NBER WORKING PAPER SERIES

PERCEIVED FOMC: THE MAKING OF HAWKS, DOVES AND SWINGERS

Michael D. Bordo
Klodiana Istrefi

Working Paper 24650
http://www.nber.org/papers/w24650

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
May 2018, Revised June 2021

The views expressed in this paper are those of the authors and do not necessarily reflect those of the Banque de France or the National Bureau of Economic Research. We thank Jonathan Rose for his discussion and Alan Blinder, Yuri Gorodnichenko, Amy Nakamura, Rob Roy McGregor, David Papell, Barbara Rossi and participants at ASSA 2020, at the Shadow Open Market Committee (SOMC) 2018 Fall Meeting, at the SOMC 2019 Conference, at the seminar at the University of California, Berkeley, at the Federal Reserve of Atlanta, at the Federal Reserve of Chicago, at the Bank of England, University of Houston and UNC Charlotte for comments and suggestions.

Perceived FOMC: The Making of Hawks, Doves and Swingers
Michael D. Bordo and Klodiana Istrefi
NBER Working Paper No. 24650
May 2018, Revised June 2021
JEL No. E03,E50,E61

ABSTRACT

An important and open question in monetary economics is how the Federal Reserve makes its policy decisions. We document that when an FOMC member was born, his/her educational background and the Committee's changing hawk-dove composition have predictable effects on FOMC decisions. The odds of an FOMC member being a hawk are higher when he/she graduated from a university linked to the Chicago school of economics; on the other hand, a dove likely graduated from a university with strong Keynesian beliefs and was born during a period of high unemployment. These findings have implications for the choice of and confirmation of FOMC members.

Michael D. Bordo
Department of Economics
Rutgers University
New Jersey Hall
75 Hamilton Street
New Brunswick, NJ 08901
and NBER
bordo@econ.rutgers.edu

Klodiana Istrefi
Monetary Policy Research Division
Banque de France
22 Rue du Colonel Driant
75001 Paris, France
Klodiana.ISTREFI@banque-france.fr

1 Introduction

An important question in monetary economics is understanding how the Federal Reserve makes its monetary policy decisions. These decisions arise from the deliberation and vote of a committee, the Federal Open Market Committee (FOMC) of the Federal Reserve.[1] In this context, the Fed's policymaking involves the aggregation of diverse individual member preferences and views into a collective decision. These preferences and the Committee's changing composition are a constant interest for academics, financial market participants and Fed watchers.

The diversity of policy preferences is traditionally summarized in labels, like hawk and dove. A hawk is a committee member who assigns a high priority to fighting inflation, while a dove is more supportive of output growth and employment. Dividing central bankers into inflation-fighting hawks or growth-promoting doves can be too simplistic. We agree. Yet, market participants, academics and central bankers themselves, use them as a convenient shorthand to summarize and communicate complex information on central bank governance and policymaking.

What moulds the central banker's type as a hawk or a dove? And, does the composition of a committee in terms of hawks and doves, as well as their deep determinants, matter for monetary policy decisions? We investigate these two questions in this paper, focusing on the FOMC. Our findings highlight early-life experiences of FOMC members, i.e., when they were born and where they graduated from, as deep determinants for their type. In addition, we document that the composition of the FOMC in terms of hawks and doves, as well as their deep determinants, help explain deviations of the Fed Funds Rate (FFR) from the path described by a conventional forward-looking Taylor rule. Overall, we show that while economic conditions obviously matter, who is the decision maker matters as well.

[1] Well-designed committees are thought to be superior to individual decision-making because of the pooling of knowledge, the diversity of views or the checks it provides against extreme preferences or autocratic power (Blinder, 2004). Because committees are important for policy outcomes, a considerable literature is dedicated to their optimal design (see Sibert (2006) and Reis (2013)).

The contribution of this paper relies on two original elements: i) the source of heterogeneity among FOMC members as hawks and doves, and ii) the importance of this heterogeneity for monetary policy decisions of the FOMC. Crucial to this investigation is the use of a novel measure characterizing the FOMC members as hawks and doves, established in Istrefi (2019). This measure categorizes as hawk and dove about 93% of the FOMC members who have served in the FOMC since the early 1960s, further distinguishing between the persistent hawks, the persistent doves and swingers (referring to those members that switched camps over their tenure).[2] For instance, in this classification, Paul Volcker is categorized as a hawk, Alan Greenspan as a swinger and Ben Bernanke and Janet Yellen as doves. As policy preferences are unobserved, Istrefi's (2019) classification relies on narratives in U.S. newspapers, portraying the policy leanings of each FOMC member with respect to the dual mandate of the Federal Reserve: maximum employment and stable prices. The narrative record in the media is used as a public source and a filter of all relevant information (personal background, economic beliefs, policy actions) about the type of the FOMC member, as known in real time.

We investigate the sources of heterogeneity between FOMC members (as hawks, doves and swingers), using insights from the literature on political science and social psychology. The latter suggest that people form their core economic and political beliefs during early stages of life, and keep them mainly unaltered thereafter. In this context, we use the historical-economic background when FOMC members grew up and the ideas or 'theories' in fashion at places where they studied, as source for some clues on the formation of types. In addition, as FOMC members are appointed to their positions, we explore the match of hawks and doves with the political and/or institutional philosophies of those who appointed them.[3] To understand swingers,

[2]While Istrefi (2019) provides us with a tool, it does not look at the questions investigated in this paper.

[3]Our main focus is on the life experience before joining the FOMC and particularly, in the forming early years of life of these members. As such, in this analysis we abstracted from other factors that have happened later in the life of FOMC members, like career background, among others.

we look at the conditions, either economic or political, under which some members changed their tune while serving at the FOMC.

There are no clear-cut answers as to what makes a hawk, a dove or a swinger. However, some tendencies are clear. We find that the odds of being a hawk are higher when a member is born during a period of high inflation, graduated from a university linked to the Chicago school of economics ('freshwater'), and was appointed by a Republican president or by the board of a regional Federal Reserve Bank with established institutional philosophies. By contrast, a dove is most likely born during a period of high unemployment, like the Great Depression, graduated from a university with strong Keynesian beliefs ('saltwater'), and was appointed by a Democratic president. Swingers share several background characteristics of the doves, but not always. The major swings in the FOMC correspond with: i) the Great Inflation of the 1970s, ii) the discussion on price stability and inflation targets in the early 1990s, and iii) a new understanding of the economy (i.e following Alan Greenspan's revelation on productivity and inflation in the late 1990s).

Importantly, the composition of the FOMC in terms of hawks and doves helps explain deviations of the FFR from the path described by a conventional forward-looking Taylor rule. For the period 1987-2007, we find that a more hawkish FOMC is associated with higher policy rates, other things equal. A more dovish FOMC raises the likelihood that the FOMC will loosen, other things equal. These results are robust to several specifications of the Taylor rule, i.e, assuming different weights of the Fed Chair in the aggregation of FOMC's hawks and doves, assuming interest rate smoothing or persistent monetary shocks.

Interestingly, a Taylor rule incorporating the FOMC composition in terms of the number of 'freshwater' versus 'saltwater' PhD graduates, suggests that the policy will tighten when this difference increases. In contrast, the policy will loosen with a higher number of members born during the Great Depression relative to those born after it. In line with these results, we show that the odds of dissenting for a tighter

policy are higher when a member graduated from a 'freshwater' university and that FOMC members born during the Great Depression have dissented more on the side of easier policy than those born before or post Great Depression. Notably, these findings suggest that ideas, through education or other early-life experiences, are persistent and have played an important role in the Fed's monetary policy. Results hold also when extending the sample to the early 1970s, echoing some arguments from the literature on the role of memories of the Great Depression or the role of the economic theories prevalent at the time, as the 'truest' cause of the Great Inflation.[4]

Overall, our findings echo the public debate and could explain why the politics of confirmation of Federal Reserve governors has been so toxic in recent years, as a reflection of sharpening partisanship in U.S. policy deliberation. In this regard, our results speak to the political economy of choosing specific individuals as central bankers, and particularly, to the choice of and confirmation of FOMC members.

Our results contribute primarily to two strands of the literature, i) the studies on central bankers' policy preferences and their determinants, focusing on the Federal Reserve (see Belden, 1989; Havrilesky and Gildea, 1989; Chappell et al., 2005; Eijffinger et al., 2015) and ii) the studies on decision-making in committees (Blinder, 2004; Sibert, 2006; Riboni and Ruge-Murcia, 2010; Reis, 2013). In relation to this literature, using Istrefi's (2019) hawk-dove measure, we take a stance on the formation of hawks and doves in the FOMC. In this regard, we bring novel results on the importance of the ideology by education (i.e. 'freshwater' versus 'saltwater' school), for shaping central banker's preferences and policy outcomes.

Istrefi's (2019) hawk and dove measure offers a more complete picture of policy preferences of the FOMC than the scarce measures used in the literature. Traditionally, policy preferences are proxied with dissents, i.e. votes opposite to the majority decision for easier or tighter policy.[5] However, dissents in the FOMC are very rare,

[4]For more details see DeLong (1997) and the comment of John Taylor in DeLong (1997).

[5]Few examples, like Chappell et al. (2005), Meade (2005) and Eijffinger et al. (2015) have used FOMC transcripts to discuss about policy preferences of FOMC members based on their preferred interest rate (either expressed in meetings or imputed by authors) before the voting takes place.

as FOMC members are reluctant to formally cast a dissenting vote. About 40% of FOMC members in our sample have never dissented and from those dissenting, few have dissented regularly and consistently in the same direction. Istrefi (2019) categorizes 93% of the FOMC members as a hawk or a dove and shows the persistence of the type: the persistent hawk, the persistent dove and swingers.

With regard to the formation of hawks and doves, we take insights from the literature on political science and social psychology that highlight early-life experiences and ideas as shaping one's personality (see Elder (1998), Giuliano and Spilimbergo (2014) and Rodrik (2014)). We contribute to these strands of literature by tying the policy beliefs of central bankers to early-life experiences. Our findings on the role of birth cohorts and graduate education for shaping policymakers and policy outcomes, highlight the importance of the transmission of knowledge and experience from parents and from teachers.

Our paper relates to Malmendier et al. (2020) which show that the inflation experience of FOMC members can explain differences in members' dissents, forecasts and speeches. We differ from this paper on several aspects. One main difference with Malmendier et al. (2020) is that our starting point is the central banker. Thus, while we look at FOMC members as hawks and doves, Malmendier et al. (2020) look at hawkish or dovish dissents and hawkish or dovish speeches of members. Our results bring forward the role of personalities in the making of monetary policy and have implications for the political economy of the choice of and confirmation of the FOMC members.[6]

Another distinguishing feature is that we focus on the events that occur during the formative years of our FOMC members (birth and education) and show that they have long-lasting effects. Notably, we highlight the role of education, through schools

While more informative than dissents, the source of this information is not available to the public in real time as FOMC transcripts are currently published with five years delay. In contrast, Istrefi's (2019) hawk-dove index is a real time measure and allows us to study personalities as with persistent policy preferences and those without.

[6]Romer and Romer (2004) have highlighted the role of personalities for policy outcomes when reviewing the lessons from history in choosing a Federal Reserve chair.

of economic thought, as an important factor shaping both the central banker's type and policy outcomes. By contrast, Malmendier et al. (2020) focus on the role of lifetime economic experience only. In their set up, inflation experience is important but the unemployment experience is not. In contrast, we find a dovish bias (and a lower FFR in the Taylor rule and more dissents for ease) for the cohort born during the Great Depression, suggesting a persistent effect of this event with very high unemployment as shaping central bankers and their policy decisions.

The paper is organized as follows: Section 2 describes our measure of FOMC member's type and some summary statistics. Section 3 discusses the sources of heterogeneity between types and Section 4 presents empirical results of the impact of the Hawk and Dove composition and its deep determinants for the policy rate decision of the FOMC. Finally, Section 5 concludes.

2 Who are the Hawks, Doves and Swingers?

In reviewing the lessons from history in choosing a Federal Reserve chair, Romer and Romer (2004) suggested that certain background characteristics like education, job experience and political partisanship can be informative for the economic views that a future Fed chair might have. More informative, they stressed, are narrative records of their economic beliefs, as expressed in their writings, testimonies and speeches before joining the Fed. Unsurprisingly, this approach is the daily business of Fed watchers, paying attention to all FOMC members, with the aim to forecast future policy moves. To summarize the economic beliefs and policy leanings of the policymaker, Fed watchers often use labels 'hawk' and 'dove', where a hawkish central banker is assumed to assign more priority to fighting inflation while a dove is more supportive of output growth and employment.

In this paper, we use the classification of FOMC members as a hawk, dove and swinger as established in Istrefi (2019). This classification is based on U.S.

newspapers' records of all relevant information that relates to the policy preferences of 130 FOMC members who served between 1960 to 2015 (hence, the perceived FOMC).[7] This period comprises the FOMC under seven Fed Chair persons, from William McChesney Martin to Janet Yellen. The narrative record in the media is used as a public source and a filter of all relevant information about the policymaker's type, as known in real time. Readings of these records reveal that the perception of the policy makers' type is usually based on information on personal background, political interests, political supporters, on economic beliefs (expressed in member's writings, testimonies and speeches before joining and during tenure at the Fed) and from policy actions when they become public.

Istrefi (2019) summarized this information in a hawk and dove index of the FOMC (hereafter Istrefi's HD). For each FOMC member, the classification of the type is based on a common definition, that is policy leaning with respect to the dual mandate of the Fed: maximum employment and stable prices. Moreover, as personalities in the FOMC change and economic conditions change, the time dimension of the hawk and dove perception of a particular member is conditional on the times they served and people they served with. Looking over their whole FOMC tenure, Istrefi (2019) observed that some members are perceived consistently as either hawks or doves (69% of the sample) and some others are perceived as switching camps over their tenure (i.e swingers, 24%) and the rest remained unknown. While hawks and doves will both support tight or loose monetary policy if there is convincing evidence of doing so, they won't be perceived as having a "change of heart" in the eyes of the public. Swingers instead, are those situational hawks or doves, usually perceived as "middle-of the-roaders" or "centrists", who switch camps either for some years or those members perceived as having a complete "change of heart". Our first part of the investigation relies on a comparison of the hawks, doves and swingers over the

[7]The Hawk-Dove index is based on human reading of about 20,000 articles or reports, from more than 30 newspapers and business reports of Fed watchers, referencing to 130 FOMC members that served between 1960 to 2015. For more details please see Istrefi (2019).

last 50 years and the second part, on the aggregate composition of FOMC hawks and doves and how it affects policy.

Although Istrefi's HD is a subjective measure based on media perceptions, Istrefi (2019) shows that its evolution matches well with narratives of monetary policy in the U.S.. Moreover, the measure matches quite well with 'true' tendencies, not known in real time, as expressed by preferred interest rates (from FOMC transcripts in Chappell et al. (2005)), by forecasting patterns of individual FOMC members and by dissents. Istrefi's HD captures media perceptions formed in real time while information on individual forecasts and FOMC transcripts is not available to the public in real time. This information has become public only since the early 1990s and, currently, their publishing delay is ten and five years, respectively. As such, this information is not part of the information set of the media when forming perceptions about the type of the FOMC member.

With regard to dissents, prior to 2002, information on FOMC voting records has been published with a delay also, ranging from 90 days after the meeting (up to 1975) to 45 days and after the subsequent meeting. Istrefi's HD measure could reflect the delayed information on dissenting members only if newspapers discussed about these dissents when they became public (and if this discussion was captured by the reading of newspaper articles by the author).

Importantly, even if the media reported on FOMC dissents with delay, these dissents are very rare (only 7% of the total votes in our sample) and few members have dissented regularly and consistently in the same direction.[8] For instance, about 40% of members in our sample have never dissented on policy, and from those dissenting, less than 40% have dissented at least twice and many of these dissents have been in opposite direction. Thus, dissents would provide limited but also

[8]The literature has already discussed that the information content of dissents is rather limited with respect to diversity, especially for committees that favor consensus, like the FOMC, as internal disagreement does not always show up in a dissent. For instance, Meade (2005) has shown that during Greenspan's time as chairman dissents accounted for only 7.5% of the votes, while the internal disagreement was estimated to be about 30%.

ambiguous information on the hawkish and dovish types. Studies relying on dissents abstract from a considerable number of FOMC members, especially the governors, as the most reluctant to dissent. Dissents allow us at best to compare groups of people only and not individual members as with Istrefi's HD measure. This measure is based on a larger information set than dissents, therefore assigning a unique policy preference to each FOMC member (93% of the 130 FOMC members in our sample), which is missing in existing studies.

Table 1: Summary statistics: persistent hawks, persistent doves and swingers

	Hawk	**Dove**	**Swinger**	**Unknown**	**Total(%)**
Gender					
Male	48	31	28	9	89.2
Female	3	8	3	0	10.8
Position in FOMC					
Board of Governors	14	31	12	0	43.8
Regional Fed President	37	8	19	9	56.2
Education, highest					
Ph.D.	28	23	17	1	53.1
J.D. Law	1	4	3	2	7.7
Other	22	12	11	6	39.2
Education, Subject					
Econ./Pol. Economy	35	29	19	1	65.6
Other	15	9	12	8	34.4
Religion					
Mainline Protestants	15	7	9	4	26.9
Catholics	3	0	3	1	5.4
Jewish	8	9	4	0	16.2
Mormon	1	0	0	0	0.8
Uncategorised	24	23	15	4	50.7
Last job prior FOMC					
Federal Reserve	17	10	11	6	33.8
Government/public sector	15	12	9	1	28.5
Banking	6	9	5	1	16.2
Academia	4	5	3	1	10.0
Other (Industry, Army)	9	3	3	0	11.5
Tenure (in years)					
Min	1.3	1.4	3.8	1.1	
Median	6.7	5.3	10.8	2.3	
Max	24.5	23.0	20.3	8.1	
All (%)	39.2	30.0	23.8	7.0	

Notes: Summary statistics for a total of 130 members serving in the FOMC during the period of 1960 to 2015. Data on hawks, doves and swingers as in Istrefi (2019). Data on personal background is mainly from: https://www.federalreservehistory.org/people. The sample on religion is limited due to data availability. Data on religion are collected from different sources, like Wikipedia, newspapers, obituaries (i.e, where memorial ceremony took place), biography websites, in what church they got married, if they were members of religious group or from their charity supports.

Table 1 presents some summary statistics with respect to the three types: persistent hawks, persistent doves and swingers. We have collected information on personal background (education, career) of FOMC members from the biography pages of the Federal Reserve History website; for data on religion we have used different sources as described in the note to Table 1.

In terms of gender, men in the FOMC are perceived slightly more on the hawkish side. Female FOMC members have been perceived mostly on the dovish side, however the sample (14 out of 130 members) is too small to assign statistical significance to these numbers. Moreover, the majority of women in the FOMC (11 of them) started their tenure from the 1990s onwards, which is a period characterized by a dovish trend for male FOMC members as well. During 1991 to 2015, out of 35 new FOMC male members, 12 were perceived as hawks, 13 as doves and 9 as swingers. Almost all women perceived as doves are from the Board of Governors, nominated to their position by a democratic president. Besides, women perceived as hawkish or swingers have all but one represented regional Federal Reserve Banks (FRB). Interestingly, half of them have represented the Cleveland Fed, known for a high inflation-fighting appetite. This goes in line with the overall observation that within the FOMC composition, FRB presidents are systematically perceived as more hawkish and the Governors as more dovish.

In terms of education, about 60% of FOMC members have a doctorate degree (either a PhD in Economics or a JD Law). The rest include members with bachelor to master degrees. In relative terms, hawks form a slightly larger share among the members with a PhD in Economics, in contrast to those with a law degree where doves and swingers dominate (although the sample is too small for strong conclusions). When looking at education by subject, again hawks are in the majority among economists but not among members with an education in law, banking or management. Even though our data on religion are limited (for only 49% of the sample), we observe that Protestants tend to be hawkish, Jews slightly dovish and

Catholics in the middle. This categorization lines up with voting in U.S. presidential elections. The subtleties of denomination would give a more nuanced picture.

In the following we discuss in more detail how some of these characteristics relate to policy preferences of FOMC members, both in the cross-section and at the time-varying composition of the FOMC (the aggregate level).

3 What Factors Could Mould the Type?

We start by investigating two main factors that might have moulded our FOMC members in the early years of their lives: ideology by education and major economic events. We base this investigation on insights from the literature on political science and social psychology, suggesting that people form their core economic and political beliefs during early stages of life, and keep them mainly unaltered thereafter. In a next step, we look at the ideology (political and institutional philosophies) of those who appointed these members, which brings into discussion partisanship in monetary policy. Finally, for swingers especially, we explore some background characteristics and the economic environment during each FOMC, to understand when swings occur.

3.1 Ideology by education?

As Rodrik (2014) puts it, "the role of ideas in determining preferences has crept into various strands of research in economics". In many of these works, preferences are not determined exogenously but through exposure to societal outcomes, media or early childhood experiences. Importantly, such influence is believed to happen during the early stages of life, further suggesting that as people grow up they become inflexible in their core beliefs (Newcomb et al., 1967; Sears, 1975; Krosnick and Alwin, 1989).

FOMC members are considered as technocrats, therefore the institutions where they studied (including the influence of teachers/mentors they had) could be natu-

ral habitats where their core economic ideas are formed.[9] Indeed, several interviews with Nobel Laureates in Economics show that it was the time during their university or graduate studies that marked their paths as an economist. For instance, in a summary of these interviews, Horn (2009) refers among others to James M. Buchanan and Gary S. Becker stating that it was studying at the University of Chicago that "turned them around" from their initial (socialist) beliefs.

Along these lines, one can think that FOMC members, and especially those that received a PhD in Economics, by training, hold certain assumptions about how the world works, that might be influenced by the economic thinking of the institution they graduated from. Moreover, since graduate studies are usually done around the mid-twenties of age, one can think of beliefs formed in these institutions as persisting for a long time.[10] As Keynes (1936) puts it, "There are not many who are influenced by new theories after they are twenty-five or thirty-years of age".

We look at the ideology by education in relation to 'freshwater' and 'saltwater' schools of thought, over which there is a long debate in macroeconomics. This labeling is first used by Hall (1976) and relates to the geographical location of universities with different views in macroeconomics ('freshwater' being closer to the Great Lakes in the US than to an ocean, and 'saltwater' being closer to an ocean). The debate was especially heated during the 1970s following an even older division between the monetarists and the Keynesians.

About half of the FOMC members in our sample (53%) hold a Ph.D. in Economics. To categorize their PhD-granting universities as 'saltwater' or 'freshwater',

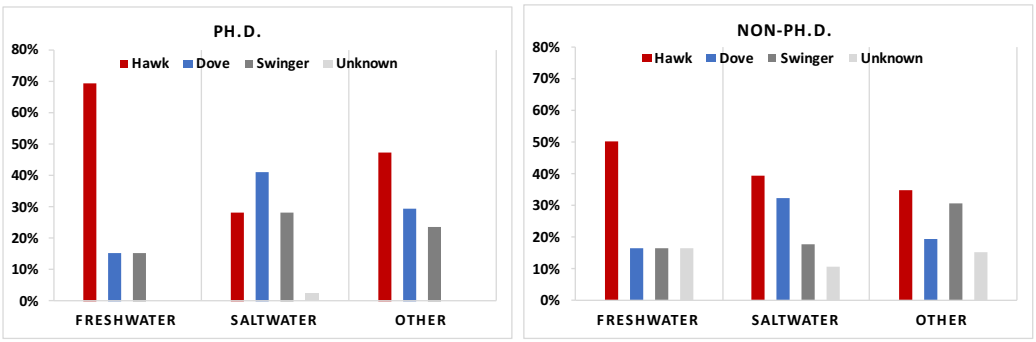
[9]Interview with Milton Friedman in Snowdon and Vane (2005), pg 200: "When you were a graduate student at Chicago, what interpretation did your teachers put forward to explain the Great Depression? Well that's a very interesting question because I have believed for a long time that the fundamental difference between my approach to Keynes and Abba Lerner's approach to Keynes, to take a particular example, is due to what our professors taught us. I started graduate school in the fall of 1932 when the Depression wasn't over by any means. My teachers, who were Jacob Viner, Frank Knight and Lloyd Mints, taught us that what was going on was a disastrous mistake by the Federal Reserve in reducing the money supply." Abba Lerner (1903–1982) was a Russian-born British economist who was taught by John R. Hicks, Lionel Robbins, and F. A. Hayek at London School of Economics. He was considered an avowed Keynesian.

[10]The average age at entry to a US PhD programme is 25-27 years (Stock and Siegfried, 2001).

we have used the conventional wisdom of looking at who were the leading faculty members in money/macro in the years our FOMC members received their PhDs. This is important as the geography of some schools has shifted over time, especially after the 1990s, with several exports between schools. FOMC members in our sample have graduated between 1928 and 1990, years when the divide between the two schools was certainly more important than today.[11]

We have categorized as "saltwater" or "freshwater" the most straightforward cases and assigned the rest of the universities in the "other" category. This categorization, backed up by the references in the literature, is presented in Table 1 in Appendix A. In the 'freshwater' group we have universities like Chicago, Carnegie Mellon University and UCLA while in the 'saltwater' group we have Harvard, Yale, MIT, and Berkeley, among others. The majority of FOMC members in our sample graduated from a 'saltwater' university, owing to the high number of graduates from Harvard (same for the non-PhDs group).

Figure 1: Ideology by education/schools of thoughts



Notes: Sample in the figure comprises all the FOMC members that have served at the FOMC during 1960-2015. Data on hawks, doves and swingers as in Istrefi (2019).

Figure 1 shows a good match between the types and the economic thinking of the institution they graduated from. Most 'freshwater'- PhD graduates are perceived as hawks, in line with the ideology of the Chicago school and its "off shoots" where

[11] Onder and Tervio (2015) using citation data between top economics journals from 1990 to 2010 find a significant division between top universities, which is consistent with the divide between 'freshwater' and 'saltwater' schools. The 'freshwater-saltwater divide' appears to be especially important for macroeconomics and econometrics.

Milton Friedman, Robert Lucas, Karl Brunner, Allan Meltzer and many others taught. The 'saltwater' PhD graduates appear rather balanced in type compared with 'freshwater' graduates. Nevertheless, we notice a clear dovish and swinging bias, in line with the thinking of this school of thought where Paul Samuelson, Robert Solow, James Tobin and Arthur Okun, among many others, taught. The proportions of hawks and doves under the 'freshwater' and the 'saltwater' labels of PhD graduates are statistically different from each other (p-value of 0.008 and 0.08, respectively). The match is not as striking for the non-PhD group (bachelor's, master's, MBA), where most are perceived as hawks. Although doves have a larger share within the 'saltwater' schools, and swingers within the 'other' universities group, these proportions are not statistically different from each other.

Overall, we observe that Fed policymakers' preferences tend to correlate with the ideology of the graduate school attended. Thus, FOMC members with PhD seem to bring to the table economic assumptions about how the world works, in line with the economic thinking of the institution they graduated from. Perhaps, the most striking is the correlation between being a hawk and attending a Chicago-type of graduate school. Colander and Klamer (1987) report results from a 1985 survey in line with our finding. In this survey, they compare the opinions of students at six top-graduate schools in the U.S. on economic perspectives and on the importance of economic assumptions (among other issues). They conclude that Chicago constitutes a "school" that is distinct from other schools, i.e., the MIT, Harvard, Stanford, Columbia and Yale. For instance, the survey shows that 100% of Chicago students agreed that inflation is primarily a monetary phenomenon while at Harvard, 46% disagreed. Likewise, 85% of Chicago students agreed that the Fed should maintain a constant money supply; at MIT and at Harvard around 60% disagreed. In a follow-up survey on the same participants, about 15 years later, Colander (2003) found that Chicago graduates continued to have the strongest belief that inflation is primarily a monetary phenomenon.

In our discussion, going to a 'freshwater' or 'saltwater' graduate school is exogenous to the hawk-dove perception as measured in this paper, which is attributed later in life when these people become FOMC members. However, students might self-select. Among other factors, graduate students might sort themselves based on unobserved factors that relate with social and political values conditioned early on in life. For instance, some studies suggest that family environment influences education and political participation (Henderson and Berla, 1994; Beck and Jennings, 1982; Jennings et al., 2009). In this regard, ideology by education can be considered as a "proxy" for other variables that we do not directly observe. However, literature also suggests that some adjustment and reinforcement of economic views (Colander and Klamer, 1987) and political views (Colander, 2005) occurs at graduate school.

3.2 Life experience in early age

The role of one's environment on subsequent intellectual development is hardly any surprise. Great events leave great marks on people. For instance, it was the traumatic impact of the Great Depression that led several Nobel Laureates to pursue economics (Snowdon and Vane, 2005; Horn, 2009). The Great Depression was a defining event, sparking fundamental changes in economic institutions, macroeconomic policy, and economic theory (Bordo et al., 1998). Unsurprisingly, times of economic hardship also influence preferences for social and economic policy. Growing up in a recession affects people's preferences towards more government redistribution and support for left-wing parties (Giuliano and Spilimbergo, 2014). Importantly, Greider (1987) argues that the memories of the Great Depression pushed policy-makers towards pursuing economic expansion and accepting the risk of inflation. Similarly, DeLong (1997) concludes that the memories of the Great Depression are the "truest" cause for the Great Inflation of the 1970s.

The shadows of the Great Depression are also observed in the discussions of FOMC members. For instance, the Wall Street Journal in 1974 cites a speech by

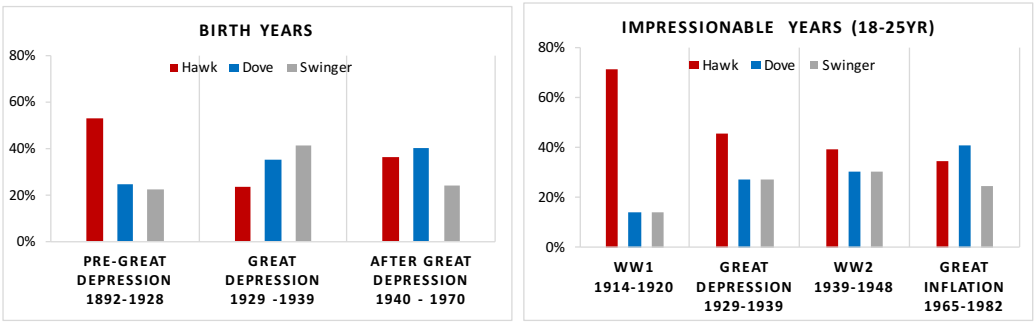
Fed Governor John E. Sheehan as he refers to Milton Friedman blaming the Federal Reserve for inflation. "Mr. Sheehan [...] added that a sharp cutback in money expansion would stall the economy and "would result in 15 to 20% unemployment by year-end, with 35 to 40% black unemployment and zero employment for black teenagers. Milton could go to his farm (in Vermont) and sit this out but when he comes back he will find the cities burned down and the University of Chicago along with them."[12] Likewise, the high inflation of the 1970s had its own influence on central bankers who lived through it. Janet Yellen in an interview in 2009 told how just about every member of the FOMC committee was schooled on the experience of the Great Inflation. This was a formative event for her and for most of her colleagues that made them want to go into the field of central banking.[13]

How does the early-life experience square with the hawkish and dovish preferences of our FOMC members? In our sample, birth years of FOMC members fall between 1892 and 1970. This period includes four great events: World War I, World War II, the Great Depression and the Great Inflation of the 70s. To begin, we take the Great Depression as the main reference point and examine members with birth dates before, during and after this event. Several studies have shown that the life pattern of children born during the Great Depression differed significantly from those born one or two decades earlier. For instance, Elder (1998) compares the lives of American children participating in two longitudinal studies, the Oakland Growth Study (birth years 1920-1921) and Berkeley Guidance study (birth years 1928-1929), finding that Berkeley children were more adversely influenced by the economic collapse of the Great Depression than were the Oakland adolescents. This literature emphasizes the role of time, place and linked or interdependent lives in explaining their life experience. Regarding linked lives, Elder (1998) argues that the influence of the Great Depression on children born during these years could be only understood through the adaptations to hardship of people who were important

[12] "Fed's Sheehan Warns Against Big Effort to Squeeze Inflation", *WSJ*, 29 March 1974.
[13] "Inflation memories run deep at central banks", *Reuters*, 29 July, 2009.

in their lives.[14] Along these lines, Fed Governor Martha R. Seger (1984-1991), a baby of the Great Depression, recalls her memories as a child making deliveries with her mother and sister and listening to the difficult stories of defeat and destruction during the Great Depression.[15]

Figure 2: Memories of great events run deep



Notes: Each war period includes the years of the war plus post-war inflation years. Left panel: all FOMC members (n=120, excluding the unknown types); right panel: only FOMC members with impressionable years in the defined periods (n=90, excluding the unknown types). The impressionable years are defined as ages of 18 to 25. Some members have impressionable years both during WWI and the Great Depression. This calculation includes only those that have unique impressionable years during one event. Data on types as in Istrefi (2019).

Figure 2 (left panel) displays the share of hawks, doves and swingers born before, during and after the Great Depression (corresponding to 53, 17 and 50 members, respectively). Indeed, the share of hawks dropped significantly within the cohorts that were born during the Great Depression and after it, compared with the pre-Great Depression period (p-value of 0.03 and 0.08, respectively). Doves rose within the Great Depression and more significantly after it (p-value of 0.42 and of 0.10, respectively). Swingers rose highest within the Great Depression (p-value of 0.07).

Next, we look at FOMC members with 'impressionable years' in one of the four great events: WWI, the Great Depression, WWII and the Great Inflation. Figure 2 (right panel) shows that the share of hawks is highest within cohorts with impressionable years during WWI (1914-1920). In this period, the inflation rate reached 23.7%, the highest rate of the 20th century (see Table 2 in Appendix A). Further, the share of hawks drops while there is a build-up in the share of doves and

[14] Indebtedness, income loss and unstable work increased the economic pressure felt by families, in turn affecting also the quality of marriages and parenting.

[15] "Family Tradition", Contact Magazine, alumni magazine of Adrian College, Fall 2013, p. 31.

swingers within the Great Depression, WWII and the Great Inflation cohorts. Interestingly, the group of those born during the Great Depression shows a higher dovish and swinger bias than the group of those growing up during the Great Depression. While this result is in line with the discussion of Elder (1998) on birth cohorts and the importance of parents for the transmission of knowledge and experiences, we consider it as suggestive evidence as samples are small for meaningful conclusions.

The Great Depression is considered to be the worst economic downturn in the history of the industrialized world. The peak- to-trough decline in real gross domestic product (GDP) was 30% and the unemployment rate escalated to 25%. In turn, the WWII and Great Inflation periods both displayed a combination of high inflation and high unemployment (see Table 2 in Appendix A for these values and respective data sources). While inflation in the 1970s reached levels up to 14%, it was lower than the levels experienced in the two world wars (23.7 and 19.7%, respectively).[16]

So far, we have looked at the match of ideology by education and big events in early life with the central bank type in isolation. As discussed above, the history of economic thought has taught us that a main driving force behind the evolution of ideas is the march of events. For instance, the Great Depression was a defining event, sparking fundamental changes in economic institutions, macroeconomic policy, and economic theory (Bordo et al., 1998). In addition, the experience of inflation during the 1970s facilitated the monetarist and the new classical counter-revolutions (Snowdon, 2001). As a results, it would be difficult to tease out the specific effect of these events on the type. We dig more in this direction in section 3.5, where we discuss how these factors jointly affect the evolution of the hawks and doves at the FOMC aggregate level.

[16]In 1985, Schuman and Scott (1989) ask a sample of 1,410 Americans to report some important events in the last 50 years. The most recalled event was WWII, followed by the Vietnam War. The Great Depression ranked in the 8th position while inflation ranked in the 15th position. WWII or the Great Depression were recalled by those that experienced them in their teens or early 20s.

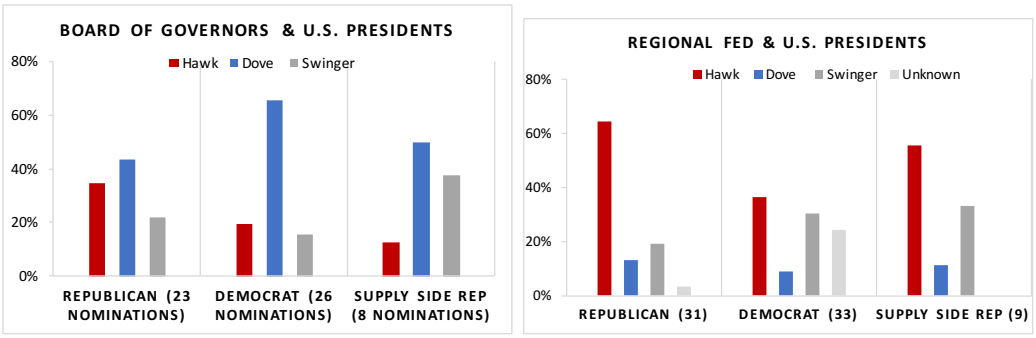
3.3 The ideology of those who appointed the FOMC member

FOMC members are appointed to their positions. Governors are appointed for fourteen years by the U.S. president, with the approval of the U.S. Senate, for 14-year terms. Each FRB president is appointed for a five-year term by his/her Bank's board of directors, with the approval of the Board of Governors. The appointment procedures of FOMC members are designed to minimize the influence of politics. We examine the types of FOMC members (hawk, dove or swinger) in relation to the ideology of who appointed them, i.e. Governors versus the party of the U.S. presidents and FRB presidents versus the FRB they represent. We have 57 Governors, 54% of whom are nominated by Republican presidents and 46% by Democratic presidents. The Republican nominees can be further characterized as traditional Republicans and as supply-side Republicans (corresponding to the Reagan presidency, (Havrilesky and Gildea, 1989). The partisanship on monetary policy would suggest that Republican administrations prefer tighter monetary policy and place more emphasis on fighting inflation, while Democrats prefer easier monetary policy to support economic growth (Hibbs, 1977; Stein, 1985; Alesina and Sachs, 1982).

What types have the Republican and Democratic presidents picked for the Board of Governors? Democratic nominees have been mostly perceived as doves and very few as hawks (left panel of Figure 3). The share of hawks appears higher within Republican nominees but a slightly higher share of them is also perceived as doves. These proportions are not statistically different from each other (only for doves at p=0.12). This choice is not very surprising - if re-election motives are present, even Republicans might choose members with dovish preferences in expectation of policies to support growth and employment. Second, the U.S. president appoints Governors, but each of them has to be confirmed by the Senate. Nominees have higher chances of confirmation if they are 'likable' by both sides in the Senate. In our sample, 70% of Governors were confirmed in a Democratic-majority Senate. Finally, these results are based on 57 members of the Board, (including seven Fed Chairs) and, obviously,

not all known Fed Chair nominations align with this distribution.

Figure 3: Political or institutional philosophies get checked at the door?



Notes: Sample in the figure comprises all the FOMC members that have served at the FOMC during 1960-2015. Supply side republican refer to Reagan and his nominations. Data on hawks, doves and swingers as in Istrefi (2019).

In contrast, when looking at FRB presidents (Figure 3, right panel), we observe a high share of hawks irrespective of the president's party. Interestingly, the distribution of the types across FRBs shows that the hawkish bias is not uniform (see Figure 1 in Appendix A). Several FRBs have had presidents predominantly perceived as hawks, like the Cleveland Fed, the Dallas Fed or the St. Louis Fed. Doves are mostly perceived in the Philadelphia Fed and the San Francisco Fed. Beyond institutional memory and ideology, several other factors could explain this distribution of types, such as the ties of the regional Fed with the Board of Governors (which is believed to have become more influential over time in choosing Fed presidents), how strong the ties of the regional Fed with the commercial banks of the region are, or the conservative versus liberal tendencies of regions.

3.4 Swingers: Education, tenure and experience in FOMC

> *"J Dewey Daane, an avowed "swinger" in policy [...] In policy matters, Mr. Daane is rather representative of the new breed's pragmatic approach, though he is sometimes criticized from the liberal side as not fully in tune with the "neo-Keynesian" economics of Gardner Ackley or of Walter Heller (the present and past chairman of the President's Coun-*

cil of Economic Advisors). "I am a neo-Keynesian", he protests."

Wall Street Journal, 1967[17]

An interesting breed of central bankers comprises those perceived to be in the swinging camp. Does the swing reflect a healthier approach to monetary policy, where members behave pragmatically and give different weights to the dual mandate as the economy evolves? Or do swingers go with the flow, following the camp that convinces them more? Further, 'a change of heart' takes time; have swingers spent longer in the FOMC than persistent hawks and doves? We discuss some of these questions below.

3.4.1 Training/education and tenure

With regard to education, one could argue that non-economists have less strong views on how the economy works, and therefore side more often with the majority view (the 'go with the flow' hypothesis). Our non-economist group includes FOMC members with education in law (mostly doves and swingers), business management (equally shared among the three types), banking (mostly hawks), agriculture and public administration (swingers). Indeed, in our sample the share of swingers within the non-economist group is higher (33%) than within the economist group (23%). Thus, by training, being a non-economist and having graduated from universities with no immediate relation to 'freshwater'/'saltwater' schools increases the odds, albeit slightly, of being a swinger (see also Figure 1).

A simple check of the 'go with the flow' hypothesis is to look at who is dissenting, i.e., going against the majority and the Fed chair. During 1960 to 2015 there have been 432 dissents, of which 426 belong to FOMC members for whom we have information on their education. Around 73% of these dissents come from the economist group (this also may reflect the fact that economists are in majority in our sample).

[17]"The Changing Fed: New Board Members Bring Liberal, Activist Approach", *Wall Street Journal*, 8 March, 1967. J Dewey Daane (Board of Governors, 1963-1974).

Furthermore, the share of those that always agree with the majority on monetary policy decisions is higher for the non-economists group, 60%, than the economists group, 34%, (p-value of 0.005). Generally, non-economists seem to favor consensus. Regarding tenure, it is true that swingers have spent more years at the FOMC (in terms of minimum and median years). Nevertheless, we also observe that the hawk or dove perception is persistent even for those that had more than 20 years in the FOMC (see Table 1).

3.4.2 Economic developments during the time spent at the FOMC

The distribution of the FOMC swingers over time shows three main swing periods, one in the early to mid-1970s and two during the 1990s to the mid-2000s (see Figure 2 in Appendix A). The first is a hawkish swing, during 1969 to 1974, corresponding with a period where inflation increased from an average of 1.3% during the first part of the 1960s to 6% in 1970, and to 12% by 1974. In response, some dovish members of the 1960s swung to becoming hawks as inflation became an important problem. A second wave of hawkish swingers is perceived during the 1990s. The early 1990s saw intensified discussions on the importance of price stability and aiming for zero inflation at the Federal Reserve. In 1989, the Reserve Bank of New Zealand introduced inflation targeting (0 to 2% target), and in the same year a congressional bill (H.J. Res. 409) called on the Fed "to adopt and pursue monetary policies leading to, and then maintaining, zero inflation". The view on price stability received wide support from the Federal Reserve. The third swing is dovish, in the late 1990s and early 2000s, and corresponds with chairman Greenspan maintaining the line that the observed productivity trend in the 1990s had increased the potential for non-inflationary growth. This view was soon endorsed by some previously hawkish members. During this period Greenspan too is perceived to have switched from being a hawk to a dove.[18]

[18] Blinder and Reis (2005): "Of course, Greenspan's initial image was not that of an inflation 'dove.' In fact, he was typically portrayed by the media as an inflation 'hawk' in the early years of

3.5 Hawk and Dove preferences at the FOMC level

So far, the analysis at the individual level suggests that having studied at a 'saltwater' rather than a 'freshwater' university seems to give cleaner answers than early-stage life experience (birth and impressionable years) in explaining differences in preferences among FOMC members. In this section we study more formally the impact of both education and birth cohort on the variation of the composition of the FOMC between Hawks and Doves, over time.

In line with the discussion on the evolution of swingers, we also control for the state of the economy, by using real-time measures of the Federal Reserve's forecast of macroeconomic conditions. The idea is to control for the possibility that the policy maker might signal to the public hawkish or dovish leanings because she expects a higher inflation or a recession. More precisely, we use Greenbook forecasts on inflation (the GDP deflator) and GDP growth. These forecasts are prepared by the Research staff at the Board of Governors some days before each FOMC meeting and are made available to all FOMC members. We use the Greenbook forecasts as in Coibion and Gorodnichenko (2012) for the period 1969-2006 which we updated up to 2007:06. These forecasts are available to the public with a 5 year delay. We end our sample just before the start of the financial crisis. This choice corresponds with the sample in the Taylor rule analysis that follows.

Figure 4 shows the aggregate composition of the FOMC in terms of cohorts born in one of our selected periods and in terms of education. The FOMC composition from now on refers only to voting members of the FOMC (max 12) and therefore additional variation observed in these variables will be due to the annual rotation scheme of four FRB Presidents. Panel (a) of Figure 4 shows the composition of the FOMC in terms of members being born before, during and after the Great Depression. Obviously, due to age constraints, the first cohort is in a majority in

his chairmanship. It took the media almost a decade to catch on to the fact that, relative to the center of gravity of the FOMC, Greenspan was actually a dove—which became crystal clear when he repeatedly restrained a committee that was eager to raise rates in 1996- 1997."

the FOMC in earlier parts of the sample and the latter cohort is in a majority in the last part of our sample. The composition of the FOMC with these three cohorts is relatively mixed only during the mid 1980s to the mid 1990s.

Panel (b) of Figure 4 shows the number of FOMC members with a PhD degree in a 'saltwater' and a 'freshwater' university, at each meeting. We notice that the share of PhD graduates coming from universities related to these two schools of economic thought has varied over time. 'Saltwater' PhD graduates have been consistently in the majority, especially during the 1970s and the 2000s. The composition is more balanced in the early 80s and in the last years of our sample. The variation over time is due to the turnover of FOMC members (Governors particularly) and the annual rotation of the FRB presidents.

We next investigate the impact of the birth cohort and of ideology by education on the policy preferences of the FOMC at the aggregate level by looking at their effect on the Istrefi (2019) Hawk-Dove balance. The balance is defined as the difference of the total number of Hawk and Dove FOMC members at each FOMC meeting, $HD_t = \sum_{i=1}^{m} Hawk_{i,t} - \sum_{i=1}^{m} Dove_{i,t}$, where HD_t denotes the Hawk-Dove balance at meeting t, m denotes the number of FOMC members (maximum 12), $Hawk_{i,t}$ and $Dove_{i,t}$ are respective hawk or dove dummies for each voting FOMC member, at meeting t. Media perceptions whether a member is a hawk or a dove are based on public information known before the FOMC meeting.

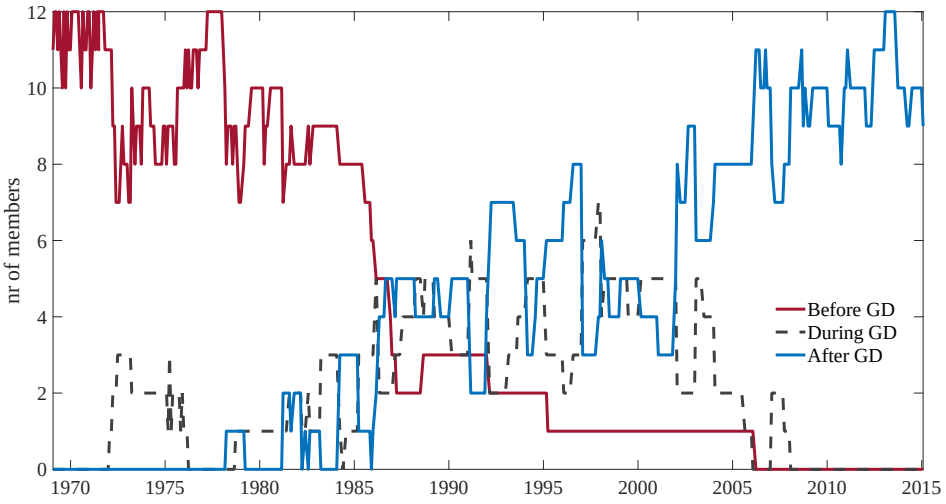
The general regression that we estimate is as follows:

$$HD_t = c + \phi_\pi E_{t^-}\pi_{t+2,t+1} + \phi_{dy} E_{t^-} dy_t + PhDeducation_t + birthcohort_t + u_t \quad (1)$$

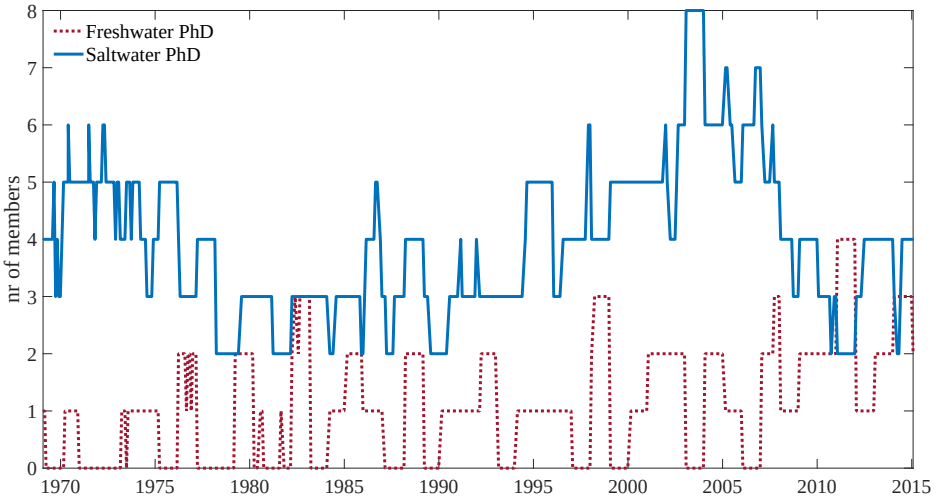
where, HD_t is the Istrefi (2019) Hawk-Dove balance as defined above, E_{t^-} denotes Greenbook forecasts of macroeconomic variables formed some days prior (t^-) to the FOMC meeting t; $E_{t^-}\pi_{t+2,t+1}$ is the average forecast of inflation over one and two quarters ahead; $E_{t^-} dy_t$ is the forecast for the contemporaneous growth rate of

Figure 4: FOMC composition by birth dates and by ideology by education

(a) Birth dates



(b) Education



Notes: FOMC voting members composition. Data are for each FOMC meeting, for the period 1969:2 to 2015:1.

output; *PhDeducation* is the number of FOMC members with PhD from 'freshwater' and 'saltwater' universities; *birthcohort* is the number of FOMC members born in respective cohorts.

Table 2: Hawk/Dove determinants

Variables	**(1)**	**(2)**	**(3)**	**(4)**
Greenbook inflation	0.58***	0.50***	0.66***	0.55***
	(0.14)	(0.15)	(0.16)	(0.19)
Greenbook output growth	0.14**	0.20***	0.17**	0.22***
	(0.07)	(0.08)	(0.07)	(0.08)
Education				
Fresh PhD		0.78**		0.71**
		(0.36)		(0.36)
Salt PhD		-0.48*		-0.43
		(0.28)		(0.28)
Birth				
before GD			-0.63***	-0.45*
			(0.24)	(0.24)
during GD			-0.54*	-0.42
			(0.33)	0.34)
during GD			-0.60**	-0.44*
			(0.27)	(0.26)
R^2	0.17	0.26	0.20	0.28
s.e.e	2.81	2.66	2.76	0.26
AIC	4.91	4.81	4.89	4.80
SIC	4.94	4.86	4.95	4.89

Notes: Columns 1 to 4 in the table presents least squares estimates for different specifications of the Hawk/Dove balance, estimated for the period 1969:2-2007:06. Fresh PhD and Salt PhD denote the number of 'freshwater' and 'saltwater' PhD graduates, respectively and born before GD, during GD and born after GD denote the composition of the FOMC in terms of birth cohorts. Newey-West HAC standard errors are reported in parentheses.
*** Significant at the 1 percent level.
** Significant at the 5 percent level.
* Significant at the 10 percent level.

We present the estimates of the impact of the birth cohort and of ideology by education on the Hawk-Dove balance when controlling for the state of the economy, for the period 1969:2 until 2007:6, in Table 2. These results show that the state of the economy can explain a small part of the variation in the Hawk-Dove Balance, with the balance increasing as expectations for inflation and growth increase (column 1). In addition, the balance of 'freshwater' and 'saltwater' PhD graduates has a relatively strong effect on the determination of the Hawk-Dove balance of the FOMC.

We find that an increase in 'freshwater' members, increases the Hawk-Dove balance by 0.78 points, while an increase in 'saltwater' graduates decreases the balance by 0.48 points. These estimates are significant at 5 and 10%, respectively (column 2). When considering the birth cohorts, we observe that all decrease the hawkishness of the FOMC (column 3). However, when considering all these factors jointly, the estimate is strongest for the 'freshwater' group (column 4).

Overall, these results suggest that having graduated from a 'freshwater' or 'saltwater' university matters for the policy preference composition of the FOMC. Nonetheless, even when controlling for the state of the economy, a large part of the variation in the Hawk-Dove balance remains unexplained ($\bar{R}^2 = 0.28$). Among other factors, this variation could be due to the rotation scheme of voting rights of FRB presidents which is exogenous and to the turnover of members.

4 Hawks and Doves and Monetary Policy

Does the composition of the FOMC in terms of hawks and doves affect the setting of monetary policy? How do the deep determinants of hawks and doves influence their voting on monetary policy decisions? Does the FOMC members education/ideology affect (on average) their support for raising /lowering/ or keeping the policy rate constant? In this section we use econometric methods to answer these questions. As is traditional in the literature, we employ an interest rate reaction function that links the endogenous response of monetary policy to macroeconomic conditions, in the spirit of Taylor (1993). We consider simple versions of Taylor rules that use real-time measures of the Federal Reserve's forecast of macroeconomic conditions (i.e., Greenbook forecasts) as advocated by Orphanides (2003).

4.1 Forward-looking Taylor rules and FOMC composition

In the following, we estimate several Taylor rule specifications. We start with a baseline estimation, in line with the analysis as in Coibion and Gorodnichenko (2012), where a preferred specification comprises only the forecasts for inflation, the growth rate of output and the output gap. In a second step we augment this specification with measures of the FOMC composition in terms of hawks and doves, and last, with their early-life experience determinants as discussed above.

Our main Taylor rule specification will be estimated for the period 1987-2007. The start of the sample corresponds with the time when the Federal Reserve's staff forecast of the output gap become available. We end the sample just before the Great Financial Crisis, thus avoiding periods for which a standard rule with inflation and the output gap would not be representative of what the Federal Reserve might have used as a reaction function. Likewise, we avoid the period when interest rates reached the effective lower bound and the Fed resorted to forward guidance on rates and balance sheet policies, for which a standard Taylor rule would not be appropriate.

For robustness, earlier periods will be treated as well when applicable. All data (forecasts and the target federal funds rate) going back to early 1970s are as in Coibion and Gorodnichenko (2012). In this database, the data for the output gap forecasts are in line with Orphanides (2003). We have updated this database up to 2007:06. We are cautious when using earlier samples as monetary policy has been conducted with different instruments over time. Moreover, meeting frequencies and procedures have been different as well.

4.1.1 A baseline forward-looking Taylor rule

The baseline forecast-based Taylor rule is the preferred specification as in Coibion and Gorodnichenko (2012):

$$i_t = c + \phi_\pi E_{t^-} \pi_{t+2,t+1} + \phi_{dy} E_{t^-} dy_t + \phi_x E_{t^-} x_t + u_t \tag{2}$$

where i_t is the target federal funds rate (FFR) set at each meeting, $E_{t^-}\pi_{t+2,t+1}$ is the average Greenbook forecast of inflation over one and two quarters ahead; $E_{t^-}dy_t$ is the forecast for the contemporaneous growth rate of output and $E_{t^-}x_t$ is forecast for the contemporaneous output gap.

Since all right-hand variables are decided prior to the interest rate decision, we estimate this Taylor rule by least squares as in Coibion and Gorodnichenko (2012). Carvalho et al. (2018) have argued as well in favor of OLS estimates for monetary policy rules, showing that for realistic sample sizes, the OLS estimator of monetary policy parameters outperforms (in precision) IV estimators.

The results of this baseline specification, for the period 1987:11-2007:06, are shown in Table 3, column (1). The estimated reaction of the Federal Reserve to the forecasted inflation is significantly greater than one ($\phi_\pi = 1.73$). This means that the Taylor Principle, with nominal interest rate responding more than point-for-point to inflation, is satisfied. Furthermore, the Federal Reserve responds with higher rates to output gaps while the reaction to output growth is not statistically different from zero.

4.1.2 A Taylor rule augmented with the Hawk and Dove composition

In the following we augment the baseline Taylor rule as in equation (1) with the composition of policy preferences of the FOMC as below:

$$i_t = c + \phi_\pi E_{t^-} \pi_{t+2,t+1} + \phi_{dy} E_{t^-} dy_t + \phi_x E_{t^-} x_t + \phi_{FOMC} CompFOMC_t + u_t \tag{3}$$

where the $CompFOMC_t$ is the composition of the FOMC between hawk and dove members, as known before the meeting t. In this version of the Taylor rule, the FOMC composition enters as an additional variable, with the idea that changes in the composition of the preferences could induce exogenous policy moves, i.e, due to the annual rotation of the voting rights of regional Fed presidents. Later in the paper we also show results for a version of the Taylor rule where the FOMC composition affects the reaction coefficients to inflation and to the output gap.

Before proceeding with the estimation, we have to take a stance on several other points. First, we have to decide on the form that preferences enter in the Taylor rule. Because the FOMC votes by simple majority, we consider the effect of Hawkish and Dovish majorities as captured by Istrefi's Hawk-Dove balance measure, where a positive (negative) number of this balance corresponds to a hawkish (dovish) majority. Moreover, the power of these majorities in interest rate setting could be nonlinear - as majorities get stronger the effect on policy might be stronger. To this aim we will consider the effect of hawkish and dovish super-majorities, defined as dummy variables that take the value 1 if the Hawk-Dove balance is greater (lower) or equal to its 75th (25th) percentile and zero otherwise.

Finally, when looking at FOMC majorities (simple or super) we have to take a stance on the importance of the policy preference of the Fed Chair relative to the preferences of other voting members. While the Chair has only vote among the other 12 (or less) FOMC members, it can exert more power in the decision making process by controlling the agenda of the Board and FOMC meetings and by forging a consensus among the FOMC members (Blinder, 2004). Several studies have discussed the power of the Fed Chair. For instance, Chappell et al. (2005) estimated that the econometric weight of the chairman Arthur Burns on policy decisions was approximately 40 to 50%, and Blinder (2004) regards the FOMC as an "autocratically collegial committee", specifically referring to Greenspan as a Fed Chair that "led the FOMC with a velvet glove, not with an iron fist". The FOMCs

led by Bernanke and Yellen have been perceived to be on the collegial side. Riboni and Ruge-Murcia (2010) have argued that a consensus model, where a supermajority is needed to move policy, fits actual policy decisions of the Federal Reserve better. Furthermore, Riboni and Ruge-Murcia (2020) looking at the power of the Fed Chair during 1974 to 2008, have argued that the data prefers a version of their model where the chair is moderately inclusive over a dictator model.

In line with this discussion, we build measures of our Hawk-Dove balance that account for different weights of the policy preference of the Fed Chair, as follows:

$$HD_t^w = wI + (1-w)(\sum_{i=1}^{m-1} Hawk_{i,t} - \sum_{i=1}^{m-1} Dove_{i,t)}$$

where HD_t^w is the weighted Istrefi's HD balance, I is an indicator variable that equals 1 if the Chair is a hawk and -1 if the Chair is a dove, and the rest is the number of hawks minus the number of doves among the other voting FOMC members. The weight, w, can take values from 0 to 1 but we consider that the Chair has at least the same weight as other members (0.5) and above. We discuss results for $w = 0.5$, where each FOMC member has the same weight and $w = 0.8$ where the preference of the Fed chair has a higher weight compared to other members.[19] While all FOMC participants deliberate on policy, our aggregated balance is defined over the voting FOMC members only, for the measure to capture the exogenous variation in the composition of the preferences due to the annual rotating scheme of voting rights of FRB presidents.

To summarize, the FOMC composition variable in equation (2) will take four forms: HD balance with $w = 0.5$ and $w = 0.8$ and respective super-majorities, represented by dummies for strong hawk or strong dove majorities in the FOMC, as defined above. A graphical comparison of the two weighted HD balances is shown in Figure 3 in Appendix A. The two measures move closely and have a correlation of

[19]We have experimented with other weights and the results lie between the two versions presented in the paper. These additional results are available upon request.

0.88. We also show the hawk and dove super-majorities for the $HD^{0.5}$. For a detailed discussion on the evolution of the HD balance, please refer to (Istrefi, 2019).

Table 3 shows the estimates from equation (3) with different specifications for the FOMC Hawk-Dove composition. Starting with column (2), the point estimates on Greenbook forecasts are very similar to the baseline estimation (column 1). In addition, a rise in the Hawk-Dove balance (independent of the weight of the Chair) is associated with a rise in the FFR and this effect is economically significant and statistically different from zero. For instance, a one unit increase in the $HD^{0.5}$ balance (the hawkishness of the FOMC), raises the interest rate by 18 basis points. The effect is stronger (around 26 basis points) in the case where the Fed Chair preference has a higher weight (column 3). The statistical properties of the two models suggest a preference for the model with equal weight for all FOMC members.

Notably, the results are stronger when we consider supermajorities in the Hawk-Dove balance (column 4 and 5). We find that the variable for the Dove super-majority has a negative and significant effect on the interest rate: a move to a strong dovish majority reduces the interest rate by 80 basis points (50 basis points when the Chair has a higher weight in the Hawk-Dove balance). Under the effect of dovish supermajorities (column 4 and 5) the estimates on inflation forecasts are lower than in the previous specifications (1.56 and 1.62 compared to 1.73), suggesting an easier "hand" on inflation. The Taylor Principle is satisfied.

The estimate for the hawkish super-majority dummy is negative but statistically not different from zero. In our sample, the hawkish super-majorities appear short lived or correspond with periods like the 1990 Gulf War and the war-related recession, the 1997 financial crisis in East Asia and the 1998 financial crisis following the Russian default (see Figure 3 in Appendix A). As Goodfriend (2002) has argued, in response to these events the Federal Reserve decreased rates significantly or postponed raising them. During 1997-1998 the financial market distress in response to the two financial crises became a primary focus of monetary policy, thus the Fed

Table 3: Taylor Rules augmented with FOMC preferences, 1987-2007

Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
Greenbook inflation	1.73***	1.73***	1.73***	1.59***	1.63***
	(0.12)	(0.12)	(0.12)	(0.12)	(0.12)
Greenbook output gap	0.67***	0.67***	0.67***	0.63***	0.66***
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
Greenbook growth	-0.10	-0.10	-0.10	-0.06	-0.11
	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)
Hawk-Dove Balance					
d($HD^{0.5}$)		0.18***			
		(0.06)			
d($HD^{0.8}$)			0.26**		
			(0.11)		
Supermajorities Hawk-Dove Balance					
Dove, $HD^{0.5}$				-0.79***	
				(0.23)	
Hawk, $HD^{0.5}$				-0.22	
				(0.21)	
Dove, $HD^{0.8}$					-0.51**
					(0.23)
Hawk, $HD^{0.8}$					-0.22
					(0.22)
R^2	0.893	0.896	0.895	0.907	0.900
s.e.e	0.711	0.705	0.708	0.668	0.693
AIC	2.182	2.171	2.179	2.068	2.141
SIC	2.259	2.268	2.276	2.184	2.257

Notes: Columns 1 to 5 present least squares estimates for different specifications of the Taylor Rule, estimated for the period 1987:11-2007:06, at the FOMC meeting frequency (158 observations). All regressions include a constant. d($HD^{0.5}$) refers to the first difference of the Hawk-Dove balance with weight $w = 0.5$, the d($HD^{0.8}$) is the first difference of the Hawk-Dove balance with weight $w = 0.8$ on the preference of the Fed Chair, respectively. Super-majorities Dove and Hawk for different weights in the HD balance are the dummy variables as defined in text. Newey-West HAC standard errors are reported in parentheses.
*** Significant at the 1 percent level.
** Significant at the 5 percent level.
* Significant at the 10 percent level.

declined to raise interest rates initially as a standard Taylor rule would suggest.

Finally, the specifications of the Taylor rule with a Hawk and Dove composition not only change the weights assigned to inflation and the output gap but they are also statistically preferred to the baseline specification in column (1), in terms of the fit (R^2) and the information criteria. Across specifications, the forward-looking Taylor Rule with super majorities and equal weight among all FOMC members performs the best. The latter is also statistically preferred to the specification with the Fed chair having a higher weight.[20]

To understand what lies behind these results we compare the actual FFR with the fitted FFR from the baseline Taylor rule specification as in column (1) and the augmented Taylor rule with super-majorities (column 4, as the best fit). In Figure 1 in Appendix B, we zoom in on the period 1995 to 2007 as it corresponds to longer-lived super-majorities than in other periods. Overall, we notice that interest rate hikes (FFR supermajorities) are predicted to be slightly larger under a hawkish super-majority and slightly smaller under a dovish super-majority, than the state of the economy would suggest (the baseline FFR). Similarly, interest rate cuts are predicted to be larger and faster under a dovish super majority. There are several interesting periods when the two estimated rules differ and the Taylor rule with super-majorities has a closer fit to the FFR, such as the late 1990s and 2001-2003.

The standard Taylor rule for 1999 suggests a more contractionary monetary policy for the year 1999 than the FOMC decided. The augmented Taylor rule with super-majorities fits the behavior of the FOMC decision remarkably closely. This fit occurs during the dovish super-majority observed in 1999, which kept the FFR lower and for longer than the state of the economy suggested. Figure 1 Appendix B shows that in 1999 there is a full switch from a hawkish super-majority to a dovish super-majority. How did this happen? The switch happened exactly at the first FOMC meeting of 1999, corresponding with a new composition of voting members,

[20]This is true even for specifications when the Fed chair is assigned a 70% rather than 80%. These results are available upon request.

reflecting the standard annual rotation of four FRB presidents with voting rights. This rotation is decided by law and thus exogenous to the state of the economy.

Istrefi's Hawk-Dove measure shows that due to the rotation scheme, on February 1999, three doves and one hawk received voting rights in the FOMC, substituting for four hawks from the FOMC of 1998. In the meantime, there was no change in the composition of the Board of Governors from the last meeting of 1998 to the first meeting of 1999 (the FOMC had 11 members in this period). The FRBs taking voting rights in 1999 were: the Federal Reserve Bank of Philadelphia, the Federal Reserve Bank of Chicago, the Federal Reserve Bank of Dallas and the Federal Reserve Bank of Minneapolis. Only the latter was perceived to have a hawkish president at the time. The new rotation substituted for the Federal Reserve Bank of Boston, the Federal Reserve Bank of Cleveland, the Federal Reserve Bank of Dallas and the Federal Reserve Bank of Kansas City, presidents of which were all perceived as hawks at the time.

Another interesting case is that of the period 2001 to 2002. Taylor rule estimates in this period show that in the post-2001 recession FFR cuts were higher than the state of the economy suggested (see Figure 1 Appendix B). The Taylor rule with super-majorities has a closer fit to the FFR. In 2002 the FOMC composition moved to a strong dovish majority. The shift again occurred at the first meeting of 2002 with the rotation of FRB presidents. The dovish arrivals from the rotation were further strengthened by the departure of a hawkish Board member (Kelley), which reversed the composition from weak hawks to super-majority doves. The dovish super-majority was further solidified during the year with the departure of the last hawkish Board member (Meyer) and the arrival of two new Board members (Bernanke and Kohn) who were perceived as doves.

So far, our analysis shows that the composition of the FOMC in terms of hawks and doves explains the FFR beyond the Greenbook economic forecasts of the Board's

staff.[21] This result echoes the finding of Romer and Romer (2008) that individual FOMC members forecasts are different from Greenbook forecasts and these differences help predict monetary shocks. Overall, we find that while economic conditions matter for policy making, who is deciding on policy matters as well.

This result is robust to alternative specifications of the Taylor rule and when extended to the early 1980s, a period in which the FOMC decision making process was not too different.[22] In alternative specifications we consider augmenting the Taylor rule as in equation (3) with interest rate smoothing and with persistent monetary shocks. The intention is to capture the observed inertia in interest rates, the origins of which have generated a lot of discussion in the literature. For instance, Rudebusch (2006) argues that this inertia is likely a reflection of omitted variables in the central bank's reaction function while Coibion and Gorodnichenko (2012) argue that such inertia represented by interest rate smoothing is a fundamental and deliberate component of the Fed's decision-making process. We show these results in Table 4. The estimate on the Hawk-Dove balance remains significant in all specifications. Interestingly, results with data from early 1980s, including the so-called Volcker disinflation period, show higher estimates for inflation forecasts and for the Hawk-Dove balance, suggesting a tougher "hand" on inflation and a stronger power from the hawks (column 5 and 6).

4.1.3 A Taylor rule augmented with FOMC early-life experience

In the following, we consider whether the deep determinants of the Hawk-Dove balance matter for policy as well. The aim of this exercise is to check for the role of ideas, whether from graduate education or early-life experience, in the Fed's monetary policy setting. Column (2) in Table 5 shows the estimates from equation

[21] Recall that Greenbook forecasts are prepared by the staff of the Board of Governors. They are designed to provide a baseline for the FOMC discussion and represent the view of the staff and not of the members of the FOMC (see Reifschneider (1997) for a description of the procedure).

[22] Results are also robust to purging the variation in the Hawk-Dove balance that is explained by the state of the economy and using the residuals in several versions of forecast-based Taylor rules. See Table 1 in Appendix B.

Table 4: Taylor Rules with FOMC preferences and interest rate smoothing

Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
	1987-2007				1981-2007	
FFR(-1)	0.88***	0.88***	0.88***	0.88***	0.88***	0.88***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.04)	(0.04)
Greenbook inflation	0.24***	0.24***	0.24***	0.24***	0.27***	0.27***
	(0.05)	(0.05)	(0.04)	(0.04)	(0.09)	(0.09)
Greenbook output gap	0.09***	0.07***	0.09***	0.09***	0.03**	0.03**
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)
Greenbook growth	0.09***	0.09***	0.08***	0.09***	0.09***	0.10***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.03)
d($HD^{0.5}$)	0.05***		0.05*		0.16*	
	(0.01)		(0.02)		(0.08)	
d($HD^{0.8}$)		0.07**		0.07		0.24*
		(0.03)		(0.05)		(0.14)
AR(1)			0.12	0.12		
			(0.08)	(0.08)		
R^2	0.991	0.991	0.991	0.991	0.970	0.969
s.e.e	0.201	0.202	0.200	0.201	0.570	0.574
AIC	-0.327	-0.318	-0.328	-0.319	1.744	1.755
SIC	-0.211	-0.202	-0.193	-0.184	1.839	1.851

Notes: Columns 1,2,5 and 6 in the table present least squares estimates for different specifications of the Taylor Rule, estimated for the period 1987:11-2007:06 and 1981:2-2007:06, at the FOMC meeting frequency (158 and 211 observations respectively). In 1981 the FOMC moved from monthly meetings to eight meetings per year. We chose this period so FOMC meetings in our sample remain comparable in frequency. Columns 3 and 4 in the table present ARMA Conditional Least Squares estimates, for the period 1987:11-2007:06. All regressions include a constant. d($HD^{0.5}$) refers to the first difference of the Hawk-Dove balance weight $w = 0.5$ while the d($HD^{0.8}$) to the first difference of the Hawk-Dove balance with weight $w = 0.8$ on the preference of the Fed Chair. The lagged FFR is the degree of interest smoothing, while the AR(1) is the persistence of the monetary policy shock. Newey-West HAC standard errors are reported in parentheses.
*** Significant at the 1 percent level.
** Significant at the 5 percent level.
* Significant at the 10 percent level.

(3) where $CompFOMC_t$ is expressed as the balance of "freshwater" and "saltwater" PhD graduates in the FOMC. In addition, column (3) shows the estimates from equation (2) where $CompFOMC_t$ is represented in terms of cohorts born before, during and after the Great Depression (GD). In the latter estimation we consider the balance of the "before GD" and "during GD" cohort relative to the "after GD" cohort. This choice is motivated by the analysis in Section 3, that showed that the "after GD" cohort is more uniform in hawks and doves, while the two others have an opposite composition, predominantly hawkish for the "before-GD" cohort and predominantly dovish and swingers for "during-GD" cohort.

Results for the period 1978 to 2007 show that a higher balance of the 'freshwater' versus 'saltwater' PhD graduates in the FOMC is associated with higher rates (column 2).[23] Thus, having graduated from a 'freshwater' or a 'saltwater' type of school matters for shaping hawks and doves and ultimately for shaping monetary policy. This result reinforces the case of the late 90s with the full switch in super-majorities, as studied above. Three out of the four hawks from 1998 that left their voting rights in 1999 were also 'freshwater' PhD graduates. These FRB presidents were Hoenig (Iowa State University), Jordan (UCLA) and Poole (University of Chicago), all perceived as hawks in this period. With the rotation of the voting rights in 1999, the number of 'freshwater' graduates goes to zero and the number of 'saltwater' PhD graduates increases (see Figure 4). This rotation contributed to shifting supermajorities from hawkish to dovish and to keeping policy more easy than the state of the economy suggested (see Figure 1 in Appendix B).

Results hold when we extend the sample to the early 80s or the late 60s (column 4 and 6). The estimate is the strongest when the sample starts in the late 60s, reflecting the fact that the divide between these schools of economic thought was stronger during the 1970s. Thus, in this period, the ideology factor was important

[23]Results with interaction terms of the FOMC composition with Greenbook forecasts show significant and higher estimates for inflation when the balance of fresh vs saltwater graduates increases. The estimate for the interaction term for output gap is not significant. Results are available upon request.

in the FOMC as well.

When considering the composition of the FOMC in terms of birth cohorts, we observe that a higher difference of the "before GD" and "during GD" cohort relative to the "after GD" cohort is associated with higher and lower interest rates, respectively (column 3 and 5). All estimates are statistically significant. Results are strongest for the period starting in 1981, probably reflecting the fact that only during the early 80s we have relatively mixed cohorts in the FOMC (see Figure 4). This is not the case for the sample starting in 1969, when the FOMC was almost entirely composed of members born before the Great Depression, therefore we omit this estimation from our analysis.

Table 5: Taylor Rules augmented with FOMC life experience

Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
	1987-2007			1981-2007		1969-2007
Greenbook inflation	1.73***	1.68***	1.45***	2.13***	1.35***	1.17***
	(0.12)	(0.13)	(0.12)	(0.13)	(0.10)	(0.16)
Greenbook output gap	0.67***	0.67***	0.71***	0.09	0.59***	0.22***
	(0.05)	(0.05)	(0.05)	(0.06)	(0.07)	(0.07)
Greenbook growth	-0.10	-0.09	-0.08	0.18**	-0.04	-0.05
	(0.07)	(0.07)	(0.07)	(0.08)	(0.06)	(0.08)
Education						
Fresh PhD-Salt PhD		0.07*		0.13		0.37***
		(0.04)		(0.09)		(0.12)
Birth						
before GD-after GD			0.31***		0.71***	
			(0.09)		(0.07)	
during GD-after GD			-0.16***		-0.39***	
			(0.06)		(0.07)	
R^2	0.893	0.896	0.904	0.825	0.919	0.627
s.e.e	0.711	0.706	0.679	1.373	0.938	2.009
AIC	2.182	2.172	2.100	3.495	2.739	4.247
SIC	2.259	2.269	2.216	3.575	2.834	4.301

Notes: Columns 1 to 3 in the table presents least squares estimates for different specifications of the Taylor Rule, estimated for the period 1987:11-2007:06, at the FOMC meeting frequency (158 observations). Columns 4 and 5 for 1981:2-2007:06 and columns 6 for 1969:2-2007:06. Fresh PhD-Salt PhD denotes the difference between the number of 'freshwater' and 'saltwater' PhD graduates and born before, during GD and born after GD denote the respective differences of the composition of the FOMC in terms of cohorts born before GD and during GD relative to after GD cohort. Newey-West HAC standard errors are reported in parentheses.
*** Significant at the 1 percent level.
** Significant at the 5 percent level.
* Significant at the 10 percent level.

Overall, we observe that the augmented Taylor rules with education and birth cohorts relative to the Great Depression period not only change the weights of inflation and output gap but also have a better statistical fit than the rule with Greenbook forecasts only. These findings suggest that ideas through education or from other early-life experiences, have played an important role in the Fed's monetary policy. Notably, the results with sample periods starting in the early 1970s or 1980s echo the argument of DeLong (1997) and the comment of John Taylor in DeLong (1997) about the *truest* cause of the Great Inflation. While DeLong (1997) links the inflation to the policies undertaken on the recommendation of Keynesians in the 1960s, and more generally to the memories of the high unemployment in the Great Depression, Taylor argues more in favor of the economic theories prevalent at the time.

Finally, we also estimate an alternative specification of the Taylor rule, where the balance of the hawks and doves, and the deep determinants, interact with Greenbook forecasts of inflation and the output gap, respectively (Table 6). In general, these interaction estimates are statistically significant for inflation but not for the output gap. The most striking is the version of the Taylor rule with supermajorities (column 3), where the reaction coefficient of inflation is lower than in the previous versions (1.71 versus 1.78) and the interaction term with the dovish supermajority lowers it further to 1.36 (1.71-0.35). Thus, a move of the FOMC to a dovish supermajority makes the FFR significantly less responsive to inflation. In contrast, a move to a hawkish supermajority reduces significantly the response of the FOMC to the forecasted output gap.

When looking at specifications with Education and Birth interactions (columns 6 and 7), we confirm that a higher share of freshwater graduates to saltwater graduates increases the weight of inflation in the reaction function. Similarly, a higher share of the "before GD" cohort relative to the "after GD" cohort increases the weight of inflation and lowers the weight of the output gap (column 7). Results with birth

cohorts (available on request) are more striking for the sample period starting in 1981. They confirm the results for the "before GD" cohort and show in addition that a higher difference of the "during GD" cohort relative to the "after GD" cohort is associated with a lower weight of inflation in the Taylor rule.

Finally, one could think of additional potential factors affecting the FOMC voting, like seniority of the FOMC members or the mix of economic and financial conditions in regional Feds, among others. While our aim is to look at determinants (education and big events in birth years) with timing before the FOMC years, our numerous Taylor rule specifications indirectly cover these factors too. For instance, we cover age through the cohort effect and the role of regional Fed characteristics through the dove and hawk measure, which as discussed above, is also linked to the different Reserve Bank institutional philosophies.

4.2 FOMC composition and dissents

Overall, our results show that the Hawk/Dove balance is important both statistically and economically, moving the FFR up to 80 basis points, suggesting that the policy preferences of FOMC members and the deep determinants that we consider, matter in interest rate setting. One wonders, how do FOMC members express these preferences and ideologies and influence monetary policy? In the case of the Fed chair, his/her input on policy setting is clear via his/her influence as agenda setter and consensus builder. For the other members, while there might be countless ways through which they can push for their policy preferences, we believe that the most likely way is through their individual forecasts of the economy and through expressed support or not (disagreement and eventually dissent) for policy alternatives put on the table.

Findings in the existing literature support these channels. For instance, Romer and Romer (2008) documented that individual FOMC members forecasts have worse predictive power than Greenbook forecasts and these differences help predict mone-

Table 6: Taylor Rules with FOMC preferences as interaction terms, 1987-2007

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Inflation	1.78***	1.78***	1.78***	1.71***	1.76***	1.80***	1.72***
	(0.11)	(0.11)	(0.11)	(0.09)	(0.10)	(0.11)	(0.13)
Output gap	0.65***	0.65***	0.65***	0.71***	0.68***	0.61***	0.41***
	(0.05)	(0.05)	(0.05)	(0.06)	(0.05)	(0.08)	(0.10)
Hawk-Dove Balance							
Inflation*d($HD^{0.5}$)		0.05*					
		(0.03)					
OutputGap*d($HD^{0.5}$)		-0.03					
		(0.03)					
Inflation*d($HD^{0.8}$)			0.1**				
			(0.04)				
OutputGap*d($HD^{0.8}$)			-0.07				
			(0.07)				
Supermajorities Hawk-Dove							
Inflation*Dove, $HD^{0.5}$				-0.35**			
				(0.15)			
Inflation*Hawk, $HD^{0.5}$				-0.12			
				(0.07)			
OutputGap*Dove, $HD^{0.5}$				0.01			
				(0.07)			
OutputGap*Hawk, $HD^{0.5}$				-0.17**			
				(0.08)			
Inflation*Dove, $HD^{0.8}$					-0.19**		
					(0.09)		
Inflation*Hawk, $HD^{0.8}$					-0.13		
					(0.08)		
OutputGap*Dove, $HD^{0.8}$					0.08		
					(0.08)		
OutputGap*Hawk, $HD^{0.8}$					-0.19**		
					(0.08)		
Education							
Inflation*(FreshPhD-SaltPhD)						0.04**	
						(0.01)	
OutputGap*(FreshPhD-SaltPhD)						-0.01	
						(0.01)	
Birth							
Inflation*(beforeGD-afterGD)							0.08*
							(0.04)
OutputGap*(beforeGD-afterGD)							-0.09**
							(0.03)
Inflation*(duringGD-afterGD)							-0.04
							(0.03)
OutputGap*(duringGD-afterGD)							0.04
							(0.03)
R^2	0.888	0.890	0.889	0.907	0.904	0.893	0.906
s.e.e	0.724	0.724	0.725	0.670	0.680	0.714	0.672
AIC	2.213	2.223	2.227	2.083	2.111	2.196	2.088
SIC	2.271	2.320	2.324	2.218	2.247	2.293	2.223

Notes: Columns 1 to 5 present least squares estimates for different specifications of the Taylor Rule, estimated for the period 1987:11-2007:06, at the FOMC meeting frequency (158 observations). All regressions include a constant. d($HD^{0.5}$) refers to the first difference of the Hawk-Dove balance with weight $w = 0.5$, the d($HD^{0.8}$) is the first difference of the Hawk-Dove balance with weight $w = 0.8$ on the preference of the Fed Chair, respectively. Super-majorities Dove and Hawk for different weights in the HD balance are the dummy variables as defined in text. Fresh PhD-Salt PhD denotes the difference between the number of 'freshwater' and 'saltwater' PhD graduates and born before, during GD and born after GD denote the respective differences of the composition of the FOMC in terms of cohorts born before GD and during GD relative to after GD cohort. Newey-West HAC standard errors are reported in parentheses.
*** Significant at the 1 percent level.
** Significant at the 5 percent level.
* Significant at the 10 percent level.

tary shocks. Moreover, Istrefi (2019) has shown that hawks and doves differ in terms of their individual forecasts and preferred interest rates (as expressed in FOMC meetings). By investigating the individual FOMC forecasts contained in the Monetary Policy Report submitted to the Congress for the period 1992 to 2007, Istrefi (2019) finds that hawks tend to forecast higher inflation compared to doves, even though these forecasts are conditional on individual judgments of "appropriate" policy. In this respect, these forecasts are seen more as strategic forecasts rather than "best" forecasts. Along these lines, Malmendier et al. (2020) has shown that heterogeneity in lifetime experiences of inflation can explain differences in FOMC members' inflation forecasts. In addition, Istrefi (2019) shows that hawks (doves) tend to prefer higher (lower) interest rates compared to those decided by the Committee and to dissent predominantly for tighter (easier) policy. With regard to the internal working of the FOMC, Meade (2005) has shown that while dissent has been as low as 7.5% of the total votes (especially during Greenspan's tenure), the rate of disagreement in internal Committee discussions was high, on the order of 30%.

In the following we also show that the FOMC composition in terms of hawks and doves and life experience matches with dissents in policy (Table 7). Before discussing the results, it is important to recall that dissents are rare and not all FOMC members have dissented during their tenure. This discussion pertains only to dissenters, about 60% of the FOMC members in our sample, abstracting from Fed Chairs and many Governors especially.

We observe that hawks dissents for tighter policy (91%), doves dissent for ease (or easier) policy (94%) while swingers dissent on both sides. Hawks and Doves have also a higher dissent rate per member, for tighter and easier policy, respectively. These results are in line with findings in Istrefi (2019). Furthermore, looking at the ideology by education specific to PhD graduates, we see that 'freshwater'-PhDs dissent in a larger proportion for tighter policy than the two other groups and have also a higher share of dissents per member (about 4.2 dissents per member). Moreover, we observe

that members born during the Great Depression have dissented more on the side of easier policy than FOMC members born before or after. For instance, four FOMC members born during the Great Depression joined the FOMC in the 1970s as Fed Governors. They graduated from a saltwater university (one with PhD) and all but one dissented at least twice for easier policy.

Table 7: Distribution of dissents per FOMC member characteristics

Dissents	**Dissents Total**	**Tighter %**	**Easier %**	**Tighter per member**	**Easier per member**
Preference type					
Hawk	187	91.4	8.6	3.4	0.3
Dove	112	6.3	93.8	0.2	2.7
Swinger	127	66.1	33.9	2.7	1.4
Unknown	2	100	0	0.2	0
Ideology by education (PhD)					
Saltwater	126	60.3	39.7	1.9	1.3
Freshwater	63	85.7	14.3	4.2	0.7
Other	43	58.1	41.9	1.5	1.1
Life experience (birth)					
Before Great Depression	267	59.2	40.8	2.5	1.8
During Great Depression	55	34.5	65.5	1.1	2.1
After Great Depression	101	81.2	18.8	1.6	0.4

Notes: During the period 1960 to January 2015 there have been about 432 dissents (corresponding only to dissents from scheduled meetings, excluding conference calls). We omit four dissents of William Treiber (vice president of the New York Fed) that was not a regular member of the FOMC but voted as an alternate. Source of data: Hawks, Doves and Swingers as in Istrefi (2019), FOMC dissents from the database of Chappell et al. (2005) updated by authors.

These results are consistent with the popular wisdom and also may explain why the politics of confirmation of Federal Reserve governors has been so toxic in recent years as a reflection of sharpening partisanship in U.S. policy deliberation. Republican senators are critical of candidates who are perceived as doves and Democratic senators are critical of candidates who are perceived as hawks. This increased scrutiny may indeed reflect the Senators' beliefs that such appointments can tip the balance of FOMC votes in directions that are contrary to their core preferences. One recent example, is the case of Peter Diamond, an MIT professor of economics and the 2010 Nobel Prize winner, whose appointment to the Federal Reserve Board of Governors was blocked by Senate Republicans. They repeatedly blocked President

Barack Obama's nomination of Diamond. Some Republican representatives referred to Diamond as "an old-fashioned, big government, Keynesian" and they could "no longer support a nominee so vocally in favor of more spending, more stimulus, and more quantitative easing."[24]

5 Conclusions

In this paper, we highlight two important factors in moulding the policy preferences of FOMC members who have served in the past 60 years: ideology, and events that shaped their early lives before joining the FOMC. Obviously, there are other factors that we have not discussed. We find that having studied at a 'saltwater' rather than a 'freshwater' university seems to give cleaner answers to explaining differences in preferences among these members. In addition, being born in a period of high unemployment or in other periods with very high inflation also seems to matter. These factors seem to matter not only for the moulding of the policy preferences of individual members but also for the overall composition of the FOMC and for its monetary policy-setting. Whether these factors have important implications for market expectations and for macroeconomic outcomes we leave for future research.

These results have important implications both for the politics of the confirmation process for Federal Reserve governors in the U.S. Senate and for the supposed policy neutrality of FOMC members. They are consistent with the popular wisdom and also may explain why the politics of confirmation of Federal Reserve governors has been so toxic in recent years as a reflection of sharpening partisanship in the U.S. policy. While ideally these members should be chosen strictly on merit (expertise), we notice that as the political divide gets wider, as has been the case in the recent years, the hawk or dove signals become more important in the confirmation process.

We find that the hawk-dove balance and its deep determinants mattered significantly in the 1980s to 2000s in determining policy rate changes but this may not

[24]Peter Diamond withdraws 3rd Fed nomination, The Tech, June 10, 2011.

be as important moving forward. Since the late 1980s there has been a considerable convergence between the two schools of thought, with 'saltwater' elements included in 'freshwater' models, and vice versa. Ideological factors might also have become muted with time because the Federal Reserve, as is the case with many central banks around the world, has converged to an understanding of the importance of price stability (and the use of flexible inflation targeting).

Nevertheless, the Fed's new policy strategy of average inflation targeting announced in 2020 and the Fed's recent response to the COVID-19 pandemic crisis and recession bring to the fore the issues raised in this paper. The new strategy raises questions like, how much of an inflation overshoot will the FOMC accept and, how long will it tolerate inflation above the 2% goal? Hawks and Doves may react very differently to these questions. Furthermore, to the extent the massive expansion in the Fed's balance sheet raises the risk of a significant run-up in inflation (well beyond the 2% target) in the future, Hawks and Doves may also react very differently. Then the composition of the FOMC may have significant effects on the policy debate and ideology could still play a role.

References

Alesina, A., Sachs, J., 1982. Political parties and the business cycle in the United States, 1948-1984. Journal of Money, Credit and Banking 20 (1), 63–82.

Beck, P. A., Jennings, M. K., 1982. Pathways to participation. American Political Science Review 76 (1), 94–108.

Belden, S., 1989. Policy preferences of fomc members as revealed by disenting votes. Journal of Money, Credit and Banking 21, 432–441.

Blinder, A., Reis, R., 2005. Understanding the greenspan standard. Proceedings - Economic Policy Symposium - Jackson Hole (Aug), 11–96.

Blinder, A. S., 2004. The quiet revolution: Central banking goes modern. Yale University Press.

Bordo, M. D., Goldin, C., White, E., 1998. In: The Defining Moment: The Great Depression and the American Economy in the Twentieth Century. University of Chicago Press.

Burda, M. C., Wyplosz., C., 1993. In: Macroeconomics: a European text. Oxford, England: Oxford University Press.

Carvalho, C., Nechio, F., Tristao, T., 2018. Taylor rule estimation by ols. Federal Reserve Bank of San Francisco Working Paper 11.

Chappell, H. W., McGregor, R. R., Vermilyea, T., 2005. In: Committee Decisions on Monetary Policy. Cambridge: MIT Press.

Coibion, O., Gorodnichenko, Y., 2012. Why are target interest rate changes so persistent? American Economic Journal: Macroeconomics 4 (4), 126–62.

Colander, D., 2003. The aging of an economist. Journal of the History of Economic Thought 25 (2).

Colander, D., 2005. The making of an economist redux. Journal of Economic Perspectives 19, 175–198.

Colander, D., Klamer, A., 1987. The making of an economist. Journal of Economic Perspectives 1 (2), 95–111.

DeLong, B. J., 1997. America's peacetime inflation: The 1970s. In: Romer, C., Romer, D. (Eds.), Reducing Inflation: Motivation and Strategy. Chicago, IL: University of Chicago Press, pp. 247–280.

Eijffinger, S. C., Mahieu, R., Raes, L., 2015. Hawks and doves at the FOMC. Working Paper 2015-013, CentER Discussion Paper.

Elder, G., 1998. The life course as developmental theory. Child Development 69 (1), 1–12.

Giuliano, P., Spilimbergo, A., 2014. Growing up in a recession. The Review of Economic Studies 81 (2), 787–817.

Goodfriend, M., 2002. The phases of u.s. monetary policy : 1987 to 2001. Economic Quarterly (Federal Reserve Bank of Richmond) 88 (4).

Gordon, R. J., 1989. Symposium on macroeconomics 1 fresh water, salt water, and other macroeconomic elixirs. Economic Record 65 (2), 177–184.

Greider, W., 1987. Secrets of the temple: How the federal reserve runs the country. New York: Simon and Schuster.

Hall, R., 1976. Notes on the current state of empirical macroeconomics. Manuscript.

Havrilesky, T. M., Gildea, J. A., 1989. The policy preferences of fomc members as revealed by dissenting votes: Comment. Journal of Money, Credit and Banking 23, 130–138.

Henderson, A. T., Berla, N., 1994. In: A new generation of evidence. The family is critical to student achievement. Washington, DC: National Committee for Citizens in Education.

Hibbs, D. A., 1977. Political parties and macroeconomic policy. American Political Science Review 71, 1467–87.

Horn, K. I., 2009. Roads to wisdom, conversations with ten Nobel Laureates in economics. Edward Elgar Publishing.

Istrefi, K., 2019. In Fed watchers' eyes: Hawks, doves and monetary policy. Working Paper Series 725, Banque de France.

Jennings, M. K., Laura, S., Bowers, J., 2009. Politics across generations: Family transmission reexamined. The Journal of Politics 71 (3), 782–799.

Keynes, J. M., 1936. The general theory of employment, interest and money. London: Macmillan (reprinted 2007).

Kilborn, P. T., 1988. Fresh water' economists gain. New York Times July 23, 1988.

Krosnick, J. A., Alwin, D. F., 1989. Aging and susceptibility to attitude change. Journal of Personality and Social Psychology 57 (3), 416–425.

Malmendier, U., Nagel, S., Yan, Z., 2020. The making of hawks and doves: Inflation experiences on the FOMC. Journal of Monetary Economics (forthcoming).

Meade, E., 2005. The FOMC: preferences, voting, and consensus. Federal Reserve Bank of St. Louis Review 87 (2), 93–101.

Newcomb, T. M., Koenig, K. E., Flacks, R., Warwick, D. P., 1967. Persistence and change: Bennington college and its students after 25 years. New York: Wiley.

Onder, A. S., Tervio, M., 2015. Is economics a house divided? Analysis of citation networks. Economic Inquiry 53 (3), 1491–1505.

Orphanides, A., 2003. The quest for prosperity without inflation. Journal of Monetary Economics 50, 633–663.

Reifschneider, D.L., S.-D. W. D., 1997. Econometric models and the monetary policy process. Carnegie-Rochester Conference Series on Public Policy 47, 1?37.

Reis, R., 2013. Central bank design. Journal of Economic Perspectives 27 (4), 17–43.

Riboni, A., Ruge-Murcia, F. J., 2010. Monetary policy by committee: Consensus, chairman dominance, or simple majority? The Quarterly Journal of Economics 125 (1), 363–416.

Riboni, A., Ruge-Murcia, F. J., 2020. The power of the federal reserve chair. Manuscript.

Rodrik, D., 2014. When ideas trump interests: Preferences, worldviews, and policy innovations. Journal of Economic Perspectives 28 (1), 189–208.

Romer, C. D., Romer, D. H., March 2004. Choosing the federal reserve chair: Lessons from history. Journal of Economic Perspectives 18 (1), 129–162.

Romer, C. D., Romer, D. H., 2008. The fomc versus the staff: Where can monetary policymakers add value? American Economic Review: Papers and Proceedings 98 (2), 230–235.

Rudebusch, G., 2006. Monetary policy inertia: Fact or fiction? International Journal of Central Banking 2 (4), 85–135.

Schuman, H., Scott, J., 1989. Generations and collective memories. American Sociological Review 54 (3), 359–381.

Sears, D. O., 1975. Political socialization. In: Greenstein, F. I., Polsby, N. W. (Eds.), Handbook of Political Science. Reading, MA: Addison-Wesley.

Sibert, A., 2006. Central banking by committee. International Finance 9 (2), 145–168.

Snowdon, B., 2001. Keeping the keynesian faith. World Economics 2 (2).

Snowdon, B., Vane, H. R., 2005. Modern macroeconomics: Its origins, development and current state. Cheltenham, UK and Northampton, MA, USA: Edward Elgar.

Stein, H., 1985. Presidential economics. New York: Simon and Schuster.

Stock, W., Siegfried, J., 2001. So you want to earn a Ph.D. in economics: how much do you think you'll make? Economic Inquiry 39, 320–335.

Taylor, J. B., 1993. In: Discretion versus policy rules in practice. Vol. 31(1) of Carnegie-Rochester Conference Series on Public Policy. Elsevier, pp. 195–214.

Appendix A Additional Tables and Figures

Table 1: Categorization of universities

Saltwater	Freshwater	Other
Yale University	University of Chicago	Ottawa University (Kansas)
Columbia University	Carnegie Mellon University	Indiana University
University of Wisconsin	Johns Hopkins University	University of Missouri
University of Michigan	UCLA	Fordham University
University of California Berkeley	Iowa State University	Washington University
MIT	Ohio State University	Wharton School of the University of Penn.
Pennsylvania University	Brown University	Wharton School of Finance
Northwestern University	University of Virginia	Florida State University
Harvard University		Rice University
Princeton University		Louisiana State University
		University of Georgia
		Tufts University
		Radcliffe College

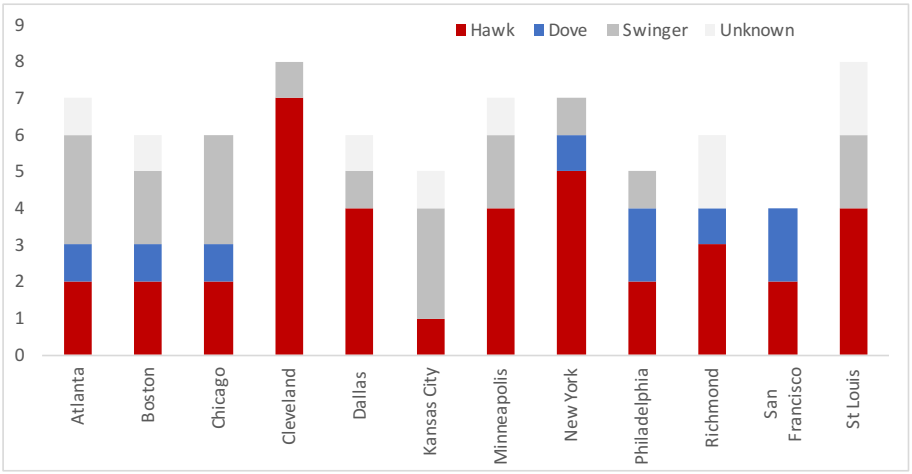
Notes: The list of universities where the FOMC members in our sample received their PhD degree. These members have graduated between 1928 and 1990. To categorize their PhD-granting universities as 'saltwater' or 'freshwater', we have have used the conventional wisdom of looking at who were the leading faculty members in money/macro in the years our FOMC members received their PhDs, backed up also by references in the literature, as in Kilborn (1988), Gordon (1989), Burda and Wyplosz. (1993), Onder and Tervio (2015), among others.

Table 2: Inflation rate and unemployment rate over the four great events

in %	**WWI 1914-1920**	**Great Depression 1929-1939**	**WWII 1939-1948**	**Great Inflation 1965-1982**
Inflation				
mean	11.6	-1.9	6.2	6.6
max	23.7	5.6	19.7	14.8
Unemployment				
mean	4.8	18.1	5.5	5.9
max	11.7	25.2	17.2	10.8

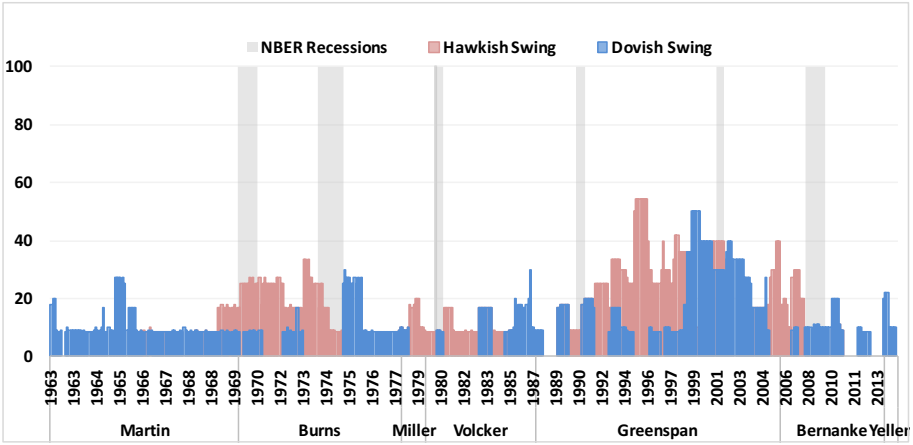
Notes: WWI (1914-1920) and WWII (1939-1948), each include the years of the war plus post-war inflation years. Source of data for the unemployment rate: pre-1929 data are from estimates of Stanley Lebergott, since 1929 from the U.S. Census Bureau (Statistical Abstract of the United States: 2003), since 1948 retrieved from FRED, Federal Reserve Bank of St. Louis. Source of data for inflation: U.S. Bureau of Labor Statistics.

Figure 1: Ideology in the FRB presidents?



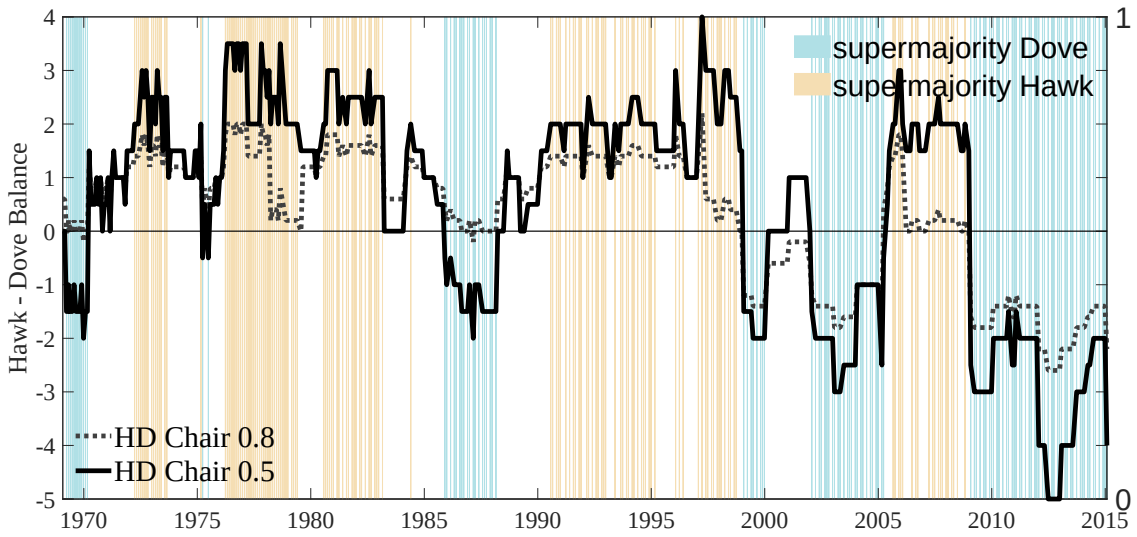
Notes: Sample in the figure comprises all the FOMC members that have served at the FOMC during 1960-2015: a total of 73 FRB presidents, including those that moved from a FRB president to a Fed Chair or Governor position, like Volcker, Coldwell and Yellen. Source of data: Hawks, Doves and Swingers as in Istrefi (2019).

Figure 2: Swingers in FOMC over time



Notes: Distribution of swingers over time within the FOMC (the share of members who were perceived to shift from doves to hawks is in red, and the share of members who were perceived to shift from being hawks to doves in blue). Sample in the figure comprises all the FOMC members that have served at the FOMC during 1960-2015. Data on swingers as in Istrefi (2019).

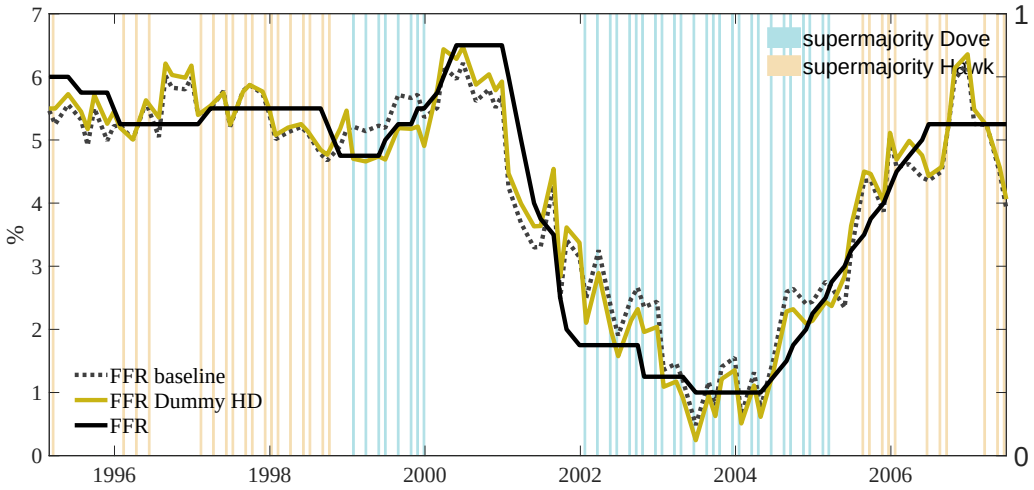
Figure 3: Hawk-Dove balance with different Fed Chair weights



Notes: At FOMC meeting frequency, sample period 1969:2 to 2015:1. Istrefi's Hawk-Dove balance with equal weights represents the composition of the FOMC where the preferences of each voting member receive the same weight (HD Chair 0.5) and the Fed Chair received a higher weight (HD Chair 0.8).

Appendix B Different Taylor rule specifications

Figure 1: Target FFR, Taylor rule predictions and strong Hawk-Dove majorities



Notes: The figure plots the actual target FFR, the predicted FFR from equations (1) and (2) where the FOMC composition is represented by the Hawks and Dove supermajorities dummies (FFR supemajorities, $w = 0.5$), and respective dummies. The steep fall of FFR in early 2000s corresponds with the recession of March-November 2001. Data are at FOMC meeting frequency, sample period for the estimation is 1987:11-2007:06.

Table 1: Taylor Rules estimates with the purged Hawk/Dove balance

Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Greenbook inflation	1.73***	1.73***	1.74***	1.66***	0.25***	0.28***
	(0.12)	(0.12)	(0.12)	(0.13)	(0.04)	(0.09)
Greenbook output gap	0.67***	0.67***	0.67***	0.65***	0.09***	0.03*
	(0.05)	(0.05)	(0.05)	(0.05)	(0.02)	(0.02)
Greenbook growth	-0.10	-0.09	-0.09	-0.06	0.08***	0.10***
	(0.07)	(0.07)	(0.07)	(0.07)	(0.01)	(0.03)
d($\hat{HD}^{0.5}$)		0.22***			0.05**	0.16*
		(0.07)			(0.01)	(0.09)
d($\hat{HD}^{0.8}$)			0.39***			
			(0.14)			
Dove supermajority, $\hat{HD}^{0.5}$				-0.55***		
				(0.18)		
Hawk supermajority, $\hat{HD}^{0.5}$				0.13		
				(0.17)		
Lagged FFR					0.87***	0.87***
					(0.02)	(0.04)
AR(1)					0.13	
					(0.08)	
R^2	0.893	0.898	0.897	0.905	0.991	0.970
s.e.e	0.711	0.698	0.700	0.674	0.200	0.568
AIC	2.182	2.151	2.156	2.086	-0.336	1.737
SIC	2.259	2.248	2.253	2.200	-0.200	1.833

Notes: Columns 1 to 5 in the table presents least squares estimates for different specifications of the Taylor Rule, estimated for the period 1987:11-2007:06, at the FOMC meeting frequency (158 observations). Column 6 is estimated for the period 1981:2-2007:06 (212 observations). All regressions include a constant. Dove, $\hat{HD}^{0.5}$ refers to the first difference of the corrected Hawk-Dove balance, for the composition of the FOMC with equal weights while the $\hat{HD}^{0.8}$ is the first difference of the corrected Hawk-Dove balance for the composition of the FOMC with 80% weight on the preference of the Fed Chair. Both have been corrected for the state of the economy. Dove and Hawk supermajority are the dummy variables as defined in text. With regard to the two last columns, the estimates are short-run responses to inflation expectations, to the expected output gap, to expected output growth and to the corrected Hawk-Dove balance, respectively. The lagged FFR is the degree of interest smoothing, while the AR(1) is the persistence of the monetary policy shock. Newey-West HAC standard errors are reported in parentheses.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.