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Perceived FOMC: The Making of Hawks, Doves and Swingers
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ABSTRACT

Narrative records in US newspapers reveal that about 70 percent of Federal Open Market Committee (FOMC) members who served during the last 55 years are perceived to have had persistent policy preferences over time, as either inflation-fighting hawks or growth-promoting doves. The rest are perceived as swingers, switching between types, or remained an unknown quantity to markets. What makes a member a hawk or a dove? What moulds those who change their tune? We highlight ideology by education and early life economic experiences of these members. The Hawk/Dove composition of the FOMC also matters for monetary policy as do the determinants that we isolate. They help explain deviations of the Federal Funds Rate from a forward–looking Taylor rule. This result has implications for the political economy of FOMC appointments. This research is based on an original dataset.

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1 Introduction

Monetary policy decisions in recent years typically arise from the deliberation and vote of a committee.[1] The setting of policy in a committee involves the aggregation of diverse individual member preferences and views into a collective decision. Given the importance for monetary policy outcomes, the heterogeneity of these preferences and views is a constant interest for academics, financial markets and commentators on monetary policy. The diversity of preferences is traditionally summarized in labels like hawk and dove, where a hawk is thought of assigning a higher priority to fighting inflation and a dove to supporting more output growth and employment. Dividing central bankers into inflation-fighting hawks or growth-promoting doves can be too simplistic. We agree. Yet, commentators on monetary policy, academics, even central bankers themselves, use these labels as convenient shorthand to summarize or communicate complex information on central bank governance and the setting of monetary policy.

What moulds the central banker's type as a hawk or a dove? We investigate this question, highlighting sources of heterogeneity amongst different types of central bankers within a monetary policy committee, focusing on the Federal Open Market Committee (FOMC) of the Federal Reserve. In addition, we also ask whether the composition of the FOMC in terms of Hawks and Doves, as well as their deep determinants, matters in the setting of monetary policy. The novelty of this paper relies on two original elements: i) the measure characterizing the policymaker's type and, ii) the source of heterogeneity among types.

In this paper, the central banker's type (which is not observable otherwise) is proxied by a hawk-dove measure as quantified in Istrefi (2017). This measure is based on narrative records in U.S newspapers regarding the policy leanings of each FOMC member, serving from the early 1960s to 2015, with respect to the dual mandate of the Federal Reserve: maximum employment and stable prices. These narratives constitute the perception on the type. Hawk or Dove perceptions derive from different sources, especially the policymaker's background (origins, education, political interests and supporters), and the policymaker's economic beliefs (expressed in writings, testimonies, speeches) and actions (votes and dissents) as they become public.

In real time, Hawk and Dove perceptions per each FOMC member are conditional

[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 and Shiller (2004)). Because monetary policy committees are important for policy outcomes, a considerable literature is dedicated to their optimal design (see, for example, Sibert (2006) and Reis (2013)).

on the times these members served and the other committee members they served with. One could think of them as situational hawks and doves. However, looking at how perceptions of each member evolved over their whole FOMC tenure, Istrefi (2017) observed that some members are perceived consistently as either hawks or doves (69 percent of the sample) and some others perceived as switching camps over their tenure (i.e swingers, 24 percent).[2] Thus, an all-time hawk is typically most concerned with stable money, stable and low inflation while an all-time dove is most concerned about low unemployment and stimulating growth. Both types will depart from these concerns (i.e support tight or loose monetary policy) if convincing evidence becomes available, however those departures won't be perceived as 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", switching camps either for some years or those members perceived as having a complete "change of heart".

In this paper we investigate the sources of heterogeneity between hawks, doves and swingers primarily using insights from the literature on political science and social psychology. This literature suggests 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. In addition, as FOMC members are appointed to their positions, we explore the match of our types with the political or/and institutional philosophies of those who appointed them. Our main focus is on determinants before joining the FOMC, however for swingers we also investigate the FOMC years to understand the conditions (either economic or political) under which they changed their tune. The period under investigation (1960-2015) covers 130 FOMC members and comprises the FOMC under seven Federal Reserve chairpersons, from William McChesney Martin to Janet Yellen.

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. A dove is most likely born during a period of high unemployment, like the Great Depression, graduated in a university with strong Keynesian beliefs ('saltwater'), and was appointed by a Democrat

[2]The rest remained an unknown quantity to markets.

president. Swingers share several background characteristics of the doves, but not always. Although swingers often follow the majority view, three main reasons seem to have sparkled the swing waves in the FOMC during 1960 to 2015: i) serious economic issues facing the central bank (i.e. the Great Inflation of the 1970s), ii) intensified discussions about the optimal monetary policy framework (i.e the discussion on price stability and inflation targets in the early 1990s), and iii) a new understanding of the economy (i.e following Greenspan's revelation on productivity and inflation in the late 1990s).

Moreover, our results show that the composition of the FOMC in terms of Hawks and Doves, as well as their deep determinants in terms of education and early life experience, matter in the setting of monetary policy. In a regression analysis with conventional forward-looking Taylor rules incorporating measures of our Hawk/Dove balance we find that an increase in the Hawk/Dove ratio raises the likelihood that the FOMC will tighten, other things equal. A higher Dove/Hawk ratio raises the likelihood that the FOMC will loosen, other things equal. Education and early life also are significant factors. A Taylor rule incorporating the FOMC composition in terms of the number of 'freshwater' versus 'saltwater' PhD graduates, suggests that the policy will tighen with the increase of this ratio. The policy will loosen with a higher number of members born during the Great Depression. Taylor rule results are in line with the (albeit rare) FOMC dissents: the odds of dissenting for a tighter policy are higher when a member graduated from a university linked to the Chicago school of economics and that FOMC members born during the Great Depression have dissented more on the side of easer policy than FOMC members born before or post Great Depression. These results have important implications for the political economy of the choice of and confirmation by the U.S. Congress of prospective Board governors.

Our results contribute primarily to the literature that studies central bankers' policy preferences and their determinants, focusing on the Federal Reserve. In relation to the existing literature, not only on the FOMC but on other monetary policy committees as well, we look at this question with a tailor-made measure on policy preferences of each individual committee member that is based on a real-time, time-varying and rich information set. Traditionally, policy preferences and diversity of views of central bankers are proxied with their voting patterns, more specifically with dissents for easier or tighter policy. However, as already discussed in the literature, the information content of individual votes and dissents is rather limited with respect to diversity, especially for committees that favor consensus, like the FOMC.[3]

[3]For instance, Meade (2005) found that during the Greenspan's time as chairman dissents

Dissents are rare (only 7 percent of the total votes during period 1960-2015) and they are casted by few members. In our sample, only 37 percent of the members have dissented at least twice and many of these dissents have been in opposite direction. Differently, the hawk-dove preference measure of Istrefi (2017) is based on a larger information set than votes, therefore being able to assign a unique policy preference to each FOMC member (93 percent of the 130 FOMC members in our sample), what is missing in existing studies.[4] In addition, novel to the literature, this measure allows studying the persistence of the policy preference, where three types emerge: the persistent hawk, the persistent dove and swingers.

Furthermore, while several papers have studied the determinants of central bankers' diversity in voting patterns, none of them presents an explicit theory of the formation of central banker's preferences, i.e. how these preferences are molded. The existing literature has examined differences in the voting patterns across different groups (externals versus internals, Board members versus Reserve Bank Presidents), educational degree and career characteristics of the individual (years of experience in business, law, Fed, government, academia), characteristics of the appointment which placed the individual on the FOMC or regional economic developments (see Belden, 1989; Havrilesky and Gildea, 1989; Chappell et al., 2005; Eijffinger et al., 2015). Some examples for the Bank of England include Gerlach-Kristen (2009) and Harris et al. (2011), among others.

Taking a different approach, we use insights from political science and social psychology, highlighting the formation of core economic and political beliefs during the early stages of life of a person. Some examples in the literature that tie personalities to early-life experiences and highlight ideas are Elder (1998), Giuliano and Spilimbergo (2014) and Rodrik (2014). In this context, we link and contribute also to these two strands of literature, by stressing two factors as correlating with the preferences of a technocratic central banker, the ideology by education (i.e. 'freshwater' versus 'saltwater' school) and great events and macroeconomic experiences during the early years (from birth to mid-20s). The latter goes in line with the findings of Malmendier et al. (2017) to which we relate closely. Malmendier et al. (2017) use the life-time inflation experience of FOMC members to explain heterogeneity in

accounted for only 7.5 percent of the votes, while the internal disagreement was estimated to be about 30 percent. Therefore internal disagreement does not always show up in a dissent.

[4] Eijffinger et al. (2015) use internal information from FOMC transcripts to build a dataset of hypothetical votes (preferences for interest rate relative to the chairman's interest rate proposal) for the period 1989-2007 as in Meade (2005). This information is fed into a Bayesian ideal points model, from which ideal points for each FOMC member are derived and interpreted in a dove-hawk scale. The estimated ideal points are not pure measures of the personal preference but a mix of different influences and the latent personal preference.

how these members vote, forecast and speak.[5] While they compare hawkish versus dovish outcomes in terms of dissents, forecasts and speeches we compare members as all-time Hawks, all-time Doves and Swingers. This comparison is done both at the individual and at the FOMC level, which is possible with the original index of Hawks and Doves of Istrefi (2017). Furthermore, in Malmendier et al. (2017) the source of heterogeneity among members is a time-varying, experience-based inflation forecast, generated from an adaptive learning model. Instead, in our paper, in line with insights from social psychology, the sources of heterogeneity are ideology by education and great events that happened only in forming, the early-stage years of life of FOMC members (from birth to mid-20s). Moreover we look at events that have had important consequences not only for inflation but for the unemployment experience as well. This is crucial, since the Federal Reserve has a dual mandate of maximum employment and stable prices. Finally, with these two different approaches we do confirm Malmendier et al. (2017)'s result that there are long-lasting effects of experience and we argue that it is the early life experience that matters.

The paper is organized as follows: Section 2 describes how the individual FOMC member's type is quantified and some summary statistics. Section 3 discusses the sources of heterogeneity between types and Section 4 present empirical results of the impact of the Hawk/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 revising 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 on 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 financial analysts and other people who do the watching of not only the Fed chair but of all the 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 and the dovish one to supporting more output and employment.

[5] How members speak and vote is part of the information that feeds the Hawk and Dove perceptions of Istrefi (2017), whenever that information becomes public.

Istrefi (2017) collects the perceptions of Fed watchers and other analysts about individual FOMC members as reflected in the US newspapers and builds a hawk–dove index of the FOMC. The Hawk-Dove index is based on human readings 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.[6] This period comprises the FOMC under seven Federal Reserve Chair persons: William McChesney Martin, Arthur Burns, William G Miller, Paul Volcker, Alan Greenspan, Ben Bernanke and 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. Thus, the perception on the type can be fed from information on personal background, political interests, political supporters, on economic beliefs (expressed in member's writings, testimonies and speeches before joining and during time at the Fed) and from policy actions (votes and dissents) as they become public.

At each point in time, for each FOMC member, the observation on the type is based on a common definition, which is the policy leaning with respect to the dual mandate of the Fed: maximum employment and stable prices. Although the index is expressed in terms of hawks and doves, its measurement takes into account that newspapers have summarized FOMC member's type in different terms over time, for instance as a conservative, a liberal, an easy money person or tight money person during the 1960s to 1980s and later mostly as inflation dove or inflation hawk, among other terms. Furthermore, the perception on the type is also informed whenever newspapers cite FOMC members positions with respect to the actual or future inflation and economic growth (unemployment, recession risks) or their preferred direction of policy. For instance, the New York Times in 1975 writes: "*Mr. Burns and his colleagues, maintain the critics, first helped bring on the recession by tightening up on the money supply and forcing interest rates too high, and now are prolonging the economic downturn by being overly concerned with inflation rather than fighting recession.*"[7]

Figure 1 shows the share of hawks (in red color) and doves (in blue color) at the FOMC as perceived in real time, quantified in Istrefi (2017). These shares vary considerably over time, featuring hawkish and dovish majorities, due to several factors.

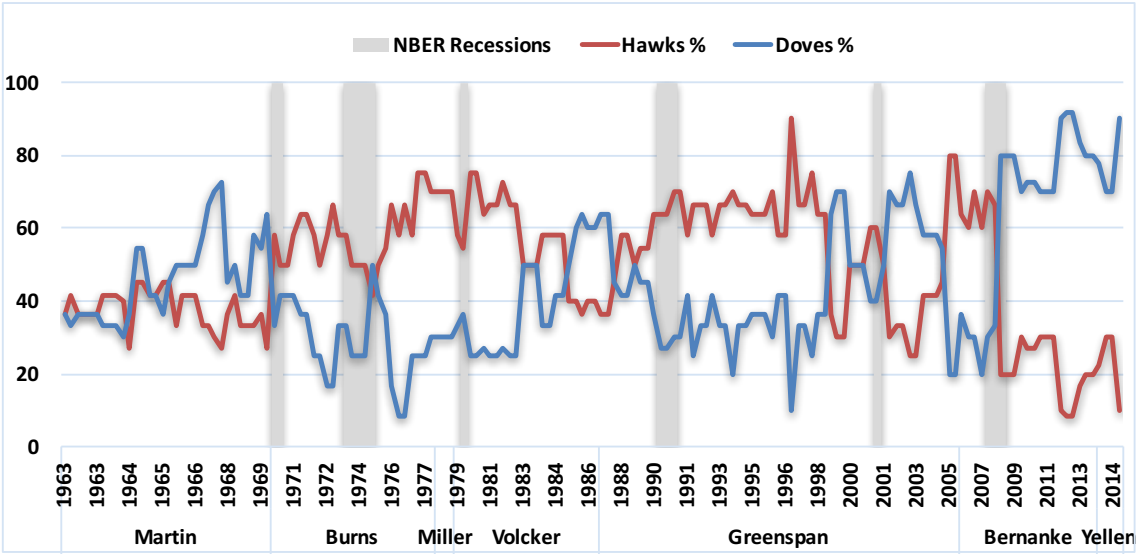
One important factor is the annual rotation of voting rights of Reserve Bank Presidents. The FOMC is comprised of seven members of the Board of Governors and five Reserve Bank presidents. Federal Reserve of New York is a permanent voter

[6] Due to the particularity of the exercise the process involved human reading rather than text mining/reading algorithms. For more details please see Istrefi (2017).

[7] "ROUNDUP: America's Money Managers", *New York Times*, 6 April 1975.

and four of the remaining eleven Reserve Bank presidents serve one-year terms on a pre-established rotating basis.[8] As such, the majorities of hawks and doves can change every year due to a new configuration of the FOMC. These majorities change also due to the turnover of members, which is high especially for the Board of Governors. For instance, during the 1970s, eight new Governors joined the FOMC (not counting three new Fed Chairs in this period, Burns, Miller and Volcker). The same pattern is observed for the whole sample, with at least nine new Governors each decade and with up to three changes in a year.

Figure 1: Perceived preferences of the FOMC



Notes: The share of perceived hawks and doves for each FOMC (beginning and end of year), from 1963 to 2015. Perceived preferences are followed in "real time", where the assigned preference of FOMC members in a meeting m, year t is based on perceptions before meeting m. In the chart, the share does not always add up to 100, as it can be that the policy preference of one or more members is not known yet. Source: Istrefi (2017).

Another source of variation is the perception that a FOMC member swung from being a hawk to a dove or vice versa, over the FOMC tenure. While the categorization as hawk and dove is with respect to the leanings of FOMC members towards the same dual mandate of the Federal Reserve over time, the economic situation that they have faced during their tenure has differed. As such, the time dimension of the hawk and dove perception is conditional on the times they served and people they served with. Looking at how perceptions of each member evolved over their whole FOMC tenure, Istrefi (2017) observed that some members are perceived consistently as either hawks or doves (69 percent of the sample) and some others perceived as

[8]The rotating seats are filled from the following four groups of Banks, one Bank president from each group: Boston, Philadelphia, and Richmond; Cleveland and Chicago; Atlanta, St. Louis, and Dallas; and Minneapolis, Kansas City, and San Francisco.

switching camps over their tenure (i.e swingers, 24 percent).[9] 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", switching camps either for some years or those members perceived as having a complete "change of heart".[10]

Istrefi (2017) shows that the evolution of Hawk/Dove measure matches well with narratives on monetary policy in the US, with voting patterns (dissents) of the FOMC, with forecasting patterns of the FOMC and with preferred interest rates as measured by Chappell et al. (2005). In Figure 1, the evolution of the measure during mid-1960 to 1990 is particularly interesting, corresponding with the rise of inflation and ending with Volcker's disinflation. Istrefi (2017) provides a detailed discussion on how Martin's, Burns' and Miller's FOMCs were perceived in this period. For instance, during the 1970s the FOMC is perceived to be hawkish, which sounds surprising ex-post knowing the evolution of inflation during these years. However, the perceived inflation-averse FOMC during the 1970s goes in line with the policymakers' misperceptions' hypothesis (see Orphanides (2003), DeLong (1997), Romer and Romer (2002) and Primiceri (2006)). This literature argues that bad inflation outcomes of the 1970s reflect mistakes of well-meaning, optimally behaving central bankers, given what they knew about the economy in real time. Furthermore, Istrefi (2017) shows that a part of the real time hawks of 1970s is made of swingers (situational hawks).

Table 1 presents some summary statistics with respect to the three types, part of our investigation in the rest of the paper: persistent hawks, persistent doves and swingers. 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 14 of them) started their tenure from the 1990s onwards, which is a period characterised by a dovish trend in male FOMC members as well. For instance, for the period 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 democrat president. Besides, women perceived as hawkish or swingers have all but one represented regional

[9]The rest remained an unknown quantity to markets.

[10]The most recent example of a swing is that of Narayana Kocherlakota (FRB of Minneapolis, 2009-2015), who in 2011 made a (highly publicised) shift from being a noted hawk to becoming a dove.

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	1	7.7
Education, Subject					
Econ./Pol. Economy	35	29	19	1	65.6
Other	15	9	12	8	34.4
Religion					
Mainline Protestants	16	5	9	4	26.2
Catholics	3	0	3	1	5.4
Jewish	8	9	4	0	16.2
Mormon	1	0	0	0	0.8
Last job prior FOMC					
Federal Reserve	17	10	12	5	34.1
Government/public sector	15	12	8	1	27.9
Banking	6	9	5	2	17.1
Academia	4	5	3	0	9.3
Other (Industry, Army)	9	3	3	0	11.6
Tenure (in years)					
Min	1.3	1.4	3.8	1.1	
Median	6.7	5.3	10.8	2.3	
Max	24.5	19.3	20.3	8.1	
All (%)	39.2	30.0	23.8	6.9	

Notes: Summary statistics for a total of 130 members serving in the FOMC during the period of 1960 to 2015. 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.

Federal Reserve Banks. Interestingly, half of them have represented the Cleveland Fed, known for a high inflation-fighting appetite (Horn and Mester). This goes in line with the overall observation that within the FOMC composition, Reserve Bank presidents are systematically perceived as more hawkish and the Board of Governors members as more dovish.

In terms of education, about 60 percent of FOMC members have a doctorate degree (either a PhD in Economics or a JD Law). On 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. Looking at religion (data only for the 48 percent of the sample), we observe that Protestants tend to be hawkish, Jewish slightly dovish and Catholics in the middle.[11] In the following we discuss in more detail how some of these characteristics relate to the preference perceptions of FOMC members.

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 life experience. 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 in detail some background characteristics and the economic environment during 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.[12] 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. Given that FOMC members are considered as

[11] This categorisation lines up with voting in US presidential elections. The subtleties of denomination would give a more nuanced picture.

[12] See Rodrik (2014) for a discussion.

technocrats, the institutions where these people studied (including the influence of teachers/mentors they had) could be natural habitats where their core economic ideas are formed.[13] 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. 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.[14,15] 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.[16] The debate was especially heated during the 1970s following an even older division between the monetarists and the Keynesians.[17] In the 'freshwater' group we have universities like Chicago, Carnegie Mellon University, UCLA and Johns Hopkins University while in the 'saltwater' group we have Harvard, Yale, MIT, and Berkeley, among others in each group.[18] About half of the FOMC members in our sample

[13]Interview with Milton Friedman in Snowdon and Vane (1997): "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.

[14]The average age at entry to a US PhD programme is 25-27 years (Stock and Siegfried (2001), Stock et al. (2011).

[15]Keynes (1936) on ideas and age: "There are not many who are influenced by new theories after they are twenty-five or thirty-years of age".

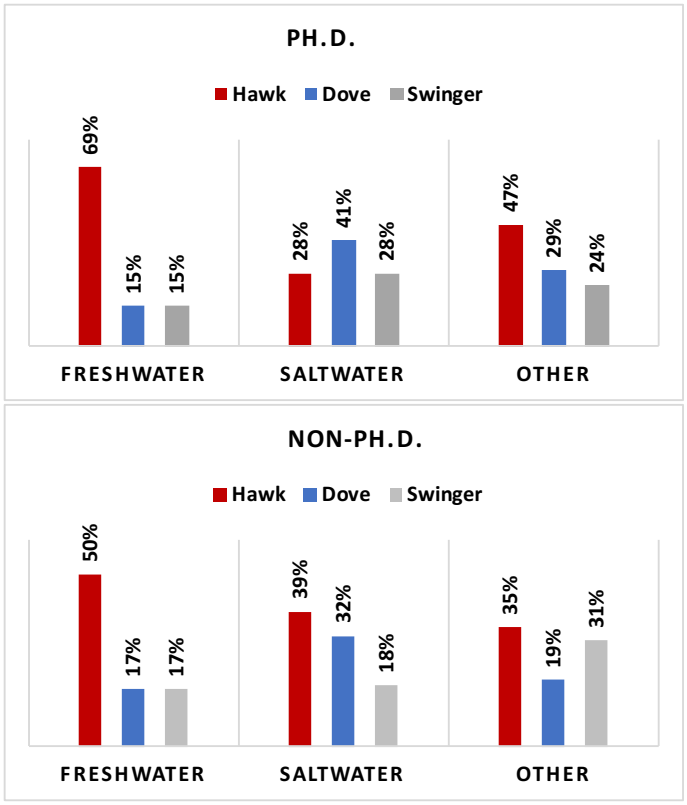
[16]These categories relate to the geographical location of universities with different views in macroeconomics ('freshwater' being closer to the Great Lakes in the US than to an ocean, and 'saltwater' being closer to an ocean).

[17]Hall (1976) was first to refer to the divide between 'freshwater' and 'saltwater' macroeconomists. As he wrote at the time: "As a gross oversimplification, current thought can be divided into two schools. The freshwater view holds that fluctuations are largely attributable to supply shifts and that the government is essentially incapable of affecting the level of economic activity. The salt water view holds shifts in demand responsible for fluctuations and thinks government policies (at least monetary policy) is capable of affecting demand."

[18]The geography of some schools has shifted over time, as there are several exports from one school to another.

(53 percent) hold a Ph.D. in Economics, all being graduated between 1928 to 1990, years when the divide between the two schools was certainly more important than today.[19,20]

Figure 2: 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.

Figure 2 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 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' PhD graduates are

[19]The majority graduated at a 'saltwater' university, owing to the high number of graduates from Harvard University (true for the non-PhDs too).

[20]Onder and Tervio (2015) suggest that the divide in economics exists even nowdays, at least when considering the citation networks. Using citation data between top economics journals from 1990 to 2010 they find a significant division between top universities, which is consistent with what is commonly thought as the divide between 'freshwater' and 'saltwater' schools. The "freshwater-saltwater divide" appears to be especially important for macroeconomics and econometrics.

statistically different from each other (p-value of 0.008 and 0.08, respectively). These matches are not as striking for the non-PhD group (bachelor's, master's, MBA), where most are perceived as hawks irrespective of the school type. 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.

In our discussion, going to a 'freshwater' or 'saltwater' graduate school is exogenous to the hawk-dove perception which is attributed later when these people become FOMC members. However, the choice of going to a particular graduate school might not be an exogenous trait per se. 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, literature suggests that family environment influences education and political participation (see 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.

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. In this regard, Friedman said: "*Put yourself in 1932 with a quarter of the population unemployed. What was the important urgent problem? It was obviously economics and so there was never any hesitation on my part to study economics.*"[21] Along these lines, Samuelson, Phelps, Solow and many others considered the Great Depression as the most serious economic catastrophe they experienced (Horn, 2009). Unsurprisingly, times of economic hardship also influence preferences for social and economic policy. Research shows that 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 (2000) concludes that the Great Depression memories are the "truest" cause for the great inflation of the 1970s.[22]

[21] Interview with Milton Friedman in 1996 in Snowdon and Vane (1997).

[22] The shadows of the Great Depression are also observed in the discussions of FOMC members. An article in the Wall Street Journal in 1974 cites a speech by Fed Governor John E. Sheehan as he refers to Friedman blaming the Federal Reserve for inflation. "Mr. Sheehan didn't argue with this [the economists'] analysis. "There isn't any lack of understanding on our board, nor lack of

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.[23] Beyond the intellectual choice, Malmendier et al. (2017) show that inflation experiences influence monetary policy views and the stated beliefs of these central bankers about future inflation. Using an estimated adaptive learning rule based on the lifetime inflation data of FOMC members since 1951, they show that experience-based inflation forecasts have significant predictive power for members' FOMC voting decisions, the hawkishness of the tone of their speeches, as well as the heterogeneity in their semi-annual inflation projections.

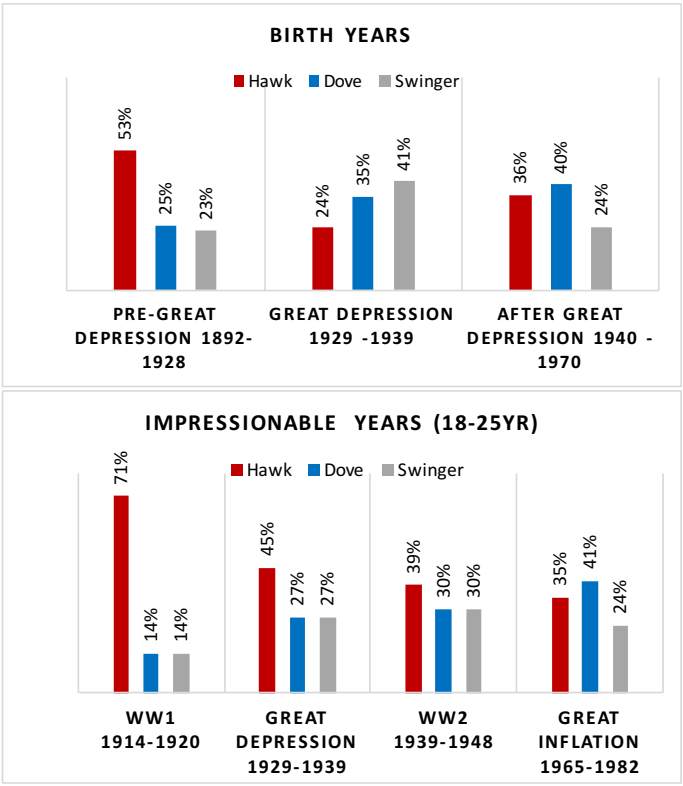
How does life experience prior to serving on the FOMC square with the hawkish and dovish preferences of our FOMC members? In our sample, birth years of FOMC members fall between 1892 and 1970. This period includes four great events: World War I, World War II, the Great Depression and the Great Inflation 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 emphasises 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 in their lives. Indebtedness, income loss and unstable work increased the economic pressure felt by families, in turn affecting also the quality of marriages and parenting. For instance, 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

courage either," he said heatedly. But he added that a sharp cutback in money expansion would stall the economy and "would result in 15 to 20 percent unemployment by year-end, with 35 to 40 percent black unemployment and zero employment for black teen-agers. 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," said Mr. Sheehan." ("Fed's Sheehan Warns Against Big Effort to Squeeze Inflation", *Wall Street Journal*, 29 March 1974).

[23] "Inflation memories run deep at central banks", Reuters, 29 July, 2009.

sister and listening to the difficult stories of defeat and destruction during the Great Depression.[24]

Figure 3: Great event memories run deep



Notes: WWI (1914-1924) and WWII (1939-1949), each period includes the years of the war plus post-war inflation years. Left panel: all FOMC members (n=119, excluding the unknown types); right panel: only FOMC members with impressionable years in the defined periods (n=89). The impressionable years are defined as ages of 18 to 25.

Figure 3 (top panel) displays the share of hawks, doves and swingers born before, during and after the Great Depression (corresponding to 59, 14 and 55 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).[25] The share of doves rose within the Great Depression and more significantly after it (p-value of 0.42 and of 0.10, respectively). Swingers had the largest rise within the Great Depression (p-value of 0.07). Some of the Great Depression-born children are the Fed Governors Nancy Teeters, Martha R. Seger, John E. Sheehan and Jeffrey Bucher, all perceived as doves. In addition, there is Governor Philip C. Jackson and Theodore H. Roberts of the St. Louis Fed who are perceived as hawks and several swingers like, Fed

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

[25]Pre-Depression children as Federal Reserve chairs: Martin (hawk), Burns (hawk), Miller (dove), Volcker (hawk) and Greenspan (swinger). Post-Great Depression children as Federal Reserve chairs: Bernanke (dove) and Yellen (dove).

Governor Wayne D. Angell, Edward W. Kelley and Silas Keehn of the Chicago Fed.

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.[26] This investigation is once more motivated by the literature in political science and social psychology which suggests that people form their core economic and political beliefs mostly during the early stages of life (age 18 to 25), which then remain fairly unaltered for the rest of their lives.[27] These preferences could relate to the family and the education environment but also to the economic environment. For instance, Giuliano and Spilimbergo (2014) show that growing up in a recession affects people's preferences towards more government redistribution and support for left-wing parties.

Figure 3 (bottom panel) shows that the share of hawks is highest within cohorts with impressionable years during WWI (1914-1924). The WWI period corresponds to years when the inflation rate reached 23.7 percent, the highest rate of the 20th century (see Table 2). Further, the share of hawks drops while there is a build-up in the share of doves and swingers within the Great Depression, WWII and the Great Inflation cohorts. The Great Depression is considered as the worst economic downturn in the history of the industrialized world. It was long and painful. The peak-to-trough decline in real gross domestic product (GDP) was 30 percent. The unemployment rate escalated to 25 percent. The Great Depression was a defining event, sparking fundamental changes in economic institutions, macroeconomic policy, and economic theory (Bordo et al. (1998)). In turn, the WWII and Great Inflation periods both displayed a combination of high inflation and unemployment, raising the importance of inflation-unemployment trade-offs. Inflation during the Great Inflation period of the 1970s reached levels up to 14 percent, however this level is lower than the levels experienced in the two world wars (23.7 and 19.7 percent, respectively).[28]

[26] Some members have impressionable years both during WWI and the Great Depression. This calculation includes only those that have unique impressionable years during the Great Depression.

[27] Newcomb et al. (1967), Sears (1975) and Krosnick and Alwin (1989), among others, show that political preferences formed during impressionable years are long lasting and difficult to change later in life.

[28] Schuman and Scott (1989) conducted a study on generations and collective memories of American citizens in 1985. In a survey, a sample of 1,410 Americans were asked 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. They also show that these memories are structured by age, with WWII or the Great Depression being more recalled by those that experienced them in their teens or early 20s.

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 (1914-1924) and WWII (1939-1949), each include the years of the war plus post-war inflation years.

3.3 The ideology of the party or the bank which appointed the FOMC member

FOMC members are appointed in their positions. Governors are appointed by the US president, with the approval of the US Senate, for 14-year terms. Each Reserve Bank 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. However, those commenting on monetary policy always look at the ideology of the appointer to guess the policy leanings of their appointees. After all, at least with respect to politics and macroeconomic policies, there is a large literature on partisanship of monetary policy that might justify looking for clues in this direction. The perception of partisanship 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.[29]

Narrative records in the media show that partisanship perceptions are applied particularly to FOMC members who have not yet signaled their views on monetary policy through previous speeches or academic work, as this example from Reuters shows: "*The Federal Open Market Committee meeting next month is unlikely to be influenced much by its two new members, Alice Rivlin and Laurence Meyer, monetary experts said. But many expect that in the long run the two Clinton appointees may shift the focus of the Fed more toward economic growth.*"[30] Therefore, as a first guess, the preference of the corresponding FOMC appointee is expected to

[29]This view is known as the 'Partisan theory' of monetary policy. It was first formulated by Hibbs (1977), who argued that leftist parties in Europe and the Democratic Party in the U.S. have been more likely to choose a point on the Phillips curve with higher inflation and less unemployment than conservative parties in Europe and the Republican Party in the US. This view has found empirical support in Beck (1982), Stein (1985) and Alesina and Sachs (1982), among others.

[30]"Little impact seen on July FOMC from new members", 20 June 1996, Reuters News.

be aligned with that of the appointer. However, initial perceptions can be further updated as more information on the actions of specific FOMC member becomes publicly known. Often, the additional information confirms first perceptions (the case of Rivlin). However, the opposite is also true (the case of Meyer) suggesting that hawk-dove labels do not always correlate with the members' party affiliations or party's preferences.[31]

FOMC members themselves never fail to stress that political or institutional philosophies get checked at the door and that their views on interest rates bear little if any relation to their politics. For instance, Greider (1987) (pg 73-74) refers to Nancy Teeters (1978-1984), a Board Governor nominated by Jimmy Carter, recalling a conversation with Arthur Burns at a dinner party: "*I said, "Arthur, you don't want someone like me on the Board of Governors with my liberal background." Arthur said, "Don't worry Nancy, within six months, you will think just like a central banker.*"[32] Edward W. Kelley (Board of Governors, 1987–2001) also points toward no political partisanship inside the Federal Reserve, as below:[33]

> REGION: *You and Chairman Greenspan are the two remaining Reagan appointees. Any significance?*
> KELLEY: At the Federal Reserve I am happy to say it has no significance whatsoever. There is a long tradition here—that is in my experience scrupulously observed—that there is no politically partisan component that interjects itself into the work of this central bank. We all either arrive with or very quickly adopt the viewpoint that our sole and only constituent is the American people and their economy. You will never be able to identify a partisan consideration in the discussions around this building.
> REGION: *Political philosophies get checked at the door?*
> KELLEY: Political philosophies get checked at the door. People maintain their own personal convictions and interests and networks. That's fine and that's appropriate, but in terms of the work of the Federal

[31] In 1975, Burns wrote a letter to President Ford presenting his recommendation for Philip C. Jackson as the leading candidate to replace Sheehan who was resigning. Burns wrote that "the principal criteria I have been using in evaluating candidates are knowledge of the fields of finance and housing, managerial competence, strength of character and reputation, and broad economic understanding." A CV of Jackson is attached to the letter. In the CV it is written that Mr. Jackson is a Democrat. The Burns memorandum was returned in the President's outbox with the following notation from Jerry Jones to Bill Walker: "Arthur Burns gave me the attached. I told him to find out if Jackson is a working Dem or just a Dem by registration". Jackson was later confirmed as a Board Governor. He served for about three years and was perceived as a persistent hawk.

[32] Nancy Teeters (Board Governor, 1978-1984) was a persistent dove.

[33] The Region, September 1999 Issue, Minneapolis Fed.

Reserve, I have never seen it emerge as a factor.

With these considerations in mind, in the following we examine the types of FOMC members (hawk, dove or swinger) in relation to the ideology of who appointed them, i.e. Board governors versus the party of the US presidents and at Regional Fed presidents versus the Regional Federal Reserve bank they represent. In our sample, we have 57 Board governors, 54 percent of whom are nominated by Republican presidents and 46 percent by Democratic presidents. The Republican nominees can be further divided in two groups, the traditional Republicans and the supply-side Republicans, the latter corresponding to the Reagan presidency, which nominated about 14 percent of total Board members.[34]

What types have the Republican and Democrat presidents picked for the Board? Indeed, Democratic nominees have been mostly perceived as doves (p-value of 0.06) and very few as hawks. The share of hawks does appear higher within Republican nominees (p-value of 0.10) but a slightly higher share of them is also perceived as doves (top panel of Figure 4).[35] For instance, President Bush nominated eight Board members, four of which are perceived as doves, two as hawks and two as swingers. Furthermore, the supply side Republican nominations (President Reagan nominations) were perceived mostly as swingers and doves. This choice is not very surprising. First of all, 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 US president appoints the Board members, 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. Our data show that 70% of the Board Governors in our sample were confirmed in a Democratic-majority Senate.

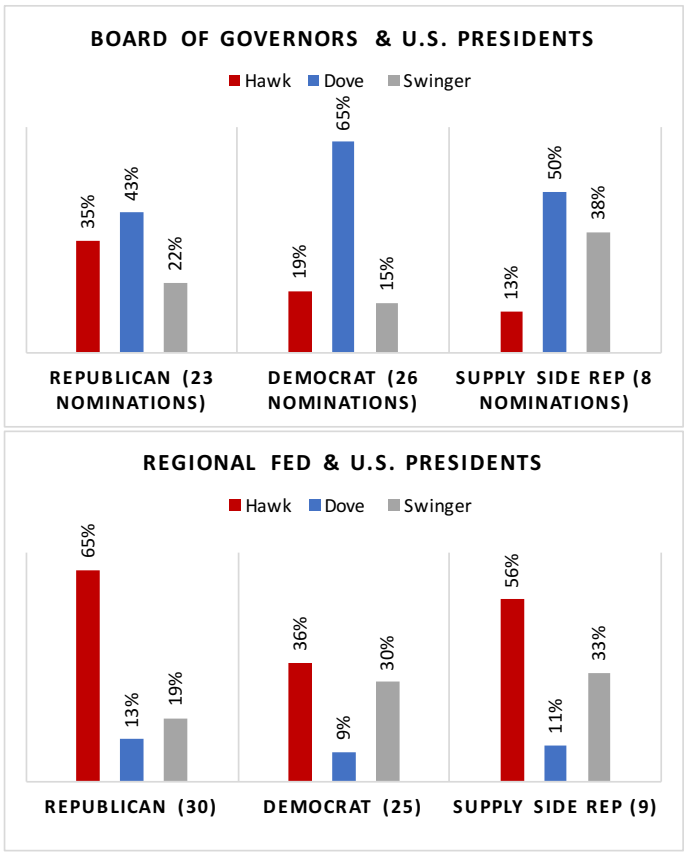
In contrast, when looking at Regional Fed presidents (Figure 4, bottom panel), we observe a high share of hawks irrespective of the president's party. Nevertheless, even within the regional Fed president nominations, the share of hawks is higher under the Republican than Democrat Presidents (p-value of 0.07) and the share of swingers increases under a Democrat or supply side President (p-value of 0.05 and 0.20).[36]

Regional Fed presidents are appointed by their Bank's board of directors, and

[34] Havrilesky and Gildea (1989) divides the Republican nominees into these two groups. Looking at FOMC dissents they have found the 'supply side' nominees of Reagan to lean towards easier monetary policies.

[35] Blinder and Reis (2005) argue that "a generation ago, monetary policy decisions had a clearly partisan cast: Democrats were typically softer on inflation than Republicans, who in turn seemed less concerned than Democrats about growth and employment. Those days are long gone now—and good riddance. While the FOMC has had its 'hawks' and 'doves' these labels have not correlated

Figure 4: 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. On the top panel, supply side republican refer to Reagan and his nominations. The panel on the bottom abstracts from the regional Fed presidents for which the monetary policy preference remained unknown, therefore the sums do not add to 100%.

as such these appointments are not followed closely in relation to politics. Given that the Board of Governors approves these nominations, political influence on the choice could be transmitted indirectly through this link. However, this link could be weak, especially for regional Feds that have a long tradition of institutional ideology that they follow. For instance, the Federal Reserve Bank of St. Louis is often cited as the 'symbol of the monetarist school of economics' or the Cleveland Fed as having 'outspoken, inflation-fighting roots'.[37] In this respect, Fed presidents are often discussed as being picked for having beliefs that go in line with those of the regional Fed they represent. When the beliefs of Fed presidents are hard to pin down ex ante, the first guess is that they might follow the line of ideology or the tradition

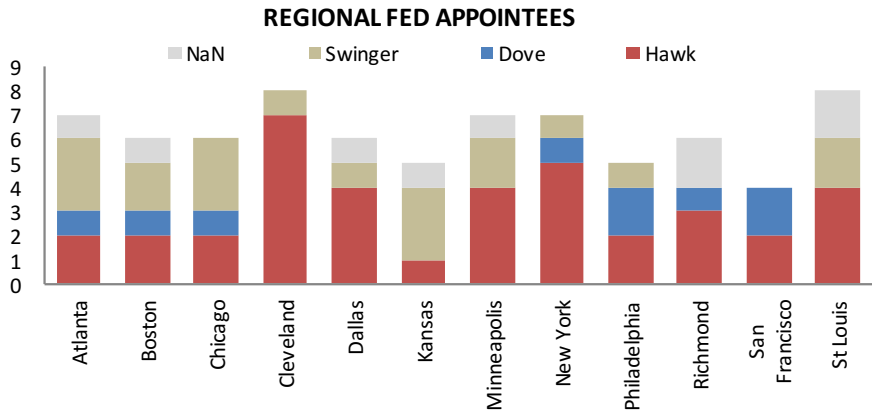
with the members' party affiliations in recent decades."

[36]The sample of supply side nominated FOMC members is small for meaningful conclusions.

[37]Back in the 1960s, the St. Louis Fed was considered the research arm of the University of Chicago. Milton Friedman was a student of Homer Jones, who was the research director and later senior vice president at the St. Louis Fed during 1958-1986.

of the appointer. For instance, the New York Times in 1985 writes, "Robert P. Forrestal of the Atlanta Fed is too new to peg, but the bank he runs leans toward monetarism."[38]

Figure 5: Ideology in the regional Fed presidents?



Notes: Sample in the figure comprises all the FOMC members that have served at the FOMC during 1960-2015: a total of 74 Fed regional presidents, including those that moved from a Fed president to a Board of Governor position like Volcker, Coldwell and Yellen.

Figure 5 shows that several regional Feds have had presidents predominantly perceived as hawks: the Cleveland Fed (i.e. Winn, Jordan, Hoskins, Mester), the Dallas Fed (i.e. Coldwell, Boykin, Fisher), the New York Fed (i.e. Hayes, Corrigan, Volcker, Geithner) or the St. Louis Fed (i.e. Roberts, Roos, Poole, Bullard). Swingers, the most common type after hawks, are mainly perceived in the Atlanta Fed (Forrestal, Guynn, Patterson) and the Kansas City Fed (Clay, Guffey, Hoenig). Doves are mostly perceived in Philadelphia Fed (Boehne, Bopp) and San Francisco Fed (Swan, Yellen). Beyond the 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*

[38]"Robert P. Forrestal of the Atlanta Fed is too new to peg, but the bank he runs leans toward monetarism." (Monetarists Gain Influence, *New York Times*, 25 February 1985).

fully in tune with the "neo-Keynesian" economics of Gardner Ackley or of Walter Heller (the present and past chairman of the President's Council of Economic Advisors). "I am a neo-Keynesian", he protests."

WSJ, 1967[39]

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 of the Fed 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

"*In contrast, Robert Forrestal, president of the Atlanta Fed, has emerged as the lonesome dove among the presidents. Quiet and unassuming, a lawyer rather than an economist, Mr. Forrestal has made few waves during most of his seven years as a Fed policy maker. But in the past year, he has launched a muted rebellion against the anti-inflation group*".

WSJ, 1991[40]

In relation to economic training, 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). The 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 percent) than within the economist group (23 percent). 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 2). Several articles in the press also point in this direction. For instance, Reuters in

[39]The Wall Street Journal article refers to J Dewey Daane who served in the Board of Governors during 1963-1974. He received a doctorate in public administration in 1949 from Harvard University. Source: "The Changing Fed: New Board Members Bring Liberal, Activist Approach", *Wall Street Journal*, 8 March, 1967.

[40]Robert Forrestal was the President of the FRB Atlanta during 1983–1996. Source: "Inflation Hawks: Fed Banks' Presidents Hold Private Positions but Major Public Role", *Wall Street Journal*, 1 August, 1991.

1991 writes: "*The heads of the Cleveland and Chicago Fed, two major industrial cities, rotate every year. Hoskins will thus be replaced by Keehn, viewed as a more of a pragmatist and in touch with regional business. "Keehn is not an economist and that is paying him a compliment," said one economist. Both Keehn and Forrestal (a lawyer) are expected to go along with the consensus, said Kim Rupert, an economist at MMS International.*"

A simple check of the 'go with the flow' hypothesis is to look at policy votes and particularly who is dissenting (going against the majority and the Fed chair). For the period from 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 percent of these dissents come from the economist group (this also reflecting that the economists are in majority in our sample). Furthermore, the share of those that always agree with the majority on monetary policy decisions is higher for the non-economists group, 60 percent, than the economists group, 34 percent, (p-value of 0.005). Generally, non-economists seem to favour consensus, although within this group there are also 'rebels' with 13 to 25 dissents, a rate of dissent comparable to the most rebellious economist (26). 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).

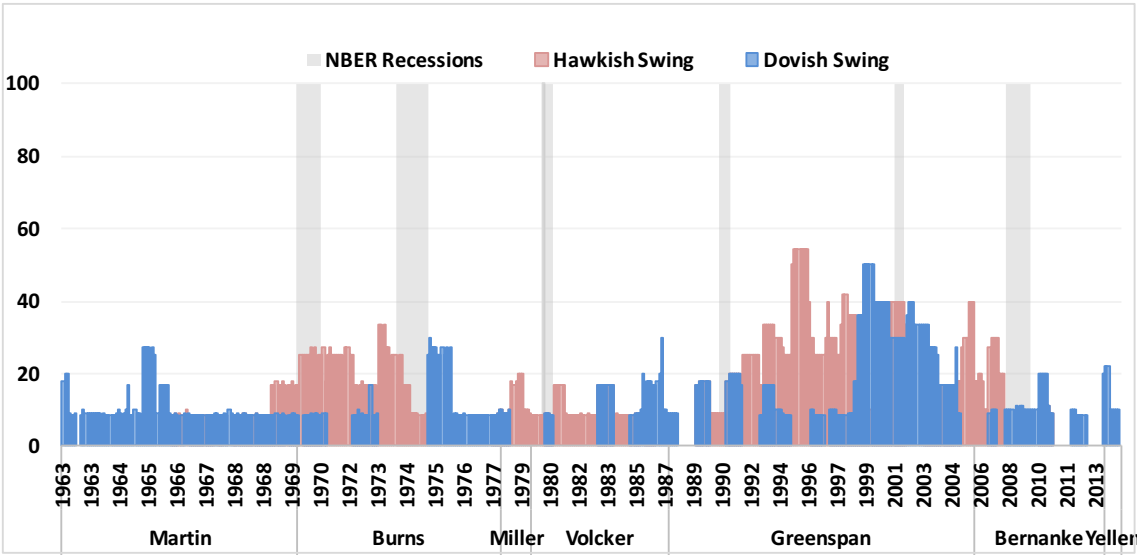
3.4.2 Economic developments during the time spent at the FOMC

Figure 6 shows the 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). While the 'true' swing of an FOMC member might have happened earlier, Figure 6 reports the time when the switch is generally perceived. Overall, we observe regular swings of one or two members in both camps, but also several periods when over 20 percent of the FOMC comprises swingers. Most striking are the perceived swings during the early to mid-1970s and during the 1990s to the mid-2000s.

The hawkish swing perceived in late 1969 to 1974 corresponds with a period where inflation increased from an average of 1.3 percent during the first part of 1960s to 6 percent in 1970, and to 12 percent by 1974. Three Board members stand out as swinging from dove to hawk camps: Robertson, Brimmer and Daane. Until 1967, Robertson (Board of Governors, 1952–1973) was considered as leading the block favoring liberal policy, in contrast to Chairman Martin's block favoring

a harder money policy.[41] Daane (Board of Governors, 1963–1974) was expected to be a 'conservative' appointee of President Kennedy but then by 1965 was seen as switching camps, sometimes on the side of Martin and sometime against.[42]

Figure 6: Swingers in FOMC over time



Notes: Sample in the figure comprises all the FOMC members that have served at the FOMC during 1960-2015.

Lastly, Brimmer (Board of Governors, 1966–1974), when appointed by President Johnson, was also expected to weaken the control of Chairman Martin. At the time of his nomination in 1966, the Los Angeles Times writes: "*President Johnson's surprise appointment of Andrew F. Brimmer as a member of the Fed board will weaken the control of Chairman Martin has exerted for many years. On the other hand by appointing a middle-of-a-roader instead of a flaming liberal, Mr Johnson has probably averted the possibility that Martin will quit. [...] Brimmer and J. Dewey are expected to constitute a pair of swing votes. Liberal Democrats were generally pleased. "Brimer may be a middle -roader," one close to the White House said.*

[41]"But now there are two general groups - one headed by Fed chairman, Martin, and the other by Robertson. In general Martin tends toward a harder money policy [...] Robertson on the other hand, is more inclined towards an easier monetary policy [...]. Joined with Martin in this loose grouping are vice Chairman Balderson and Shepardson. With Robertson are Mitchell and the new member Maisel. Somewhere in the middle is Daane." ("Robertson Shakes Some of the Reserve Out of Federal Reserve Board", Los Angeles Times, 26 September 1965).

[42]"The most interesting testimony however may come from J Dewey Daane, an appointee of President Kennedy and a former assistant secretary of the treasury who believes in the "new economics" of the Kennedy-Johnson era that Martin mistrusts but who cast the key vote in the 4 to 3 decision. Daane is referred to as the board's swing man, sometimes voting with Martin, Balderston and Charles N Shepardson, who usually vote together on board policies and sometimes with Robertson, Mitchell and Maisel, who usually vote as a bloc." ("Rep. Patman Orders Interest Hike Quiz", Chicago Tribune, 8 December 1965).

"But you can bet it's Lyndon's kind of middle road."[43] Nevertheless by 1970, with inflation rising, the three of them, Robertson, Brimmer and Daane, were seen more often on the anti-inflation side of Martin. They were perceived to keep this stance even after Martin's chairmanship ended.

By 1975, with inflation still at double double-digit levels, a dovish swing is perceived for some outspoken anti-inflation hardliners, like Eastburn (FRB Philadelphia, 1970–1981) and Wallich (Board of Governors, 1974–1986). During this period, their actions did not match their words, as they supported an easier monetary stance than the majority. There are several newspaper articles quoting Eastburn talking about the worst peacetime inflation and if inflation is to be moderated, the growth in money must also be moderated.[44] However, in deciding interest rates, Eastburn dissented three times (once in 1973 and two times in 1975) in support of an easier monetary stance than the majority.[45] Similarly, Wallich dissented twice, in 1974 and 1977, in support of easier monetary policy.[46] Wallich was a member of the Board until 1986. From 1978 onwards he was perceived as one of the strongest hawks on inflation.

The second wave of hawkish swingers is perceived during the 1990s. There are several observations regarding this period. First, by the late 1980s there was a surge of inflation, which reached up to 6 percent in 1990. Second, the early 1990s saw intensified discussions on the importance of price stability and aiming for zero inflation. The Reserve Bank of New Zealand introduced inflation targeting in 1989, with annual inflation target of 0 to 2% and in 1991 the Bank of Canada and the federal government agreed on an inflation-targeting regime, with initial targets for the inflation rate of the midpoint of 2-4%. In 1989, a congressional bill (H.J. Res. 409) called on the Federal Reserve "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. However there were expressed differences on

[43] "Federal Reserve Chief's Control Seen Weaker: Brimmer, New Member, Will Probably Vote Occasionally with Liberal Bloc", Los Angeles Times, 27 February 1966.

[44] "Eastburn said if inflation is to be moderated, the growth in money must also be moderated. "Translated into current policy, these lessons mean that the recent 7% growth in money (the narrow money supply) must be moderated over a period of time, and the time could be quite long," he said." ("Fed Presidents Urge Moderate Money Supply", Los Angeles Times, 18 July, 1974).

[45] "Open Market Unit of Fed Voted Nov. 18 to Spur Money Supply", Wall Street Journal, 6 January, 1976.

[46] "But Governors Lilly and Wallich dissented from the decision regarding it as 'more firming' than they considered 'appropriate' in light of their judgment that 'the economic situation wasn't very strong.' Two other committee members dissented for the opposite reason, arguing that the tightening was "an inadequate response to the rapid rates of monetary growth over recent months." ("Plan to Tighten Credit Divided Members Of Fed Policy Committee, Records Show", Wall Street Journal, 24 October, 1977).

exactly how low inflation should be and on the possible negative effects of a zero-inflation plan.

The view on "removing inflation from the economic equation" was endorsed by many FOMC members, including several doves, who constitute the hawkish swings during this period, like Board governors Angell and Kelley.[47]For instance, Reuters writes in 1988 as follows: "*Federal Reserve board governor Wayne Angell said that he will not be satisfied during his tenure with the Fed unless the central bank reduces U.S. inflation to zero. [...] He said the Fed would "take steps designed to bring the inflation rate down to zero."*[48]

The hawkish swing of the early 1990s was soon followed by a dovish swing in the late 1990s and early 2000s. These years correspond with 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 in the FOMC. A noted swinger in this period was Robert D. McTeer, President of the Dallas Fed since 1991. Given his previous background at the Richmond Fed, many observers expected him to have 'a fairly conservative hand' on monetary policy. In line with these expectations, by 1996 McTeer was emphasizing the aim of zero inflation for the Fed. However, by 2001 he was considered as 'the lonesome dove', ranking in the other side of the hawk-dove spectrum.[49]

During this period Greenspan too was part of the swingers, perceived to have switched from a hawk to a dove.[50] For instance, in 2002 the Wall Street Journal writes: "*Former Fed officials said Mr. Kohn's views are close to those of Mr. Greenspan, who has been labeled a dove in recent years for his willingness to see how fast the economy could grow without fueling inflation. Mr. Kohn puts more stock than Mr. Greenspan in standard economic models that associate inflation pressure with very low levels of unemployment and high capacity utilization, those officials*

[47]"Fed's Angell says he seeks to eliminate inflation." Reuters News, 15 June 1988.

[48]"Several Fed presidents like Corrigan, Hoskins, Parry and Black, all known as hawks, testified before Congress in support of a House resolution that calls for zero inflation." ("Fed Presidents Support Zero-Inflation Proposal", The Region, 1 February 1990).

[49]"Some Fed members have sounded increasingly optimistic on productivity, yet the only policy maker to vote against either of the Fed's last two rate increases - on the grounds that productivity has increased the potential for non-inflationary growth - is Dallas Fed chief Robert McTeer." ("Fed's McDonough Says Productivity Will Slow, But Timing Uncertain", Dow Jones Business News, 11 November 1999).

[50]Blinder and Reis (2005) discuss the case of Greenspan: "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 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. But it should have been evident earlier."

said."[51]

3.5 Hawk/Dove preferences at the FOMC level

So far, the analysis at the individual level suggested 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 estimate the impact of both on the variation of the FOMC Hawk-Dove balance, 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. 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.

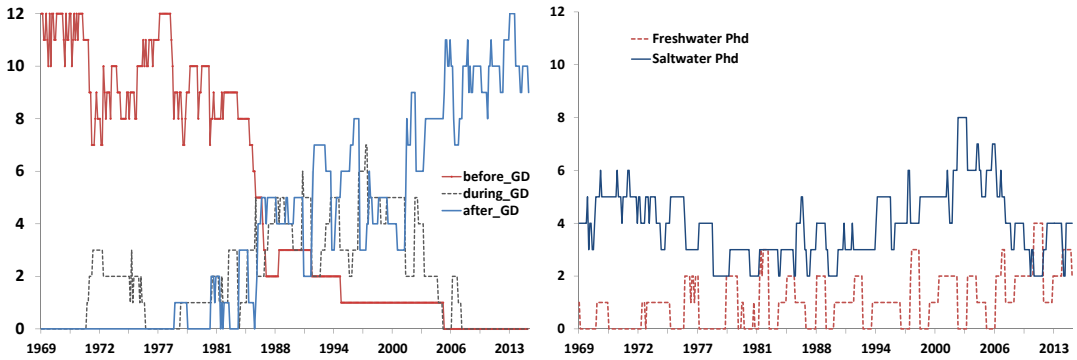
The right panel of Figure 7 shows the composition of the (voting) FOMC in terms of members being born before, during and after the Great Depression. Obviously, due to age constraints, the first cohort is in majority in the FOMC in earlier parts of the sample and the latter cohort is in majority in the last part of our sample. The composition of the FOMC with these three cohorts is relatively mixed only during the mid 1980s to 2000. The left panel of Figure 7 shows the number of (voting) FOMC members with a PhD degree in a 'saltwater' and a 'freshwater' university, in each meeting. We observe that the share of PhD graduates coming from universities related to these two schools of economic thought has varied over time. During the period 1969 to 2015, this share has ranged from 16 to 80 percent, with a clear domination of PhD graduates in the composition of the FOMC in the last two decades. The variation over time is due to the turnover of FOMC members (the Board particularly) and the rotation scheme of the Reserve Bank presidents. We also observe that 'Saltwater' PhD graduates have been consistently in majority, however in the last years the composition is more balanced.

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 are as follows:[52]

[51] "Bush Chooses Two to Fill Fed Vacancies", Wall Street Journal, 9 May 2002.

[52] Our sample ends just before the start of the financial crisis. This choice corresponds with the sample in the Taylor rule analysis that follows. 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 10 years delay.

Figure 7: FOMC composition by birth dates (left) and by ideology by education (right)



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

$$HawkDove_t = \underset{(1.87)}{0.82} + \underset{(0.15)}{0.50} E_{t^-}\pi_{t+2,t+1} + \underset{(0.07)}{0.20} E_{t^-}dy_t + \underset{(0.17)}{0.08} d(beforeGD_t)$$
$$- \underset{(0.22)}{0.22} d(duringGD_t) - \underset{(0.22)}{0.38} d(afterGD_t) + \underset{(0.36)}{0.77} freshPhD_t - \underset{(0.28)}{0.48} saltPhD_t + u_t$$

$$\sigma_u = 2.66, \bar{R}^2 = 0.27$$

where, $HawkDove_t$ is the Istrefi (2017)'s Hawk-Dove balance which is based on public information known up to the day of the FOMC meeting. In this composition, the preference of each voting member is assigned the same weight. E_{t^-} denotes the Board of Governors Research staff's forecasts of macroeconomic variable 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 output; $d(beforeGD_t)$, $d(duringGD_t)$, $d(afterGD_t)$ is the first difference of FOMC members born in respective cohorts; $freshPhD_t$ and $saltPhD_t$ is the number of FOMC members with PhD from 'freshwater' and 'saltwater' universities, respectively; and Newey-West HAC standard errors are in parentheses.

These results show that the state of the economy can explain a part of the variation in the Hawk-Dove Balance, with the balance increasing as expectations for inflation and growth increase. Moreover, the Hawk-Dove balance increases with the number of members born before the Great Depression and decreases with the number of members born during and after the Great Depression. Nevertheless, only the estimate for the latter cohort is statistically different from zero, at 10 percent.

This specification shows that the 'freshwater' and 'saltwater' PhD graduates have a relatively strong effect on the determination of the Hawk-Dove balance of the

FOMC. We find that an additional member with a PhD from a 'freshwater' university increases the Hawk-Dove balance by 0.77 points while an additional graduate from a 'saltwater' university reduces this balance by 0.48 points. These estimates are significant at 5 and 10 percent, respectively.

Overall, these results suggest that having graduated at a 'freshwater' or 'saltwater' university and the period when these members are born matters for the policy preference composition of the FOMC. Nonetheless, even when controlled for the state of the economy, a large part of the variation in the Hawk-Dove balance remains unexplained ($\bar{R}^2 = 0.27$). Among other factors, this variation could be due to the rotation scheme of Reserve Bank presidents and the turnover of members.

4 Hawks and Doves and Monetary Policy

Does the composition of the FOMC in terms of hawks and doves affects the setting of the 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).

To proceed, we first purge the variation in the Hawk-Dove balance that is explained by the state of the economy and use the residuals from this estimation in several versions of forecast-based Taylor rules. All estimations are done at the FOMC meeting frequency. Regressing the Hawk-Dove balance on real-time Greenbook forecasts of inflation and growth, for the period 1969:2-2007:6, yields:

$$HawkDove_t = \underset{(0.86)}{-0.65} + \underset{(0.14)}{0.58} E_{t-}\pi_{t+2,t+1} + \underset{(0.07)}{0.14} E_{t-}dy_t + u_t$$

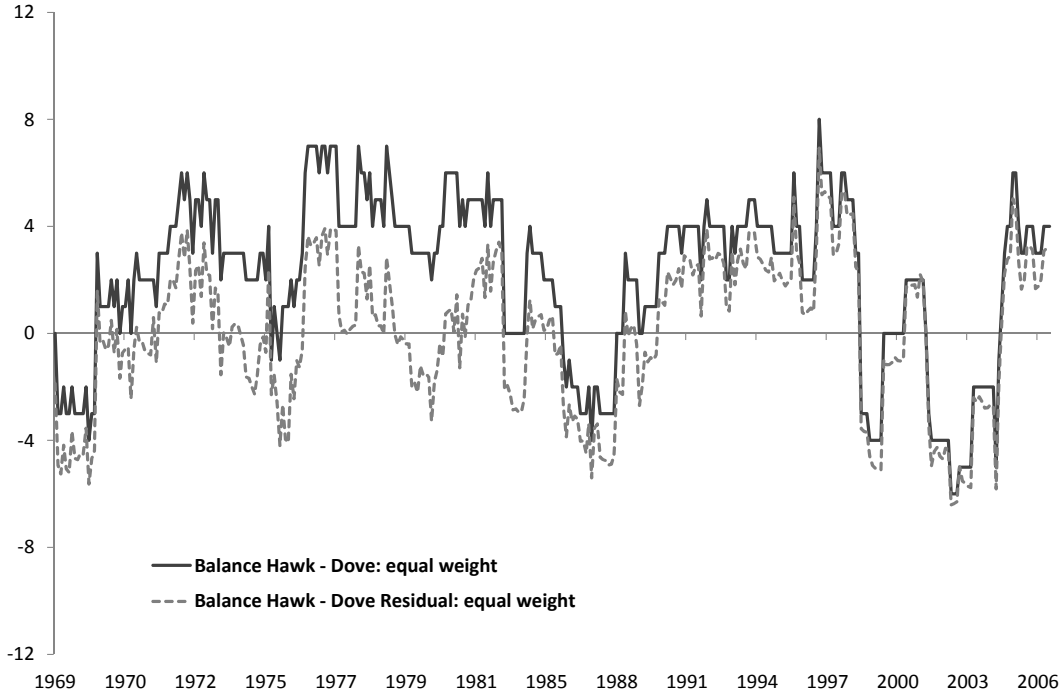
$$\sigma_u = 2.8, \bar{R}^2 = 0.17$$

where, $HawkDove_t$ is the Istrefi (2017)'s Hawk-Dove balance which is based on public information known up to the day of the FOMC meeting. In this composition, the preference of each voting member is assigned the same weight. $E_{t-}\pi_{t+2,t+1}$ is the average Greenbook's forecast of inflation over one and two quarters ahead; $E_{t-}dy_t$ is

the Greenbook forecast for the contemporaneous growth rate of output; and Newey-West HAC standard errors are in parentheses.

A graphical comparison of the estimated residuals and the original, raw Hawk-Dove balance is shown in Figure 8. Overall, the two measures are highly correlated (0.9). The biggest difference is observed during the 1970s and early 1980s, where some hawkish majorities turn dovish when corrected for the state of the economy. This confirms our previous discussion on major swing waves during 1965-2015, where only those in the 1970s and early 1980s seemed related to the state of the economy. Interestingly, dovish majorities in 1969, mid 1970s and around 1980 (1978-1983) correspond with the dovish episodes as discussed in Owyang and Ramey (2004). They arrived at these dates using regime switching methods on realized data on inflation and unemployment over the period 1965:3–1999:2, while our dovish and hawkish episodes are based on ex-ante information (subjective beliefs on the perception of policy preferences and on forecasts of the economy). For the Owyang and Ramey (2004)'s sample, the Hawk-Dove balance shows an additional dovish majority in the last part of 1980s.

Figure 8: Hawk-Dove balance corrected for Greenbook forecasts



Notes: At FOMC meeting frequency, sample period 1969:2 to 2007:6. 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.

In the following, we estimate several Taylor rule specifications, in line with the analysis as in Coibion and Gorodnichenko (2012), where a preferred baseline specification as in equation (1), comprising only the forecasts for inflation, the growth rate

of output and the output gap, is first augmented with various measures of the FOMC composition and lastly with interest rate smoothing and a persistent AR(1) process for the errors, u_t. The latter specification is intended to account for the observed policy inertia in the United States as discussed in Rudebusch (2002), Rudebusch (2006) and Coibion and Gorodnichenko (2012), among others.

We start with a baseline forecast-based Taylor rule as below:

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

where i_t is the target federal fund 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 the interest rate decision, we estimate this Taylor rules 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 IV estimators. This Taylor rule is estimated for the period 1987:11-2007:06. We end the sample just before the financial crisis, thus avoiding periods for which a standard rule with inflation and 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 Federal Reserve resorted to Forward Guidance on rates and balance sheet policies, for which a standard Taylor rule would not be appropriate. The results of this specification are shown in Table 3, column (1). We observe that this baseline specification explains a substantial part of the variation of the FFR, with $R^2 = 0.89$. 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.

Next, we augment the baseline Taylor rule as in equation (1) with the composition of the FOMC as follows:

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

where the $CompFOMC_t$ is the composition of the FOMC as known before the meeting. The FOMC composition variable will take several forms, as described below:

- In a first version, the FOMC composition will be expressed with the corrected Hawk-Dove balance (the residual). In this specification, the preferences of voting FOMC members are assigned equal weight (see Figure 8).

- In a second version, the FOMC composition in terms of hawk and dove preferences assigns a higher weight to the preference of the Fed Chair. The Fed chair can have more power in the decision making process by forging a consensus among the FOMC members and by controlling the agenda of the board and FOMC meetings. The role of the Fed chair versus the FOMC in the monetary policy decision is particularly interesting during the late 1980s to early 1990s. It has been already observed in the literature that between 1987-1993 a bulk of policy decisions did not occur at a formal FOMC meeting, see for instance Cecchetti and Schoenholtz (2019) and Cieslak and Vissing-Jorgensen (2000). At first sight this fact suggests an absolute power of the Fed chair in policy decisions.[53] However, a careful reading of the history of the FOMC decision procedures reveals that, during this period, the FOMC was deciding not only on the current policy but also on a statement about the likely future changes in policy. This statement is referred often in the literature as the Asymmetric Policy Directive. This directive was indicating a bias or the tilt toward easing or tightening and was giving the Fed chairman the possibility to change policy in the inter-meeting period (with or without consulting the FOMC).

  Looking at the data from 1983 to 1999, Thornton and Wheelock (2000) found that inter-meeting policy changes after 1987 were always in the direction specified by the FOMC asymmetric language.[54] Thus, the asymmetric policy directive was giving additional power to the Fed chair, however the Fed chair acted on policy on the direction decided by the FOMC. To account for this discussion, we report the results for the composition that assigns an 80 percent weight to the preference of the Fed Chair, thus giving a high power to the Fed chair in the decision process. The Hawk-Dove balances with different weights of the Fed chair (corrected for the Greenbook forecasts) have a correlation of

[53] Some of the changes in the Fed Fund rate during this period are smaller than 25 basis points and these have been thought as technical adjustments designed to keep reserve markets at the desired level.

[54] Furthermore, Thornton and Wheelock (2000) found evidence that asymmetric language may have helped to build consensus among the voting FOMC members.

0.8. A visualisation of these balances is shown in Appendix.[55]

- In a third version, the FOMC composition is investigated in terms of strong dovish or hawkish majorities. To this aim, a strong hawk majority is a dummy variable that takes the value 1 if the corrected Hawk - Dove balance is greater or equal to its 75th percentile and zero otherwise. A strong dove majority is a dummy variable that takes value 1 if the corrected Hawk - Dove balance is less or equal to its 25th percentile and zero otherwise. The period 1987-2007 shows several short- and long-lived strong majorities. Some notably long-lived majorities are the hawk majority during 1997-1998 and two dove majorities in 1999 and during 2002-2004 (see Figure 9).

- In a fourth version, the FOMC composition is represented by the balance of "freshwater" and "saltwater" PhD graduates in the FOMC.

- Finally, the FOMC composition is represented in terms of cohorts born during and after the Great Depression. We do not include the cohort born before the Great Depression in this analysis. This cohort had been reduced to three members by the date our Taylor Rule analysis starts (in 1987) and by 1995 only one of them was left (see Figure 7).

Columns (2) to (6) in Table 3 show the estimates from equation (2) with its several specification for the FOMC composition. Starting with column (2), the point estimates on the three Greenbook economic variables are very similar to the baseline estimation. In addition, a rise in the Hawk-Dove balance increases the interest rate and this effect is economically significant and statistically different from zero. For instance, increasing the hawkishness of the FOMC, raises the interest rate by 11 basis points. The effect is much higher (around 40 basis points) in the case where the Fed Chair preference has a higher weight (80 percent), as shown in column (3). The statistical properties of the two models show a slight preference for the model with FOMC composition with equal weights.

Similarly, the results are stronger when strong dove and hawk majorities are taken into account (column 4). We find that the variable for the Dove majority has a negative and significant effect on the interest rate: a move to a strong dovish majority reduces the interest rate by 55 basis points. The estimate for the hawkish majority dummy is positive but not statistically different from zero. One reason could be that the strong hawkish majorities appear short lived or correspond with

[55]We have experimented with other weights, 70% or 50% and the results lie between the two versions presented in the paper. We also estimated the Taylor Rules with a sample from 1994 to 2007 and the results are similar. These additional results are available upon request.

Table 3: Taylor Rules estimates over different specifications nesting the corrected Hawk/Dove balance, interest rate smoothing and persistent shocks

Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
Greenbook inflation	1.73***	1.73***	1.74***	1.66***	1.73***	1.73***	0.25***	0.26***	0.20***
	(0.12)	(0.12)	(0.12)	(0.13)	(0.12)	(0.12)	(0.04)	(0.09)	(0.04)
Greenbook output gap	0.67***	0.67***	0.67***	0.65***	0.67***	0.67***	0.09***	0.03*	0.04***
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.02)	(0.02)	(0.01)
Greenbook growth	-0.10	-0.09	-0.09	-0.06	-0.10	-0.10	0.08***	0.1***	0.13***
	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.01)	(0.03)	(0.02)
d(Hawk-Dove, equal)		0.11***					0.03**	0.08*	0.02**
		(0.03)					(0.01)	(0.04)	(0.01)
d(Hawk-Dove, 80% Chair)			0.39***						
			(0.14)						
Dove majority				-0.55***					
				(0.18)					
Hawk majority				0.13					
				(0.17)					
d(Freshwater-Saltwater)					0.09***				
					(0.03)				
d(born during GD)						-0.17**			
						(0.07)			
d(born after GD)						-0.12			
						(0.07)			
Lagged FFR							0.87***	0.87***	0.92***
							(0.02)	(0.04)	(0.02)
Persistent shock, AR(1)							0.13		
							(0.08)		
R^2	0.893	0.898	0.897	0.905	0.895	0.895	0.991	0.971	0.988
s.e.e	0.711	0.698	0.700	0.674	0.708	0.710	0.200	0.571	0.257
AIC	2.182	2.151	2.156	2.086	2.179	2.191	-0.336	1.748	0.154
SIC	2.259	2.248	2.253	2.200	2.277	2.307	-0.200	1.843	0.257

Notes: Columns 1 to 7 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 8 is estimated for the period 1981:2-2007:06 (212 observations) and column 9 is estimated for the period 1984:1-2007:06 (188 observations). All regressions include a constant. d(Hawk-Dove, equal) refers to the first difference of the Hawk-Dove balance, for the composition of the FOMC with equal weights while the d(Hawk-Dove,80% Chair) is the first difference of the 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 majority are the dummy variables as defined in text. d(Freshwater-Saltwater) denotes the first difference of the 'freshwater'-'saltwater' PhD graduates balance and d(born during GD) and d(born after GD) denote the first difference of the composition of the FOMC in terms of cohorts born during and after the Great Depression. With regard to the three 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.

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, in response to which the Federal Reserve decreased rates significantly or postponed raising them.[56] Under the strong hawk and dove majority version the estimate on inflation forecasts is lower than in the previous specifications (1.66 compared to 1.73). However, the effect remains statistically significant and the Taylor Principle is satisfied. Finally, these three specifications of the Taylor rule are statistically preferred to the baseline specification in column (1), in terms of both the fit (R^2) and the AIC and SIC criteria. Among these specifications, the forward-looking Taylor Rule with strong hawk and dove majorities performs the best.[57]

When looking at the deep determinants of the Hawk/Dove preferences, we find that an increase in the balance of 'freshwater' versus 'saltwater' PhD graduates in the FOMC is associated with higher rates (column 5). When looking at early-life experience variable, we observe that an increase in the number of FOMC members born during the Great Depression is associated with lower interest rates (column 6). Both estimates are statistically significant.

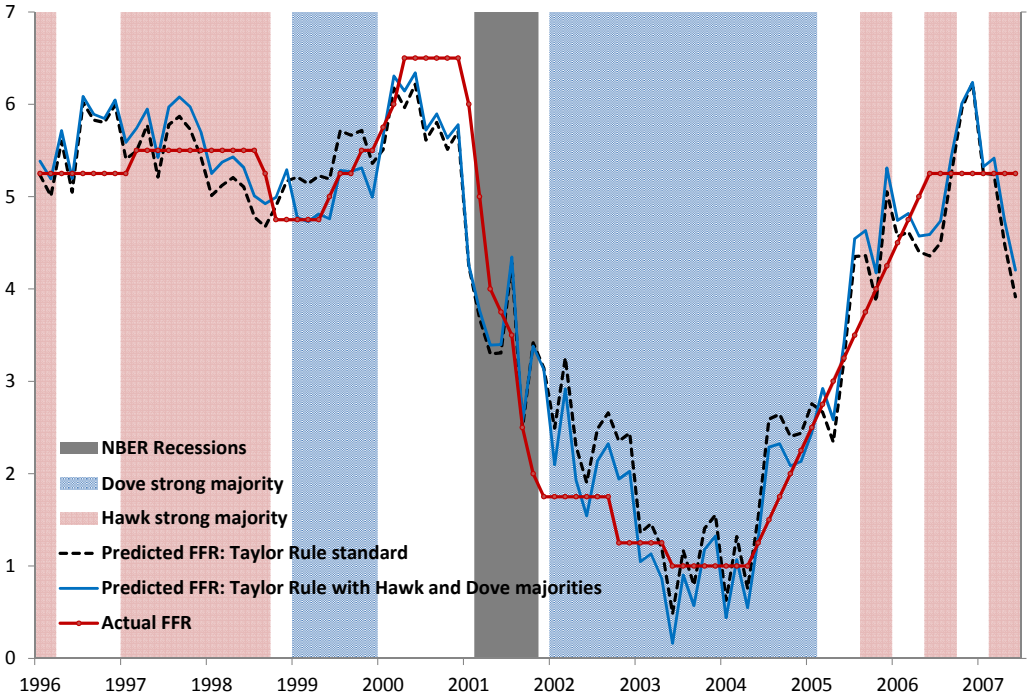
Figure 9 compares the actual FFR with the fitted FFR from the baseline Taylor rule specification as in column (1) and the Taylor rule with strong dove and hawk majorities as in column (4), for the period 1996 to 2007 when the majorities where longer-lived. We also plot the periods with strong Hawk and Dove majorities. From the fit of the Taylor rule with the hawk/dove majority one can observe that interest rate hikes are predicted to be slightly larger under a hawkish majority and slightly smaller under a dovish majority, than the predicted state of the economy would suggest. Similarly, interest rate cuts are predicted to be larger and faster under a strong dovish majority.

There are several interesting periods when the standard Taylor rule and the Taylor Rule with strong hawk/dove majorities differ, like during 1997-1998-1999 and 2001-2003. For instance, Goodfriend (2002) argues that in response to the Asian financial crisis in 1997, the Fed resisted a tightening of monetary policy due to financial market distress but later also postponed a policy easing that the economic conditions suggested. Taylor rule results confirm this (see Figure 9). The Fed

[56] In reviewing the phases of U.S. monetary policy, Goodfriend (2002) argues that during 1997-1998 the financial market distress in response to the two financial crisis became a primary focus of the monetary policy, thus the Fed declined to raise interest rates initially as a standard Taylor rule would suggest.

[57] The Taylor Rule specification with the FOMC composition with equal weights is also statistically preferred to the composition that assigns a higher weight to the Fed chair. This is true even for specifications when the Fed chair is assigned a 70% or 50% weight rather than 80%. These results are available upon request.

Figure 9: 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 majority dummies), Hawk and Dove majorities and the NBER recession (March-November 2001). Data are at FOMC meeting frequency, sample period for the estimation is 1987:11-2007:06.

lowered rates only in September 1998 after the Russian Default in August 1998. In terms of the composition of the FOMC, during the years 1997 to 1998 the FOMC is perceived to have a strong hawkish majority (the longest lived in this sample), supported by perceived hawks both in the Board and from the rotating regional Fed presidents.[58] A major shift occurred in 1999, when the FOMC is perceived to have switched from a strong hawkish majority to a strong dovish majority. The standard Taylor rule for 1999 suggests a more contractionary monetary policy however the Taylor rule with the hawk/dove majority shows inaction for four meetings and then a hike, closer to the true behaviour of the FOMC (the hike came after three meetings).

The switch to a dovish majority happened exactly at the first meeting of the year of the FOMC, which corresponds with a new composition of FOMC members reflecting the standard annual rotation of Reserve Bank presidents with voting rights.[59] Istrefi (2017)'s Hawk-Dove measure shows that due to the rotation scheme,

[58]However, during 1997 perceptions about Greenspan changed from a hawk to a dove and by the end of 1998, also McDonough, the New York Fed President, was perceived as a dove. His dovish swing was already counted in the two last meetings of the FOMC in 1998 when the strong hawkish majority (controlled for the state of the economy) ended.

[59]The FOMC is composed of 12 members - the seven members of the Board of Governors and five of the 12 Reserve Bank presidents. The president of the Federal Reserve Bank of New York is a permanent member of the Committee while the presidents of the other Reserve Banks fill the

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 Reserve Banks 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 that specific time.

This case is also supported by the version of the Taylor rule with the FOMC composition expressed by the number of 'freshwater' and 'saltwater' PhD graduates. The rotation of Federal Bank presidents in 1998, increases the number of 'freshwater' PhD graduates from zero in 1997 to three in 1998. More specifically, these Fed 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 FOMC in 1999, the number of 'freshwater' graduates goes back to zero and the number of 'saltwater' PhD graduates increases (see Figure 7), thus contributing in this period to a complete shift of the FOMC from a hawkish to a dovish majority (see Figure 9).

Another interesting case is that of the period 2001 to 2002 when the FOMC composition moved from a weak hawkish majority to a strong dovish majority. The shift again occurred at the first meeting of 2002 which corresponds with a new composition of FOMC due to the rotation of Reserve Bank presidents. The rotation in 2002 substituted for four hawks of 2001 with three hawks and a dove in 2002. The additional dove, together with the departure of a hawkish Board member (Kelley) reversed the composition from hawks to doves. Further, during 2002, the dovish majority in the Board strengthened with the departure of the last hawkish Board member (Meyer) and the arrival of two new Board members (Bernanke and Kohn) which were perceived as doves. Taylor rule estimates in this period show that the post-2001 recession FFR cuts were higher than the state of the economy suggested (see Figure 9).

Last, we also estimate a version of the Taylor rule with interest smoothing and persistent monetary shocks. This specification is intended to capture the observed inertia in interest rates, the origins of which have generated a lot of discussion in the

remaining four voting positions on the FOMC on an annual rotating basis.

literature (see among others Rudebusch (2002), Rudebusch (2006) and Coibion and Gorodnichenko (2012)). 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 Federal Reserve's decision-making process. Table 3, column (7) shows the estimates of the specification with interest rate smoothing, a persistent shock and the corrected FOMC hawk-dove balance (equal weights). In this specification the Taylor Principle is satisfied - the implied long-response to inflation (0.25/(1-0.87)) is bigger than 2. Moreover, a higher Hawk-Dove balance increases the interest rate and this effect is statistically different from zero. Differently, the estimate for the persistent shock is not significant.

Results are robust to extending the sample period to 1980s.[60] In column (8) and (9) we estimate the Taylor rule with interest smoothing and the Hawk/Dove composition (equal weights) for a larger sample period, starting from 1981 (when FOMC moved from monthly meetings to 8 meetings per year) and starting from 1984 (when the asymmetric policy directive was in place). A big difference is observed for the output gap forecasts and GDP growth forecast estimates, where the reaction to the latter is estimated to be stronger than compared to post-1987 results. The estimates on the corrected FOMC hawk-dove balance (equal weights) are positive and statistically different from zero.

Overall, our results show that the Hawk/Dove balance is important both statistically and economically, suggesting that the policy preference of FOMC members and its deep determinants that we consider matter in interest rate setting. In some of the specifications, the inclusion of the FOMC hawk and dove composition reinforces (column 3, 8 and 9 especially) or lowers (column 4) the response of the rule to forecasted inflation compared to baseline specification that do not include this composition.

The results above are also confirmed when looking at voting outcomes in terms of dissents.[61] Table 4 shows that hawks have a higher rate of dissents compared to the other types and the majority of their dissents is for tighter policy (about 92 percent,

[60] Output gap back to 1980s follow Orphanides (2003).

[61] Dissents present limited information as they are very rare despite higher internal disagreement before the vote. Many of the FOMC members never dissented during their tenure. In our sample, only 62 percent of FOMC members have dissented at least once and only 37 percent dissented more than twice. From those that dissented more than twice, about half of the dissents are on both the hawkish and the dovish side, therefore not very informative on the type of the member. Istrefi's (2017) hawk-dove index assigns a unique type to 93 percent of FOMC members (Fed chair persons included as usually they do not dissent).

p-value of 0.00). Furthermore, doves dissent for ease (or easier) policy (94 percent, p-value of 0.00) while swingers dissent on both sides, however leaning towards tighter dissents. Hawks and doves have also a higher dissent rate per member, for tighter and easer policy, respectively.[62] Looking at 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 (p-value of 0.000) and have also a higher share of dissents per member (about 4.2 dissents per member). In turn, we observe that members born during the Great Depression have dissented more on the side of easer policy than FOMC members born before or post the Great Depression (p-value of 0.000).

Table 4: Distribution of dissents per FOMC member characteristics

Dissents	**Dissents Total**	**Tighter %**	**Easier %**	**Tighter per member**	**Easier per member**
Preference type					
Hawk	191	91.6	8.4	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	271	59.8	40.2	2.6	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, 63 percent of which were in favor of tighter policy and 37 percent in favor of easier policy. The total number is 436 dissents, corresponding only to dissents from scheduled meetings (excluding conference calls). Four dissents that are not included in these calculations belong to William Treiber (vice president of the New York Fed) that was not a regular member of the FOMC but voted as an alternate.

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 the U.S. polity. 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. These results

[62] Istrefi (2017) observes a good match between perceptions on the type and dissents at each FOMC meeting. In this exercise, perceptions on policy preferences are based on information prior to meeting, thus prior to the vote.

are also important because they reveal that the FOMC may not be as policy neutral as some of the quotes earlier in this paper suggest.

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 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 explain differences in preferences among these members. In addition, being born in a period of high unemployment like the Great Depression or in other periods with very high inflation also seems to matter. They seem to matter not only for the moulding of the policy preference of individual members but also for the overall composition of the FOMC and for its monetary policy-setting.

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. polity.

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 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. We suspect that if we were to do the same analysis 20 years from now, we may not observe such divisions.

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). Moreover, since the Global Financial Crisis the debate has largely been over financial stability, not price stability. Financial stability has become a growing concern of central banks, and a key difference among them is on exactly what role the financial stability objective should play in their policymaking. Should central banks 'lean against the wind' of asset price booms, or 'clean up the mess' after the boom bursts? And if central banks lean against the wind, what tools should they use – macroprudential regulation or their policy interest rates? Although it is too

soon to tell, ideology could still play a role.

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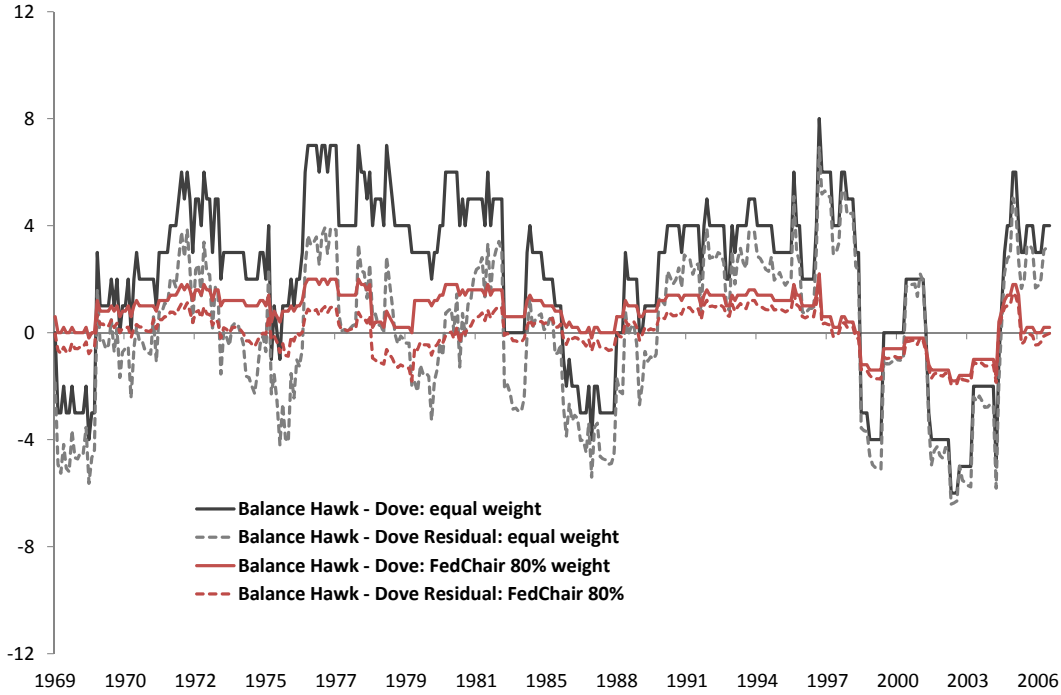
A Hawk-Dove balance with different weights

Figure 10: Hawk-Dove balance corrected for Greenbook forecasts



Notes: At FOMC meeting frequency, sample period 1969:2 to 2007:6. 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.