

Essays on FOMC members' interest rate voting behavior

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Abstract

The present dissertation contains three chapters dealing with the following research questions: what drives dissenting (or inconsistent) voting behavior in the Federal Open Market Committee (FOMC) – the monetary policy making body in the Federal Reserve. Dissenting voting behavior includes disagreement among FOMC members with respect to monetary policy actions proposed by the chairman in FOMC meetings. Since voting protocols of such meetings are published dissenting voting behavior is detectable. Both scientists and practitioners use voting data to predict future interest rate decisions made by the FOMC.

Chapter 1 and Chapter 2 examine determinants of dissenting voting behavior whereas Chapter 3 focuses on inconsistent voting behavior.

Firstly, Chapter 1 uses FOMC members' voting data in the period of 1992 to 2001. The following results can be derived from this study: we find that individual forecasts of key macroeconomic variables, individual background characteristics and political determinants help to explain voting patterns of FOMC members. Using interaction models in an ordered probit framework, we find that FOMC members with longer careers in government, industry, academia, non-governmental organizations (NGOs), or on the staff of the Board of Governors are more focused on output stabilization, while FOMC members with longer careers in the financial sector or on the staffs of regional Federal Reserve Banks are more focused on inflation stabilization.

Secondly, in Chapter 2 we expand our database up to the period 1978 to 2010 and ask whether regional macroeconomic conditions do also explain FOMC members' individual voting behavior. Using random effects ordered logit estimations, we find that FOMC members representing districts with high levels of regional unemployment rates are more likely to vote for monetary ease and less likely to vote for monetary tightening. Expanding our analysis to regional house price dynamics, we find that members representing districts with high regional house prices are more likely to vote for monetary tightening and less likely to vote for monetary easing.

Thirdly, since FOMC members sometimes change their voting behavior within a meeting inconsistent voting is observed. Therefore, in Chapter 3 it is asked why FOMC members may change their interest rate preferences. Verbatim transcripts of FOMC meetings between 1989 and 2008 – provided by the staff of the Board of Governors – reveal that the Federal Reserve's transparency change in 1993 significantly lowered the probability of casting inconsistent votes. What is more, Bank presidents (as well as female members) have a higher probability – on average – to cast inconsistent votes than Board members (male members). Additionally, individual career backgrounds and political aspects explain inconsistent votes as well.

Keywords: FOMC; voting behavior; non-linear estimation techniques

Kurzzusammenfassung

Die vorgelegte Dissertation besteht aus drei Kapiteln und behandelt folgende Forschungsfragen: Was beeinflusst abweichendes (oder inkonsistentes) Abstimmungsverhalten im Federal Open Market Committee (FOMC) – das geldpolitische Entscheidungsorgan der Federal Reserve. Abweichendes Abstimmungsverhalten beinhaltet Unstimmigkeiten zwischen FOMC Mitgliedern bezüglich geldpolitischer Handlungen, die in den FOMC Meetings vom jeweiligen Vorsitzenden vorgeschlagen werden. Da Abstimmungsprotokolle solcher Meetings publiziert werden, kann abweichendes Abstimmungsverhalten beobachtet werden. Wissenschaftler als auch Praktiker nutzen Abstimmungsdaten, um zukünftige Zinsentscheidungen des FOMC prognostizieren zu können.

Kapitel 1 und Kapitel 2 untersuchen Determinanten des abweichenden Abstimmungsverhaltens, wohingegen Kapitel 3 inkonsistentes Abstimmungsverhalten in den Vordergrund rückt.

Erstens, im Kapitel 1 werden Abstimmungsdaten von FOMC Mitgliedern zwischen 1992 und 2001 betrachtet. Folgende Resultate lassen sich von dieser Studie zusammenfassen: Individuelle Prognosen über makroökonomische Schlüsselvariablen, individuelle Karrierehintergründe und politische Determinanten erklären Abstimmungsmuster von FOMC Mitgliedern. Mit der Hilfe von Interaktionsmodellen in einem Ordered-Probit-Modellrahmen zeigen wir, dass sich FOMC Mitglieder mit einem Karrierehintergrund in der Regierung, Industrie, Wissenschaft, Nichtregierungsorganisationen (NROs) oder als Mitarbeiter im Stab des Board of Governors eher auf die Stabilisierung des Outputs konzentrieren, während FOMC Mitglieder mit einem Karrierehintergrund im Finanzsektor oder als Mitarbeiter im Stab einer regionalen Zentralbank eher auf die Stabilisierung der Inflation konzentrieren.

Zweitens, im Kapitel 2 erweitern wir unsere Datenbasis auf den Abschnitt von 1978 bis 2010 und wollen die Frage beantworten, ob regionale makroökonomische Bedingungen ebenfalls beim Abstimmungsverhalten von FOMC Mitgliedern eine Rolle spielen. Wir verwenden Random-Effects-Ordered-Logit-Modelle und schlussfolgern, dass FOMC Mitglieder, die einen Distrikt mit hoher regionaler Arbeitslosigkeit repräsentieren, eine höhere Wahrscheinlichkeit haben, für niedrigere Zinsen abzustimmen und eine niedrigere Wahrscheinlichkeit haben, für höhere Zinsen abzustimmen. Wir erweitern die Betrachtung auf regionale Hauspreise und finden heraus, dass FOMC Mitglieder, die einen Distrikt mit hohen regionalen Hauspreisen repräsentieren eine höhere Wahrscheinlichkeit haben, für höhere Zinsen abzustimmen und eine niedrigere Wahrscheinlichkeit haben, für niedrigere Zinsen abzustimmen.

Drittens, da FOMC Mitglieder innerhalb eines Meetings hin und wieder die geäußerte Zinspräferenz ändern, lässt sich inkonsistentes Abstimmungsverhalten beobachten. Demzufolge wird in Kapitel 3 gefragt, warum FOMC Mitglieder ihre Zinspräferenzen ändern. Wortgetreue Aufzeichnungen von FOMC Meetings zwischen 1989 und 2008 – bereitgestellt durch den Stab des Board of Governors – zeigen, dass die Transparenzänderung der Federal Reserve von 1993 die Wahrscheinlichkeit inkonsistenter Abstimmungen signifikant verringerte. Darüber hinaus haben Bankpräsidenten (als auch weibliche Mitglieder) im Durchschnitt eine höhere Wahrscheinlichkeit inkonsistent abzustimmen als Boardmitglieder (männliche Mitglieder). Hinzu kommt, dass individuelle Karrierehintergründe als auch politische Aspekte inkonsistentes Abstimmungsverhalten erklären.

Schlüsselwörter: FOMC; Abstimmungsverhalten; Nicht-lineare Schätzmethoden

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Preface

Monetary policy plays a crucial role in the economic cycle since central banks are not only responsible for providing cash to the economy but first and foremost to pursue politically important goals. The most important central banks, like the Federal Reserve or the European Central Bank (ECB), implement certain measurements (e.g., increasing or decreasing the short term interest rate in question) to meet monetary policy objectives such as price stability or maximum employment. Nowadays, most central banks delegate responsibility of monetary policy decisions to committees – consisting of members with different monetary policy goals, professional experiences, or monetary policy preferences. Possible heterogeneity among committee members might lead to different assumptions about the optimal path of monetary policy and, hence, to dissenting views in the implementation of monetary policy actions. In the case of the Federal Reserve, all members of the Federal Open Market Committee (FOMC) – which is the monetary policymaking body of the Federal Reserve – have the opportunity to assent to or to dissent from the Chairman’s or Chairwoman’s interest rate proposal in official meetings.

Central bank transparency varies worldwide. In the case of the Federal Reserve, data availability of voting protocols is excellent as compared to other central banks like the European Central Bank leaving voting outcomes undisclosed up to today. Fortunately, the outcome of FOMC meetings has been well documented and published for many decades now. Not only scientists use these documents of monetary policy meetings (so called meeting *minutes* or *transcripts*) to identify patterns or regularities in voting behavior. Also practitioners, e.g. professionals working in the finance branch, usually take a deep look on FOMC voting protocols to derive possible future movements in monetary policy actions. Therefore, this dissertation concentrates on the voting behavior of the Federal Reserve and aims to detect empirically determinants of dissenting voting behavior of FOMC members’ interest rate decisions. Taken together, the literature on FOMC voting behavior, to which this dissertation is related, has not only highly scientific significance but also highly practical importance.

This thesis contains three research articles, dealing with different aspects of individual voting behavior of FOMC members. In a nutshell, the first paper links individual forecasts of key macroeconomic variables to FOMC members’ dissenting voting behavior. This paper also investigates how individual career concerns or political affiliations might shape monetary policy preferences. The second paper focuses on regional macroeconomic conditions of Federal

Reserve districts thereby focusing on regional house price dynamics and its impact on dissenting voting behavior of FOMC members. Finally, the third paper tries to uncover determinants of inconsistent voting behavior – defined as FOMC members’ switching interest rate preference between the two voting stages within a meeting. This paper mainly focuses on the Federal Reserve’s transparency change in 1993.

Chapter 1 called: *Forecast dispersion, dissenting votes, and monetary policy preferences of FOMC members: the role of individual career characteristics and political aspects* is joint work with Stefan Eichler and has been published in *Public Choice*. This chapter focuses on individual forecasts of key macroeconomic variables, individual background characteristics and political determinants to explain voting patterns of FOMC members. One of our main contributions to the literature is to investigate possible moderating effects shaping dissenting voting behavior of individual FOMC members. In particular, using data from 1992 to 2001, we study the impact of members’ economic forecasts on the probability of casting dissenting votes in the FOMC. Voting records are used to derive individual interest rate preferences including a preference to vote in line with the committee majority’s interest rate decision (coded as 0), dissents from the consensus decision in favor of monetary tightening (indicating a higher preferred interest rate, coded as +1), or dissents from the consensus decision in favor of monetary easing (indicating a lower preferred interest rate, coded as –1). Employing ordered probit techniques, we find that higher individual inflation and real Gross Domestic Product (GDP) growth forecasts (relative to the committee’s median) significantly increase the probability of dissenting in favor of tighter monetary policy, whereas higher individual unemployment rate forecasts significantly decrease it. Using interaction models, we find that FOMC members with longer careers in government, industry, academia, non-governmental organizations (NGOs), or on the staff of the Board of Governors are more focused on output stabilization, while FOMC members with longer careers in the financial sector or on the staffs of regional Federal Reserve Banks are more focused on inflation stabilization. We also find evidence that politics matters, with Republican appointees being much more focused on inflation stabilization than Democratic appointees. Moreover, during the entire Clinton administration ‘natural’ monetary policy preferences of Bank presidents and Board members for inflation and output stabilization were more pronounced than under periods covering the administrations of both George H. W. Bush and George W. Bush, respectively.

Chapter 2 contains the paper called: *Regional house price dynamics and voting behavior in the FOMC* which is also joint work with Stefan Eichler and which has been

published in *Economic Inquiry*. In this paper we take a deeper look on FOMC members' regional affiliation. Every FOMC member is more or less affiliated to a district he/she represents in the committee. Regional affiliation of Federal Reserve Bank presidents is assumed to be stronger than for members of the Board Governors being located in Washington D.C. Literature on FOMC voting finds dissenting voting behavior attributed to different regional economic conditions. In particular, FOMC members facing high levels of unemployment rates in their districts are more likely to vote for lower interest rates (e.g., Meade and Sheets 2005; Chappell et al. 2008). We extend this analysis by focussing on regional house price dynamics. From a theoretical point of view, it is a priori not clear if central banks should react to asset prices such as house prices. For example, Bernanke and Gertler (1999, 2001) share the view that central bankers should only focus on stabilizing inflation and output. However, it might be reasonable to incorporate asset prices in a monetary policy framework. It seems plausible to avoid the building-up of extreme asset price bubbles since bursting of these bubbles may have a severe impact on the economy. Hence, it remains an empirical question if monetary policymakers take house prices into account. This paper examines the impact of house price gaps in Federal Reserve districts on the voting behavior in the FOMC from 1978 to 2010. Applying a random effects ordered probit model, we find that a higher regional house price gap significantly increases (decreases) the probability that this district's representative in the FOMC casts interest rate votes in favor of tighter (easier) monetary policy. In addition, our results suggest that Bank presidents react more sensitively to regional house price developments than Board members do.

Finally, **Chapter 3** called: *Inconsistent voting behavior in the FOMC* introduces a relatively new feature of FOMC voting behavior, namely inconsistent voting. Using word for word transcripts (instead of meeting minutes or statements) I am able to investigate if FOMC members changed their choice of the policy alternative between two stages of voting within a meeting. If a member indeed changed his/her interest rate preference – coded in reference to the Chairman's proposal – an inconsistent vote is collected. In this paper it is asked: What are the drivers for monetary policy makers to change their interest rate preferences within a meeting? It is hypothesized that the change in transparency in 1993 as well as individual characteristics of FOMC members may play a significant role in inconsistent voting behavior. Using FOMC voting data extracted from verbatim transcripts from 1989 until 2008 results can be summarized as follows: The regime shift in transparency has a significant impact on the probability of casting inconsistent votes. After 1993, the probability of casting inconsistent votes decreases significantly, on average by 3.3 percentage points. FOMC members with longer

tenure on the committee have a lower probability of casting inconsistent votes. Further results suggest that Board members and Bank presidents differ significantly, with Bank presidents casting inconsistent votes more often than Board members do. This relation holds true for gender as well, with female members casting more inconsistent votes than males. In addition, political aspects and career backgrounds also contribute to explaining inconsistent voting behavior in the FOMC. Conditional effects reveal that after the change in transparency differences between Board members and Bank presidents remain, whereas differences between male and female members have diminished. Further results suggest that FOMC members with a career in the government sector have been strongly affected by the regime shift in transparency.

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Abbreviations

D.C.	District of Columbia
ECB	European Central Bank
EPCP	Expected Percentage share of Correctly Predicted cases
ESRA	European Survey Research Association
FOMC	Federal Open Market Committee
GDP	Gross Domestic Product
GSCI	Goldman Sachs Commodity Index
IWH	Institut für Wirtschaftsforschung Halle
MPC	Monetary Policy Committee
NGO	Non-Governmental-Organization
PCP	Percentage share of Correctly Predicted cases
PMLE	Penalized Maximum Likelihood Estimation
S&P	Standard and Poor's
U.S.	United States

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1. **Forecast dispersion, dissenting votes, and monetary policy preferences of FOMC members: the role of individual career characteristics and political aspects***

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3.1. Introduction

The Federal Open Market Committee (FOMC) is the monetary policy committee in the United States, containing seven members of the Board of Governors and five of the twelve voting presidents of regional Federal Reserve Banks. In fact, all twelve regional Federal Reserve Bank presidents participate in FOMC meetings and its policy go-arounds, thereby discussing alternatives of monetary policy actions and voicing their individual preferences. Sometimes FOMC members disagree with the interest rate proposed by the chairman, expressed by dissenting votes in the policy go-around, or dissents in the formal vote (i.e., when FOMC members prefer higher or lower short-term interest rates than proposed by the chairman of the FOMC).¹ In this paper I focus on one specific feature of FOMC voting behavior, namely inconsistent voting behavior – defined as switching preference on the short-term interest rate, as voiced by FOMC members in their meetings. In particular, inconsistent voting behavior occurs if a member shows disagreement on the interest rate proposed by the chairman in the policy go-around, but this member agrees in the formal vote.²

In the sense of inconsistent voting behavior, committee member's formal dissenting votes were held back which may offset possible positive aspects of revealing dissenting votes. Some researchers find desirable effects if committees publish revealed individual voting preferences. For instance, Gerlach-Kristen (2004) and Riboni and Ruge-Murcia (2014) show in their papers that dissenting votes improve the predictability of future interest rate changes in monetary policy committees such as the Bank of England's Monetary Policy Committee (MPC), the Swedish Riksbank, or the FOMC. Interestingly, Meade (2005) finds that after committee discussions the proposed interest rate (by Alan Greenspan) was nearly always adopted by the committee, whereby the official dissent rate was quite low, but at the same time the disagreement in the policy go-around was quite high (7.5% vs. 30%).³ Thus, considering inconsistent voting behavior may increase the understanding of monetary policy preferences of

¹ Some studies conclude that disagreement about monetary policy may have significant implications, e.g., for the returns to and volatility of financial markets (Ehrmann and Fratzscher 2007a, 2007b; Blinder et al. 2008; Hayo et al. 2012; Neuenkirch 2012).

² In FOMC meetings, the second round of discussion is dedicated to discuss the Chairman's and other members' policy preferences – the so called policy go-around. Before this discussion takes place, the Board's staff presents different policy alternatives. After policy preferences were shared, the FOMC takes the vote on the monetary policy decision.

³ In her dataset, there was only one meeting (October, 2nd 1990) where Greenspan's proposal – made in the policy go-around – was not realized in the official vote. However, voting members' dissenting or assenting stances (relative to Greenspan's interest rate proposals) remain at both voting stages of this meeting.

individual FOMC voting members, and, hence, improve the information set available to monetary policy forecasters.

Only a few papers have examined possible sources of a switching voting behavior in the FOMC, focusing on the shift in transparency of 1993. Before this shift in transparency, the staff of the Board of Governors had taped the meetings in order to prepare the minutes to be published after the meetings. Most members believed that these tapes were recorded over for the purpose of recording the subsequent meeting. However, before overwriting the existing data the Board's staff prepared verbatim transcripts of the past meetings, an instance which was unknown to all committee members including Greenspan (Hansen et al. 2014 p. 9). Due to pressure exerted by U.S. Congress in order to foster monetary policy transparency, the FOMC decided to publish these lightly edited verbatim transcripts of its (*past* and *future*) discussions with a lag of five years (Swank et al. 2008 p. 481).

This shift in the FOMC fits with the general trend toward increased transparency of developed countries' central banks in recent decades. Through this trend market participants may have a better understanding of central banks' monetary policy goals and preferences, leading theoretically to reduced inflation rates by reducing uncertainty.⁴ In addition, it is widely accepted that increased transparency may lead to an increase in the accountability of (monetary) policymakers (Hansen et al. 2014).⁵ Holmström (1999) underscores this "discipline"-effect of policymakers in his career concerns model. A positive effect of the transparency change in 1993 is found by Hansen et al. (2014) by making use of computational linguistic models to study the impact of the transparency shift on FOMC debates. Borrowing from the career concerns literature, they find evidence for a marginally positive net effect between the discipline and conformity effect.⁶

⁴ Ehrmann et al. (2012) use panel data to investigate the impact of higher transparency and central bank communication on the forecast dispersion of economic agents. They find that increased transparency lowers dispersion among professional forecasters; however, the effect becomes smaller in already highly transparent central banks.

⁵ "A strong commitment to transparency imposes self-discipline on policymakers. It ensures that their policy decisions and explanations are consistent over time. Facilitating public scrutiny of monetary policy actions enhances the incentives for the decision making bodies to fulfill their mandates in the best possible manner." <http://www.ecb.europa.eu/ecb/orga/transparency/html/index.en.html>

⁶ For more details of the discussion in terms of pros and cons of higher transparency see, e.g., Hansen et al. (2014). They hypothesize that higher transparency may have a (beneficial) discipline and/or (detrimental) conformity effect on policymakers.

Some researchers, however, emphasize possible drawbacks of increased transparency, especially in the FOMC after 1993 when FOMC members become aware that verbatim transcripts would be released with a 5-year lag. As Greenspan (1993) stated: “A considerable amount of free discussion and probing questioning by the participants of each other and of key FOMC staff members take place. In the wide-ranging debate, new ideas are often tested, many of which are rejected ... The prevailing views of many participants change as evidence and insights emerge. This process has proven to be a very effective procedure for gaining a consensus ... It could not function effectively if participants had to be concerned that their half-thought-through, but nonetheless potentially valuable, notions would soon be made public. I fear in such a situation the public record would be a sterile set of bland pronouncements scarcely capturing the necessary debates which are required of monetary policymaking.”

Meade and Stasavage (2008) find theoretical and empirical evidence for a decline in dissenting voting behavior of FOMC members after 1993 in the Greenspan era. In their study, official votes and verbatim transcripts of FOMC meetings between 1989 and 1997 are used to support their analyses. Further papers also find empirical evidence of changing voting behavior after 1993 (see, e.g., Eichler and Lähler 2014a; Eichler and Lähler 2014b). However, these papers solely use dissenting votes cast in the formal voting. Swank et al. (2008) show in a theoretical framework, that once the committee reaches a decision, members tend to speak with one voice to the public. They state that the regime shift in transparency in 1993 led the FOMC to conduct pre-meetings, which, in turn, resulted in more scripted formal meetings.

Following Meade and Stasavage (2008), inconsistent voting behavior is defined as a change in preference on the preferred interest rate voiced in the policy go-around relative to the interest rate preference cast in the formal voting. That is, a member who showed disagreement on the interest rate proposed by Chairman Greenspan in the policy debate, but agreed in the formal vote, is considered to have cast an inconsistent vote (coded as 1). As well, in their study voicing agreement in the policy go-around but dissenting in the formal vote has also been defined as an inconsistent vote.⁷ In contrast to this, consistent voting includes cases of

⁷ In contrast to Meade and Stasavage (2008), I solely use events where FOMC members voiced disagreement in the policy go-around but assented in the official vote (to measure the united front assumption more appropriate). One may also define inconsistent voting behavior as a committee member agreeing in the policy go-around and dissenting in the formal vote. However, in the period examined this case did not occur with respect to the short-term interest rate proposal. Voicing agreement in the policy go-around but dissenting in the formal vote only occurred when Greenspan’s proposal on the policy *bias* or *tilt* was considered. These cases were excluded from the analysis.

dissenting votes in both the policy go-around and in the formal vote, and instance of agreement in both the policy go-around and in the formal vote (coded as 0).⁸

One could expect that the occurrence of inconsistent voting behavior would have decreased after the regime shift in transparency due to the formation of a united front to present to the public (that is, that the entire committee would speak with one voice), the existence of pre-meetings and, hence, the increase in scripted formal FOMC meetings. Former Governor Larry Meyer (2004) states that pre-meetings conducted by the Board of Governors actually took place. He characterizes the pre-boardmeetings as a place of real exchange of ideas and consensus seeking among Board members: “Unlike the FOMC meeting the next day, the discussions at the Monday Board meeting did not consist of prepackaged presentations. They were a much truer give-and-take, a serious exchange of ideas, with each of us questioning one another along the way. I often used the pre-FOMC Monday Board meetings as an opportunity to engage the Chairman in a discussion of the outlook and monetary policy, as I had previously done in the individual meetings. While we may not have always explicitly voiced our support of his policy recommendation at the end of the individual meetings, and later, at the end of the pre-FOMC Monday Board meetings, there was, in my view, an implicit commitment to support the Chairman the next day. Of course, if you were not prepared to support the Chairman at the FOMC meeting the next day, you had the obligation to tell him so at the Monday Board meeting.”⁹ Meade and Stasavage (2008 p. 4) state that after 1993 FOMC members tend “(...) to present the sort of pre-pared statements that may result in less real deliberation.” However, the latter study finds that switching voting behavior was barely affected by the transparency change of 1993. Using records of FOMC transcripts over the period between 1989 and 1997, Swank et al. (2008) show some suggestive evidence that switching voting behavior declined after 1993.

This paper aims to offer a deeper insight in inconsistent voting in the FOMC through incorporating unconditional *and* conditional channels in order to analyze possible member

⁸ One might think that inconsistent voting has been affected by the *musical chair* phenomenon saying that the number of dissents was implicitly constrained in FOMC meetings under Chairman Greenspan, and that the voting order may matter. Indeed, Gerlach-Kristen and Meade (2010) find that the higher the number of total dissents already cast the lower the probability of further dissents. However, the impact of the musical chair phenomenon in this study is limited since I focus on instances of switching from *disagreement* in the informal voting stage to *agreement* in the formal voting stage. In addition, data show that only 7% of inconsistent votes have been made in meetings with more than two formal dissents. Most inconsistent votes have been made in meetings with no formal dissent (48%).

⁹ As reported in Cieslak et al. (2016 p. 21).

specific factors – in addition to institutional features such as the regime shift in transparency in 1993. So far, the literature on FOMC voting uses such member-related characteristics to explain *dissenting* voting behavior but not *inconsistent* voting behavior. More specifically, I use data on voiced disagreement in the policy go-around released in verbatim transcripts as well as dissents cast in the formal voting from 1989 to 2008, expanding noticeably the time span used in Meade and Stasavage (2008). Second, I am able to detect further individual characteristics (e.g., career backgrounds or gender), which may also contribute to our understanding of inconsistent voting behavior in the FOMC. For example, Eichler and Lähler (2014b) find that, when dissenting on the chairman’s formal interest rate proposal, FOMC members with career backgrounds in government tend to prefer easier monetary policy, whereas FOMC members with a career in the financial sector tend to prefer tighter monetary policy. As far as reputational concerns are considered, Meade and Stasavage (2008) find that experience gathered in FOMC meetings has no impact on inconsistent voting behavior. Following Meade and Stasavage (2008), reputational aspects are, of course, included in the analysis.¹⁰ Surprisingly, gender issues in the FOMC have thus far barely been examined. However, Chappell and McGregor (2000) find that female FOMC members tend to prefer easier monetary policy than male members do. Since this study focuses on inconsistent voting behavior, the question as to whether there are voting patterns related to differences in consensus building preferences amongst male and female FOMC members remains to be examined.¹¹

Third, as FOMC members may have different political affiliations (e.g., through the appointment channel), or may have been the object of political pressure from the current administration, political considerations must be included in the analysis. Political considerations in monetary policy committees are examined for instance in Havrilesky and Gildea (1992, 1995), Chappell et al. (1993, 1995), Tootell (1996), Meade and Sheets (2005), Harris and Spencer (2009) and Harris et al. (2011). For instance, Chappell et al. (1993, 1995) show that Board members with a Democratic affiliation tend to prefer an easier monetary policy stance whereas Board members with a Republican affiliation tend to prefer a tighter monetary policy stance. A similar voting pattern is detected in the case of the incumbent administration

¹⁰ Sibert (2003) show in a theoretical model that institutional characteristics of central banks (e.g., whether or not delayed individual votes are published) may have different effects on the incentive to building up reputation for junior and senior policy makers.

¹¹ However, literature on consensus building activity in other U.S. political institutions (e.g., Congress, or Senate) show empirical evidence for differences of male and female lawmakers. Many studies find that male and female lawmakers use different political approaches, with men being more competitive and individualistic, and women being more consensus oriented and collaborative (Rinehart 1991; Thomas 1994; Duerst-Lahti 2002; Jeydel and Taylor 2003; Volden et al. 2013).

(Chappel et al. 1993). Thus, it is rational to assume that political pressure exerted by the current administration could have an impact on consensus building tendencies in committees like the FOMC, especially given the fact that the majority of the FOMC (7 out of 12 FOMC monetary policymakers are members of the Board of Governors) is elected by the U.S. President and confirmed by the Senate.

Finally, detecting unconditional channels of inconsistent voting behavior in the FOMC (such as the regime shift in 1993, or being either Board member or Bank president) raises the question of examining possible conditional channels, e.g., how the regime shift in transparency may shape individual characteristics conditional on the probability of casting inconsistent votes (i.e., if there are significant differences between Board members and Bank presidents before 1993, do they still appear after the transparency change or not).

To sum up, these advancements lead us to the following research questions: i) Does higher transparency have an (unconditional) impact on the probability of casting inconsistent votes? ii) Do Board members and Bank presidents (and analogously, male and female FOMC members) differ in their likelihood of casting inconsistent votes?¹² iii) Do individual career backgrounds, individual experience gathered in FOMC meetings, or political considerations have an impact on inconsistent voting behavior? iv) To which extent are conditional effects at work when comparing the periods before and after the regime shift? To answer these questions, I use FOMC's transcript voting data as revealed in the policy go-around and in the formal vote between 1989 and 2008.

Results show clear empirical evidence of a decline in the probability of inconsistent voting by FOMC members after 1993's shift in transparency. In particular, the probability of casting an inconsistent vote in the FOMC decreased on average by 3.3 percentage points. Further results indicate that, in general, Bank presidents have a higher probability of casting inconsistent votes, whereas Board members tend to vote in line with their interest preference voiced in the policy go-around. Taking the regime shift of transparency into account, I find that

¹² There are several papers exploring different voting behavior of (voting and non-voting) Bank presidents and Board members. Sources of these different views may be the regional affiliation or availability of regional information (see, e.g., Belden 1989; Gildea 1990; Tootell 2000; Meade and Sheets 2005; Chappell et al. 2005, 2008; Meade 2010; Hayo and Neuenkirch 2013; Eichler and Löhner 2014a), institutional factors such as the power of the chairman as well as individual preferences of FOMC members (Allen et al. 1997; Chappell et al. 1997, Chappell and McGregor 2000; Chappell et al. 2007a, 2007b, 2012), or monetary policy committee members' individual forecasts on inflation, real GDP growth or the unemployment rate (see, e.g., Riboni and Ruge-Murcia 2008; Banerghansa and McCracken 2009; Harris and Spencer 2009; Harris et al. 2011; Tillmann 2011).

Bank presidents' probability of casting an inconsistent vote is 7.8 percentage points higher than the probability for Board members in the pre-1993 period, and 4.5 percentage points higher in the post-1993 period. Female FOMC members do also have a significantly higher probability of casting inconsistent votes than male ones. Interestingly, the probability for female FOMC members dropped sharply (by 31.6 percentage points), converging with their male counterparts after 1993. Further results indicate that members with longer experience in the FOMC have a lower probability of voting inconsistently. What is more, members with a career background in the industrial sector (and NGOs) have a significantly lower probability of casting inconsistent votes. Other career backgrounds seem to have no direct impact on inconsistent voting behavior, taking the entire period of this study into account. However, by applying interaction models the study shows that FOMC members with a career in the government sector (relative to the mean of the committee) have a significantly lower probability of casting inconsistent votes in the FOMC after 1993, and this effect is more pronounced the longer a FOMC member has served in the government sector.

The remainder of this paper is organized as follows. Section 3.2 provides some descriptive evidence about inconsistent voting in the FOMC. Section 3.3 contains data description and hypotheses in the first part, whereas the second part of Section 3.3 is dedicated to presenting the regression analysis containing baseline regressions, robustness checks, and interaction models. Finally, Section 3.4 gives a short summary.

3.2. Descriptive evidence

As already outlined, this paper uses transcripts of FOMC meetings – released after a lag of 5 years – containing verbatim records of FOMC members. These transcripts have been used in several papers investigating the determinants of disagreement within the FOMC (see, e.g., Edison and Marquez 1998; Meade 2005; Thornton 2005; Chappell et al. 2007b; Chappell et al. 2008). In addition, transcripts provide some advantages over meeting minutes (Meade 2005):

- Transcripts provide information about “true” policy preferences (e.g., output stabilization vs. inflation stabilization) as voiced in the policy go-arounds. Thus, opinions rather than votes can be collected from these documents. Additionally, explicit values of preferred interest changes are (with some exceptions) mentioned by meeting participants when they discuss policy alternatives. For example, transcripts contain information not only about the preferred direction of change

(tightening versus easing), but also about the magnitude (+/- 25 (50, 75, 100, etc.) basis points).

- Meeting minutes contain only information about the formal vote of each member (dissenting or assenting). Thus, minutes signal strong individual deviations from the interest rate proposed by the chairman. Transcripts provide information about the entire continuum of disagreement.
- Transcripts contain verbatim information about Board members and voting and non-voting Bank presidents, whereas the minutes only reveal information about voting members.¹³

FOMC meetings usually have a clear structure, although there were some minor differences under the chairmanships of Greenspan and Bernanke. In general, FOMC meetings contain two rounds of discussions published in FOMC transcripts. In the first round, FOMC members expressed their views on economic conditions (with regional Bank presidents providing further information about their districts), whereas the second round was dedicated to discussing policy options (after the staff of the Board presents its Blue Book). In the second round of deliberations, Alan Greenspan typically spoke first giving a summary of the prior discussion and a policy recommendation to debate on (other participants followed including Governors, as well as voting and non-voting Bank presidents), while Bernanke provided a summary of discussion and a policy recommendation at the beginning or at the end of the policy go-around.¹⁴ After the second round of discussion the official vote was taken, in which the chairman votes first, thereby proposing the monetary policy action. Since FOMC members voiced their individual preferences on the policy issue in the policy go-around (the second round of discussion) and were voting shortly afterwards (the formal vote), it is possible to construct a binominal voting indicator measuring (in)consistent voting behavior. An inconsistent vote is recorded if: a) FOMC member voiced disagreement (e.g., preferring an alternative policy option with respect to the chairman's position) in the second round of discussion, and if b) the *same* member casts an assent in the official vote. When both conditions are fulfilled by the *same* member, the member has voted inconsistently (coded as 1; 0 otherwise). Table 3.1 shows all inconsistent votes contained in the dataset. In the period between 1989 and 2008, 94

¹³ The Federal Reserve system is based on a rotating voting scheme. Whereas all Bank presidents attend FOMC meetings, only five out of twelve Bank presidents have a voting right with the New York Fed president as a permanent voter.

¹⁴ A dummy variable – *Greenspan* – is included in the regression analysis to control for potential patterns in inconsistent voting behavior of FOMC members under the different chairmanships of Alan Greenspan and Ben Bernanke.

inconsistent votes out of 1796 total votes were recorded (5.2% of all votes cast). Bank presidents change their views on the monetary policy stance more frequently than Board members do (59 vs. 35 inconsistent votes, indicating a share of 7.3% of all votes cast by Bank presidents and 3.6% of all votes cast by Board members).

From 1989 until October 1993¹⁵ there were 37 meetings with 30 inconsistent votes being recorded (a share of 0.81 inconsistent votes per meeting, or 7.1% of total votes), and from November, 1993 to the end of 2008 they were 128 meetings with 64 recorded inconsistent votes (a share of 0.5 inconsistent votes per meeting, or 4.5% of total votes). Taking Board members and Bank presidents into account, the descriptive evidence reveals that until the regime shift a Board member cast an inconsistent vote, in average, 0.35 times per meeting (or 5.4% of total votes cast by Board members), whereas a Bank president cast an inconsistent vote, on average, 0.46 times per meeting (or 9.4% of total votes cast by Bank presidents). After the regime shift these numbers drop to 0.17 times per meeting (or 3.0% of total votes) for Board members and to 0.33 times per meeting (or 6.6% of total votes) for Bank presidents. Female FOMC members changed their views, in total, 21 times (or 8.9% of total votes cast by female members), while male FOMC members changed their views 73 times (or 4.7% of total votes cast by male members).

To sum up, the descriptive evidence reveals that the regime shift in transparency in 1993 may have had an impact on inconsistent voting behavior, leading to a lower probability of inconsistent voting in the FOMC. What is more, Board members and Bank presidents seem to have different voting patterns, with Bank presidents casting inconsistent votes more often, regardless of the time period considered. However, such descriptive evidence is typically not sufficient to prove the hypotheses since there are several potential factors, such as career background characteristics or political affiliations that may also affect inconsistent voting behavior. Hence, a regression approach is presented below using pooled, random effects and rare events logit models to provide empirical evidence. To examine potential conditional effects of the regime shift, interaction terms are included in the regression analysis as well.

¹⁵ Meade and Sheets (2005) date the November meeting of 1993 as the very first meeting of the regime shift.

TABLE 3.1: STYLIZED FACTS OF INCONSISTENT VOTING BEHAVIOR FROM 1989 TO 2008

	Board		Bank		Sum
	Male	Female	Male	Female	
1989	1	1	6		8
1990		3	1		4
1991			4		4
1992	3	4	6		13
October 1993		1			1
November 1993	3		1		4
1994	4	2	5		11
1995	2	2	5	2	11
1997	1		5		6
1998	1		2	3	6
2000	1		5		6
2001	2		5	1	8
2003	1	1	2		4
2007	1		2		3
2008		1	4		5
Sum	20	15	53	6	94

Note: Years with no inconsistent votes were dropped from the table.

3.3. Regression analysis

3.3.1. Data and hypotheses

In addition to the variables of interest, i.e. before and after the regime shift (*Tape*), whether one is a Board member or Bank president (*Board member*), individual career backgrounds (*Academia, Government, Industry, Finance, NGO, Board staff, Fed bank staff*), political affiliations (*Dem governor, Rep Governor, Dem bank president, Rep bank president, President's party*), gender (*Gender*), and gathered committee experience (*Experience*), the dataset contains, in line with the previous literature on FOMC voting behavior, several additional control variables listed in Table A 3.1 in the Appendix. To provide robustness to the presented results, institutional characteristics (represented by the dummies *Meeting* and *Greenspan*) of the FOMC; national macroeconomic conditions (namely the *National industrial production gap*, the *National inflation*, the *National output gap*, the *National unemployment*, the *National house price gap*, the *Federal funds rate*, the *National exchange rate index*, and the *National commodity price index*); and regional macroeconomic conditions (namely *Regional house price gap*, *Regional unemployment*, *Failed deposits of regional banks*, and *Regional*

coincident index) are included in the analysis. Descriptive statistics are provided in Table A 3.2. These institutional characteristics, national macroeconomic conditions, and regional conditions may have a systematic influence on inconsistent voting behavior, although the expected signs were not clear *a priori*.

Nevertheless, some hypotheses can be drawn from the literature and from the descriptive evidence provided in the Introduction Section and in Section 3.2. Generally, literature shows some contradicting effects of the shift in transparency in 1993 on the debating environment in the FOMC. However, in the case of inconsistent voting this study is rather related to Meade and Stasavage (2008) finding negative outcomes in terms of voting behavior. The transparency effect – represented by the dummy *Tape* in the regression analysis – is assumed to decrease the probability of casting inconsistent votes. In more detail, after FOMC members became aware that verbatim transcripts would not only be kept but also be published, FOMC members changed their voting behavior in FOMC meetings. Meade and Stasavage (2008) provide empirical evidence that the probability of casting dissenting votes in the policy go-around and in the formal vote declined significantly after 1993. However, in the case of inconsistent votes the authors found only weak evidence that inconsistent voting behavior was affected by the transparency shift. Following the study mentioned above, a negative coefficient is predicted.

What is more, because of the anecdotal evidence that during the time period in question the Board of Governors conducted so called pre-meetings, which may have resulted in more scripted formal FOMC meetings, it is assumed that Board members have a lower probability of casting inconsistent votes than Bank presidents do since Bank presidents do not attend those pre-meetings. Since the dummy variable *Board member* is coded as Governor = 1, Bank president = 0, a negative coefficient is predicted. Concerning gender, from theoretical point of view it is not clear *a priori* how male versus female FOMC members may behave in terms of inconsistent voting behavior in a monetary policy committee such as the FOMC.¹⁶

With respect to reputational aspects, reasons of herding as well as anti-herding of inexperienced members can be drawn. Intuitively, at the beginning of the career in the committee a member may have a higher probability of changing his/her view in the formal vote

¹⁶ However, descriptive evidence from Section 3.2 reveals a comparatively high ratio of inconsistent votes made by female FOMC members. Taking this together, a positive coefficient is predicted since the dummy *Gender* is defined as female member = 1, male member = 0 indicating a higher probability of voting inconsistent for female members.

towards the interest rate proposed by the chairman, if he/she expressed a dissenting view in the policy go-around. This behavior could be explained by inexperienced members' preference of fostering consensus in order to avoid the status of an "outsider" in the committee and, thus, lose credibility right at the beginning of his/her career.¹⁷ Along this reasoning, for experienced members it may be easier to keep their interest rate preference in both the informal and formal voting stage leading to a higher probability of consistent votes. On the other hand, inexperienced agents have a higher motivation to improve their productivity relative to experienced members (Holmström 1999).¹⁸ An increase in productivity can be realized by members undertaking costly (due to time-spending) acquisition of information about the stance of the economy. To signal this information advantage, an inexperienced member may have a higher incentive to keep his/her dissenting view in the informal as well as in the formal vote leading to a lower probability of inconsistent votes in the committee. Therefore, it remains an empirical question which channel may have a higher impact on inconsistent voting in the FOMC.

Finally, since this is the first paper that analyzes the impact of FOMC members' individual characteristics on inconsistent voting behavior it is difficult to formulate clear hypotheses for either a certain career background or the political affiliation *a priori*.

Relating to the descriptive evidence given above some further exercises can be conducted in terms of conditional effects. It is supposed that the shift in transparency may not only have had a direct effect on the probability of casting inconsistent votes but may shape inconsistent voting behavior in the FOMC as well, tested in interaction models. Therefore, the *Tape* dummy is interacted with the independent variables in question: *Board member*, *Gender*, *President's party*, *Experience*, and career backgrounds (*Academia*, *Government*, *Industry*, *Finance*, *NGO*, *Board staff*, *Fed bank staff*). Some results of interest are provided in Section 3.3.4.¹⁹

¹⁷ Agents with career concerns show herding behavior once they face uncertainty about their own expertise (see, e.g., Scharfstein and Stein 1990).

¹⁸ A rise in productivity, in our case, contains the members' ability to make better judgements of the stance of the economy.

¹⁹ Using a diff-in-diff analysis, Hansen et al. (2014) find that inexperienced members' influence on policy topics increased after 1993.

3.3.2. *Empirical methodology*

In order to test the determinants of inconsistent voting behavior I use a binominal voting indicator as the dependent variable. For each FOMC meeting, the transcripts published by the Board of Governors provide information for each member as to whether the member agreed with the interest rate suggestion of the chairman, dissented in favor of tightening with a higher preferred interest rate, or dissented in favor of easing with a lower preferred interest rate. Since transcripts contain both verbatim information of the second round of discussions (so called policy go-around) and information about the formal vote, inconsistent voting behavior is detectable. Following Meade and Stasavage (2008) a member voted inconsistently if a member showed disagreement on the interest rate proposed by the chairman in the policy go-around, but voted in agreement in the formal vote (coded as 1, 0 otherwise). In order to account for the binominal nature of the dependent variable I use standard logit models to test the hypotheses.²⁰

The empirical strategy was as follows: models I-V of Table 3.2 show the results of a pooled estimator for the logit models. Different variable constellations are estimated in order to mitigate the omitted variable bias. Model I contains a simple equation of institutional factors, whereas models II-V incorporates a bundle of controls. In a nutshell, model II adds political affiliation dummies, model III adds national and regional macroeconomic conditions, model IV takes professional experience measured as individual career background characteristics (instead of committee experience) into account. Finally, model V incorporates institutional characteristics of the FOMC, political affiliations and individual career background characteristics of FOMC members. In order to assess the economic significance of the independent variables on inconsistent voting behavior of FOMC members, average marginal effects are presented giving the discrete change in the probability of casting an inconsistent vote for a one unit change in the explanatory variable, *ceteris paribus* (see Table 3.3 and Table 3.5).

Coming to the results of the baseline regressions, Table 3.2 reveals that the regression results confirm the hypotheses. The *Tape* variable – tracking the regime shift in transparency – is negative and highly significant in all specifications. That is, once FOMC members became aware that meetings were not only recorded but would be published as well, the probability of

²⁰ One might think that probit models could also be appropriate. Therefore, probit models (not reported, but available upon request) of the baseline regressions were conducted showing similar results. In order to account for potential unobserved heterogeneity among Federal Reserve districts I use a random effects estimator for the logit models as robustness checks (see Table 3.4).

casting inconsistent votes decreased significantly. In other words, FOMC members changed their voting behavior towards consistent voting. Thus, the results confirm the hypothesis that after 1993 the FOMC was forced to develop a more united front to present to the public by speaking with one voice. This led not only to a lower probability of casting dissenting votes in the formal vote (which is not examined in this paper but for which evidence was found in other studies) but also to a lower probability of casting inconsistent votes (which is the focus of the present paper). In terms of economic significance and relative importance expressed by marginal effects, I find a decrease in the probability of casting inconsistent votes in the FOMC on average by 2.4 percentage points up to 3.8 percentage points after 1993.

As hypothesized, the *Board member* dummy is negative and highly significant in all regressions, meaning that Board members' probability of casting inconsistent votes is significantly lower than Bank presidents' probability, with the marginal effect ranging from 4.3 percentage points to 5.1 percentage points.

Moreover, the more experienced a FOMC member the lower the probability of casting inconsistent votes. In other words, relatively new members tend to change their views towards consensus more often than "old hands" do. These results indicate that the conformity channel described in the career concerns literature outweighs the discipline channel to some extent. Inexperienced members tend to herd towards the Chairman, avoiding the status of "standing out". However, the economic significance remains relatively small. Gaining one more year of experience as a FOMC member leads to a lower probability of casting inconsistent votes by 0.3 percentage points.

FOMC members having worked in industry and NGOs before becoming a Bank president or Board member have a significantly lower probability of casting inconsistent votes. This result could be interpreted as being more resilient to the chairman's pressure of converging towards the interest rate proposal by members with a career in industry or NGO which, in turn, might result in better job market opportunities after retiring from the position in the committee. More specifically, marginal effects yield that one more year of working in industry or with NGOs before becoming a Board member or Bank president (relative to mean of the committee) leads to a 0.7 percentage points and 0.5 percentage points lower probability of casting inconsistent votes, respectively.

Interestingly, the dummy *Gender* is positive and highly significant, i.e. female FOMC members change their views on the appropriate monetary policy stance towards consensus more often than male ones do. Hence, while many studies find higher consensus building activity by women in Congress or Senate, this is the first study I am aware of providing empirical evidence for higher consensus building activity by women in the FOMC.

Finally, taking policy issues into account, the results show that the *President's party* dummy is positive and significant, indicating a higher probability of casting inconsistent votes during the Clinton administration, and a lower probability of casting inconsistent votes during the Bush administrations. Further, Bank presidents elected during Republican presidencies show a significantly higher probability of casting inconsistent votes (in comparison to Democratic Board members).

Turning to the controls, with the exception of the national inflation rate, for which the empirical significance is small, the results show no clear impact of either national or regional macroeconomic conditions. In addition, Wald χ^2 values of models I-V of Table 3.2 indicate the variable constellations are appropriate. The model fit is further assessed by using pseudo R^2 , the Percentage share of Correctly Predicted cases (PCP), and the Expected Percentage share of Correctly Predicted cases (EPCP).

TABLE 3.2: COEFFICIENTS OF THE BASELINE REGRESSIONS USING POOLED LOGIT ESTIMATOR

Variable	Model				
	I	II	III	IV	V
Tape	-0.495 ** (0.25)	-0.633 ** (0.26)	-0.799 *** (0.24)	-0.805 *** (0.24)	-0.720 *** (0.27)
Meeting	-0.456 (0.56)	-0.571 (0.56)	-0.124 (0.67)	-0.070 (0.67)	-0.145 (0.67)
Greenspan	0.639 (0.40)	0.484 (0.43)	0.335 (0.57)	0.021 (0.60)	0.160 (0.61)
Board member	-1.023 *** (0.22)		-1.056 *** (0.22)	-0.906 *** (0.33)	
Experience	-0.060 * (0.03)	-0.060 ** (0.03)	-0.059 * (0.03)		
Gender	0.870 *** (0.28)	0.946 *** (0.29)	0.879 *** (0.28)	0.839 *** (0.32)	0.962 *** (0.32)
President's party		0.465 **	0.506 **	0.501 **	0.452 **

		(0.23)	(0.21)	(0.22)	(0.23)
Dem bank president		0.337			0.431
		(0.43)			(0.51)
Rep bank president		1.059 ***			1.101 **
		(0.40)			(0.47)
Rep governor		-0.325			-0.118
		(0.40)			(0.44)
National industrial production gap			-0.241	-0.280	-0.262
			(0.19)	(0.19)	(0.19)
National inflation			-0.649 *	-0.693 *	-0.660 *
			(0.35)	(0.36)	(0.37)
Regional unemployment			-0.212	-0.097	-0.148
			(0.16)	(0.17)	(0.18)
Regional house price gap			-0.046	-0.037	-0.047
			(0.06)	(0.05)	(0.05)
Academia				0.012	0.037
				(0.02)	(0.02)
Government				-0.057	-0.013
				(0.06)	(0.07)
Industry				-0.152 ***	-0.131 **
				(0.06)	(0.06)
Finance				-0.025	-0.002
				(0.02)	(0.02)
NGO				-0.105 *	-0.102 *
				(0.06)	(0.06)
Board staff				-0.005	0.011
				(0.02)	(0.02)
Fed bank staff				-0.015	0.008
				(0.02)	(0.03)
Constant	-2.052 ***	-2.735 ***	-2.001 **	-2.462 ***	-3.463 ***
	(0.70)	(0.80)	(0.86)	(0.87)	(1.03)
Pseudo R2	0.05	0.06	0.06	0.11	0.11
Wald chi2	37.26 ***	58.59 ***	56.61 ***	68.19 ***	71.12 ***
LogL	-351.26	-346.20	-345.14	-329.39	-327.90
PCP (%)	94.77	94.77	94.77	94.77	94.77
EPCP (%)	90.28	90.32	90.37	90.48	90.49
No. of Obs	1796	1796	1796	1796	1796

Note: Results from pooled logit model estimation. Dependent variable: inconsistent vote. Robust standard errors in parentheses. *, **, *** indicate significance at the 10%, 5% and 1% levels, respectively.

TABLE 3.3: AVERAGE MARGINAL EFFECTS OF THE BASELINE REGRESSIONS USING POOLED LOGIT ESTIMATOR

Variable	Model				
	I	II	III	IV	V
Tape	-0.024 ** (0.01)	-0.031 ** (0.01)	-0.038 *** (0.01)	-0.038 *** (0.01)	-0.034 *** (0.01)
Meeting	-0.022 (0.03)	-0.028 (0.03)	-0.006 (0.03)	-0.003 (0.01)	-0.007 (0.03)
Greenspan	0.031 (0.02)	0.023 (0.02)	0.016 (0.03)	0.001 (0.03)	0.008 (0.03)
Board member	-0.050 *** (0.01)		-0.051 *** (0.01)	-0.043 *** (0.02)	
Experience	-0.003 * (0.00)	-0.003 * (0.00)	-0.003 * (0.00)		
Gender	0.042 *** (0.01)	0.046 *** (0.01)	0.042 *** (0.01)	0.040 *** (0.02)	0.046 *** (0.02)
President's party		0.022 ** (0.01)	0.024 ** (0.01)	0.024 ** (0.01)	0.021 ** (0.01)
Dem bank president		0.016 (0.02)			0.020 (0.02)
Rep bank president		0.051 *** (0.02)			0.052 ** (0.02)
Rep governor		-0.016 (0.02)			-0.006 (0.02)
National industrial production gap			-0.012 (0.01)	-0.013 (0.01)	-0.012 (0.01)
National inflation			-0.031 * (0.02)	-0.033 * (0.02)	-0.031 * (0.02)
Regional unemployment			-0.010 (0.01)	-0.005 (0.01)	-0.007 (0.01)
Regional house price gap			-0.002 (0.00)	-0.002 (0.00)	-0.002 (0.00)
Academia				0.001 (0.00)	0.002 (0.00)
Government				-0.003 (0.00)	-0.001 (0.00)
Industry				-0.007 ** (0.00)	-0.006 ** (0.00)
Finance				-0.001 (0.00)	0.000 (0.00)
NGO				-0.005 * (0.00)	-0.005 * (0.00)

				(0.00)	(0.00)
Board staff				0.000	0.001
				(0.00)	(0.00)
Fed bank staff				-0.001	0.000
				(0.00)	(0.00)
No. of Obs	1796	1796	1796	1796	1796

Note: Average marginal effects. Robust standard errors in parentheses. *, **, *** indicate significance at the 10%, 5% and 1% levels, respectively.

3.3.3. Robustness checks of the baseline regressions

In this subsection several robustness checks are presented to underscore the results of baseline regressions. First, a random effects estimator instead of a pooled estimator is used in the regressions. Table 3.4 presents the results of random effects logit estimations using the same specifications as in Table 3.2. The results found in Table 3.4 support the results of the baseline regressions. The coefficient of *Tape* remains negative and significant in all regressions, indicating that the 1993 change in transparency significantly decreased the probability of inconsistent voting behavior in the FOMC, although the empirical and economic significance is slightly smaller when applying a random effects estimator. The results for *Board member*, *Experience*,²¹ *Gender*, *President's party*, and *Rep bank president* are confirmed as well. In other words, the coefficient estimations remain robust regardless of whether pooled or random effects estimation techniques are used, emphasizing the robustness of the baseline results.

Second, a variety of national and regional macroeconomic control variables were added to model III of Table 3.2. These determinants were used in many other papers dealing with FOMC voting behavior and may also have had a significant impact on inconsistent voting behavior (see Table 3.6 for coefficient estimates, and Table 3.7 for marginal effects). In more detail, in model I the *National output gap* was added; in model II the *National unemployment*; in model III the *Federal funds rate*; in model IV *Failed deposits of regional banks* and the *Regional coincidence index*; and finally in model V the *National house price gap*, the *National exchange rate index*, and the *National commodity price index*. To capture a possible change in inconsistent voting behavior during turmoil episodes, a time dummy – *recession* – is included

²¹ As an alternative specification, I replaced member's committee experience with his/her age having also a negative and significant impact on inconsistent voting in the FOMC. Results are not presented here but available upon request.

in the analysis as well.²² As the results of Table 3.6 and Table 3.7 indicate, coefficient estimations as well as marginal effects of the variables in question remain significant and show the predicted signs.

Third, taking the large number of consistent votes (coded as zero) relative to the small number of inconsistent votes (codes as one) into account, rare events logit models are applied to address this issue.²³ As can be seen from Table 3.8 coefficient estimates from rare events logit models are very similar to those from baseline regressions indicating correctly estimated coefficients when using standard logit estimation techniques.

Finally, as “outliers” (i.e., frequent inconsistent voters) may drive the results the top two inconsistent voters were dropped out of the sample accounting for 19% of total inconsistent votes being recorded. Again, results remain the same showing highly significant and correctly predicted coefficients similar to those in the baseline regression presented in Table 3.2.²⁴

TABLE 3.4: COEFFICIENTS OF THE BASELINE REGRESSIONS USING RANDOM EFFECTS LOGIT ESTIMATOR

Variable	Model				
	I	II	III	IV	V
Tape	-0.544 ** (0.25)	-0.587 * (0.31)	-0.911 *** (0.29)	-0.767 ** (0.30)	-0.631 * (0.33)
Meeting	-0.364 (0.56)	-0.485 (0.56)	-0.065 (0.59)	-0.034 (0.59)	-0.103 (0.59)
Greenspan	0.623 (0.40)	0.467 (0.46)	0.113 (0.51)	-0.129 (0.54)	0.079 (0.58)
Board member	-1.318 *** (0.26)		-1.388 *** (0.27)	-1.014 *** (0.39)	
Experience	-0.068 * (0.03)	-0.071 ** (0.03)	-0.069 ** (0.03)		
Gender	0.800 **	0.836 **	0.809 **	0.344	0.517

²² It is well known that uncertainty about contemporary or forecast values of macroeconomic conditions increases during episodes of real economic recession (e.g., Bachmann et al. 2010; Bloom 2013; Jurado et al. 2013). Therefore, it is reasonable to assume that during episodes of recessions decisions about the appropriate monetary policy stance might be more difficult than in tranquil times which, as a result, could lead to a higher likelihood of casting inconsistent votes.

²³ Leitgoeb suggested at the 2013 European Survey Research Association (ESRA) to apply Penalized Maximum Likelihood Estimation (PMLE) for datasets with a large number of observations and a relatively small number of events (in our case, events are inconsistent votes). He noticed that maximum likelihood estimates might be biased in cases of rare events. To overcome this possible issue, penalized maximum likelihood estimations are applied by using STATA’s *firthlogit* command (see e.g., the *Firth Method*, introduced by Firth (1993)).

²⁴ Results are not presented here but available upon request.

	(0.33)	(0.34)	(0.34)	(0.48)	(0.49)
President's party		0.473 *	0.539 **	0.475 *	0.421
		(0.27)	(0.27)	(0.27)	(0.28)
Dem bank president		0.814 *			0.333
		(0.46)			(0.57)
Rep bank president		1.685 ***			1.442 ***
		(0.42)			(0.56)
Rep governor		0.048			-0.174
		(0.44)			(0.51)
National industrial production gap			-0.294	-0.328 *	-0.314 *
			(0.18)	(0.18)	(0.18)
National inflation			-0.664	-0.736 *	-0.689
			(0.43)	(0.43)	(0.44)
Regional unemployment			-0.016	0.038	0.002
			(0.20)	(0.21)	(0.21)
Regional house price gap			-0.071	-0.039	-0.049
			(0.06)	(0.06)	(0.06)
Academia				0.028	0.067 **
				(0.02)	(0.03)
Government				0.040	0.117
				(0.09)	(0.10)
Industry				-0.140 **	-0.102
				(0.07)	(0.07)
Finance				-0.009	0.025
				(0.03)	(0.03)
NGO				-0.103	-0.101
				(0.09)	(0.09)
Board staff				-0.009	0.022
				(0.04)	(0.04)
Fed bank staff				0.024	0.058
				(0.04)	(0.04)
Constant	-2.164 ***	-3.502 ***	-1.835 **	-2.465 ***	-3.770 ***
	(0.78)	(0.89)	(0.87)	(0.83)	(1.02)
Lnsigma2u	-0.165	-0.108	-0.098	-0.504	-0.270
	(0.60)	(0.61)	(0.60)	(0.77)	(0.70)
Sigma_u	0.921	0.948	0.952	0.777	0.874
	(0.28)	(0.29)	(0.28)	(0.30)	(0.31)
rho	0.205	0.214	0.216	0.155	0.188
	(0.10)	(0.10)	(0.10)	(0.10)	(0.11)
Likelihood-ratio test of rho=0	27.06 ***	25.84 ***	26.38 ***	7.46 ***	10.38 ***

Wald chi2	32.39 ***	40.81 ***	41.80 ***	41.99 ***	46.26 ***
Log pseudoL	-337.73	-333.27	-331.95	-325.65	-322.71
No. of Obs	1796	1796	1796	1796	1796

Note: Results from random effects logit model estimation. Dependent variable: inconsistent vote. Standard errors in parentheses. *, **, *** indicate significance at the 10%, 5% and 1% levels, respectively.

TABLE 3.5: AVERAGE MARGINAL EFFECTS OF THE BASELINE REGRESSIONS USING RANDOM EFFECTS LOGIT ESTIMATOR

Variable	Model				
	I	II	III	IV	V
Tape	-0.020 *	-0.020	-0.034 **	-0.018	-0.013
	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)
Meeting	-0.014	-0.018	-0.002	-0.001	-0.002
	(0.02)	(0.03)	(0.02)	(0.01)	(0.01)
Greenspan	0.016 *	0.012	0.003	-0.002	0.001
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Board member	-0.047 ***		-0.046 ***	-0.020 *	
	(0.02)		(0.02)	(0.01)	
Experience	-0.002 **	-0.002 **	-0.002 *		
	(0.00)	(0.00)	(0.00)		
Gender	0.034 *	0.034 *	0.032 *	0.007	0.011
	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)
President's party		0.015	0.017 *	0.009	0.008
		(0.01)	(0.01)	(0.01)	(0.01)
Dem bank president		0.032			0.006
		(0.02)			(0.01)
Rep bank president		0.076 **			0.036
		(0.03)			(0.02)
Rep governor		0.001			-0.003
		(0.01)			(0.01)
National industrial production gap			-0.009	-0.006	-0.005
			(0.01)	(0.00)	(0.00)
National inflation			-0.020	-0.014	-0.012
			(0.01)	(0.01)	(0.01)
Regional unemplyoment			0.000	0.001	0.000
			(0.01)	(0.00)	(0.00)
Regional house price gap			-0.002	-0.001	-0.001
			(0.00)	(0.00)	(0.00)
Academia				0.001	0.001 *
				(0.00)	(0.00)
Government				0.001	0.002

				(0.00)	(0.00)
Industry				-0.003 ***	-0.002 *
				(0.00)	(0.00)
Finance				0.000	0.000
				(0.00)	(0.00)
NGO				-0.002	-0.002
				(0.00)	(0.00)
Board staff				0.000	0.000
				(0.00)	(0.00)
Fed bank staff				0.000	0.001
				(0.00)	(0.00)
No. of Obs	1796	1796	1796	1796	1796

Note: Average marginal effects. Standard errors in parentheses. *, **, *** indicate significance at the 10%, 5% and 1% levels, respectively.

TABLE 3.6: ROBUSTNESS CHECKS OF THE BASELINE REGRESSIONS USING POOLED LOGIT ESTIMATOR

Variable	Model				
	I	II	III	IV	V
Tape	-0.850 *** (0.26)	-0.805 *** (0.26)	-0.702 ** (0.28)	-0.912 *** (0.26)	-0.670 ** (0.28)
Meeting	-0.165 (0.62)	-0.186 (0.63)	-0.091 (0.68)	-0.077 (0.68)	-0.046 (0.67)
Greenspan	0.122 (0.50)	0.254 (0.50)	0.239 (0.53)	0.493 (0.56)	0.601 (0.58)
Board member	-1.057 *** (0.22)	-1.055 *** (0.22)	-1.048 *** (0.22)	-1.036 *** (0.22)	-1.036 *** (0.22)
Experience	-0.059 * (0.03)	-0.060 * (0.03)	-0.058 * (0.03)	-0.059 * (0.03)	-0.056 * (0.03)
Gender	0.919 *** (0.28)	0.892 *** (0.28)	0.885 *** (0.28)	0.859 *** (0.28)	0.884 *** (0.28)
President's party	0.617 *** (0.23)	0.563 ** (0.23)	0.444 * (0.25)	0.433 * (0.23)	0.486 ** (0.23)
Recession	0.511 (0.34)	0.193 (0.35)	-0.008 (0.38)	-0.068 (0.40)	0.161 (0.34)
National industrial production gap			-0.230 (0.20)	-0.217 (0.20)	-0.296 (0.21)
National output gap	0.347 (0.24)				
National unemployment		0.284 (0.84)			
National inflation	-0.896 **	-0.707 **	-0.780 **	-0.739 **	-0.624

	(0.37)	(0.34)	(0.39)	(0.36)	(0.40)
Federal funds rate			0.067		
			(0.06)		
National house price gap					0.015
					(0.06)
National exchange rate index					0.135
					(0.12)
National commodity price index					0.019
					(0.02)
Regional unemployment	-0.228	-0.218	-0.234	-0.157	-0.202
	(0.16)	(0.16)	(0.16)	(0.17)	(0.16)
Regional house price gap	-0.064	-0.055	-0.070	-0.063	
	(0.06)	(0.06)	(0.06)	(0.06)	
Failed deposits of regional banks				-0.008	
				(0.01)	
Regional coincident index				0.171	
				(0.17)	
Constant	-1.807 **	-1.899 **	-2.285 **	-2.029 **	-2.507 ***
	(0.83)	(0.83)	(0.92)	(0.91)	(0.94)
Pseudo R2	0.07	0.06	0.07	0.07	0.07
Wald chi2	75.97 ***	72.79 ***	70.78 ***	77.15 ***	70.18 ***
LogL	-344.83	-345.76	-344.56	-343.80	-344.04
PCP (%)	94.77	94.77	94.77	94.77	94.77
EPCP (%)	90.36	90.35	90.38	90.38	90.38
No. of Obs	1796	1796	1796	1796	1796

Note: Results from pooled logit model estimation. Dependent variable: inconsistent vote. Robust standard errors in parentheses. *, **, *** indicate significance at the 10%, 5% and 1% levels, respectively.

TABLE 3.7: AVERAGE MARGINAL EFFECTS OF THE ROBUSTNESS CHECKS OF THE BASELINE REGRESSIONS USING POOLED LOGIT ESTIMATOR

Variable	Model				
	I	II	III	IV	V
Tape	-0.041 ***	-0.039 ***	-0.034 **	-0.044 ***	-0.032 **
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Meeting	-0.008	-0.009	-0.004	-0.004	-0.002
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Greenspan	0.006	0.012	0.011	0.024	0.029
	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)
Board member	-0.051 ***	-0.051 ***	-0.050 ***	-0.050 ***	-0.050 ***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Experience	-0.003 *	-0.003 *	-0.003 *	-0.003 *	-0.003 *
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)

Gender	0.044 *** (0.01)	0.043 *** (0.01)	0.043 *** (0.01)	0.041 *** (0.01)	0.042 *** (0.01)
President's party	0.030 *** (0.01)	0.027 ** (0.01)	0.021 * (0.01)	0.021 * (0.01)	0.023 ** (0.01)
Recession	0.025 (0.02)	0.009 (0.02)	-0.000 (0.02)	-0.003 (0.02)	0.008 (0.02)
National industrial production gap			-0.011 (0.01)	-0.010 (0.01)	-0.014 (0.02)
National output gap	0.017 (0.01)				
National unemployment		0.014 (0.04)			
National inflation	-0.043 ** (0.02)	-0.034 ** (0.02)	-0.037 ** (0.02)	-0.036 ** (0.02)	-0.030 (0.02)
Federal funds rate			0.003 (0.00)		
National house price gap					0.001 (0.00)
National exchange rate index					0.006 (0.01)
National commodity price index					0.001 (0.00)
Regional unemployment	-0.011 (0.01)	-0.010 (0.01)	-0.011 (0.01)	-0.008 (0.01)	-0.010 (0.01)
Regional house price gap	-0.003 (0.00)	-0.003 (0.00)	-0.003 (0.00)	-0.003 (0.00)	
Failed deposits of regional banks				-0.000 (0.00)	
Regional coincident index				0.008 (0.01)	
No. of Obs.	1796	1796	1796	1796	1796

Note: Average marginal effects. Robust standard errors in parentheses. *, **, *** indicate significance at the 10%, 5% and 1% levels, respectively.

TABLE 3.8: ROBUSTNESS CHECKS OF THE BASELINE REGRESSIONS CONSIDERING RARE EVENTS BY USING FIRTHLOGIT ESTIMATION

Variable	Model				
	I	II	III	IV	V
Tape	-0.496 ** (0.24)	-0.626 ** (0.29)	-0.793 *** (0.27)	-0.773 *** (0.28)	-0.678 ** (0.30)
Meeting	-0.548 (0.38)	-0.657 (0.52)	-0.207 (0.55)	-0.160 (0.55)	-0.232 (0.56)

Greenspan	0.639	0.441	0.259	0.029	0.162
	(0.40)	(0.43)	(0.48)	(0.51)	(0.53)
Board member	-1.011 ***		-1.039 ***	-0.856 ***	
	(0.23)		(0.23)	(0.32)	
Experience	-0.058 **	-0.058 **	-0.056 **		
	(0.03)	(0.03)	(0.03)		
Gender	0.876 ***	0.948 ***	0.880 ***	0.846 ***	0.950 ***
	(0.27)	(0.28)	(0.27)	(0.31)	(0.32)
President's party		0.455 *	0.489 **	0.495 **	0.448 *
		(0.25)	(0.25)	(0.25)	(0.25)
Dem bank president		0.329			0.421
		(0.41)			(0.50)
Rep bank president		1.027 ***			1.049 **
		(0.39)			(0.47)
Rep governor		-0.329			-0.083
		(0.40)			(0.45)
National industrial production gap			-0.240	-0.280	-0.260
			(0.17)	(0.17)	(0.17)
National inflation			-0.675 *	-0.719 *	-0.684 *
			(0.39)	(0.39)	(0.39)
Regional unemployment			-0.212	-0.092	-0.138
			(0.15)	(0.16)	(0.17)
Regional house price gap			-0.043	-0.031	-0.041
			(0.06)	(0.06)	(0.06)
Academia				0.012	0.035
				(0.02)	(0.03)
Government				-0.058	-0.017
				(0.06)	(0.07)
Industry				-0.125 **	-0.105 *
				(0.05)	(0.05)
Finance				-0.023	-0.001
				(0.02)	(0.03)
NGO				-0.060	-0.059 *
				(0.07)	(0.07)
Board staff				0.002	0.017
				(0.03)	(0.03)
Fed bank staff				-0.015	0.008
				(0.02)	(0.03)
Constant	-1.893 ***	-2.557 ***	-1.806 **	-2.230 ***	-3.185 ***
	(0.67)	(0.77)	(0.77)	(0.76)	(0.90)

Wald chi2	32.40 ***	40.29 ***	43.80 ***	43.29 ***	44.31 ***
Penalized LogL	-339.55	-331.07	-324.58	-287.99	-284.82
No. of Obs	1796	1796	1796	1796	1796

Note: Results from penalized maximum likelihood estimation (*firthlogit estimation*). Dependent variable: inconsistent vote. Standard errors in parentheses. *, **, *** indicate significance at the 10%, 5% and 1% levels, respectively.

3.3.4. Results of the interaction models

Since the baseline regressions indicate that 1993's change in transparency directly affected inconsistent voting behavior in the FOMC, by significantly reducing the probability that a FOMC member voted inconsistently, one may raise the question as to whether this circumstance also had a conditional effect for different groups on the committee. For example, in the 1989-2008 period, Bank presidents and Board members showed clear differences in inconsistent voting behavior in the sense that Board members (male members) had a significantly lower probability of casting inconsistent votes than Bank presidents (female members) did. Likewise, FOMC members with less committee experience had a significantly higher likelihood of voting inconsistently, in comparison to those with more experience. Therefore, in the subsequent analysis it is asked if conditional effects shape inconsistent voting amongst different groups of FOMC members. For this, the *Tape* variable is interacted with member-specific characteristics (being a Board member or Bank president, gender, committee experience, career background before becoming a FOMC member, and political affiliation).

Coefficient estimations of interaction models are provided in Table A 3.3 in the Appendix. Based on these estimations, marginal effects are calculated and presented below, whereas in Table 3.9 the *Tape* dummy is interacted with the *Board member* dummy, in Table 3.10 the *Tape* dummy is interacted with the *Gender* dummy, and finally in Table 3.11 the *Tape* dummy is interacted with the *President's party* dummy. The interaction effects of columns 2 and 3 in Table 3.9-Table 3.11 represent the expected probability (marginal effect) of inconsistent voting between interacted dummy variables, whereas columns 4 and 5 represent differences in these marginal effects. For instance, being a Bank president (Board member) between 1989 and 1993 has a 13.5% (5.7%) probability of inconsistent voting. After the regime shift in transparency, the probability of inconsistent voting drops significantly to 7.1% for Bank presidents and to 2.5% for Board members. As already outlined, Bank presidents and Board members differ significantly with respect to their inconsistent voting behavior. For Bank presidents the probability of casting an inconsistent vote before (after) introducing the regime shift is 7.8 percentage points (4.5 percentage points) higher than for Board members.

Gender has, in fact, not only a direct effect but also a conditional effect when considering inconsistent voting behavior within the FOMC. Interestingly, the probability that a female member cast an inconsistent vote drops by 31.6 percentage points after 1993, whereas the probability for male members of casting an inconsistent vote remains relatively constant (dropping just by 2.2 percentage points). Apparently, voting behavior of male and female members converged greatly as a result of the decision to publish verbatim transcripts.

TABLE 3.9: EXPECTED PROBABILITIES FROM INTERACTING BOARD AND TAPE DUMMIES

	Marginal effect	Marginal effect	Differences dy/dx	Marginal effect	Marginal effect
	Tape = 0	Tape = 1		Tape = 0	Tape = 1
Bank presidents	0.135 *** (0.03)	0.071 *** (0.01)	Bank presidents - Board member	0.078 ** (0.03)	0.045 *** (0.01)
Board member	0.057 *** (0.02)	0.025 *** (0.01)		Bank president	Board member
			Tape (1) – Tape (0)	-0.065 ** (0.03)	-0.032 ** (0.02)

TABLE 3.10: EXPECTED PROBABILITIES FROM INTERACTING GENDER AND TAPE DUMMIES

	Marginal effect	Marginal effect	Differences dy/dx	Marginal effect	Marginal effect
	Tape = 0	Tape = 1		Tape = 0	Tape = 1
Male	0.064 *** (0.01)	0.042 *** (0.01)	Male – Female	-0.314 *** (0.10)	-0.020 (0.02)
Female	0.378 *** (0.10)	0.062 *** (0.02)		Male	Female
			Tape (1) – Tape (0)	-0.022 (0.01)	-0.316 *** (0.10)

In order to test the conditional effect of the direct political influence channel, Table 3.11 presents the results of interacting *Tape* and the *President's party* dummy. FOMC members changed their views the most under the presidency of George H. W. Bush from 1989 to 1993 (10.1%) and the least under the presidency of George W. Bush from 2001 to 2008 (2.4%). Under the presidency of Bill Clinton FOMC members changed their views on average by 7%. As it turns out, the probability of casting inconsistent votes decreases significantly over time confirming the results of the previous section. Moreover, the last column of Table 3.11 reveals

that under the presidency of Bill Clinton the probability of casting inconsistent votes was significantly higher (4.6 percentage points) than under the presidency of George W. Bush taking office in 2001. As a result, the Clinton – Greenspan period could be interpreted as being more consensus building oriented than the (G. W.) Bush – Greenspan and (G. W.) Bush – Bernanke periods, respectively.

TABLE 3.11: EXPECTED PROBABILITIES FROM INTERACTING PRESIDENT'S PARTY AND TAPE DUMMIES

	Marginal effect	Marginal effect	Differences dy/dx	Marginal effect	Marginal effect
	Tape = 0	Tape = 1		Tape = 0	Tape = 1
Republican	0.101 *** (0.02)	0.024 *** (0.01)	Republican - Democratic	0.084 *** (0.03)	-0.046 *** (0.01)
Democratic	0.017 (0.02)	0.070 *** (0.01)		Republican	Democratic
			Tape (1) – Tape (0)	-0.077 *** (0.02)	0.052 *** (0.02)

Note: Table 3.9 – Table 3.11: Marginal effects represent the expected probability of the outcome being one (inconsistent voting) of a one unit change in the predictor (*ceteris paribus*) with respect to a certain cell. Delta-Method standard errors are in parentheses. Covariates are held at their mean values.

As indicated by the baseline results, FOMC member having worked in different branches before becoming Bank president or Governor have a systematically different unconditional probability of casting inconsistent votes. This holds true especially for members with a career in industry having a significant lower probability of casting inconsistent votes than members without a career in industry.

Since career aspects may play a role in inconsistent voting behavior in the FOMC, Figure 3.1 – Figure 3.8 show the marginal effects of interacting *Tape* with *Experience* gathered in FOMC meetings (Figure 3.1) and the individual career backgrounds before becoming FOMC member (Figure 3.2 – Figure 3.8), respectively. The x-axis of each figure shows the number of years of working experience relative to the committee’s mean value for the respective meeting. The y-axis of each figure shows the marginal effect of changing the *Tape* dummy value from 0 to 1 on the probability of casting an inconsistent vote.

For the interaction model using meeting *Experience* as the conditioning variable, Figure 3.1 reveals that the difference in the marginal effect between periods of publishing (*Tape* = 1) and not publishing (*Tape* = 0) verbatim transcripts is negative and upward sloping. Significant

differences have been found for FOMC members with short experience in the committee. That is, after the change in transparency the probability of casting an inconsistent vote is significantly smaller for FOMC members with low experience. In other words, the more experienced a member, the smaller the difference between the pre-1993 and post-1993 periods (that is, significant differences in inconsistent voting behavior between members diminish with longer committee experience). Concerning career aspects, only Figure 3.3 shows clear interdependence between career background and the transparency shift in 1993 on the probability of voting inconsistently in the FOMC. The marginal effect (which tracks the impact of the regime shift) is negative and downward sloping, indicating a lower probability of casting inconsistent votes in the FOMC after 1993. This effect is more pronounced the longer a FOMC member has served in the government sector (relative to the mean of the committee) before becoming Bank president or Board member. For instance, take the example of a committee member who has worked 10 years more in the government sector relative to the average of the committee before becoming a Bank president or Board member. After the regime shift in 1993 this member's probability of casting an inconsistent vote is 0.5 percentage points lower than before the shift. Accordingly, FOMC members with a career in the government sector have been strongly affected by the regime shift in transparency.

FIGURE 3.1: MARGINAL EFFECT OF INTERACTING TAPE DUMMY AND EXPERIENCE

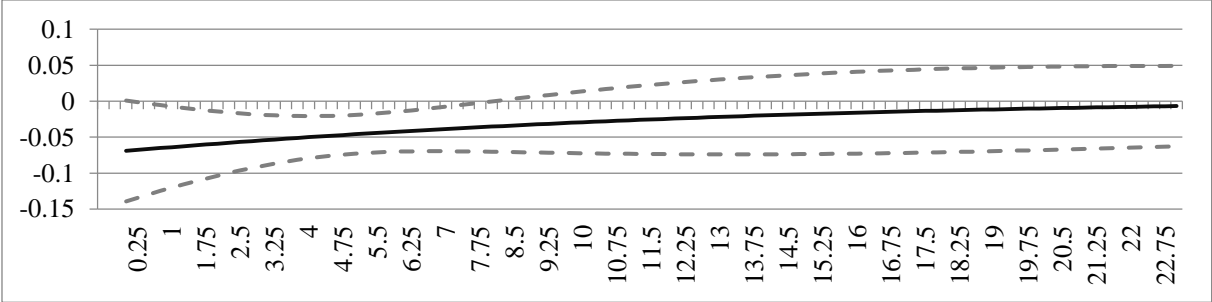


FIGURE 3.2: MARGINAL EFFECT OF INTERACTING TAPE DUMMY AND ACADEMIA

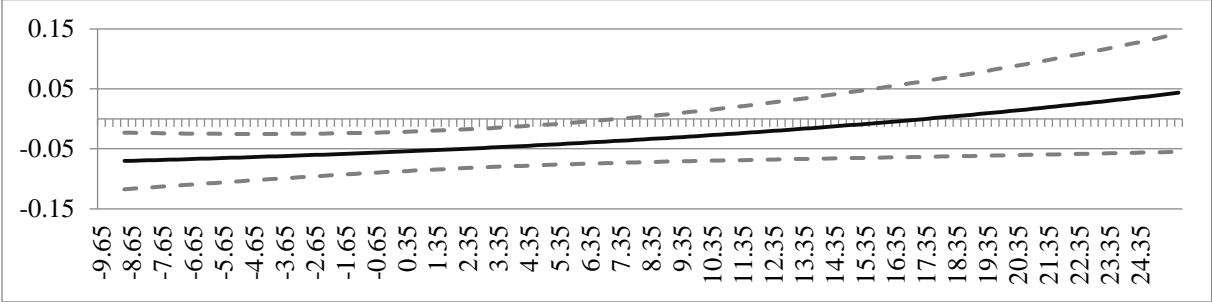


FIGURE 3.3: MARGINAL EFFECT OF INTERACTING TAPE DUMMY AND GOVERNMENT

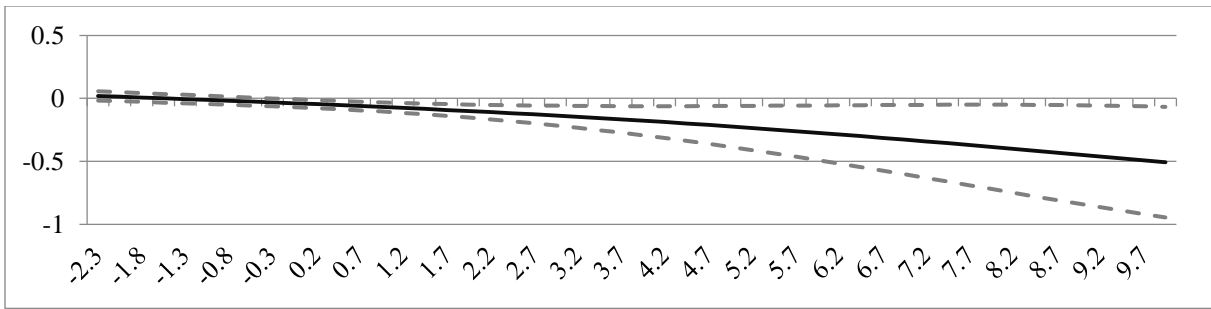


FIGURE 3.4: MARGINAL EFFECT OF INTERACTING TAPE DUMMY AND INDUSTRY

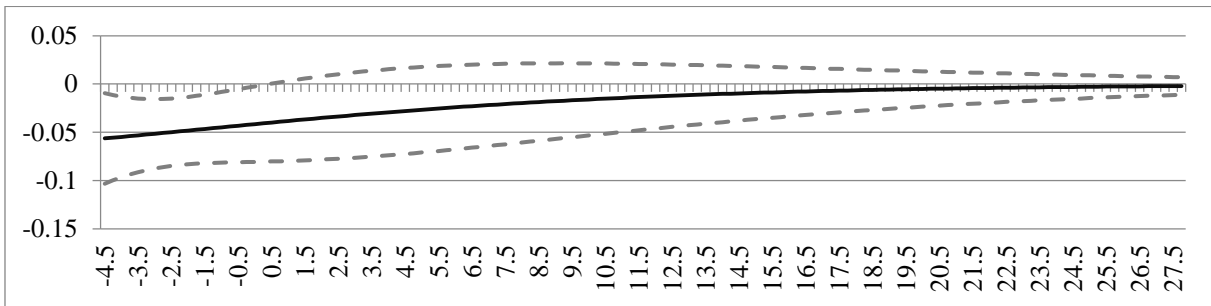


FIGURE 3.5: MARGINAL EFFECT OF INTERACTING TAPE DUMMY AND FINANCE

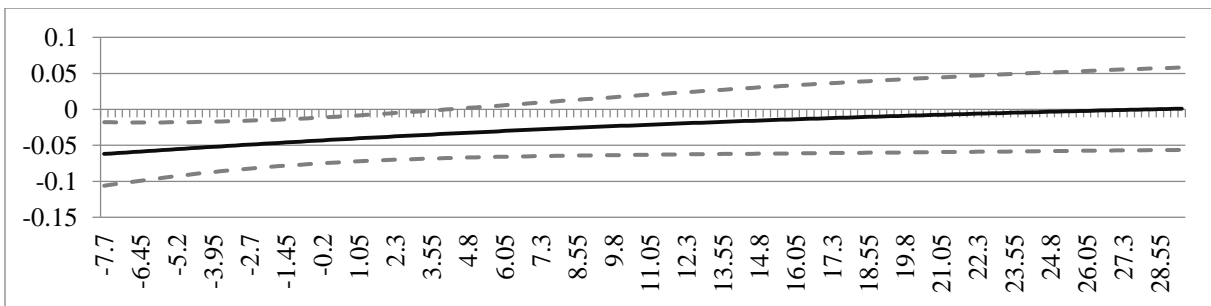


FIGURE 3.6: MARGINAL EFFECT OF INTERACTING TAPE DUMMY AND NGO

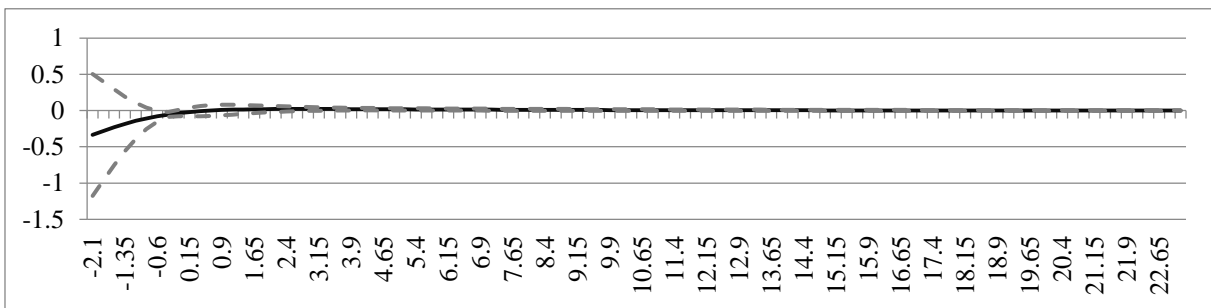


FIGURE 3.7: MARGINAL EFFECT OF INTERACTING TAPE DUMMY AND BOARD STAFF

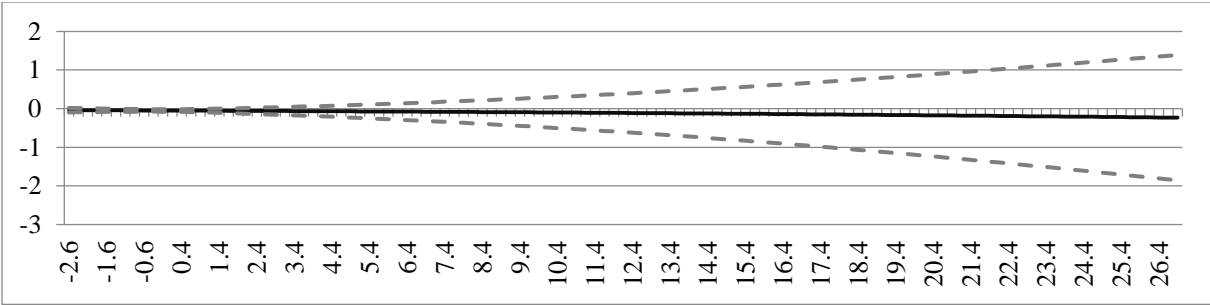
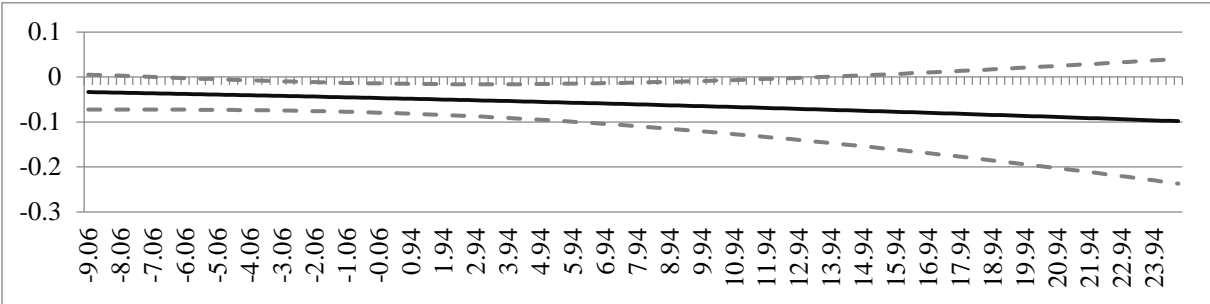


FIGURE 3.8: MARGINAL EFFECT OF INTERACTING TAPE DUMMY AND FED BANK STAFF



Note Figure 3.1- Figure 3.8: Solid lines display the difference of marginal effects between before and after the change in transparency on the probability of casting an inconsistent vote. Dashed lines display the 95% confidence intervals. The x-axis of each figure shows the number of years of working experience relative to the committee’s mean value for the respective meeting. The y-axis of each figure shows the marginal effect of switching from 0 to 1 in the *Tape* dummy on the probability of casting an inconsistent vote.

3.4. Conclusions

Using FOMC voting data extracted from verbatim transcripts from 1989 until 2008, I test several potential determinants influencing inconsistent voting behavior. Inconsistent voting behavior is defined as switching from dissenting in the policy go-around to assenting in the formal vote. It is hypothesized that the change in transparency in 1993 as well as individual characteristics of FOMC members may play a significant role in inconsistent voting behavior.

Applying logit models, the results can be summarized as follows: The regime shift in transparency has a significant impact on the probability of casting inconsistent votes. After 1993, the probability of casting inconsistent votes decreases significantly, on average by 3.3 percentage points. FOMC members with longer experience on the committee have a lower probability of casting inconsistent votes. Further results suggest that Board members and Bank presidents (likewise, male and female members) differ significantly, with Bank presidents (female members) casting inconsistent votes more often than Board members (male members)

do. In addition, political aspects and individual career backgrounds also contribute to explaining inconsistent voting behavior.

Conditional effects reveal that after the change in transparency, differences between Board members and Bank presidents remain, whereas differences between male and female members diminish. Further results suggest that FOMC members with a career in the government sector have been strongly affected by the regime shift in transparency. Finally, during the presidency of George W. Bush the probability of casting inconsistent votes in the FOMC was significantly lower than during the presidency of Bill Clinton.

From an international point of view it would be interesting to study a possible impact of transparency changes (and/or altering committee compositions) on the voting behavior, and especially on inconsistent voting, in other major central banks such as the MPC of the Bank of England²⁵ or the European Central Bank. Indeed, the MPC recently announced that the Bank of England will publish written transcripts with a lag of eight years.²⁶ In addition to that, the ECB also announced to publish minutes in the future. However, the publication lag is fixed to a period of 30 years.²⁷ Thus, this paper provides not only a deeper insight of inconsistent voting behavior in the FOMC, but might also be used to derive possible determinants affecting inconsistent voting behavior in the MPC or in the Governing Council of the ECB.

²⁵ The Warsh report (December 2014) suggests that the Bank of England's MPC should release its written transcripts with a delay of five to ten years.

<http://www.bankofengland.co.uk/publications/Documents/news/2014/spwarsh111214.pdf>

²⁶ <http://www.bankofengland.co.uk/publications/Pages/news/2014/168.aspx>

²⁷ https://www.bundesbank.de/Redaktion/EN/Topics/2015/2015_02_19_ecb_accounts.html

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Appendix

TABLE A 3.1: VARIABLE DEFINITIONS AND SOURCES

Variable	Definition	Data sources
	<u>Dependent variable</u>	
<i>Inconsistent vote</i>	FOMC member cast either an inconsistent vote (1), i.e. casting a dissent in the policy go-around and assenting in the formal vote; or cast a consistent vote (0)	FOMC transcripts
	<u>Regional variables</u>	
<i>Regional unemployment</i>	- Difference between unemployment rate in district i and national unemployment rate - District unemployment rate is the weighted average of state-specific unemployment rates, population shares are used as the weighting scheme	National and State Unemployment Rate: Bureau of Labor Statistics Resident Population: Census Bureau
<i>Failed deposits of regional banks</i>	Failed deposits of insolvent banks per capita in district i District failed deposits is the weighted average of price-deflated state-specific failed deposits (district boundaries are taken from Chappell et al. (2008)), population shares are used as the weighting scheme	Failed deposits: Federal Deposit Insurance Company Resident population: Census Bureau Consumer price index: Bureau of Labor Statistics
<i>Regional coincident index</i>	Index reflects current economic conditions in a state combining nonfarm payroll employment, average hours worked in manufacturing, the unemployment rate, and wage and salary disbursements. The trend for each state's index is set to the trend of its gross domestic product (GDP), so long-term growth in the state's index matches long-term growth in its GDP. Index is used as month-over month percentage change. Difference between coincident index in voter i's district and national coincident index District coincident index is the weighted average of state-specific coincident indexes (district boundaries are taken from Chappell et al. (2008)), population shares are used as the weighting scheme	Federal Reserve Bank of Philadelphia
<i>Regional house price gap</i>	Percentage deviation of district i's house price index from time trend State-specific house price gap is calculated as percentage difference between state-specific house price index and Hodrick-Prescott-based time trend; smoothing parameter for the Hodrick-Prescott filter was set to 1,600; quarterly house price indexes are interpolated to monthly data using the cubic spline method District-specific house price gap is the weighted average of state-specific house price gaps (district boundaries are taken from Chappell et al. (2008)), population shares are used as the weighting scheme	House price index for U.S. states: Federal Housing Finance Agency Resident population: Census Bureau
	<u>National variables</u>	

<i>National industrial production gap</i>	Percentage deviation of national industrial production index from Hodrick-Prescott-based time trend; smoothing parameter for the Hodrick-Prescott filter was set to 14,400	Industrial Production: Board of Governors
<i>National inflation</i>	Month-over-month percentage change in Consumer Price Index	Consumer Price Index: Bureau of Labor Statistics
<i>National output gap</i>	Month-over-month change in Hodrick-Prescott-based output gap; smoothing parameter for the Hodrick-Prescott filter was set to 1,600	National output: Bureau of Labor Statistics
<i>National unemployment</i>	Month-over-month change in national unemployment rate	National Unemployment Rate: Bureau of Labor Statistics
<i>Federal funds rate</i>	Federal Funds Rate of the Wednesday prior to the FOMC meeting	Federal Funds Rate: Board of Governors
<i>National house price gap</i>	Percentage deviation of national house price index from Hodrick-Prescott-based time trend; smoothing parameter for the Hodrick-Prescott filter was set to 1,600; quarterly house price indexes are interpolated to monthly data using the cubic spline method	House price index for the U.S.: Federal Housing Finance Agency
<i>National Commodity price index</i>	Quarter-over-quarter percentage change in S&P GSCI Commodity Spot Price Index	S&P GSCI, drawn from Datastream
<i>National Exchange rate index</i>	Quarter-over-quarter percentage change in trade weighted nominal dollar exchange rate index; higher values indicate depreciation of the U.S. dollar	Federal Reserve, drawn from Datastream
<i>Recession</i>	Dummy variable; equals 1 if U.S. economy turns into recession, 0 otherwise	The Econbrowser Recession Indicator Index
<u>Institutional dummy variables</u>		
<i>Board member</i>	Dummy variable; equals 1 if vote cast by Board member, 0 if vote cast by Bank president	
<i>Tape</i>	Dummy variable indicating the date since all committee members were aware that the FOMC meetings have been tape recorded; equals 1 from 1993M11 thru 2008M12 and 0 otherwise	FOMC voting minutes (November, 16 1993)
<i>Meeting</i>	Dummy variable; equals 1 if vote cast at face-to-face meeting, 0 if vote cast via conference call	
<i>Greenspan</i>	Dummy variable; equals 1 if FOMC chairman is Alan Greenspan, 0 otherwise; reference category is the chairmanship of Ben Bernanke	
<i>Gender</i>	Dummy variable; equals 1 if FOMC member is female, 0 otherwise	
<u>Individual career experience</u>		
<i>Experience</i>	Number of years FOMC member has worked as committee member	Own calculations
<i>Career background in Academia, Government, Industry, Finance, NGO, Board of Governors, Federal Reserve Bank</i>	Number of years FOMC member has worked in a full time position in the respective sector before becoming Bank president or Board member minus mean committee value	Own calculations
<u>Political affiliation through appointment dummies</u>		
<i>Dem governor</i>	Dummy variable equals 1 if Federal Reserve Board member was appointed by Democratic President; 0 otherwise	Own calculations

<i>Rep governor</i>	Dummy variable equals 1 if Federal Reserve Board member was appointed by Republican President; 0 otherwise	Own calculations
<i>Dem bank president</i>	Dummy variable equals 1 if Federal Reserve Bank president was elected during Democratic presidency; 0 otherwise	Own calculations
<i>Rep bank president</i>	Dummy variable equals 1 if Federal Reserve Bank president was elected during Republican presidency; 0 otherwise	Own calculations
<u>Political pressure dummy</u>		
<i>President's party</i>	Dummy variable equals 1 if current President of the United States is Democratic; 0 otherwise	Own calculations

TABLE A 3.2: DESCRIPTIVE STATISTICS OF ALL DETERMINANTS

Variable	Mean	Std. dev.	Min	Max
<i>Regional house price gap</i>	0.011	2.342	-9.926	12.527
<i>Regional coincident index</i>	0.129	0.887	-2.662	2.700
<i>Failed deposits of regional banks</i>	6.130	37.163	0	1039.192
<i>Regional unemployment</i>	-0.129	0.687	-2.246	1.813
<i>National unemployment</i>	0.004	0.146	-0.400	0.500
<i>National inflation</i>	0.244	0.255	-1.803	0.950
<i>National output gap</i>	-0.044	0.548	-2.405	1.140
<i>National house price gap</i>	0.199	2.112	-4.162	5.552
<i>Federal funds rate</i>	4.440	2.162	0.130	9.860
<i>National Commodity price index</i>	0.063	5.624	-13.086	19.845
<i>National exchange rate index</i>	0.218	1.201	-3.256	3.394
<i>Recession</i>	0.188	0.391	0	1
<i>Board member</i>	0.547	0.500	0	1
<i>Tape</i>	0.766	0.424	0	1
<i>Meeting</i>	0.967	0.180	0	1
<i>Gender</i>	0.131	0.338	0	1
<i>Greenspan</i>	0.859	0.349	0	1
<i>Experience</i>	5.282	4.600	0	23
<i>Academia</i>	0.787	9.356	-9.65	25.111
<i>Government</i>	0.467	3.000	-2.294	10.167
<i>Industry</i>	1.328	9.512	-4.5	27.895
<i>Finance</i>	0.679	9.085	-7.706	29.444
<i>NGO</i>	0.342	3.151	-2.118	23.263
<i>Board staff</i>	0.203	4.984	-2.526	27.111
<i>Fed bank staff</i>	-2.809	8.343	-9.059	24.889
<i>Dem governor</i>	0.134	0.341	0	1
<i>Rep governor</i>	0.413	0.493	0	1
<i>Dem bank president</i>	0.164	0.370	0	1

<i>Rep bank president</i>	0.289	0.453	0	1
<i>President's party</i>	0.394	0.489	0	1

TABLE A 3.3: COEFFICIENT ESTIMATES OF INTERACTION MODELS

Variable	Model			
	I	II	III	IV
Tape	-0.753 ** (0.31)	-0.470 * (0.26)	-1.584 *** (0.37)	-0.923 ** (0.46)
Board member	-0.983 ** (0.39)	-1.192 *** (0.23)	-1.029 *** (0.22)	-1.068 *** (0.23)
Tape*Board member	-0.107 (0.47)			
Meeting	-0.121 (0.67)	-0.114 (0.65)	-0.135 (0.69)	-0.120 (0.67)
Greenspan	0.338 (0.57)	0.342 (0.57)	-0.177 (0.65)	0.322 (0.57)
Experience	-0.058 * (0.03)	-0.062 ** (0.03)	-0.046 (0.03)	-0.078 (0.08)
Tape*Experience				0.026 (0.08)
Gender	0.877 *** (0.28)	2.351 *** (0.52)	0.931 *** (0.29)	0.885 *** (0.28)
Tape*Gender		-1.922 *** (0.61)		
President's party	0.505 ** (0.21)	0.487 ** (0.22)	-1.923 * (1.05)	0.519 ** (0.22)
Tape*President's party			3.078 *** (1.11)	
National industrial production gap	-0.242 (0.19)	-0.248 (0.19)	-0.215 (0.19)	-0.243 (0.19)
National inflation	-0.650 * (0.35)	-0.665 * (0.35)	-0.788 ** (0.36)	-0.651 * (0.35)
Regional unemplyoment	-0.212 (0.16)	-0.244 (0.17)	-0.280 * (0.16)	-0.208 (0.16)
Regional house price gap	-0.045 (0.06)	-0.044 (0.06)	-0.066 (0.06)	-0.047 (0.06)
Constant	-2.041 ** (0.88)	-2.176 ** (0.85)	-1.248 (0.90)	-1.903 ** (0.95)
Pseudo R2	0.06	0.08	0.08	0.06
Wald chi2	56.06 ***	68.45 ***	60.38 ***	57.56 ***
LogL	-345.11	-340.18	-337.55	-345.06
PCP (%)	94.77	94.77	94.77	94.77
EPCP (%)	90.37	90.45	90.49	90.38
No of Obs	1796	1796	1796	1796

TABLE A 3.4: COEFFICIENT ESTIMATES OF INTERACTION MODELS, CONT'D

Variable	Model			
	V	VI	VII	VIII
Tape	-0.948 *** (0.24)	-0.739 *** (0.25)	-0.928 *** (0.40)	-0.751 *** (0.24)
Board member	-1.207 *** (0.23)	-1.060 *** (0.24)	-0.706 *** (0.23)	-0.918 (0.66)
Meeting	-0.032 (0.66)	-0.107 (0.68)	-0.090 (0.66)	-0.116 (0.66)
Greenspan	0.285 (0.57)	0.338 (0.57)	-0.016 (0.59)	0.374 (0.57)
Gender	1.134 *** (0.29)	0.871 *** (0.30)	0.679 ** (0.28)	0.962 *** (0.28)
President's party	0.535 ** (0.22)	0.537 ** (0.21)	0.490 ** (0.22)	0.508 ** (0.21)
National industrial production gap	-0.241 (0.19)	-0.301 (0.19)	-0.275 (0.19)	-0.258 (0.19)
National inflation	-0.615 * (0.19)	-0.673 * (0.19)	-0.681 * (0.35)	-0.656 * (0.35)
Regional unemployment	-0.272 (0.17)	-0.141 (0.18)	-0.178 (0.18)	-0.174 (0.16)
Regional house price gap	-0.061 (0.05)	-0.030 (0.05)	-0.024 (0.05)	-0.028 (0.06)
Academia	-0.001 (0.02)			
Tape*Academia	0.057 ** (0.02)			
Government		0.270 ** (0.11)		
Tape*Government		-0.488 *** (0.13)		
Industry			-0.128 ** (0.06)	
Tape*Industry			-0.044 (0.10)	
Finance				-0.034 (0.02)
Tape*Finance				0.027 (0.03)
Constant	-2.332 *** (0.88)	-2.420 *** (0.89)	-2.350 *** (0.91)	-2.445 *** (0.86)
Pseudo R2	0.08	0.09	0.09	0.06
Wald chi2	79.95 ***	73.51 ***	47.63 ***	58.37 ***
LogL	-338.42	-335.04	-335.79	-346.25
PCP (%)	94.77	94.77	94.77	94.77

EPCP (%)	90.42	90.50	90.41	90.35
No of Obs	1796	1796	1796	1796

TABLE A 3.5: COEFFICIENT ESTIMATES OF INTERACTION MODELS, CONT'D II

Variable	Model		
	IX	X	XI
Tape	-0.567 (0.42)	-0.834 *** (0.24)	-0.802 *** (0.24)
Board member	-0.774 *** (0.22)	-0.936 *** (0.23)	-0.777 *** (0.29)
Meeting	-0.144 (0.67)	-0.110 (0.67)	-0.120 (0.67)
Greenspan	0.360 (0.56)	0.359 (0.58)	0.352 (0.56)
Gender	0.950 *** (0.28)	1.007 *** (0.28)	0.935 *** (0.30)
President's Party	0.487 ** (0.21)	0.533 ** (0.21)	0.523 ** (0.21)
National industrial production gap	-0.251 (0.19)	-0.252 (0.19)	-0.254 (0.19)
National inflation	-0.635 * (0.35)	-0.625 * (0.35)	-0.652 * (0.19)
Regional unemployment	-0.134 (0.17)	-0.225 (0.16)	-0.208 (0.16)
Regional house price gap	-0.030 (0.05)	-0.031 (0.05)	-0.028 (0.05)
NGO	-1.090 (1.09)		
Tape*NGO	0.910 (1.09)		
Board staff		0.059 (0.16)	
Tape*Board staff		-0.038 (0.16)	
Fed bank staff			0.024 (0.02)
Tape*Fed bank staff			-0.017 (0.02)
Constant	-2.673 *** (0.93)	-2.395 *** (0.87)	-2.434 *** (0.86)
Pseudo R2	0.07	0.06	0.06
Wald chi2	56.85 ***	54.46 ***	56.69 ***
LogL	-342.33	-347.04	-346.97
PCP (%)	94.77	94.77	94.77

EPCP (%)	90.38	90.34	90.34
No of Obs	1796	1796	1796

Note: Results from pooled logit model estimation. Dependent variable: inconsistent vote. Robust standard errors in parentheses. *, **, *** indicate significance at the 10%, 5% and 1% levels, respectively.