member Monetary Policy Committee. Also, the Bank of Japan in its over one hundred year old history has had only four women sitting in the nine member Policy Board, and none of these women held the post of Deputy Governor.⁶ In 2014 the Swiss National Bank as a whole had a staff gender ratio that was 73% male (Central Bank Directory 2015) and the first woman appointed to the Governing Board took office in 2015⁷. Sweden's central bank (Riksbank) is the oldest in the world, dating back to 1668 and women have been appointed to the central bank board.⁸ Yet, even the Riksbank has had no female in the position of central bank governor. The gender gap is much smaller in some central banks and the Bank of Thailand is a prime example of an institution promoting women to leadership positions: From 2006 to 2010, the Thai central bank had Tarisa Watanagase as governor, as well as two other female deputy governors out of a total of three deputies.⁹

The 2014 nomination and the subsequent appointment of the US Federal Reserve chair Janet Yellen gave the media an opportunity to note, for example, that developed countries face a greater gender gap in appointments to the central bank than developing countries. In 2015 there were a total of 16 female central bank governors or presidents (Diouf and Pepin 2015), of which the majority serve in developing countries.¹⁰ The total number does not look appalling, yet a historical investigation based on my newly coded data (Figure 1) shows that for years 1998-2014, the number of women holding the post of governor, chair

⁴ The announcement said: "By the end of 2019, 35% of middle management positions (Heads of Division, Deputy Heads of Division, Heads of Section, Senior Advisers and Advisers) and 28% of senior management positions (Directors General, Deputy Directors General, Directors and Principal Advisers) should be held by women.

The share of women in middle management positions at currently 17%, while women hold 14% of senior management positions. The ECB also currently has a web page dedicated to women at the institution: <https://www.ecb.europa.eu/careers/working-at-the-ecb/women/html/index.en.html> and has been organizing recruiting events to attract female talent (FemaleTalent@ECB-Open Day 2016).

⁵ <http://www.voxeu.org/article/ecb-would-benefit-less-gender-discrimination>

⁶ Takako Masai (appointed in 2016), Sayuri Shirai (appointed in 2011), Miyako Suda (appointed in 2001) and Eiko Shinozuka (appointed in 1998).

⁷ The board member is Andréa Maechler, appointed by the Bundesrat in December 2014.

⁸ The Riksbank has had however over the years an impressive number of women in the leadership of the bank. In 2014, there were three female Deputy Governors: Kerstin Jochnick, Cecilia Skingsley, and Karolina Ekholm (became in 2014 state secretary at the Ministry of Finance).

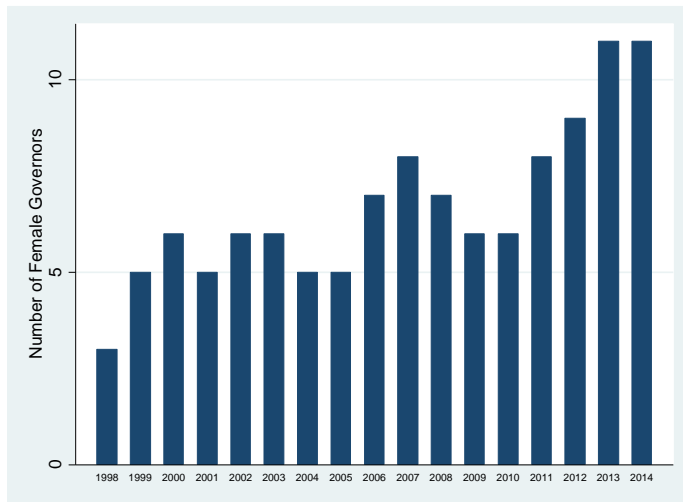
⁹ Gender diversity at the Bank of Thailand is also reflected in the number of females for technical positions inside the central bank: <http://www.bloomberg.com/news/articles/2014-11-24/in-battle-of-sexes-at-central-banks-thai-women-have-already-won> .

¹⁰ Some exceptions are Janet Yellen (US) or Karnit Flug (Israel).

or president in one of the 114 central banks I code is more likely to be in the low one digit numbers.

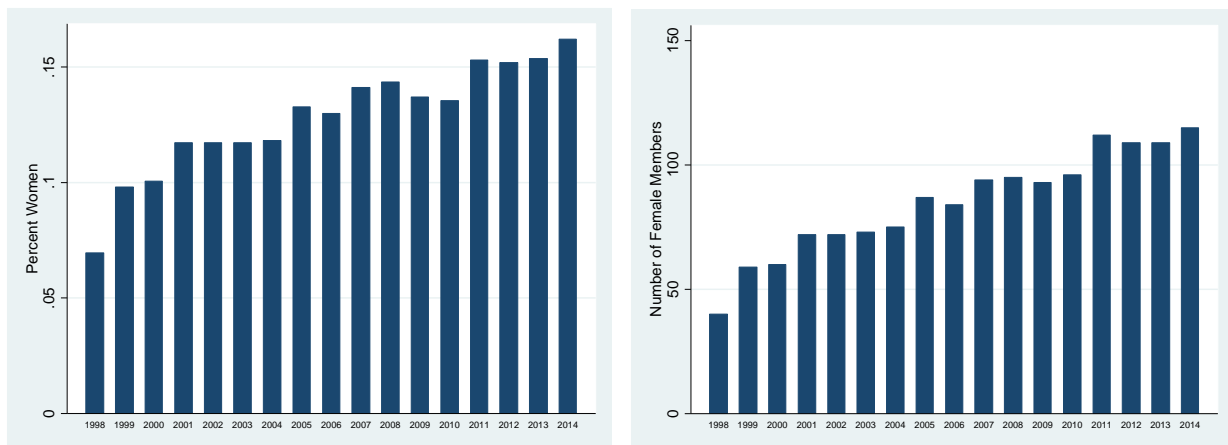
Similarly, Figure 2 shows that the percentage of women in leadership positions in boards at the central banks in the same 114 countries remains somewhere around 10-15% for 1998-2014, although there is an upward trend. In terms of raw numbers there is clearer progress, as there were 31 women in leadership positions in 1998 (7 countries that appointed two or more females to central bank leadership positions) and 109 women in 2014 (35 countries that appointed two or more females to central bank leadership) (Figure 2).

Figure 1. Average number of female central bank governors: 1998-2014; 114 countries



Note: In some central banks, the title may be president or chair.

Figure 2. Percent women in central bank boards (yearly average); Number of women in central bank boards: 1998-2014; 114 countries

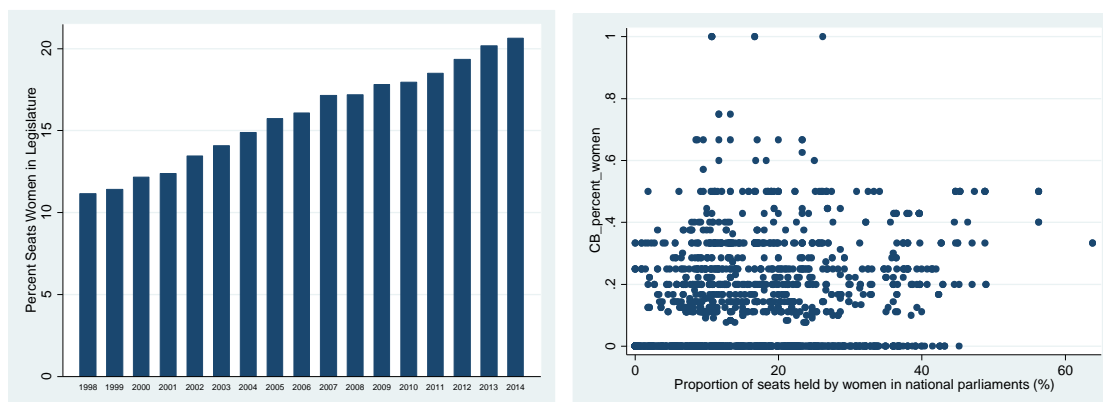


Note: There is variance regarding who is coded in a so called generic “central bank board”. Depending on the country, the aim is to code the leadership of the central bank on monetary policy and that can include

the governor and deputy governors; the governor and the board of directors; the management; or the monetary policy committee / board.¹¹

In the politics and gender literature, a key outcome is women's participation in the electoral process and women's representation in national parliaments or in parties' leadership are key metrics to gauge participation. Figure 3 shows for the sample of 114 countries for which I have available the percentage of women in central bank boards, the average share of seats taken up by women in national parliaments¹². From 1998 to 2014, the trend is similar to women in central bank boards, with a small increase of about eight percentage points, from an average of about 13 percent to 21 percent. What is somewhat surprising is the absence of a simple linear correlation between the two measures: For plenty of central banks with a significant female representation in their national parliaments, there are no women in the central bank board. I note a positive association between women's representation and the gender of appointments to the central bank only when women's representation in parliaments is large (greater than about 30 to 40%).

Figure 3. Percent seats to women in national parliaments (yearly average); Correlation of the percent women in central bank boards and women's representation in national legislatures: 1998-2014; 114 countries



Janet Yellen's appointment as Chair of the Board of Governors of the US Federal Reserve System opened renewed questions into why women are so highly under-represented in the central banking profession. Yet, there is little systematic investigation into the causes of the gender gap in the appointment of central bankers. There are several exceptions: Masciandaro et al. (2015) look at a simple cross section of the gender of monetary policy committees for year 2015, investigating the correlates of the gender of appointments. Diouf and Pepin (2015) investigate the appointment of central bank chairs (governors, presidents)

¹¹ The standard error of the average yearly percentage female appointments to central bank boards does not change much over years 1998-2014 and neither does the average number of members in the boards.

¹² Data is from the World Bank World Development Indications (WDI).

in 46 countries since 1949¹³, looking at the characteristics of countries that appoint female chairs.

LITERATURE

Low levels of female representation at the top echelons of business and government or low participation in politics may be a consequence of *limited supply* (Norris and Lovenduski 1993, Norris 1997; Paxton and Hughes 2007). Women may self-censure because they dislike becoming a managers or entering political competition and the process of reaching leadership positions, or they may face high costs or low ambition and motivation (Huffman and Cohen 2004).

Theoretically, the supply of women for leadership positions or political office depends on a range of socio-economic factors (Hughes 2009) and may be mediated by the electoral process (Sanbonmatsu 2006), partisanship (Kenworthy and Malami 1999, Reynolds 1999, Wolbrecht 2000), ambition (Fox and Lawless 2011), aversion to the electoral process (Kanthak and Woon 2015) or existing descriptive representation and interaction rules (Karpowitz et al. 2012).

Alternatively, on the *demand side* (Lovenduski and Norris 1993, Terjesen et al. 2009), women may face discrimination, prejudice or social biases. Paxton (1997), for example, finds that female labor market participation or education do not influence their parliamentary representation. Thus, voters could be beholden to stereotypes (Hudy and Terkildsen 1993), cultural norms may be stacked against women (Norris and Inglehart 2001; Paxton and Kunovich 2003) or, in a relatively low information environment, candidate selectors could decide on abilities and qualifications based on perceptions rather than hard facts (Lovenduski and Norris 1993, Terjesen et al. 2009). For example, Niven (1998) finds that male party chairs prefer features associated with men and this effect may be reversed as the number of women in party leadership increases (Kittilson 2006), or a quotas push party elites to search harder for additional pools of recruits (Krook 2009).

Below, I look more specifically at the theories and factors behind countries using *gender quotas*, *higher female representation* in national legislatures / parties, and more gender balance in *cabinet appointments*. The ideas and empirical results are useful in thinking theoretically about the gender gap in the appointment of central bank leadership.

Since WWII, women have increasingly been in school, working outside the home or involved in political activism. Yet, as we pointed out important gender gaps remain. Gender equality in politics and business is a topic of great interest for governments, interest and professional groups, the public and media in countries around the world. Electoral gender quotas has been one of the ways in governments have promoted equality in elected office. Gender quotas can refer to policies that require setting aside seats in local or national elected bodies; to requirements that political parties include a certain percentage of women among the nominated candidates for public office; or the political parties voluntarily setting for themselves percentages of women candidates.¹⁴ Although less prevalent, gender quotas are also present in business and several

¹³ Panel data analysis covers the period 1980-2014.

¹⁴ Krook (2009) talks about reserved seats, party quotas and legislative quotas. There is significant variation in the nature of electoral quotas, with a large size differences (South Korea

countries require firms to set aside seats for women in their corporate boards, including Finland, Norway, Spain, France and Malaysia, or Canada's Quebec region (Terjensen et al. 2009, Economist 2011¹⁵, Guy et al. 2011)

A large literature studies the determinants of gender quotas for women in politics and points to domestic and international factors. Krook (2009) identifies four sets of explanations that include the mobilization of women themselves, elite strategic behavior¹⁶, norms of fairness and equality (usually promoted by left wing parties or during periods of democratization), and international norms and norm diffusion¹⁷. Kittilson (2006) investigates women's integration in political parties and parliamentary offices in ten Western European countries (1975-1997), and quotas are made more likely by women's presence in high ranking party positions¹⁸ or increased party competition.

The literature also discusses a number of cross country explanations for the variation in women's political representation. In developed countries several factors are shown to be important, including electoral institutions, partisanship and gender quotas. Thus, women are represented in greater numbers in countries with proportional representation (Lovenduski and Norris 1993), left wing governments (Caul 1999, Hughes 2004), legal mandates for gender quotas (Caul 2001, Paxton and Hughes 2015)¹⁹ or international pressure to increase representation (Paxton et al. 2003). Across political regimes, democratic political institutions represent a broader range of interests, and, thus, could be expected to be related to increased female representation (Inglehart and Norris 2003). However, a number of cross-national studies do not find that democracies have more women represented in parliament (Paxton and Kunovich 2003, Paxton et al. 2006), and democratization may in fact reduce women's representation (Matland & Montgomery 2003).

A directly related literature investigates the gender patterns of appointment to executive positions. This work notes the dearth of women elected or appointed as president, prime minister or other cabinet position (Davis 1997, Reynolds 1999, Krook and O'Brien 2012, Jalalzai 2013, Thomas and Wilcox 2014). This work also notes the appointment of females to specific cabinet post like ministries of education or family / women's affairs or the appointment of "token" females to cabinet posts. In a recent article, Krook and O'Brien (2012) suggest that appointments may be a function of political institutions, gender equality, and women's political recruitment. Their findings indicate that a number of variable impact the gender composition and portfolio prestige of appointments to ministerial positions, including political institutions,

50% vs. Nepal 5%) and enforcement (France's weak enforcement vs. Brazil's requirement to leave unfilled seats open) (Bush 2011).

¹⁵ Economist July 21, 2011, "The wrong way to promote women".

<http://www.economist.com/node/18988506>

¹⁶ This factor may be more important in advanced industrial economies (Caul 2001).

¹⁷ Bush (2011) shows that gender quotas are adopted by countries that receive foreign aid or undertake post-conflict peace operations.

¹⁸ O'Brien (2015) investigates how women rise to party leadership positions.

¹⁹ Quota research has recently focused on how the nature of quotas affect representation, including requirements to place women at the top of party lists or sanctions for party leaders for non-compliance with quota requirements.

although the presence of women in other elite positions was by far the most important determinant.

THEORETICAL EXPECTATIONS

I propose a theoretical explanation built around what I call “the high value of a seat” in the leadership of a country’s central bank, which is related to the importance of monetary policy, the committee based decisions of most modern central banks and the potentially different preferences of women in monetary policy. First, the role of the central bank in the economy is unambiguously large. The primary job of modern central banks is the conduct of monetary policy. This means setting interest rates, targeting the exchange rate or money supply, and setting the reserve requirements for commercial banks. These policies and the easiness or tightness of money in the economy have very large average and distributional consequences for the welfare and wealth of political constituencies (Hibbs 1987, Lohmann 1998). Indeed, (different) political actors have been more or less inclined to “supply” different policy actions (e.g., low or high interest rates) and economic outcomes (e.g., inflation, employment) at some specific times rather than others (Hibbs 1987, Clark and Arel-Bundock 2013).

In addition, most modern central banks are governed by committees or boards (Blinder 2007), so each seat in the board and the background and preferences of each member are relevant to the collective decision making (Chappell et al. 1993, Chappell et al.2005). Also, Farvaque et al. (2010) and Chappell and McGregor (2000), for example, uncover a role of gender diversity in the inflation performance central banks, even if they identify opposite effects.

Finally, individual male or female candidates for the central bank leadership have individual backgrounds and preferences. Yet, the high value of a seat in the central bank board is compounded by what may be perceptions that women have different preferences than men about monetary or fiscal policies, and more broadly, about the role of government in the economy. For example May, McGarvey, and Whaples (2013) find that women holding PhDs in economics have different opinions than men on the amount of regulations in the US economy or the fairness of the distribution of income.²⁰ Such preferences are validated by research showing that giving the women the right to vote has had an important ratcheting up effect on US states’ public spending and revenue (Lott and Kenny 1999), as well as on the size of social spending in Western Europe (Aidt and Dallal 2008) or family benefits in the OECD (Ennsner-Jedenastic 2017). A greater number of women member of parliament and greater representation of women in political parties’ leadership is also associated with political parties’ emphasis on social justice and welfare expansion (Kittilson 2011). Additional work also shows that voters tend to view female political candidates as more competent on social and welfare issues (Huddy and Terkildsen 1993, Lawless 2004).

²⁰ Relative to males, PhD women economists are 21 percentage points more likely to disagree that the US has excessive government regulation of economic activity and 32 percentage points are more likely to agree with making the distribution of income more equal (May, McGarvey, and Whaples 2013)

The make-up of central bank's leadership could be related to having a qualified pool of potential candidates, as central bankers themselves would argue. Yet, it seems implausible that, in the contemporary period I look at (1998-2014), the supply is so restricted, that twenty countries in my sample have had no women in the central bank's leadership. It is hard to understand the complete lack of gender diversity in countries like Mexico, Switzerland, New Zealand or Singapore from the perspective of a low supply of female economists. The trend in the educational background of leadership of central banks is to appoint PhD economists and university professors (Farvaque et al. 2011). Nevertheless, of the 175 monetary policy-makers they survey between 1999 and 2008 for advanced OECD countries, Farvaque et al. (2011) find that about 43 percent still held only bachelors or master degrees. Adolph (2013) also shows that for rich countries for the period 1950 to 2000 the average percent of central bank board members with advanced economics degrees (master and PhD degrees) was only 30%, and varied vastly from Norway (100%), the Netherlands (80%) and Switzerland (75%) to Sweden (15%), Finland (14%), Austria (12%) and Japan (6%).

Rather, the explanation lies on the demand side and comes from limited incentives to find and accommodate diverse and appropriate candidates. Through the appointment process, the lack diversity of central bank leadership reflects a low priority attached to the gender ratio, given the generally high value of each seat in the central bank board. Usually, the central bank governor, its deputies, members of the boards of directors or monetary policy committee are appointed by the legislature or by the executive branch.²¹ These politicians can be influenced to support more or less gender balanced boards by factors that drive the value of a seat. The value of one seat as a member of the central bank leadership is already large, given the consequences of monetary policy, the likely divergence in preference of female members and usual collective decision making in central bank boards. Yet this this value can vary along several dimensions, including the size of the board, the political connections of would-be women candidates or the institutionalized nature of the relationship between the central bank and the government.

Token female governors

A number of large central banks, like the ECB (six member Executive Board)²² or the Bank of Japan (nine member Monetary Policy Board²³) have had in their composition only one female

²¹ For example, in the US the President appoints members of the Board of Governors of the Federal Reserve and the Senate confirms the nominees. In Israel the President appoints the central bank governor on the recommendation of the Government, and monetary policy committee members are directly appointed by the Government. In Russia, the parliament (the Duma) appoints the Chairman of the Bank of Russia and the Board of Directors. In the UK the Government nominates the Governor of the Bank of England and members of the Monetary Policy Committee. The Governor of the Bank of England is formally appointed by the Queen at the recommendation of the Government, and some of the Monetary Policy committee members are nominated by the Governor of the Central Bank.

²² For the ECB I refer only to the Executive Board (EB) and not the whole monetary policy decision making body (Governing Council), of which the EB is part of. This is because the Governing Council is made out of the governors of the national central banks of the euro zone and these governors are elevated to their positions in national politics.

²³ The Monetary Policy Board dates back to the 1997 central bank reform, implemented in 1998.

governor at a time²⁴. Many of these appointments have taken place in the face of media scrutiny and public discussions about the lack of gender diversity in central bank leadership. Central banks and their boards control, or, at a minimum, influence economic conditions in a particular country, both in terms of aggregate and distributional effects. Women would-be candidates for these central bank board seats could be perceived as less qualified, could have fewer political and central bank connections²⁵ and, altogether, could be perceived as more risky in terms of unknown preferences and reactions in monetary policy. Given, that seats in central bank boards are likely then to have an economic and political value, women candidates can be less of a sure bet. Thus, when there are more seats available to be filled, one particular seat in the central bank board is likely to be less politically valuable and “token” appointments are more likely. In the US for example, fears existed that the Obama administration could appoint a woman (Lael Brainard) to the Federal Reserve Board, and substitute this gender balancing nomination for the appointment of Janet Yellen as the Chair of the Fed Board.²⁶ *My hypothesis is therefore that women will be elevated to leadership positions in larger boards (H1).*

Networks and political support

Lack of political connections is often discussed as a reason for why there are few women appointed in central bank leadership positions. Without the “right” network women may simply not make it to the short-list for high value seats in central bank leadership. The value of networks in politics is well established: Political parties act as gatekeepers for women entering politics and women are less likely to be asked to run for office compared to equally qualified men (Niven 1998, Sanbonmatsu 2006, Fox and Lawless 2010). For example, women candidates for US states governor positions complain about the existence of “old-boy networks” that disadvantage women from running and advancing in their political careers (Windett 2014)

Measuring the role of women in political networks is difficult. However, a large literature shows that elites act as gate keepers or enablers for gender balance in parties or candidate selection. Female elites could support female candidates by influencing list placement or party financial contributions and by further increasing women representation through internal party rules for percentages of women as candidates (Caul 1999, Kittilson 2006, Kunivitch and Paxton 2005). Similarly, more women parliamentarians could support the appointment or elevation within the central bank of female candidates. In the US, for example, female Democratic Senators and other women groups voices their strong support in favor of Janet Yellen for the position of Chair of the US Federal Reserve.²⁷ *I expect therefore that higher rates of representation in national parliaments translates into more women in central bank boards (H2).*

In addition, research has shown that corruption tends to work to the disadvantage of women, because women are outside traditional rent based networks. Dollar et al. (2001), for example,

²⁴ At the ECB these are Sirka Hemeleinen (Finland), Gertrude Tumpel-Gugerell (Austria), and Sabine Lautenschläger (Germany).

²⁵ “Where are the women in central banking?”, Washington Post, September 19 2013; “A Study in Scarcity: Women at Central Banks”, New York Times, October 8 2013.

²⁶ “Top female Treasury official reported under consideration for Federal Reserve post”, The Washington Post, September 8, 2013.

²⁷ “Women’s groups push Yellen for Fed”, Politico August 28 2013; “Yellen as America’s Favorite Shows Fed Captured by Democracy”, Bloomberg October 9 2013.

show that governments with a greater representation of women in government tend to be perceived as less corrupt. Their initial conjecture was that women are more trustworthy and, therefore, are perceived to be less corrupt. More recent research offer different explanations, related to women's exclusion from political networks. Thus, women may be less corrupt because they are outsiders to networks of power and patronage (Branisa and Ziegler 2011), or because corrupt officials discourage women's representation as a way to preserve the stream of benefits from corruption (Bjarnegård 2013; Goetz 2007). Women may also be less likely to engage in corruption because they are more likely to be held accountable and punished (Esarey and Schwindt-Bayer 2017). If corruption stands for entrenched networks of distributing patronage and favors and women tend to be less corrupt, then corruption may be a good indicator for women's lack of extensive networks that can promote them to the leadership of central banks. *It can be expected, therefore, that more corruption is associated with fewer women in positions of leadership in their central banks (H3).*

Central bank governance

In the last three decades many countries around the globe allowed their central banks to be more independent from politics. This means that central banks could decide monetary policy without being responsive to politicians' popularity or re-election prospects. The rise of legal central bank independence and the high stakes for the economy, further raise the value of a particular seat in the central bank leadership team.

Women may come non-traditional networks or are less well known, they may present potentially more risk in terms of unknown monetary policy preferences. In this case, politicians may be reluctant to elevate or appoint women to central bank boards, due to the fact that independence protects to a great degree board members from politicians' influence or coercion. On the other hand, women may be thought to align themselves more readily with government preferences and be more dovish, given their traditional association with policies related to women's issues (Hudy and Terkildsen 1993, Masciandaro et al. 2015). Then, elevating women to leadership positions may be considered more dovish in terms of monetary policy preferences and thus governments could be more likely to favor women in central bank boards. In either case, if women are appointed or elevated to board positions, the interactions between the government and the central bank and the governance and functions of the central bank are likely to be relevant. *My expectation with regards to central bank independence is therefore that it will likely affect central bank board gender balance, but the direction of this effect may be ambiguous (H4).*

A number of other explanations can be related to the pattern of female appointments to leadership positions in central banks including explanations related to democratic institutions, economic development or partisan and electoral concerns.

Political institutions

Inglehart and Norris' (2003) revised modernization theory argues that industrialization and democratization change social norms towards an acceptance of gender equality. Industrialization promotes women entering the work force, while democratization promotes social policies, and both processes promote an attitude shift in the role of gender. The caveat is that some cultural norms that center on patriarchal arrangements (Muslim societies) are less likely to progress towards gender equality. This theory suggest that the appointment of women in position of

authority in central banks should be more prevalent in developed countries, democracies, countries with an improved socio-economic status for women and non-Muslim countries. Paxton (1997) also suggests that in democracies consistent and transparent rules should help women work through the political system to be in a position of authority. In some less democratic countries, on the other hand, women can be emancipated in the work place and in politics even when the society as a whole does not support the change.

Development

Going back to Inglehart and Norris' (2003) revised modernization theory, rich, industrial, urban societies are more likely to exhibit social norms that accept gender equality and women in the work force. Thus, the expectation is that richer countries and countries with more women that work outside of the home are likely to see more women in positions of leadership in their central banks.

Partisanship and electoral concerns

Left wing parties have generally embraced more egalitarian values and parties of the left have been associated with more political representation for women. Women's preferences on social issues may also match more closely the references of left wing parties. The egalitarianism of left wing parties and the potential preference overlap could then translate into the elevation of women to leadership positions in central bank boards. Equally important, election times can be periods when political parties cater to the electorate. In recent times the appointment of women to leadership central bank positions is a highly discussed media issue. If attracting women's vote is a factor in parties' electoral strategy, then election years could see more appointments of women to central bank boards.

DATA, RESEARCH DESIGN AND RESULTS

The gender in central bank leadership positions data covers years 1998 to 2014 for 114 countries. To the extent possible or whenever there was a central bank reform, I code the institutional body responsible for monetary policy. Because I go back to 1998, the main data source for the coding is the Central Bank Directories 1999-2015. I code each directory as showing the central bank personal from the preceding year. The panel structure of the data is attractive, yet, for particular countries, there are challenges to defining consistently across years the leadership of the central bank. One example is the Bank of Israel, where, while the Governor has the deciding stance or vote, monetary policy is decided successively by the Governor advised by a number of Senior Directors, the Governor advised by a monetary forum or the Monetary Committee (6 members, where the governor has the casting vote in the event of a tie).²⁸ A much easier case is the Bank of Japan, where, after the bank reform of 1997 (implemented in 1998), I code all the nine members of the Monetary Policy Board for the duration of the sample.

I refer generically to the central bank leadership coded here as the "*central banks board*". This includes for example: the governor and the bank directors in Argentina; the Reserve Board in

²⁸ Consequently, the number of members in the generic "central bank board" for Israel varies from four to eleven.

Australia; the governor and deputy governors in Brazil; the Monetary Policy Board in Hungary (also in Finland); the governor, senior deputy governor and deputy governors in Indonesia; the governor and deputy governors in France; the executive board in Germany; the monetary council in Greece; or the governing board in Sweden.

The number of central bank board members coded for each country varies and therefore it makes little sense to model the number of female members. The average size of the board is close to 5 members, with a minimum of 1 and a maximum of 16. A more appropriate variable is therefore the proportion of women in the central bank board. The dependent variable is thus the number of female members in central bank boards (average 0.6, with a minimum of 0 and a maximum of 5) divided by the total number of board members. The proportion of women in the board averages 0.11%. Of note, 51% of the country-years have zero women in the central bank board, and 20 countries did not have women in their central bank leadership for the period coded (including Azerbaijan, Bangladesh, Mexico, New Zealand²⁹, Saudi Arabia, Singapore, Uzbekistan, Switzerland).

Independent variables are coded to test hypotheses H1-H4: The size of the central bank board is based on my own coding. The proportion of seats held by women in national legislatures (percentage) are from the World Bank World Development Indicators (WDI). Corruption is from the International Country Risk Guide, with a range from 0 (no corruption) to 6 (high levels of corruption). Appropriately for this paper, the ICRG measures corruption in the form of networks sharing favors like “excessive patronage, nepotism, job reservations, ‘favor-for-favors’, secret party funding, and suspiciously close ties between politics and business” (ICRG, p.5). Central bank independence is the Cukierman et al, (1992) index from Bodea and Hicks (2015) and updated by the author to 2014³⁰. The index ranges from 0 to 1, with larger values showing more independence.

In addition to the key independent variable I also include a number of additional variables: Democracy is operationalized with the Polity score, ranging from -10 to 10, with positive numbers denoting democracies. GDP per capita; % urban population; female labor force participation (percentage) are from the WDI. I measure partisanship based on the DPI, and code a variable called left when the party of the chief executive is on the left. Elections are based on Hein Goemans’ election dates dataset, NELDA (v3) and author corrections. The election variable is a dummy with a value of 1 for both presidential and parliamentary elections. In addition I include a country’s past five years average of the logged inflation rate (WDI) and fiscal deficit (Bodea and Higashijima 2017 and updates).³¹ The lagged values of inflation and fiscal deficit can arguably capture a country’s aggregate preferences in monetary and fiscal policy. Finally, I include the oil and gas rents per capita (Ross 2012), to potentially capture the effect of natural

²⁹ For New Zealand I code the governor, deputy governor and chief economist. The central bank’s board does not make monetary policy decisions but advises the governor and monitors the performance.

³⁰ For euro zone countries the value of the CBI index codes the European Central Bank.

³¹ In the models in Table 4 I also include the country’s the de facto exchange rate regime. This is not included in the main analysis because the available data ends in 2012. I recode a standard measure (Reinhart & Rogoff 2004, Ilzetzki et al. 2008) such that 1 stands for de facto pegs and crawls (Ilzetzki et al. coarse coding 1, 2, 3). All other categories are coded as zero.

resource exploitation on the number of women in the labor force and their loss of political influence (Ross 2009). The oil-gas rents variable is logged to address the issue of outliers with a very significant production of hydrocarbons. Other controls of interest could be included in the models, but the lack of within country variation makes it impossible to estimate their effect. These include: cultural diversity, percent Muslim population; former colonial status; or the country's legal system.

Modeling the proportion of women in central bank boards presents two key challenges. The first is that unobservable factors drive the association between the independent variables in the regression models. I address this issue by using country fixed effects in all models. The second issue is that the dependent variable is a proportion, taking values in between zero and one. I present therefore three types of models: a regular OLS model with robust standard errors; a generalized linear model (GLM) with a logit link and the binomial family, with robust standard errors³²; and a fractional response regression with a logit model for the conditional mean, specifically aimed at estimating outcomes like rates, proportions and fractional data.

Table 1 shows some simple averages of the percent women in central bank leadership positions for several key independent variables. Two points stand out: First, some of largest differences are seen for countries that have a large proportion seats in national parliaments occupied by women (above 30%) and countries where women have joined the labor force in large numbers (above 44%). Second, surprisingly, democracies, countries with proportional electoral systems, large boards, independent central banks, left wing governments and western (rich) nations do not have a higher percent of women in boards. More specifically, both democracies and anocracies appoint more women than dictatorships, but there is little difference between democracies and anocracies. Also, there is no simple relationship between larger central bank leadership teams, independent central banks, the political left or more democratic electoral systems (PR). Finally, among the regions of the world, Latin America and Sub-Saharan Africa stands out as the regions with the highest percent of women in central bank boards (17%), higher than the percentage of Western (rich) nations (13%). The euro zone's average is about the same as the average for all Western nations combined.

[Table 1 about here]

Results: Determinants of % women in central bank leadership

Table 2 shows the results of the more rigorous regression models. The fixed effects model control for unmeasured country time-invariant characteristics. A Hausman test for the OLS models indicates that the country fixed effects estimation is preferred.³³ Time fixed effects were initially included in the linear models. However, an F test indicates that years fixed effects are not required, so the year fixed effect were not used.³⁴ In Table 2 I use % urban population to proxy development, while in the appendix (Table A2) I use GDP/capita. The two variables are highly correlated (0.79) and cannot therefore be included in the same model. In these tables I

³² This model has predicted values between zero and one, consistent with the range of the dependent variable.

³³ $\text{Prob} > \chi^2 = 0.0005$, so the fixed effects estimation is preferred.

³⁴ The F test fails to reject the null that the coefficients for all years are jointly equal to zero. Including the time fixed effects leaves the estimations unchanged.

first estimate OLS regressions, followed by GLM models with a logit link, and fractional response regressions with a logit model for the conditional mean. For each type of empirical estimation, I first show models that include only a few of the independent variables that do not restrict the sample size much, followed by a models with all independent variables and controls. Table A1 in the Appendix shows that the results are similar when I exclude from the analysis the countries that never appointed women to central bank leadership while in the sample.

[Table 2 about here]

There are several relatively robust findings. A first is that large boards will see a greater proportion of women elevated to a leadership position. The coefficient on the number of board members is positive and statistically significant across all most of the empirical models. This findings supports hypothesis H1 and the idea that women will be appointed to boards when then value of a single seat is lower.

There is also support for the idea that traditional networks of influence do not help women be appointed to central bank boards (H2 and H3). Thus a greater political representation of women (% seats women in parliament) is associated in many of the empirical models with a greater proportion of women in central bank leadership. On the other hand, corruption has a negative effect on the proportion of women in central bank boards. This supports the idea that corruption networks tend to work to the disadvantage of women in high value leadership positions..

Central bank independence is associated with more representation for women in central banks, even though only two of Models 5 and 6 show statistically significant findings. Central banks that are more independent are likely to l see more gender balance. Appendix Table A3 shows the results using the Garriga (2016) central bank independence index. This index is available until 2012, but codes additional countries. The results are more supportive of hypothesis H3. Given the global move towards central bank independence and transparency, these findings suggest that more gender balance lies ahead.

In terms of the control variables, a very robust finding is that the level of urbanization (% urban population) is consistently associated with the gender composition of central bank boards, while GDP/capita is not (Appendix Table A1). Thus, more urban countries will have more women appointed to central bank leadership positions, while being simply a richer country does not guarantee gender balance. Also, more women in the workplace (% female in the workforce) is not related to gender balance in the central banks. These finding suggests that not all operationalizations of modernization theory and development need contribute equally to more gender equity in leadership positions.

Controlling for urbanization (or GDP/ capita), political democracy tends to reduce the share of women in central bank boards, although the coefficient on the Polity democracy score is negative and statistically insignificant in all models, These findings are inconsistent with the modified modernization theory, and more representative political institutions do not appear to contribute to elevating a higher share of women to leadership positions in central banks. Still such institutions may have a positive effect through political representation, given that a higher ratio of female parliamentarians is associated with more gender balance.

Two other interesting findings are that countries with large amounts of oil rents and countries with a history of inflation are less likely to have gender balance in the central bank leadership. Thus both oil gas value/capita and the average inflation in the past five years have a negative coefficient in the statistical models and reduce the proportion of women in the central bank board. On the other hand, variables related to the strategic behavior of political parties do not achieve statistical significance: The left variable is statistically insignificant and with an opposite sign to the predicted direction. Similarly, election years make no difference to the appointment of women to central bank leadership positions.

Tables 3 and 4 show the findings from alternative estimation techniques. Table 3 shows the results from a simple logit model where the dependent variable is dichotomous, coding the presence of women as a 1 and the lack of gender diversity as a 0. Given that twenty countries in the sample have not had any gender diversity while in the sample, fixed effects estimations are not appropriate because they would simply drop those countries out of the estimation, raising the issue of selection bias. Instead, I use a model that conditions the effect of the explanatory variables on their respective country means, as a substitute for country fixed effects (Wooldridge 2002). This means that the logit model includes all independent variables and their country averages. Also in Table 3 I show the results from a Poisson count model with country fixed effects and robust standard errors. Table 4 shows the results from a multinomial probit model³⁵ with three outcome variables: 0 for no gender diversity; 1 for one female appointment; and 2 for two or more female appointments. Similar to the logit model the multinomial includes all independent variables and their country averages.

[Tables 3&4 about here]

The results in Tables 3 and 4 broadly confirm the key findings on hypotheses H1-H3. Central bank independence as a determinant of gender balance, on the other hand, receives the least support.

Outcomes: Money growth and inflation rates

While understanding the determinants of gender balance in central banks' leadership is important, equally relevant is to understand whether gender has an impact on money growth rates, inflation and interest rates. The results are shown in Tables 5-7. The models are OLS regressions with country fixed and year effects and lagged dependent variable. The model specification follows Bodea and Hicks (2015). Inflation models also include the lag of the change in the broad money supply (M2), to control for the disciplinarian effect of central bank action. This is because, although central bank actions have a relatively direct effect on the money supply, the bank has only imperfect control of inflation.³⁶ Inflation is a result of money supply increases that in the longer run exceed demand for cash balances. An independent central bank that is credibly conservative ensures a more robust money demand that reduces the inflationary effects of a monetary expansion. By controlling the broad money supply (M2) and the

³⁵ The multinomial probit model is preferred to an ordered model because it does not use the restrictive independence of irrelevant alternatives (IIA) assumption.

³⁶ This applies particularly to developing countries, where there is an imperfect understanding of monetary policy transmission mechanisms, money demand functions are unstable, and inflation forecasting remains inaccurate. IMF 2006.

disciplinarian effect of central bank action, the gender balance variable coefficient more likely to reflect an additional credibility effect via a robust money demand and anchored inflation expectations.³⁷

The core dependent variables are the change in the broad money supply (M2) and the inflation rate. M2 is an intermediate monetary aggregate (currency in circulation and short-term deposits); data are from the International Monetary Fund's International Financial Statistics (IFS), supplemented with the World Bank's World Development Indicators (WDI). I use the log of M2 growth rates, taking the log of 1 plus the absolute value. For the eighty-one negative values of M2 change, I then add a minus sign to the logged value. The inflation measure is the yearly change in the consumer price index (WDI, OECD statistics, IFS). I use the logged inflation rate as the dependent variable, and, for consistency I treat negative values (twenty-five observations) similar to negative M2 changes.

[Tables 5&6 about here]

The key variables of interest are: the proportion of women in central bank boards; an indicator variable coding whether there are any women in the central bank board (0 for no women; and 1 for any number greater or equal to 1); the gender of the central bank governor. These variables are lagged one period.

Controls include: The polity2 score, the central bank independence and its interaction with the polity2 score; the lagged logged value of gross domestic product (GDP; WDI); the lagged trade openness (WDI); a dummy variable for a fixed exchange rate regime based on the IMF's official classification³⁸; the lagged value of a country's fiscal budget deficit/surplus relative to GDP; and indicator variables for presidential and legislative election years. Inflation rate models also include the lag of the change in the broad money supply (M2).

The models in Table 5 suggest that higher proportion of women in the central bank board is associated with higher rates of money growth (Model 13). At the same time, the simple indicators of whether there are any women or whether the governor of the central bank is a woman do not achieve statistical significance (Models 14&15). This result suggests that central banks with a higher gender balance may be less disciplinarian and the instrumental variable Model 16 confirms this finding. Model 16 uses Stata `xtivreg2` command. The excluded instruments are the number of central bank board members, the percent seats for women in parliament, the percent urban population and the number of years since women got the right to vote in national elections. The Hansen J Statistic for the exogeneity of parameters (p value==0.43) confirms the choice of instruments, although the Kleibergen-Paap Wald F Statistic(4.8) raises concerns about the weakness of these instruments. Model 17 interacts the proportion of women in the central bank board with the per capita growth variable, to understand better whether there are counter-cyclical effects to gender balance. Indeed the interaction term is negative and statistically significant, indicating that a greater proportion of women will lead to

³⁷ See Levy-Yeyaty and Sturzenegger 2001; Ghosh et al. 1997; Bodea and Hicks 2015; Bodea 2014.

³⁸ This is a recoding and an update (to 2014) of a standard measure (Reinhart & Rogoff 2004, Ilzetzki et al. 2008) such that 1 stands for de facto pegs and crawls (Ilzetzki et al. coarse coding 1, 2, 3). All other categories are coded as zero.

higher rates of money growth in economic recessions (when there are negative rates of economic growth).

Inflation (Table 6) is only higher for central banks that are headed by women (Model 20). Having women on the board (Model 18) or having a greater higher proportion of women in leadership positions (Model 18; instrumental variable Model 21) does not appear to be linked to higher inflation. This happens while, in the inflation model, I control for the rates of money growth, suggesting that more women in the board (beyond the governor) do not pose a credibility problem beyond the effect implied by money supply growth. Only women governors appear to be facing a credibility problem in keeping inflation low.

CONCLUSION

In this paper I investigate systematically the prevalence of women in the top echelons of leadership of central banks. This includes top positions as central bank governors or presidents, as well as membership in, what I call generically, the central bank boards. The percentage of women in leadership positions in boards at the central banks in the 114 countries I code is somewhere around 10-15% for 1998-2014, although there is an upward trend.

My explanation for the relatively low proportion of women in central bank boards lies on the demand side and is reflective of limited incentives to find and accommodate a diverse set of candidates. Through the appointment process, the lack diversity of central bank leadership reflects a low priority attached to the gender ratio, given the high value of each seat in the central bank board. I link the comparative statics of the value of each seat in the central bank board to the size of the board, the existence (or lack thereof) of networks that support women's rise to influential positions and the governance of the central bank.

Empirically, I use country and year fixed effects models and find support for the key hypotheses that a larger share of women in the boards of central banks is more likely when: boards include more members; national legislatures include more women; corruption is low and the central bank has more independence.. On the other hand, surprisingly, I find that democracy, national income and women's labor force participation do not affect the share of women in leadership position in central bank boards. In addition, I explore some of the possible consequences of gender diversity on monetary policy. In terms of outcomes, women in leadership positions in central banks appear to be associated with higher rates of money growth, which are likely countercyclical, but not higher rates of inflation. Only female central bank governors appear to have a credibility problem in keeping inflation low.

Some policy implications follow from these findings: Countries like Japan who proclaim a desire to elevate the status of women in politics and the job market have a way to go in achieving gender balance in their central bank. Currently the share of women in the lower house of the Japanese parliament stands at a meager 9.5 percent, and the percent of women

in government in government jobs is 3.5%.³⁹ My work suggests that political representation by women legislators in Japan need to increase to have more than token elevation of women to powerful leadership positions in the Bank of Japan's Monetary Policy Board. In addition, corruption appears to negatively influence gender balance and, so, corruption reduction measures are also likely to increase gender balance, as are reforms to make central banks more independent.

³⁹ The percent of Japan's female lawmakers is significantly behind Saudi Arabia's; CNN Money September 29, 2016. <http://money.cnn.com/2016/09/29/news/economy/japan-women-government/index.html>

Tables

Table 1. Average of % Women in Central Bank Boards

	% Women in Central Bank Board	Standard Deviation
Autocracy - Polity<-5	4%	9%
Anocracy	13%	16%
Democracy - Polity>5	14%	17%
PR	13%	16%
Non-PR	14%	17%
Left	13%	16%
Non-left	13%	16%
% Women in nat. Parliam >30%	18%	17%
% Women in nat. Parliam <30%	12%	16%
Female % labor force>Median (44%)	17%	17%
Female % labor force< Median (44%)	9%	15%
CBI>=CBI Median (0.56)	13%	16%
CBI<CBI Median (0.56)	12%	17%
CB Transparency> Median	13%	16%
CB Transparency, Median	10%	17%
Number of Board Members > 5 (Median)	13%	13%
Number of Board Members < 5 (Median)	12%	20%
Regions		
Western nations	13%	14%
Eastern Europe	14%	16%
Latin America	17%	21%
Sub Saharan Africa	17%	17%
Asia	11%	15%
N Africa and Middle East	3%	7%
Euro area	12%	12%

Table 2. Determinants of % Women in Central Bank Leadership

	OLS		GLM Logit link		Fractional Response Regression	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
CB nr. of board members	0.003 (0.004)	0.002 (0.004)	0.041 (0.021)**	0.034 (0.019)*	0.030 (0.011)***	0.025 (0.011)**
Women in parl. % seats	0.001 (0.002)	0.002 (0.002)	0.016 (0.010)	0.019 (0.011)*	0.010 (0.005)*	0.012 (0.006)**
Lag corruption	-0.016 (0.010)*	-0.016 (0.010)	-0.178 (0.063)***	-0.161 (0.065)**	-0.094 (0.034)***	-0.087 (0.034)**
Lag CBI	0.089 (0.054)	0.089 (0.056)	0.729 (0.474)	0.650 (0.490)	0.492 (0.260)*	0.468 (0.268)*
Urban population %	0.009 (0.003)***	0.010 (0.003)***	0.077 (0.015)***	0.080 (0.016)***	0.044 (0.008)***	0.046 (0.008)***
Female in labor force	-0.004 (0.006)	-0.004 (0.006)	-0.006 (0.037)	-0.007 (0.037)	-0.006 (0.019)	-0.006 (0.019)
Lag democracy	-0.003 (0.003)	-0.004 (0.004)	-0.029 (0.026)	-0.042 (0.026)	-0.016 (0.014)	-0.021 (0.014)
Left		0.002 (0.005)		0.024 (0.066)		0.011 (0.037)
Election year		-0.015 (0.010)		-0.155 (0.062)**		-0.083 (0.034)**
Lag ln oil&gas value/capita		-0.015 (0.009)		-0.235 (0.069)***		-0.106 (0.035)***
Ln inflation (past 5 yrs)	0.001 (0.002)	0.002 (0.002)	0.016 (0.010)	0.019 (0.011)*	0.010 (0.005)*	0.012 (0.006)**
Constant	-0.301 (0.258)	-0.268 (0.270)	-6.905 (1.956)***	-5.751 (1.970)***	-4.041 (0.998)***	-3.440 (1.012)***
N / countries	1,425	1,333	1,425	1,333	1,425	1,333

Note: Dependent variable: % Women in CB Board; * $p < 0.05$; ** $p < 0.01$. All models include country fixed effects. Development operationalized with level of urbanization.

Table 3. Women in Central Bank Leadership: Logit model; Count of women in Central Bank Leadership: Poisson count model

	Logit: Women Presence- Yes/No		Poisson count model	
	Model 7	Model 8	Model 9	Model 10
CB nr. of board members	0.347 (0.052)***	0.335 (0.054)***	0.173 (0.015)***	0.169 (0.014)***
Women in parl. % seats	0.057 (0.015)***	0.045 (0.017)***	0.018 (0.007)**	0.019 (0.008)***
Lag corruption	-0.172 (0.069)**	-0.353 (0.109)***	-0.085 (0.044)*	-0.065 (0.047)
Lag CBI	-0.675 (0.538)	-0.705 (0.600)	0.436 (0.321)	0.354 (0.326)
Urban population %	0.035 (0.012)***	0.040 (0.014)***	0.052 (0.009)***	0.048 (0.010)***
Female in labor force	-0.178 (0.051)***	-0.161 (0.057)***	0.029 (0.029)	0.029 (0.029)
Lag democracy	0.051 (0.019)***	0.053 (0.022)**	-0.004 (0.022)	-0.007 (0.022)
Left		-0.156 (0.170)		0.020 (0.063)
Election year		0.134 (0.142)		0.018 (0.045)
Lag ln oil&gas value/capita		-0.024 (0.076)		-0.023 (0.048)
Ln inflation (past 5 yrs)		-0.198 (0.107)*		-0.127 (0.050)**
Constant	-4.378 (0.574)***	-3.624 (0.715)***	-6.356 (1.436)***	-5.734 (1.457)***
N / countries	1,425	1,333	1,425	1,333

Note: Dependent variable for Models 7-8: Women presence in CB Board; Dependent variable for Models 9-10: The count of women in CB Board. Logit models include the country averages of all independent variables. Poisson models include country fixed effects. Development operationalized with level of urbanization. * $p < 0.05$; ** $p < 0.01$.

Table 4. Multinomial probit – Outcomes: no women (0); one female appointment (1); two or more female appointments (2)

	Model 11: Base outcome = one female appointment (1)		Model 12: Base outcome = one female appointment (1)	
	Outcome: No women	Outcome: two or more female appointments	Outcome: No women	Outcome: two or more female appointments
CB nr. of board members	-0.149 (0.075)**	0.322 (0.080)***	-0.135 (0.076)*	0.336 (0.078)***
Women in parl. % seats	-0.042 (0.021)**	0.015 (0.030)	-0.031 (0.025)	0.022 (0.035)
Lag corruption	0.353 (0.143)**	0.189 (0.152)	0.374 (0.154)**	0.252 (0.173)
Lag CBI	0.150 (0.727)	-1.262 (0.948)	-0.080 (0.743)	-1.530 (0.870)*
Urban population %	-0.023 (0.023)	0.010 (0.021)	-0.028 (0.024)	0.009 (0.019)
Female in labor force	0.131 (0.082)	-0.045 (0.101)	0.133 (0.089)	-0.005 (0.104)
Lag democracy	-0.030 (0.037)	0.047 (0.033)	-0.030 (0.035)	0.059 (0.032)*
Left			0.126 (0.260)	-0.065 (0.272)
Election year			-0.151 (0.094)	-0.047 (0.103)
Lag ln oil&gas value/capita			0.002 (0.105)	0.053 (0.150)
Ln inflation (past 5 yrs)			0.183 (0.168)	0.106 (0.206)
Constant	3.055 (0.857)***	-2.566 (1.286)**	2.792 (1.162)**	-1.256 (1.344)
N / countries		1,365		1,277

Note: Dependent variable outcomes: no women (0); one female appointment (1); two or more female appointments (2). Models include the country averages of all independent variables. * $p < 0.05$; ** $p < 0.01$.

TABLE 5. Outcomes: Effect of female membership in CB leadership on *broad money growth* (M2)

	Model 13	Model 14	Model 15	Model 16	Model 17
Lag log change M2	0.096 (0.050)*	0.097 (0.051)*	0.100 (0.051)*	0.020 (0.043)	0.096 (0.052)*
Lag ln GDP/capita	-0.114 (0.040)***	-0.112 (0.040)***	-0.106 (0.039)***	-0.049 (0.052)	-0.110 (0.042)***
Lag GDP/capita growth	0.231 (0.111)**	0.228 (0.111)**	0.221 (0.111)*	0.312 (0.120)***	0.397 (0.121)***
Lag openness	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Lag CBI	0.053 (0.114)	0.053 (0.115)	0.053 (0.116)	-0.130 (0.067)*	0.044 (0.117)
Lag Polity	0.011 (0.006)*	0.011 (0.006)*	0.010 (0.006)	0.005 (0.004)	0.011 (0.006)*
CBI* Polity	-0.020 (0.012)*	-0.019 (0.012)	-0.019 (0.012)	-0.016 (0.007)**	-0.019 (0.012)
De jure fixed ER	-0.009 (0.021)	-0.009 (0.021)	-0.009 (0.021)	0.013 (0.019)	-0.009 (0.021)
Lag fiscal balance	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)
Presidential elections	-0.007 (0.010)	-0.007 (0.010)	-0.007 (0.010)	-0.002 (0.012)	-0.006 (0.010)
Parliamentary elections	-0.003 (0.007)	-0.004 (0.007)	-0.004 (0.007)	-0.009 (0.009)	-0.004 (0.007)
Lag % CB women	0.047 (0.020)**			0.545 (0.251)**	0.094 (0.030)***
Lag % CB women * Lag GDP/capita growth					-1.255 (0.514)**
Lag women in CB (yes/no)		0.009 (0.008)			
Lag CB governor gender			-0.009 (0.008)		
Constant	2.949 (0.951)***	2.906 (0.966)***	2.749 (0.933)***		2.857 (0.991)***
R2 Adjusted	0.14	0.14	0.14		0.14
N	1,135	1,135	1,135	1,088	1,135

Notes: * p<0.1; ** p<0.05; *** p<0.01. The dependent variable is the log of broad money. Country and year fixed effects are included.

Model 16: Stata `xtivreg2`; Instruments: the number of central bank board members, women in parliament % seats; percent urban population; number of years since women got the right to vote in national elections; Hansen J Statistic (p value)=0.43; Kleibergen-Paap Wald F Statistic=4.8.

TABLE 6. Outcomes: Effect of female membership in CB leadership on *inflation*

	Model 18	Model 19	Model 20	Model 21
Lag ln inflation	0.222 (0.058)***	0.223 (0.058)***	0.220 (0.058)***	0.223 (0.068)***
Lag log change M2	1.213 (0.219)***	1.204 (0.217)***	1.224 (0.215)***	1.246 (0.235)***
Lag ln GDP/capita	0.815 (0.268)***	0.799 (0.269)***	0.796 (0.266)***	0.971 (0.363)***
Lag GDP/capita growth	0.186 (0.726)	0.200 (0.721)	0.189 (0.731)	0.430 (0.721)
Lag openness	0.003 (0.001)*	0.003 (0.001)*	0.003 (0.001)*	0.002 (0.002)
Lag CBI	-0.279 (0.332)	-0.285 (0.324)	-0.252 (0.339)	-0.669 (0.364)*
Lag Polity	0.055 (0.022)**	0.054 (0.022)**	0.059 (0.022)***	0.028 (0.017)*
CBI* Polity	-0.105 (0.040)***	-0.103 (0.039)**	-0.111 (0.039)***	-0.037 (0.032)
De jure fixed ER	-0.339 (0.137)**	-0.338 (0.135)**	-0.344 (0.135)**	-0.264 (0.121)**
Lag fiscal balance	-0.026 (0.014)*	-0.026 (0.014)*	-0.026 (0.014)*	-0.027 (0.016)*
Presidential elections	-0.117 (0.057)**	-0.113 (0.057)**	-0.118 (0.057)**	-0.111 (0.059)*
Parliamentary elections	-0.004 (0.041)	-0.005 (0.041)	-0.003 (0.041)	0.005 (0.041)
Lag % CB women	0.153 (0.141)			1.223 (1.438)
Lag women in CB (yes/no)		0.076 (0.056)		
Lag CB governor gender			0.144 (0.064)**	
Constant	-19.023 (6.566)***	-18.622 (6.579)***	-18.533 (6.527)***	
R2 Adjusted	0.28	0.28	0.28	
<i>N</i>	1,136	1,136	1,136	1,025

Notes: * p<0.1; ** p<0.05; *** p<0.01. The dependent variable is the log of inflation. Country and year fixed effects are included. Model 21: Stata xtivreg2; Instruments: women in parliament % seats; percent urban population; number of years since women got the right to vote in national elections; Hansen J Statistic (p value)=0.37; Kleibergen-Paap Wald F Statistic=4.7. .

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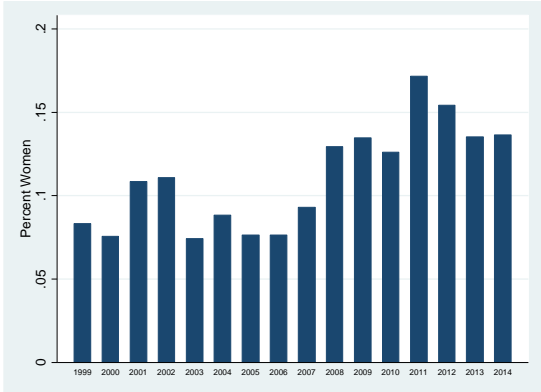
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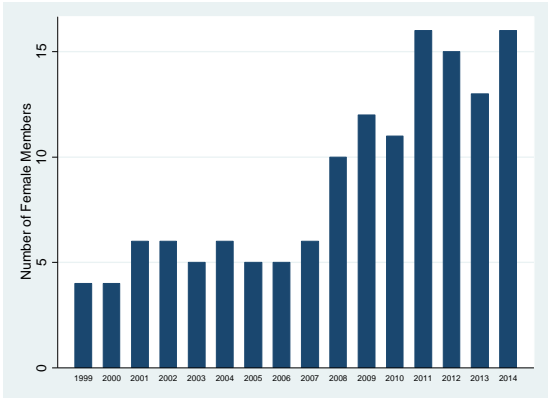
Appendix

Figure A1 Euro area

Percent women in central bank boards (yearly average)



Number of women in central bank boards: 1998-2014



Correlation of the percent women in central bank boards and women's representation in national legislatures

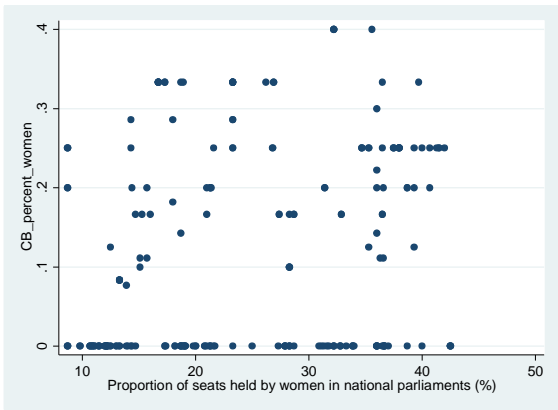


Table A1. Determinants of % Women in Central Bank Boards – Countries that never had women appointed are excluded

	OLS		GLM Logit link		Fractional Response Regression	
CB nr. of board members	0.003 (0.75)	0.002 (0.58)	0.041 (1.99)*	0.034 (1.78)	0.030 (2.67)**	0.025 (2.35)*
Women in parl. % seats	0.002 (0.79)	0.002 (0.84)	0.016 (1.54)	0.019 (1.77)	0.010 (1.91)	0.012 (2.12)*
Lag corruption	0.100 (1.65)	0.089 (1.46)	0.729 (1.54)	0.650 (1.33)	0.492 (1.89)	0.468 (1.75)
Lag CBI	-0.015 (1.43)	-0.015 (1.48)	-0.178 (2.83)**	-0.161 (2.50)*	-0.094 (2.78)**	-0.087 (2.52)*
Urban population %	0.009 (3.13)**	0.010 (3.53)**	0.077 (5.09)**	0.080 (5.15)**	0.044 (5.44)**	0.046 (5.42)**
Female in labor force	-0.004 (0.59)	-0.003 (0.53)	-0.006 (0.17)	-0.007 (0.19)	-0.006 (0.30)	-0.006 (0.32)
Lag democracy	-0.004 (1.02)	-0.004 (1.11)	-0.029 (1.11)	-0.042 (1.61)	-0.016 (1.14)	-0.021 (1.47)
Left		0.002 (0.34)		0.024 (0.36)		0.011 (0.31)
Election year		-0.016 (1.43)		-0.155 (2.50)*		-0.083 (2.43)*
Lag ln oil&gas value/capita		-0.016 (1.44)		-0.235 (3.40)**		-0.106 (3.01)**
Ln inflation (past 5 yrs)	0.002 (0.79)	0.002 (0.84)	0.016 (1.54)	0.019 (1.77)	0.010 (1.91)	0.012 (2.12)*
Constant	-0.315 (1.12)	-0.291 (1.00)	-6.905 (3.53)**	-5.751 (2.92)**	-4.041 (4.05)**	-3.440 (3.40)**
N / countries	1,244	1,213	1,425	1,333	1,425	1,333

Note: Dependent variable: % Women in CB Board; * $p < 0.05$; ** $p < 0.01$. All models include country fixed effects. Development operationalized with level of urbanization.

Table A2. Determinants of % Women in Central Bank Leadership: Development operationalized with GDP/capita

	OLS		GLM Logit link		Fractional Response Regression	
CB nr. of board members	0.003 (0.004)	0.002 (0.004)	0.030 (0.022)	0.025 (0.021)	0.025 (0.012)**	0.020 (0.011)*
Women in parl. % seats	0.002 (0.002)	0.003 (0.002)	0.020 (0.011)*	0.024 (0.011)**	0.012 (0.006)**	0.015 (0.006)**
Lag corruption	-0.015 (0.010)	-0.014 (0.010)	-0.171 (0.064)***	-0.147 (0.066)**	-0.088 (0.034)**	-0.077 (0.035)**
Lag CBI	0.125 (0.057)**	0.123 (0.059)**	1.248 (0.457)***	1.170 (0.466)**	0.760 (0.252)***	0.721 (0.257)***
Lag ln GDP/capita	0.022 (0.032)	0.016 (0.040)	0.253 (0.202)	0.129 (0.233)	0.141 (0.111)	0.077 (0.128)
Female in labor force	-0.000 (0.006)	-0.000 (0.006)	0.018 (0.037)	0.015 (0.038)	0.010 (0.019)	0.008 (0.020)
Lag democracy	-0.002 (0.004)	-0.002 (0.004)	-0.020 (0.028)	-0.030 (0.028)	-0.010 (0.015)	-0.014 (0.015)
Left		0.002 (0.005)		0.030 (0.067)		0.015 (0.037)
Election year		-0.007 (0.010)		-0.079 (0.066)		-0.041 (0.036)
Lag ln oil&gas value/capita		-0.016 (0.009)*		-0.240 (0.073)***		-0.110 (0.037)***
Ln inflation (past 5 yrs)	0.002 (0.002)	0.003 (0.002)	0.020 (0.011)*	0.024 (0.011)**	0.012 (0.006)**	0.015 (0.006)**
Constant	-0.136 (0.391)	-0.013 (0.448)	-4.951 (2.758)*	-2.688 (2.953)	-2.959 (1.469)**	-1.786 (1.581)
N / countries	1,425	1,333	1,425	1,333	1,425	1,333

Note: Dependent variable: % Women in CB Board; * $p < 0.05$; ** $p < 0.01$. All models include country fixed effects. Development operationalized with GDP/capita.

Table A3. Determinants of % Women in Central Bank Leadership: CBI measures with the Garriga (2016) index

	OLS		GLM Logit link		Fractional Response Regression	
CB nr. of board members	0.003 (0.004)	0.003 (0.004)	0.046 (0.021)**	0.040 (0.020)**	0.032 (0.012)***	0.028 (0.011)**
Women in parl. % seats	0.001 (0.002)	0.002 (0.002)	0.014 (0.011)	0.018 (0.011)*	0.009 (0.005)*	0.011 (0.006)**
Lag corruption	-0.014 (0.009)	-0.015 (0.010)	-0.152 (0.063)**	-0.155 (0.065)**	-0.078 (0.034)**	-0.081 (0.035)**
Lag CBI – Garriga index	0.124 (0.072)*	0.113 (0.073)	1.261 (0.458)***	0.966 (0.460)**	0.756 (0.245)***	0.635 (0.248)**
Urban population %	0.009 (0.003)***	0.011 (0.003)***	0.081 (0.015)***	0.090 (0.016)***	0.047 (0.008)***	0.052 (0.009)***
Female in labor force	-0.004 (0.006)	-0.004 (0.006)	-0.018 (0.037)	-0.017 (0.037)	-0.011 (0.019)	-0.011 (0.020)
Lag democracy	-0.004 (0.003)	-0.005 (0.003)	-0.039 (0.024)	-0.050 (0.023)**	-0.023 (0.013)*	-0.027 (0.013)**
Left		0.011 (0.015)		0.059 (0.097)		0.029 (0.053)
Election year		0.003 (0.005)		0.045 (0.068)		0.021 (0.038)
Lag ln oil&gas value/capita		-0.017 (0.010)*		-0.194 (0.061)***		-0.102 (0.034)***
Ln inflation (past 5 yrs)		-0.012 (0.008)		-0.209 (0.068)***		-0.092 (0.035)***
Constant	-0.338 (0.259)	-0.315 (0.273)	-7.038 (1.973)***	-6.034 (1.992)***	-4.223 (1.021)***	-3.679 (1.038)***
N / countries	1,400	1,301	1,400	1,301	1,400	1,301

Note: Dependent variable: % Women in CB Board; * $p < 0.05$; ** $p < 0.01$. All models include country fixed effects. Development operationalized with level of urbanization.

Table A4. Summary statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
% Women in Central Bank Boards	1,916	0.128203	0.166402	0	1
CB nr. of board members	1,916	5.771921	2.538613	1	16
Urban population %	1,903	60.38737	23.17622	8.55	100
Ln GDP/capita	1,881	8.880633	1.420309	5.720635	11.60824
Female in Labor Force %	1,903	40.51688	9.21796	11.89261	54.27767
Women in parl. % seats	1,802	16.85675	11.04125	0	63.8
CBI	1,692	0.602851	0.20047	0.121632	0.979
Transparency	1,262	5.050713	3.021632	0	14.5
Polity	1,778	4.741282	6.457732	-10	10
Corruption	1,641	2.904327	1.247676	0.5	6
PR	1,746	0.628866	0.483247	0	1
Left	1,875	0.300267	0.458496	0	1
Election	1,818	0.309681	0.462489	0	1
Ln oil&gas value/capita	1,869	14.57809	10.14873	0	26.81043
Fiscal deficit (past 5 yrs)	1,673	-1.21745	4.62099	-12.4096	31.78
Ln inflation (past 5 yrs)	1,754	1.813969	0.938668	-1.82133	7.10728