Lady Justice's Delay:
Judicial Policy Bargaining and the Duration of Senate Proceedings at the German Federal Constitutional Court

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To Gerit

Preface

> "If I hear the word 'Bundesverfassungsgericht' one more time, I will leave the room"
> Christine Lagarde, Managing Director of the International Monetary Fund (cited by Müller 2012, own transl.)

This alleged quote by Christine Lagarde might have come from a stressful moment in the course of writing a thesis on the FCC. Its more fundamental purpose is to pinpoint the enormous political decision-making power held by a small group of FCC judges in the midst of the European sovereign debt crisis. This thesis hopefully contributes to a better understanding of this very powerful yet underresearched political actor.

I am indebted to many people who have been of major help in these four years of research. First of all, thanks to my parents who have supported me throughout my whole educational and academic career. Many thanks to my husband Gerit who motivated me in times of ups and downs and who regularly gave valuable feedback on the more technical parts of this dissertation.

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Throughout the doctorate, I have benefited a lot from cooperation with the DFG-project team. Thanks to Thomas Gschwend for being a great mentor, both academically and personally. I learned a lot in your classes and from your personal advise. It was a pleasure to work with you. Thanks to Christoph Hönnige, Caroline Wittig, and Benjamin G. Engst for a great time on the team and for your permanent support on open questions and data issues. Thanks to Dr. E. Goetze and G. Rittershofer for collecting and providing

the list of dates of receipt from internal FCC records. Thanks to Philipp Broniecki and all student assistants for collecting the huge amount of data in the project.

I will follow my path outside academia but always enjoy to remember these years working with you. Whenever I hear the word 'Bundesverfassungsgericht', I will think of a great time at D7, A5, and Karlsruhe Schlossbezirk.

Mannheim, October 2014

Jens Brandenburg

Contents

Part I.

Outset

1. Introduction

How does policy bargaining at the German Federal Constitutional Court (FCC) affect the duration of senate proceedings? This study offers a new theory of dynamic policy bargaining with incomplete information. A new simulation procedure is developed to derive hypotheses. New data on FCC proceedings since 1972 is collected and linked to the extended GESTA legislation database. The event history analysis shows that bargaining duration increases with preference uncertainty. The empirical impact of policy preference heterogeneity and other bargaining-related factors on the overall duration of FCC proceedings is not strong and systematic enough to clearly stand out from other causes.[1]

The FCC is selected as a case for two reasons. First, the FCC is the "most powerful independent constitutional court of the world" (Schönberger 2011, 45, own transl.) with a particularly large set of competencies and political impact (Alivizatos 1995; François 2011; Fromont 1999; Häberle 2001; Kneip 2009; 2013; Kommers 1994; Limbach 2001). It may declare federal laws unconstitutional and indirectly influence legislators by anticipated vetoes (Landfried 1984, 51ff).[2] Some scholars even see the FCC as a prototype of specialized constitutional jurisdiction (Kneip 2009). Its independence from highest federal courts of ordinary jurisdiction, its self-conception as a constitutional body, and its enormous plentitude of competencies in international comparison constitute its unique type (Wahl 2006). Jestaedt even elevates the FCC to a "third archetype of constitutional courts" at eye level to the older basic models of U.S. Supreme Court and Austrian Verfassungsgerichtshof (Jestaedt 2011, 96, own transl.). In light of the FCC's political relevance and independence, impacts of policy motivation on bargaining duration are more likely and more relevant to the political system than in any other constitutional court.

Second, the FCC is an "export hit" (Jestaedt 2011, 150, own transl.). It has served as a role model for many constitutional courts in the world since 1970s, including Spain, Portugal, South Korea, South Africa, and many new democracies in Central and Eastern

[1] The layout of this thesis is set with LaTeX. Graphics are created with R 2.15.3 (Development Core Team 2008) and the R package plotrix (Lemon 2006).

[2] See Stone (1992) and Vanberg (1998) for detailed analyses on the autolimitative effect of anticipated vetoes.

Europe.[3] Even though these courts might not share the full range of competencies, empirical findings on the FCC will be relevant for judicial politics research on a large set of comparable constitutional courts worldwide.

Empirical political science research on the FCC still is at a very early stage compared to the intense research on U.S. Supreme Court (Herrmann 2010; Hönnige and Gschwend 2010; van Ooyen and Möllers 2006*a*; von Beyme 2001). There are numerous edited volumes on the FCC, including interdisciplinary historical, judicial, social science, and philosophical perspectives (e.g. Badura and Dreier 2001*a*;*b*; Rogowski and Gawron 2002*b*; Stolleis 2011; van Ooyen and Möllers 2006*b*; Vorländer 2006*b*). Most scholars of European constitutional courts have focused on their interdependence with the legislature and the government (Hönnige 2007; Stone Sweet 2000; Vanberg 2001; von Beyme 1998). Whereas the U.S. literature predominantly opts for the rational choice institutionalism approach, studies on the FCC are mostly embedded in interpretative institutionalism (Hönnige and Gschwend 2010, 522).

There still is little knowledge about the FCC's bargaining processes behind closed doors.[4] "We have little knowledge about processes within the Court – analyses from a political science perspective virtually do not exist" (Herrmann 2010, 411, own transl.). This is at least partially due to the limited amount of publicly available data on the FCC's internal processes (Menzel 2011, 10f) as compared to the large U.S. Supreme Court database (Spaeth et al. 2013). Some FCC judges might see a moderate influence of personal and political values on FCC decision-making (Landfried 1984, 45). But the Court officially denies any influence or motivation by political concerns and many judges claim to share this view[5], whereas journalists and political scientists point to the Court's political nature (Prantl 2011; Schmidt 2011). This thesis opts for the latter view and contributes to a better understanding of internal, policy-motivated bargaining processes at the FCC from a strategic rational choice perspective.

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[3] See Benda, Klein and Klein (2012, 4), von Beyme (2006), Häberle (2001), Hönnige and Gschwend (2010), Jestaedt (2011), Menzel (2011), Rath (2013), Schönberger (2011, 44), Schlaich and Korioth (2012, 4), Sólyom (2011), Tomuschat (2001), Wahl (2006), and Zürn (2011).

[4] "The public does not realize the dispute sometimes lasting for weeks or months behind an eventually unanimous decision, like in the abortion conflict or in the asylum decisions. They see the finished product" (FCC judge no. 29, cited by Kranenpohl 2010, 415, own transl.).

[5] "[... T]he Court is not a political body. Its sole review standard is the Basic Law" (Federal Constitutional Court 2014).
"The Federal Constitutional Court does not decide politically but solely based on the Basic Law" (FCC judge and former politician Peter Müller, cited by Janisch 2012, own transl.).
"Even if judicial opinions are to be weighed, it is not about politics. 'The Federal Constitutional Court comes to exclusively judicial decisions' " (FCC president Andreas Voßkuhle, cited by Bannas 2011, own transl.).

For three reasons, we should care about the duration of FCC proceedings:

1. The timing of an agreement is an essential **part of any negotiation outcome**. "If it did not matter when people agreed, it would not matter whether or not they agreed at all" (Cross 1965, 72). Delayed FCC decisions might even be too late to have any effect at all.[6] There is no binding rule in what order and how fast to deal with pending proceedings. The FCC's yearly list of proceedings to be settled is internally called the "list of lies" (Rath 2013, 29). If judges bring a case forward with high priority, this will already be a political decision (Rath 2013, 29).

2. The FCC depends on **public support** to uphold its political impact and to have its decisions implemented (Vanberg 2005). Public confidence in the Court positively correlates with perceived institutional performance in reasonable time (Vorländer and Brodocz 2006, 267). Journalists share the view that duration of FCC proceedings matters.[7] The duration of proceedings affects the Court's major source of political power.

3. The duration of FCC proceedings is a **current political and legal challenge**. The European Convention on Human Rights entitles everyone to a hearing "within a reasonable time" (Art. 6 §1 ECHR, see also Grabenwarter 2008). Both current and potential future complainants' rights are affected. An excessive duration of conflictual FCC proceedings could lower future complainants' incentives to fight for their constitutional rights. Judicial delay discourages potential plaintiffs from filing legal disputes at ordinary courts (Sobbrio, D'Agostino and Sironi 2010) and similar effects are plausible at constitutional courts.

   Several times, the European Court of Justice has accused Germany of an excessive length of constitutional complaint proceedings at the FCC.[8] The FCC's enormous

[6] Siegfried Kauder (CDU), who chaired the parliamentary BND investigation committee on the federal government's role in the Iraq war, blamed the FCC for delayed decisions: "Not before five weeks after the close of the committee, we learned that the government should not have blocked so many files and that approvals of witness statements have been handled too restrictively" (cited by jub/FOCUS Online 2010, own transl.). Indeed, the FCC's second senate came to a decision as late as on June 17, 2009 (BVerfGE 124, 78), more than two years after the case was filed and just one day before the committee's final session: "A decision by the Court was not available until the declatory resolution (*Feststellungsbeschluss*) of the committee on June 18, 2009" (BT-Drs. 16/13400, p. 47, own transl.).

[7] In the coverage on the politically salient child pornography accusations against the German politician Sebastian Edathy, a leading German news agency reports: "Meanwhile, the German Federal Constitutional Court received the constitutional complaint by the former SPD Member of Bundestag Edathy. The Court's spokesman did not give any information on the content nor *the possible duration* of the proceeding" (dpa 2014, own transl., emphasis added).

[8] Exemplary ECJ decisions are *Trippel v. Germany* (2003), *Voggenreiter v. Germany* (2004), *Wimmer v. Germany* (2005), *Sürmeli v. Germany* (2006), *Kirsten v. Germany* (2007), and *Kaemena and Thöneböhm v. Germany* (2009).

caseload leads to a severe bottleneck of pending proceedings (Bundesministerium der Justiz 1998; Uerpmann 2001). The then leaving FCC judge Ernst-Wolfgang Böckenförde even feared that the increasingly high workload would necessarily lead to the collapse of the Court from within. Statistically, he argued, judges would need to complete 47.5 chamber cases in just one day in order to keep up with incoming cases (Böckenförde 1996, 282). Until recently, there has been a complete lack of an effective remedy in this respect at the national level (see section 6.1; Benda, Klein and Klein 2012, 512f; Schlaich and Korioth 2012, 55).

The duration of FCC proceedings matters from political, public, and legal perspectives. Hence, it is important to know how political or policy-motivated incentives and bargaining constellations at the FCC affect delay of proceedings. Until now, there is but mere conjectures and anecdotal evidence. Benda, Klein and Klein (2012, 166) suppose that the delay of FCC decisions after an oral argument indicates substantial controversy in the senate. Kommers and Miller (2012, 38) blaim the Court for regular delay out of strategic incentives so that initiating parties would ultimately withdraw their case.[9] Lamprecht (2011, 44ff) and (Wesel 2004, 89f) both claim that the first senate delayed the party prohibition proceeding against the KPD out of political concerns.[10] The proceeding of the famous "Lüth" decision in 1958, which raised the basic rights of the Grundgesetz to an objective scale of values, took more than six years: "Why did it take so long? Maybe because it was so important or because the senate was overstrained with such complaints. We do not know for sure" (Wesel 2004, 132, own transl.). This thesis seeks to disentangle potential causes and to provide a sound theory of how policy bargaining-related factors affect the duration of FCC proceedings.

Chapter 2 introduces the FCC's basic structure and procedures that are relevant for further analysis. FCC judges have an enormous leeway to decide in a largely institution-free environment. Chapter 3 discusses previous approaches to explain delay of policy bargaining processes. No compelling and logically consistent theory of how policy pref-

[9] Their numbers are misleading, though. A minor proportion of the 168 organ disputes and 163 abstract judicial reviews that were closed until 2011 have actually been withdrawn. At least 58% of these organ disputes and 67% of these abstract judicial reviews have resulted in a regular decision on the merits by the Court (FCC 2014*a*). These numbers do not yet contain some initial proceedings that were regularly decided in the course of conjoint proceedings.

[10] They tell the following story: The prohibition of the SRP had just been decided within one year, whereas the KPD proceeding took almost 5 years. Chancellor Konrad Adenauer got impatient and in July 1956 his party's convenient parliamentary majority changed the Federal Constitutional Court Act (FCCA) so that the competence of party prohibitions would be assigned to the second senate on August 31, 1956. The first senate sped up the proceeding and the prohibition of the KPD was finally decided on August 17.

erences affect bargaining duration has been provided yet. Chapter 4 extends Banks and Duggan (2006)'s bargaining model by the assumption of preference uncertainty. This new model of dynamic policy bargaining with incomplete information allows to explain variance in bargaining delay and can be applied to numerous policy bargaining settings. Chapter 5 presents a new, computing-time efficient simulation procedure to solve these games. Hypotheses on the dynamic policy bargaining model with incomplete information are derived via computer simulation. They reveal a much more distinguished picture of factors of bargaining delay than previous accounts suggest. Chapter 6 presents a research design to test these hypotheses on all 694 FCC senate proceedings with reference to federal legislation since 1972. The analysis makes use of new data sources and links FCC proceeding data to the extended GESTA legislation dataset. Chapter 7 finally presents the results from event history analysis. Preference uncertainty increases bargaining duration. The empirical impact of other policy bargaining-related factors on duration is not strong and systematic enough to clearly stand out from other causes.

2. The German Federal Constitutional Court

This chapter provides a brief introduction into the FCC's position in German politics, its formal structure, and procedural rules.[11] The description of the institutional setting lays the ground for the formal theory of FCC decision-making to be developed in chapter 4. The main conclusions of the present chapter are: (a) FCC judges have far-reaching competencies to change legislative policy and (b) they negotiate in a largely institution-free surrounding.

2.1. History

Since its beginning in 1951, the FCC has gained an established and very powerful position in German politics.[12] Following the experience from Weimar Republic and World War II, its precise institutional structure and powers were disputed in the Parliamentary Council (Niclauß 2006) and continued to be a contested issue in the Adenauer era (Lembcke 2006). Wesel (2004) identifies two severe crises of the Court: The first took place in 1952/53, when the Adenauer government tried to politically manipulate the Court in a dispute on German rearmament. The second crisis occurred in 1994/95, when the Court faced harsh political and public resistance after a series of high-conflict, unpopular decisions that culminated in the open refusal of the Kruzifix decision by the Bavarian government.[13] In the long run, neither crisis has seriously harmed the Court.

FCC judges are regularly accused of political bias, e.g. in a series of decisions against the social-liberal government coalition in the 1970s (Grigoleit 2006; Wesel 2004[14]). Politicians still threaten to cut the Court's competences these days in response to unfavored decisions

[11] Unless otherwise indicated, the information in this chapter is taken from Schlaich and Korioth (2012) and Benda, Klein and Klein (2012). Kommers and Miller (2012, chap. 1) present an excellent English language introduction into the Court. The latter source serves as a valuable orientation for translating technical terms from the German judiciary into English.

[12] See Wesel (2004), Lamprecht (2011), Menzel (2011), and Schönberger (2011) for more comprehensive historical overviews.

[13] See also Schaal (2006).

[14] See Menzel (2011, 14f) for a pointed critique on Wesel's overly simplifying historical account.

(vek/SPIEGEL Online 2014). Yet, none of these offenses has succeeded in reducing the Court's political influence and its public standing (Menzel and Müller-Terpitz 2011). Apart from temporary uncertainty in the mid-1990s, the FCC has remained a widely recognized, uncontested and powerful actor in German politics throughout the whole period under study.

2.2. Jurisdiction

The Court's main tasks are to settle disputes between constitutional organs or federal entities, and to control court decisions, executive, and legislative acts in terms of their constitutionality (Schlaich and Korioth 2012, 5f). A direct comparison to the U.S. Supreme Court helps to get a better understanding of the German particularities in constitutional jurisdiction. The FCC differs from its American counterpart in many ways:

- The FCC is not an appellate court. It is a specialized court that deals with constitutional questions only (Rogowski and Gawron 2002*a*; Schlaich and Korioth 2012, 197ff).
- Ordinary courts are bound to the Basic Law. But the FCC is the only court in the German federal system that is empowered to annul legislative acts. Its members can even judge on the constitutionality of laws without a concrete dispute at hand.
- The FCC has no *certiorari* power (Schlaich and Korioth 2012, 183). It is generally obliged to decide on every submitted case, so that it has very limited power over its docket (Benda, Klein and Klein 2012, 154). Kommers and Miller (2012, 35) rightly point to the gate-keeping power of chambers. But with regard to their limited jurisdiction on obvious or totally hopeless constitutional complaints (see section 2.3), this barrier is not very strong.
- The FCC is obliged to decide on highly politicized cases. Despite a moderate norm of judicial restraint[15], there is no political question doctrine that allows judges to ignore politically delicate cases (Benda, Klein and Klein 2012, 12ff).

The Court's agenda is externally determined. FCC judges can neither deny to deal with inconvenient cases, nor can they hold consultations without external initiation (Benda, Klein and Klein 2012, 97). But once a case is docketed, they possess far-reaching competencies.

[15] "Judicial restraint implies that justices should defer to elected officials as much as possible within the bounds established by the Constitution" (Bailey and Maltzman 2011, 9). See von Beyme (2010, 419ff) for a more elaborated account on judicial restraint at the FCC.

2.3. Structure and Composition

The following paragraphs summarize the Court's structure, decision-making rules, and the role and selection of FCC judges.

Plenary The *plenary* is a board of all 16 members of the Court. It is mainly responsible for organizational tasks (e.g. budget plans, the assignment of competencies, etc.) and for resolving conflicting legal opinions between the senates. Its resolutions are binding but the final decision on a case is always made by a senate or chamber.

Senates The FCC is a "twin court" and consists of two eight-member *senates* with distinct jurisdiction. Both senates are of equal rank and act as "the Federal Constitutional Court". They can not revise each other's decisions (Schlaich and Korioth 2012, 26). In the beginning, the first senate ("*Grundrechtssenat*") exclusively dealt with basic right disputes and the second senate ("*Staatsrechtssenat*") resolved constitutional conflicts between state organs only. The caseload had been heavily biased towards the first senate due to the high number of constitutional complaints. Therefore, the second senate was allocated partial jurisdiction on constitutional complaints in 1956.[16] While different emphases on basic rights and state law still prevail, the strict separation between senates has been relaxed.

Decision-making in the senate Most decisions formally require a simple majority of at least six attendant judges. Each judge has one vote, so the (vice) president's position counts just as much as any of their colleagues'. If less than six judges attend (e.g. due to illness), the whole consultation procedure has to be reopened. Judges from the other senate can be chosen by the lot if this is necessary to reach the quorum of six in very urgent cases.[17] In the event of a tie (4:4 or 3:3), the objected act will not be declared unconstitutional (Benda, Klein and Klein 2012, 62).

Chambers Each year, both senates appoint several *chambers*. These sub-committees consist of three permanent judges from the respective senate. Their main purpose is to release the senate from minor cases. By unanimity rule, a chamber can decline the admissibility of a concrete judicial review or deny to accept a constitutional complaint for review.

In 1986, chambers replaced the functionally similar "preliminary examination committees" (*Vorprüfungsausschüsse*). Unlike their predecessors, a chamber may even

[16] See Federal Law Gazette (BGBl 1956 I, 662), Rath (2013, 15), Limbach (2001, 20f), and Benda, Klein and Klein (2012, 74f).

[17] This provision was introduced in 1986 (Benda, Klein and Klein 2012, 153).

grant a constitutional complaint – but only in obvious cases that do not directly target a legal norm. Cases of general importance or constitutional questions yet unanswered by a senate must be referred to the whole senate (Benda, Klein and Klein 2012, 78ff, 185, 196)

Judges FCC *judges*[18] are elected for a personal term of 12 years with an age limit of 68. They may not be reelected (Schlaich and Korioth 2012, 28). When judges start their term at the Court, they must be at least of age 40, formally qualified to hold the position of a judge, and eligible to the German Bundestag. Three members of each senate must have been federal judges before (Schlaich and Korioth 2012, 28).

FCC judgeship is a full-time job. With the exception of being professor, no other job is compatible with this office (Benda, Klein and Klein 2012, 64f). This job-related provision and the exclusion of judges' reelection prospects strengthen a judge's political independence, once he is elected.[19] Each judge is supported by his own department. Legal assistants play an important role in preparing decisions (Wieland 2002). But only judges themselves take part in the confidential consultations of a senate (Kranenpohl 2010, 88ff).

Selection of judges A 12-member *election committee* of the Bundestag and the plenary of the Bundesrat each elect half of the judges for a specific senate at the FCC. The same bodies also select the *president* and *vice president* of the Court, who each chair a senate with administrative and respresentative duties.

Since the election requires a two-third majority, politicians need to compromise across party lines. In practice, positions are evenly split between the christian democrats (CDU/CSU) and social democrats (SPD). They sometimes grant a seat to their smaller coalition partner. The proposal is typically accepted by unanimity. A very small number of party leaders effectively selects the judges so that most judges are party-affiliated, party members, or even prominent politicians. "Neutral" candidates without obvious party-affiliation make up a minority of the Court (Geck 1986, 31ff). Meetings of the election committee are secret and there is little public debate about potential candidates (Schlaich and Korioth 2012, 30).

[18] I refer to members of the FCC as "judges", whereas members of the U.S. Supreme Court are called "justices".

[19] The present study does not focus on gender as a decisive feature in the judicial policy-making process. Throughout this thesis, the generic masculine refers to judges, complainants etc. irrespective of their gender or biological sex.

2.4. Forms of Action

The legislator has defined a variety of forms of action at the FCC. They involve disputes between state organs, abstract and concrete judicial review, individual and municipal constitutional complaints, the prohibition of political parties, review of election results, and many more.[20] The present study is limited to FCC proceedings that object to federal laws. The most important and frequent forms of action of this kind are:

Abstract judicial review The federal government, a state government, or one-fourth of the members of the Bundestag can file a proceeding of *abstract judicial review* ("abstrakte Normenkontrolle") in order to question the constitutionality of a legal norm. The quorum used to be one-third of the members of the Bundestag until it was lowered by the "Grand Coalition" in 2008 (Benda, Klein and Klein 2012, 278). The procedure does not require any reference to a concrete case at issue.

Concrete judicial review An ordinary court can file a *concrete judicial review* ("konkrete Normenkontrolle") if it considers a legal norm that is relevant for a decision on a pending "concrete" case to be unconstitutional. The FCC's jurisdiction is limited to evaluating the constitutionality of such a legal norm.[21] As long as constitutional rights or principles are not violated, the application of legal norms to concrete cases remains up to ordinary courts.

Constitutional Complaint Any individual natural person or legal entity can file a *constitutional complaint* ("Verfassungsbeschwerde"). They may directly object to a legal norm that personally, currently, and directly affects them. Or they may turn against an ordinary court's decision and indirectly object to a norm (Schlaich and Korioth 2012, 90f). Municipalities can file a constitutional complaint but object to federal or state laws only (Benda, Klein and Klein 2012, 269). Unlike other forms of action, constitutional complaints require a positive vote by at least three judges of the senate to be accepted for review.[22] The FCC is to accept any complaint that is related to grave hardship on the complainant or of general significance (Kommers and Miller 2012, 12).

[20] See Benda, Klein and Klein (2012), Kommers and Miller (2012, 10), and Rinken (2002, 62ff) for more detailed descriptions.

[21] The FCC may also decide on whether state law conflicts with federal law or other norms (Schlaich and Korioth 2012, 311). Such proceedings of judicial review are not relevant in this study.

[22] See FCCA, § 93d (3) and Schlaich and Korioth (2012, 180).

2.5. The Course of a Proceeding

The study focuses on the duration of FCC proceedings. We will therefore have a look at the course that a request typically takes, once it has reached the Court (Kranenpohl 2010, 82f). Figure 2.1 provides the general outline. It is a simplified presentation and does not account for special cases like conjoint proceedings, plenary decisions, transfers across senates, or senate decisions exluded from the official collection of decisions. The typical course of proceedings is discussed in the following.

1. **Administration** Incoming requests are first sighted by the administration. Obviously hopeless or inadmissible constitutional complaints that do not even fulfill formal requirements enter the *general register* ("Allgemeines Register"). The decision is made by a *Präsidialrat* who does not hold the position of a judge. Complainants receive a written note. Only if they insist on a decision by a judge, the complaint is transferred to the official docket of the Court ("Verfahrensregister"). The request will be closed otherwise (Benda, Klein and Klein 2012, 87f; Schlaich and Korioth 2012, 182).

   Each year, about 4500 requests are ultimately closed in the general register. The remaining 6000 complaints are officially docketed. They include more than 1000 cases from complainants who insisted on a decision by a judge and another 1000 presumably hopeless requests whose complainants are known for notorious insistance on judicial decisions anyway (Schluckebier 2012).

2. **Rapporteur** Once a case is docketed, the Präsidialrat proposes a *rapporteur* ("Berichterstatter") to whom the respective senate's chair will assign the proceeding. The FCC's opinion assignment procedure is much less discretionary than the U.S. Supreme Court's procedure (Segal and Spaeth 2002, 357ff). The yearly schedule of responsibilities ("Geschäftsverteilung") clearly defines individual judges' responsibilities for certain fields of law. It largely determines the chair's decision and leaves little room for interpretation in most cases.

   The rapporteur and his or her department then prepare a comprehensive *Votum*. Such a written document includes all case-relevant facts, legal norms, opinions, arguments, and a first proposal on how to decide the proceeding (Kommers and Miller 2012, 27). If the proceeding is a constitutional complaint or a concrete judicial review, the rapporteur will decide whether to submit the case to the chamber (step 3) or whether to directly target the senate (step 4, cf. Schlaich and Korioth 2012, 185). All other forms of action directly go to the senate.

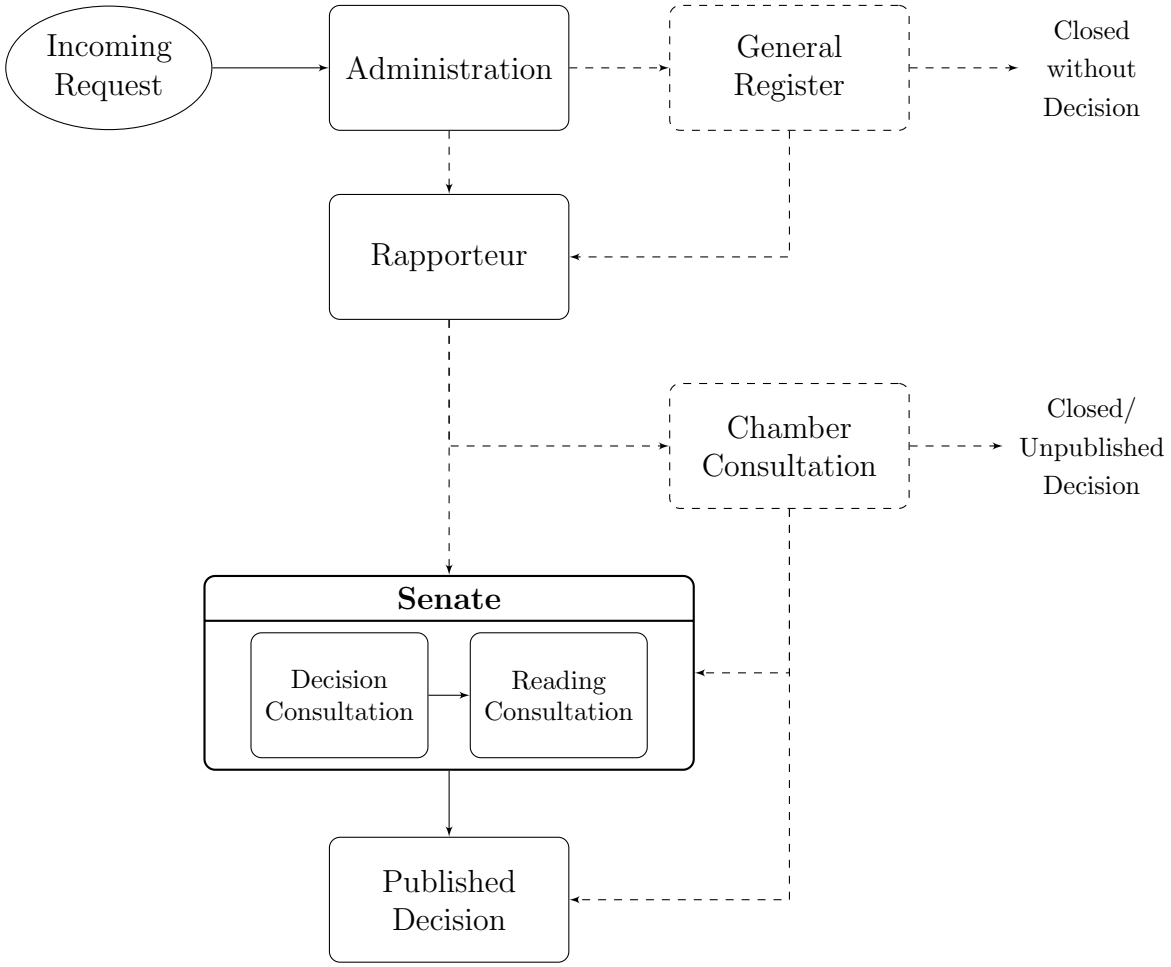

Figure 2.1.: **The Course of a Proceeding at the FCC:** Senate decisions are the focus of this study. When these cases enter the Court, they are typically classified by the administration, prepared by a rapporteur, possibly discussed in a chamber, discussed and decided in a senate, and published in the FCC's collection of decisions.

3. **(Chamber consultation)** If the case enters a chamber, the Votum circulates between the chamber's judges. The consultation process is usually limited to the exchange of written notes. If all three judges unanimously agree to decline or grant a complaint, the proceeding will be closed.[23] About 97% of all docketed constitutional complaints are dealt with this way (Schlaich and Korioth 2012, 185). The proceeding will be forwarded to the senate, otherwise. Only the most important chamber decisions are published in the FCC's collection of decisions.

4. **Senate consultation** Senate consultations take place in regular face-to-face meet-

[23] See section 2.3 for more information. These mostly trivial or obvious cases will not be considered in my study.

ings. Conferences are scheduled every Tuesday and often also take Wednesdays and Thursdays – except for the weeks in August and September, when the Court is not in session (Kommers and Miller 2012, 28). Consultation meetings are confidential and restricted to participating judges. Legal assistants in charge of the Votum's preparation are not allowed to participate.

The group of justices that will finally make the decision is determined at the beginning of the senate consultation. Judges consider both the formal admissibility and the merits of a case. Separate proceedings on the same object can be linked to a joint decision. If a decision depends on another court's ruling, the proceeding can be deferred (Benda, Klein and Klein 2012, 128f).

The consultation of a proceeding is divided into two phases:

a) In the **decision consultation** ("Entscheidungsberatung"), the rapporteur introduces the case and his or her favored solution as announced in the Votum. The judges then negotiate about a common solution. This process might take several sessions and can include an oral argument. The senate eventually agrees on a common outcome that is supported by a majority of participating judges.

   Oral arguments are conducted in very few proceedings.[24] They are optional in most procedures and take a lot of time to prepare (Kranenpohl 2010, 100). They may also serve to inform the public about a proceeding in cases of major political importance (Benda, Klein and Klein 2012, 129ff; Kommers and Miller 2012, 26f).

   Based on the consultation outcome, the rapporteur prepares a *decision draft* ("Entscheidungsentwurf"). Even if he or she was in the minority, the rapporteur would be responsible for writing the majority opinion. Only in rare cases, the opinion has been assigned to other judges (Kommers and Miller 2012, 28). The decision draft will then lay the ground for the second phase of consultation.

b) In the **reading consultation** ("Leseberatung"), the senate revises the decision draft and passes the final decision. This process goes far beyond editorial formalities. Judges sometimes dispute about single connotations so that the reading consultation can be very intense and lengthy.[25]

[24] From 1990 to 2013, there were 73 oral arguments held in the first senate and 101 in the second senate – a total Court's average of 7.25 oral arguments per year (FCC 2014*a*, annual statistics 2013).

[25] Two FCC judges report:

> "We have intensely discussed every sentence and sometimes single words. More often than not, the [reading] consultation of the decision draft took more time than the [decision] consultation of the Votum" (No. 11, cited by Kranenpohl 2010, 99, own transl. and comments).

Besides this very general outline, hardly any procedural rules restrict negotiations in the senate. The mere existence of a formal list of speakers in discussions varies in time and between the senates (Kranenpohl 2010, 96f).

Judges share a strong norm of consensus, though. Senate negotiations are fights about majorities that regularly result in compromise (Lepsius 2011, 241). In a "separate opinion" (*Sondervotum*), judges may express their disagreement with a decision (*dissenting opinion*) or with its reasoning (*concurring opinion*; cf. Schlaich and Korioth 2012, 35).[26] They are typically published only on issues that are either scientifically fundamental or very conflictual in society (Limbach 2001, 34). A senate will only rely on majority decisions and separate opinions if there is no way to achieve consensus (Kranenpohl 2010, 181ff).

With the U.S. Supreme Court in mind, one might expect the rapporteur to possess an enormous agenda-setting impact on the final outcome (Kranenpohl 2010, 133ff). They enjoy wide discretion in setting priorities and scheduling when to introduce which case. So unfavored cases can be considerably delayed (Kranenpohl 2010, 91). They are experts of the case and might have an information advantage. But on the other hand, all case-relevant information and legal opinions must be included in the Votum. The rapporteur's colleagues are usually well prepared in conference meetings (Kranenpohl 2010, 94). Since rapporteurs are typically appointed to a field where they do not have a particular expertise, the professional checks and balances within the senate further limit the bargaining advantage (Kranenpohl 2010, 148ff). The first proposal is frequently changed in the senate and the Votum does not confine the final decision at all (Kranenpohl 2010, 93, 155ff). Judges can hardly predict a negotiation's outcome at the beginning.[27] So the rapporteur might have

> "The most dramatic situation, when a decision is finally found, is the reading consultation" (No. 29, cited by Kranenpohl 2010, 98, own transl.).

[26] Separate opinions were legally introduced in 1971 and have been applied for the whole period under study (4^{th} Amendment of the FCCA Act of Dec 21, 1970; BGBl I, 1765). For more detailed information, see Lamprecht (1992).

[27] Four FCC judges report:

> "When the door closes at 10 o'clock, seven hounds jump at the one game [the rapporteur]" (No. 30, cited by Kranenpohl 2010, 96, own transl.).
>
> "When I enter the Senate with a Votum, I do not know the outcome. I really don't know!" (No. 4, cited by Kranenpohl 2010, 95, own transl.).
>
> "We all enter a common boat and after a long journey we reach shores that we didn't even know of, when we started" (No. 18, cited by Kranenpohl 2010, 95, own transl.).
>
> "Of course, you have some idea about where there might be resistance. But there are many surprises. [...] Resistance often comes from where you do not expect it"

a moderate bargaining advantage due to the largely self-determined timing of cases and a more extense preparation. But given the strong culture of mutual control and well-prepared, intense negotiations, this advantage is rather limited and "probably overestimated from outside" (Judge no. 28, cited by Kranenpohl 2010, 143, own transl.).

Senate consultations end with a final vote on the decision including both merits and reasoning.

5. **Publication of the decicion** The Court's decision will then be announced and published in the Court's official collection of FCC decisions (*BVerfGE*). The collection includes all senate decisions that are not explicitly exluded from publication (Benda, Klein and Klein 2012, 167).[28] Since judges can change their vote anytime until the final decision is published (Benda, Klein and Klein 2012, 155), the publication of a decision literally ends the proceeding.

   Published decisions are written in a very comprehensive way and they roughly share a common layout (Benda, Klein and Klein 2012, 158ff):

   a) **Leading sentences** ("Leitsätze") are a concise summary of the decision's main legal propositions. They are optional and not formally binding.

   b) The **rubrum** is the head of the decision and includes detailed information such as the case's file number, its form of action, complainants or petitioners and sometimes defendants, attorneys of record, objected norms or actions, potentially violated constitutional rights and federal norms, the senate, patricipating judges, the date of oral argument, and the date of the final decision on the merits.

   c) The **Tenor** is the binding ruling of the case.

   d) The **reasoning** is split into several parts. It often adheres to the following structure: Part A includes a short summary of the facts of the case, a report on relevant legal norms and sometimes even these norms' legal history, the actual circumstances of the case, legal comments of participants in the proceeding, and sometimes further comments on available evidence and the case's procedural

(No. 27, cited by Kranenpohl 2010, 155, own transl.).

[28] I expect only minor decisions to be excluded from publication. Ordinary courts, politics, and the public will only adhere to a decision if it is commonly known and accessible. The FCC's legitimacy and political power depend on public support and transparency. FCC judges have a high incentive to make decisions publically available. I am not aware of any complaints about non-published decisions of general interest.

history. Part B refers to the *admissibility* ("Zulässigkeit") of the request. Part C refers to the reasoning on the merits ("Begründetheit") and is frequently split into a more general interpretation of the constitution ("Maßstäbeteil") and a specific application to the case at issue ("Subsumtionsteil", cf. Lepsius 2011, 168ff). Part D might include further information on deadlines for the legislator to implement the Court's decision, and the like.

e) **Separate opinions** and the names of their authors are attached if applicable.

f) The document closes with **signatures** of all participating judges.

The rapporteur of the proceeding is not publically indicated. Whereas judges may insist on having their separate opinion made public, the disclosure of proportion of votes formally needs to be confirmed by a majority of judges (Lietzmann 2006, 271). Following an informal norm, it is usually published at the request of the minority side (Kranenpohl 2010, 477).

2.6. Leeway of Decision

The Court has a large leeway of decision. The Basic Law provides a mere framework of abstract principles with plenty of room for concrete interpretation (Limbach 2001, 29). The large set of legally feasible decision alternatives enables FCC judges to make use of this flexibility. The great variety of potential outcomes goes far beyond simply granting vs. denying a request. When reviewing a legal norm, the FCC can:[29]

- declare it *null and void* ("Nichtigkeitserklärung") so that the norm is ineffective from its point of introduction with retrospective effect.
- declare it *null and void with regard to specific circumstances* (", soweit...").
- declare it *incompatible with the Basic Law* ("Unvereinbarkeitserklärung") so that the norm may no longer be applied – as soon as the decision is published or after a deadline has passed.
- specify a binding *interpretation in conformity with the Basic Law* ("verfassungskonforme Auslegung") of the norm. This option does not affect the plain text of a norm but it does set the meaning that is generally binding for any application of this norm.

[29] The following typology summarizes the most common decision alternatives. These categories are neither mutually exclusive nor exhaustive. See Benda, Klein and Klein (2012, 298f), Rath (2013, 30f), Rinken (2002, 69ff), and Schlaich and Korioth (2012, 271ff) for more detailed descriptions.

- pass an *admonitory decision* ("Appellentscheidung") that keeps the objected norm temporarily in effect but calls upon the legislator to pass a new regulation, possibly setting a deadline. The Court can even provide directives with regard to that new regulation's content at an arbitrary level of precision (Ossenbühl 2001, 42).
- simply reject a constitutional complaint or a judicial review as *without merit* ("unbegründet") without making a generally binding statement on the norm's constitutionality.
- positively affirm the the norm's *conformity with the Basic Law*.
- add *obiter dicta* as quasi-judgments beyond the boundaries of the given case.

All of these options can relate to an entire law, single paragraphs, minor parts, or even single words of a norm. If a precise deadline is set, it can be short or generous. The Court's requirements on a norm can be formulated at any level of precision. Exceedingly detailed decisions have occasionally led to criticism of the Court acting as a "backup legislator" (Ossenbühl 2001, 45). E.g., consider the 2012 decision on the 19^{th} Amendment of the Federal Electoral Law, where the FCC set an upper limit of approximately 15 *Überhangmandate*: "The Senate is aware of the fact that the number of 15 overhang seats can not be completely justified as an act of judicial norm specification" (BVerfGE 131, 316, own transl.). Further examples of very detailed requirements include *Party Finance VI* (BVerfGE 85, 264), the interim regulation in *Common Marital Names* (BVerfGE 84, 9), and *Abortion II* (BVerfGE 88, 203; cf. Ossenbühl 2001, 45f).

Whenever a legal norm is objected, the FCC has a great variety of potential outcomes to choose from. The set of potential outcomes goes far beyond simply granting or rejecting a complaint. If only executive acts or ordinary court rulings are objected, the FCC's leeway of decision might be more restricted. Since the present study investigates proceedings with reference to federal legislation, the set of potential outcomes is virtually unlimited in all cases of interest.

In summary, the FCC is one of the major actors in the German political system with far-reaching competencies of judicial review. Its strong position has remained largely unaffected in the period under study. The Court can not set its own agenda. But once a request has been filed, the judges possess large discretion on when and how to deal with it. The internal proceeding roughly divides into administrative filtering, case preparation

by the rapporteur, and senate consultations. Negotiations in the senate are confidential, intense, consensus-oriented, at eye level between a small group of permanent judges, and largely free of formal procedures. Whenever a legal norm is objected, the Court has a great variety of decision alternatives to choose from. This study seeks to shed some light into the black box of FCC consultation processes.

Part II.

Theory

3. Explanations of Policy Bargaining Duration

The present study aims at explaining how judicial policy bargaining affects the duration of proceedings at the FCC. Political scientists commonly apply spatial models in order to explain processes and outcomes of legislative policy-making. Consultations at the FCC can be compared to these legislative settings. Once a case is filed to a senate, judges negotiate on the outcome behind closed doors in a largely institution-free setting (see chapter 2). They can select from a large range of potential policy outcomes. There is a majority rule and decisions to replace the legal status quo are collectively binding. Much can be learned from previous models of multi-player policy bargaining in political science.

In this chapter, we will have a look at existing explanations of policy bargaining duration. I will start off with a recap of George Tsebelis' veto player theory that links political preferences and the number of veto players to 'policy stability' (section 3.1). I will then present empirical studies and explanations of policy-related bargaining duration that mostly build on veto player theory (section 3.2). Finally, I will argue that a sound spatial model of dynamic policy bargaining under uncertainty yet needs to be developed in order to explain bargaining delay (section 3.3).

3.1. Veto Players and Policy Stability

Tsebelis (1995; 2002)' veto player theory is a widely acknowledged explanation of how and why the number of veto players and their preferences affect policy stability. *Veto players* are "individual or collective actors whose agreement is necessary to change the status quo" (Tsebelis 2002, 19). The status quo, potential policy outcomes, and veto players' ideal points are located in an n-dimensional policy space. Veto players' indifference curves are circular and their utility of particular policies decreases with Euclidean distance. All players are assumed to be completely informed about the game and other players' preferences.

Tsebelis' model is static in that it does neither allow for changing preferences over

time, nor for a sequence of multiple proposals and votes. The *agenda setter* can propose a new policy to replace the status quo. His "take it or leave it" proposal will only come into effect if all veto players agree. Tsebelis implicitly assumes sincere voting. So agenda setters always propose their most preferred yet feasible outcome and veto players only consider their sincere preferences about the two alternatives currently up for vote. The *winset* denotes the set of policies that can defeat a given status quo. The *core* unites all points with an empty winset. In general, the size of the core increases with the number of veto players, the majority threshold, and ideological distances between players. The size of the winset decreases accordingly (Tsebelis 2002, 24ff, 54).

Tsebelis aims to analyze "policy stability" across systems rather than to explain the process or precise outcomes of political decision-making (Tsebelis 2002, 1ff). Despite its undoubted contribution to contemporary political research, veto player theory comes along with an important shortcoming: the concept of its dependent variable 'policy stability' remains vague and ambiguous. This is surprising in light of the very precise elaboration of the rest of the model. Throughout the book, Tsebelis paraphrases his understanding of **'policy stability'** in numerous ways:

1. Is policy stability the absence of "*potential* for policy change" (Tsebelis 1995, 292, emphasis added) or the "*impossibility* for significant departures from the status quo" (Tsebelis 2002, 2, emphasis added)? Then stable systems would allow for no or just marginal changes to the status quo. Most notably, the model would not make any claim about the speed of negotiations.

2. Is it the "*difficulty* of effecting significant change" (Tsebelis 2002, 21, 37; Tsebelis 2010, 4, emphasis added)? Major changes might thus be possible but players would need to work harder or longer to achieve such a change. The veto player model does not account for such a measure of difficulty: Any potential outcome within the winset can immediately be enacted without any particular efforts, whereas there is no way to ever reach a policy outcome beyond the winset.

3. Is it related to a system's "capacity to make changes quickly" or "a faster or slower *pace* of the institutional process" (Tsebelis 2002, 7f, emphasis added)? The veto player model would then completely miss a convincing link to its dependent variable. As a static framework, it fails to explain dynamic phenomena such as the duration of decision-making. Such an approach would be "highly suspect, since delay without time is a contradiction in terms" (Helland 2005, 8).

4. Is policy stability *defined* (Tsebelis 2002, 8) rather than merely *indicated* (Tsebelis 2002, 21) by the size of the winset? The wording is at least confusing in that it

> links a static set of potential agreements to the notion of "stability" that is usually associated with a dynamic meaning.

We do not know the precise definition of 'policy stability' that Tsebelis had in mind. Technically, the veto player model is static and does not account for dynamics over time. So either its conclusions are correct but unrelated to bargaining duration – or there is a time dimension in the concept of 'policy stability' and the model lacks logical consistency. Either way does not turn the veto player model into a valid explanation of duration in policy negotiations.

In the next section, we will see that most empirical scholars of dynamic policy bargaining simply ignore this caveat.

3.2. Empirical Studies on Bargaining Delay

What empirical conclusions on policy bargaining-induced delay have scholars drawn so far? The present section reviews results from the fields of judicial politics, government formation, legislative decision-making, and the duration of wars. In all of these fields, scholars have attempted to explain the duration of bargaining processes over policies in a broad sense. Studies of economic bargaining processes typically assume non-spatial preferences. Their results would be hard to transfer to the FCC, where most conflicts go beyond the distribution of a fixed ressource. I am not aware of any other research area that has linked policy-related preferences to bargaining duration. The section starts with judicial politics, where institutional settings most comparable to the FCC are likely to be found.

Judicial Politics

The duration of judicial proceedings has been investigated by a large number of scholars. They typically focus on non-political factors such as caseflow management, formal procedures, informal norms, administrative capacities, and pretrial congestion. Results are mostly based on aggregate statistics and limited to the analysis of civil or criminal law proceedings at ordinary courts (AAPSS 1960; Church 1982; Church et al. 1978; Clark and Merryman 1976; Djankov et al. 2003; Heise 2000; Steelman 1997; Trotter and Cooper 1982; Weatherburn 1993). Proceedings at ordinary courts are faster in districts where judges depend on competitive elections (Goelzhauser 2012). Institutional settings, bargaining costs, asymmetric information and subjective expectations on the trial outcome affect the time to settlement in various kinds of ordinary legal disputes (Cremers 2007; Farmer and Pecorino 1994; Fenn and Rickman 1999; Kessler 1996; Spier 1992; Spurr 1997).

Such a settlement or compromise between parties of a proceeding usually is not a feasible option in FCC negotiations. Proceedings at the FCC differ from these settings in four ways: First, most cases do not match the simple plaintiff vs. defendant scheme known from ordinary courts (Schlaich and Korioth 2012, 43). Second, the parties of a proceeding generally can not avoid trials by out-of-court settlements (Benda, Klein and Klein 2012, 152; Schlaich and Korioth 2012, 45). Third, depending on the type of procedure, complainants can not simply withdraw a case (Benda, Klein and Klein 2012, 149ff).[30] Fourth, disputes end up at the FCC precisely because previous institutions like the parliament or lower courts failed to reach a compromise solution.

There is little research on preference-related bargaining duration related to the U.S. Supreme Court. Increasing ideological divergence between the president and the Senate causes strategic delay in the presidential selection of U.S. Supreme Court nominees (Shipan and Bargen 2014) and in their confirmation process (Shipan and Shannon 2003). Goelzhauser (2011) speaks of justices "delaying and avoiding" constitutional disputes several times. Both his hypotheses and the empirical analysis are limited to the phenomenon of case avoidance, though. Justices tend to avoid deciding constitutional cases when their preferences are polarized and when the opinion environment is deeply divided on the issues at stake. They will do so when the costs of negotiation are too high, their decisions might be less resistant to political pressure, and an ideological minority of justices could easily manipulate the outcome by procedural means to split a winning coalition (Goelzhauser 2011, 489). None of these arguments makes up a compelling story of why justices would *delay* rather than *avoid* such undesired cases.

To sum up, the established models and findings on judicial delay can hardly be transferred to the analysis of policy bargaining processes and their duration at the FCC. They are either limited to ordinary courts and non-political factors – or they do not explain the duration of proceedings in a convincing way. Fortunately, the literature on legislative negotiations will be more revealing.

Government Formation in Multiparty Systems

In parliamentary systems, parties bargain about both policy positions and the distribution of offices in government coalitions (Laver 1998). So parties' policy preferences might well

[30] The Court can deny the withdrawal of both constitutional complaints (BVerfGE 98, 218[242]; Benda, Klein and Klein 2012, 188; for a more opposing view cf. Schlaich and Korioth 2012, 41f) and abstract judicial review cases (Benda, Klein and Klein 2012, 297; Kommers 1994, 474; Schlaich and Korioth 2012, 41). This is different to concrete judicial review cases that can be withdrawn by the ordinary court at its own discretion (Benda, Klein and Klein 2012, 355). But these latter cases do not involve compromise-seeking parties of the procedure at the constitutional court level anyway.

have an impact on the duration of coalition negotiations.

Diermeier and van Roozendaal (1998) analyze the duration of government formation processes in 13 multi-party democracies. They argue that party leaders strategically bargain about cabinet formations under incomplete and private information: Coalition agreements will finally need to be approved by each party's members. There is at least some uncertainty about members' preferences and party leaders have privileged knowledge about their own party's preferences. They will exploit this private information strategically and thereby delay negotiations. Diermeier and van Roozendaal show that uncertainty indeed prolongs the formation of cabinets, whereas ideological polarization and the number of effective parties have no effect on duration.[31] In the light of the rather indirect measures, these empirical conclusions should not be overrated, though.

Martin and Vanberg (2003) conduct a similar study with different measurements. They show that ideological diversity significantly prolongs negotiations. The number of parties effect on duration is statistically significant but it switches from positive to negative over the course of negotiation (Martin and Vanberg 2003, 330f). The authors offer several explanations for why preference heterogeneity might delay coalition negotiations: First, party leaders can better estimate the preferences of ideologically close parties due to increased interaction and overlapping constituencies. Second, following Tsebelis (2002)' veto player framework, diverse preferences are associated with smaller winsets and therefore require a "more detailed policy agreement to ensure that all coalitions partners are willing to join a coalition" (Martin and Vanberg 2003, 326). Third, party leaders might seek lengthy negotiations as a signal of hard effort to their constituents before they present big concessions in terms of policy distance. Fourth, with concave utility functions, imperfect information, and fixed costs of delay, a formateur is willing to make larger policy concessions as distance decreases, thereby facilitating fast agreements if policy distance is low.[32]

[31] Their vague reference to the incomplete information approach in game theory and the perceived lack of a model claiming such effects (Diermeier and van Roozendaal 1998, 612, fn. 9) remains a weak reasoning for the non-effects of ideology and the number of parties. Golder rightly counters: "[T]he fact that such a model might not (currently) exist is not compelling evidence that bargaining complexity has no effect on delays" (Golder 2010, 29, fn. 12).

[32] Martin and Vanberg (2003, 326, fn. 9) briefly mention this interesting but demanding argument in a footnote. I do not see how to derive such a definite conclusion without presuming a more specific set of individual strategies and the rules of the game. It might hold true, for example, if all parties possess individual, fixed policy boundaries beyond which they will not enter a coalition (compare to the idea of "policy horizons" by Warwick 2006): Since delay is expensive, the formateur prefers immediate agreement over continued negotiations. So he will propose a more distant policy position in exchange for a reduced risk of underestimating the distances to other parties' horizons. The closer their expected horizons are to his ideal point, (1) the more generously he will adjust his offer (due to concave utility functions), (2) the more likely he will reach the true horizons (private information), and (3) the more likely will be early agreement.

Golder (2010) shows that both ideological polarization and high numbers of legislative parties slow down government formation, but only if there is sufficient uncertainty about other parties' preferences.[33] She argues that both factors increase bargaining complexity and make it harder for party elites to obtain relevant information in the bargaining process. However, she does not provide a compelling explanation of why and how exactly ideological divergence would increase complexity and delay.[34]

In summary, empirical evidence suggests that coalition negotiations are delayed by the level of uncertainty about preferences, the number of parties involved, and ideological divergence. Future research should focus on improved choices of operationalization and more precise theoretical foundations. The numerous explanations of the heterogeneity effect on delay offered by Martin, Vanberg, and Golder all somehow refer to bargaining in a policy space and the role of preference uncertainty. A more explicit theory is yet to be presented.

Legislative Decision-Making

In line with Tsebelis' veto player theory, preference heterogeneity increases gridlock in legislative decision-making (Binder 1999). But does it also take *longer* to reach an agreement when preferences are diverse? König and Bräuninger (2005, 61ff) find hardly any association between ideological heterogeneity or divided government and legislative duration in German politics. Manow and Burkhart (2008), in contrast, find a moderate delay by divided government. Political preferences do affect the speed of legislative committees in Chile (Aninat and Londregan 2006). Becker and Saalfeld (2004) expect ideological diversity and larger numbers of partisan veto players to slow down the legislative process. But they find little supporting evidence in their empirical analysis of labor and social

Negotiations at the FCC are more about strategically changing a status quo policy than about building coalitions based on policy horizons. Judges do not face anything like intra-party principals to whom they must defend unpopular policy compromises. There is no exclusive formateur judge repeatedly offering "take it or leave it" proposals and the assumption of strategic proposals but non-strategic voting is rather implausible. Despite the persuasive simplicity of their argument, I will therefore not pursue this approach in the following chapters.

[33] Like Diermeier and van Roozendaal (1998) and Martin and Vanberg (2003), Golder uses a very weak measure of uncertainty. It would be interesting to see if the results remain robust for alternative operationalizations like the level of inconsistency or vagueness in party manifestos and speeches, public statements on preferred coalitions, internal fragmentation of parties, leadership stability, or legislative experience.

[34] "Ideological polarization increases complexity because it makes it more likely that a formateur has to bargain with at least one party that does not hold similar positions on several different types of policy" (Golder 2010, 15). Of course, a policy-oriented formateur would prefer to bargain with like-minded parties and make less concessions. But given the same level of uncertainty and no further assumptions, why would rational bargaining be more *complex* with distant parties? Her argument would profit from a more specific bargaining model.

security policy-making in 17 Western European countries.

A lively debate mainly aimed at methodological refinements has taken place between scholars of legislative duration in European Union decision-making. They consistently show that polarized member state preferences and participation of the European Parliament delay the process, whereas the use of qualified majority instead of unanimity voting speeds up EU legislation (Golub 1999; 2007; 2008; Golub and Steunenberg 2007; König 2007; 2008; Schulz and König 2000; Zorn 2007).[35] If preferences diverge not only within the Council but also between legislative bodies, i.e. between the European Commission, the Council, and the European Parliament, the process will take even longer (Klüver and Sagarzazu 2013; Toshkov and Rasmussen 2012).

Most of these studies explicitly refer to Tsebelis' veto player framework. Negotiations with polarized preferences take longer because of the "need for extensive bargaining" (Klüver and Sagarzazu 2013, 392). The larger the core, the more time will pass by until actors craft a complex package deal or shift their position (Golub 2007, 157f). Schulz and König (2000) provide the most elaborated version of the line of argument that is broadly shared in the literature: If there is little consensus to change policy, actors will engage in "time-consuming negotiations over side-payments and package deals" (2000, 657). Their model builds on the plain but "relatively uncontroversial" (Schulz and König 2000, 657) assumption that the size of the core and decision-making speed are inversely related. They openly confess the theoretical incompletion of their argument: "We rely on this conjecture from the spatial model of legislative choice, since there are few dynamic models that yield testable propositions about the duration of political decision-making processes. [...] Since the focus of our analysis is empirical rather than theoretical, we make do with a conjecture based on a static model and leave the development of a dynamic model of the duration of political decision-making processes for future research" (Schulz and König 2000, 656, fn. 11). To the best of my knowledge, no such model has been provided yet.[36]

A nice exception to the widely spread use of the static veto player model in dynamic settings is provided by Tsebelis himself: Tsebelis and Money (1997, 102ff) apply Grossman and Perry (1986)'s sequential buyer and seller model of asymmetric information to intercameral bargaining between the upper and the lower house. Constantly updating their beliefs about the other house's preferences, they alternately make policy offers until a proposal is accepted. Tsebelis and Money expect the number of bicameral negotiation rounds to increase with the level of uncertainty and the time discount factor. The empirical analysis is aimed at the effect of uncertainty about the other house's discount

[35] See also Drüner (2007), Drüner et al. (2012), and Hansen (2012).

[36] The dynamic, incomplete information extension of the spatial model as presented in chapter 4 is supposed to fill this gap at least partially.

factor rather than uncertainty about the other house's policy preferences. Unfortunately, Grossman and Perry's model – dealing with one-sided uncertainty in two-player, one-dimensional 'division of a pie' bargaining – can not be directly transferred to multi-player, n-dimensional policy negotiations between equal judges at the FCC.

To sum up, there is mixed evidence on the effect of political preferences on legislative duration at the national level. In the European Union, divergent preferences, more actors, and higher thresholds clearly prolong legislative decision-making. Uncertainty slows down intercameral bargaining. A dynamic, preference-related explanation of legislative delay in multi-player setting remains to be provided.

The Duration of Wars

Among a broad literature on the duration of interstate and civil wars, Cunningham (2006) draws the most explicit link between veto players' spatial preferences and the duration of violence. Since "[c]ivil wars can be thought of as violent conflict over policy" (Cunningham 2006, 877), he directly applies Tsebelis' veto player theory to the study of war duration: The more parties involved and the more diverse their preferences, the smaller the winset and the more time it will take to find a peace agreement. This is consistent with other findings that third party interventions prolong intra- (Regan 2002) and interstate conflicts (Shirkey 2012). He elaborates four arguments of why conflicts involving multiple veto players with heterogeneous preferences last longer: First, the range of accepted agreements is smaller. Second, information asymmetries are more likely. Third, incentives to hold out[37] and, fourth, shifting alliances hinder early settlement.

The first argument is a direct application of Tsebelis' concept of winsets. Unlike many other scholars, Cunningham apparently recognizes that the size of a bargaining range is not sufficient to explain duration. If rational actors were completely informed about each other's preferences, there would be immediate agreement. So Cunningham connects the size of winsets with the idea of private information: The "smaller that range is, ceteris paribus, the more likely problems such as information asymmetries will lead to bargaining breakdown" (Cunningham 2006, 879). In contrast to Tsebelis' assumption of sincere voting, he presumes strategic behavior in the third and fourth argument. Even though Cunningham does not foreground these deviations from veto player theory nor present a more detailed formal account, we will see that these advancements are the key to a more comprehensive explanation of bargaining delay.

[37] Compare to the "war of attrition" framework in section 3.3.

In summary, the empirical literature is not very promising for our purpose. Studies of judicial delay focus on administrative factors and ordinary courts. I am not aware of any study that links political preferences to the duration of proceedings at a constitutional or any similar court. Studies on coalition negotiations suggest that preference uncertainty, high numbers of parties, and ideological diversity increase delay. They lack a sound theory, operationalizations are weak and results are often inconclusive. Legislative bargaining is delayed by divergent preferences, more actors, and higher majority thresholds. Similarly, civil wars are prolonged by high numbers of parties involved and by diverse preferences.

The scholarly debate has largely focused on empirical refinements. Explanations of how and *why* preference heterogeneity would delay bargaining settlement remain ad-hoc or limited to vague references to the veto player framework. However, the static veto player framework does not provide a logically consistent explanation of bargaining delay (see section 3.1). In the following section, I will show that bargaining dynamics and incomplete information are essential in order to explain duration in policy negotiations.

3.3. The Role of Dynamics and Uncertainty

Disregarding the static nature of the spatial veto player model, empirical scholars seem to agree that preference heterogeneity slows down policy bargaining due to smaller winsets and larger cores. There is a long list of ad-hoc explanations to justify this claim. To name a few, it might take more time to discover commonly accepted outcomes, side-payments might be necessary, and information asymmetries might be more severe (cf. section 3.2). Assuming complete information, like Tsebelis does, one could as well claim the contrary: If the winset is large, players have high incentives to extensively bargain over the final agreement out of a larger range of potential outcomes. If the winset is small, the outcome is pretty much determined and players would not expect to gain much from continued bargaining. Following this argument, preference heterogeneity would *speed up* rather than *slow down* decision-making.[38]

The logical inconsistency and arbitrariness of these explanations is surprising, given the highly sophisticated state-of-the-art in game theory. Decades ago, game theorists moved beyond the static Nash Bargaining Solution (Nash, Jr. 1950) because it did not cover dynamic bargaining processes (Cross 1965, 69). Ever since, formal models often explicitly account for the time dimension in bargaining processes. I will discuss the two major approaches to explain bargaining delay: war of attrition games and sequential games with multiple offer and voting rounds.

[38] I thank Thomas Bräuninger for this decisive objection on a very early draft of my model.

Wars of Attrition

Time-consuming conflicts about the allocation of a ressource can be modelled as a *war of attrition*. The framework originates from biology (Bishop and Cannings 1978; Smith 1974; 1982) and was later applied and advanced in economics (Bulow and Klemperer 1999; Fudenberg and Tirole 1986; Hendricks, Weiss and Wilson 1988) and political science (Alesina and Drazen 1991; Fearon 1998). In a war of attrition game, the desired ressource will not be allocated before the players reach a collective agreement. In every round, each player decides whether to continue or concede. Delay is costly and whoever holds out the longest, receives the benefit.

In principle, policy negotiations could be modelled as wars of attrition. Players would argue about which end of the policy winset to agree on. Delay will possibly occur if they are not completely informed about each other's ability to hold out. For two reasons, this approach does not seem very promising for our purpose:

1. At the FCC, judges bargain on a nearly daily basis (Böckenförde 1996), about roughly comparable issues, and in a constant composition of only eight players for a long time. They will soon know each other well. Even if they differed in their personal endurance for whatever reason, they would probably have a pretty good idea about each other's general patience, bluffing techniques, and bargaining habits. Some of them might turn their privilegged skills into more advantegeous outcomes. But their attributes will not come as a surprise in the long run, so that rational counterparts will expect the likely outcome and concede immediately in order to avoid costly delay.[39] The same argument applies to almost any political committee or institution where stable actors interact in negotiations on a regular basis.

2. A more general concern is the size of the pie in such a game. If the game is dynamic and strategic players have at least some expectations about more or less likely future outcomes, why would the pie or winset be defined by sincere indifference curves? A classic war of attrition game would overly reduce the complex dynamics of policy negotiations to a simplistic tug-of-war or arm-wrestling with little explanatory power.

Sequential Offers and Votes

Sequential games of multiple offers and votes formalize dynamic negotiations between two or more actors. There is a predefined number of periods (*finite-horizon* games) or

[39] Players would at least not gain anything from defending the status quo for another round, since the conflict takes place within the boundaries of the common winset.

open-end bargaining until an agreement is reached (*infinite-horizon* games, cf. Fudenberg and Levine 1983). Each round, an *agenda setter* makes a proposal and players decide whether to accept or reject the proposal. The role of the agenda setter can either be fixed throughout the game, alternate between players in a specified order, or be assigned according to a random recognition rule. If the proposal is accepted, the game usually ends.

Rubinstein (1982) presents a well-known sequential, two-player, alternating-offer, infinite-horizon bargaining game over the partition of a pie. He assumes both players to be completely informed about the game and the other player's preferences. Hence, the first agenda setter anticipates his opponent's willingness to compromise. Since delay is costly, the agenda setter makes just enough concession to reach immediate agreement. There will never be delay in the subgame perfect equilibrium of this game (Rubinstein 1987, 204, 211ff).

Baron and Ferejohn (1989) extend Rubinstein's model to a legislative bargaining setting with multiple players, majority voting, and a random recognition rule. Again, players bargain about the division of a ressource with complete information and there will be immediate agreement.[40] Banks and Duggan (2000) generalize this division-of-a-pie model to multidimensional spatial policy bargaining. They implicitly assume that all players prefer all policy alternatives over the status quo (Banks and Duggan 2000, 85). This restriction is removed in a more advanced version of their model, where the status quo is explicitly modeled as one one of multiple policy alternatives (Banks and Duggan 2006).

Sequential games model separate bargaining periods, where anticipated payoffs from future bargaining affect policy outcomes. If players are completely informed and if they prefer early agreements over delay, actual delay will usually not be predicted:

> "In a bargaining situation with complete information it is hard to understand why there should be a bargaining process. [...] Both [players] should be able to anticipate the final agreement and to reach it at once" (Selten 1988, 217).

Many of these dynamic models do not aim at explaining duration in the first place. But since we seek to explain empirically observed variance in bargaining delay, we need to move beyond these models.

[40] I refer to the "closed rule" version of Baron and Ferejohn's game only. The possibility of "open rule" amendments might cause delay (Baron and Ferejohn 1989, 1195). But there is no institutional equivalent to an open rule as described by Baron and Ferejohn in negotiations at the FCC. Judges do not have to wait for a formal second reading with another exclusive agenda setter before they seek a majority on a proposal, once it is made.

Private information is a major cause of delay in bargaining models (Kennan and Wilson 1990; 1993). Multiple negotiation periods can serve to reveal private information (Selten 1988). Players might have a rough idea about their opponents' preferences and constantly update subjective beliefs about their "real types" based on observed behavior (Cramton 1984; Cross 1965; 1977; Fudenberg and Tirole 1983; Rubinstein 1985). Or they might strategically induce delay as a credible signal of bargaining strength (Admati and Perry 1987; Cramton 1992).

In the 1960s, Coddington (1968) already presented a dynamic, incomplete information bargaining model between two impatient actors. Both players have subjective expectations about the other player's response to their actions. Alternately making demands, they observe their opponent's reaction, adjust their expectations accordingly and make new demands based on updated expectations. Except for the limited number of actors and the preference representations, this model is already close to what we need in this study.

To the best of my knowledge, no model so far combines spatial policy negotiations between multiple players with sequential, infinite-horizon bargaining periods, alternating offers and private information about preferences. Most dynamic bargaining models are tailored at economic disputes or distributional politics (e.g. Baron and Ferejohn 1989; Battaglini, Nunnari and Palfrey 2012). A convinving policy bargaining model would need to be both spatial and sequential (e.g. Baron 1991; Baron and Herron 2003). Multiple players would need to be modeled. Cameron (2000)'s sequential veto bargaining model between a legislative proposer (Congress) and a gate-keeping veto player (President) might be applied to interactions between parliament and the constitutional court (Cameron and McCarty 2004, 409). But presuming an exclusive agenda setter and take-it-or-leave-it proposals, it does not apply to multi-player settings with equal bargaining rights.

Banks and Duggan (2006) present a multi-player, dynamic, infinite-horizon policy bargaining model with alternating offers and spatial policy preferences. Unfortunately, they assume complete information and players typically agree immediately. The model fails to explain bargaining duration. Despite this downside, Banks and Duggan provide the most suitable approach to be applied to dynamic policy negotiations with multiple players. Incomplete information seems to be the key to make their theory explain policy bargaining delay. So I will extend their model to a game with preference uncertainty in the following chapter.

In this chapter, I have shown that Tsebelis (2002)' static veto player theory fails to consistently explain bargaining dynamics and duration. Empirical studies show that

higher numbers of actors, preference heterogeneity, and higher majority thresholds often tend to increase delay in policy bargaining. Scholars typically refer to ad-hoc explanations or to the veto player framework. No convincing theory of how policy preferences affect bargaining duration is yet available. From a game theory perspective, sequential models and incomplete information are the keys to predict bargaining duration. In the following chapter, I will extend Banks and Duggan (2006)'s dynamic policy bargaining model to include private information about players' preferences. To the best of my knowledge, this will currently be the most explicit model of how and why spatial policy preferences affect bargaining delay in multi-player settings.

4. A Dynamic Policy Bargaining Model with Incomplete Information

As discussed in chapter 3, no formal model so far provides a convincing explanation of the duration of dynamic, multi-player policy negotiations. Incomplete information is the key to predict delay in policy negotiations. My approach is to combine a dynamic version of the spatial policy-making model with the assumption of incomplete information.

In the present chapter, I define a dynamic policy bargaining model with incomplete information. While the general setup of the model is transferable to other empirical settings, the motivation and baseline for the following chapters is their applicability to FCC proceedings. Therefore, the model's general setup is based on the FCC's institutional setting as depicted in chapter 2. It is limited to the core phase of senate consultations (see figure 2.1). This is where the big conflicts take place and where legal norms can be declared unconstitutional. The model does not account for case preparation by the administration and the rapporteur. Nor does it refer to chamber consultations, where minor issues are decided and anticipated outcomes of subsequent senate negotiations would be important. I do not explicitly distinguish between decision consultations and reading consultations in the senate. Judges continue to bargain about the outcome in both phases. The first may best refer to the first periods of the bargaining game with large moves, while the latter might best refer to small-step policy refinements in late periods of the bargaining process.

Senate negotiations are modeled as a dynamic bargaining game about policy. This is in line with the institutional setting of the FCC. Judges are independent actors and they decide by majority rule (section 2.3). Their agenda, i.e. the set of relevant issues and the status quo, is externally determined and judges are obliged to make a decision (section 2.2). The Court is very independent and powerful (section 2.1), so I will not account for third actors involved in the decision-making process. The large variety of potential outcomes (section 2.6) is represented by continuous sets of policy alternatives. Senate consulations are largely institution-free and the rapporteur does not have exclusive agenda-setting power (section 2.5). Policy negotiations are modeled as infinite-horizon sequences of alternating policy proposals and collective votes, until a collective agreement

is found.

In the following sections, I formulate and justify the model's assumptions (section 4.1). The previously mentioned dynamic policy bargaining model by Banks and Duggan (2006) is presented (section 4.2). Finally, I extend their model by the assumption of incomplete information about other actors' preferences (section 4.3).

4.1. Model Assumptions

The main assumptions of the dynamic, multi-player, policy bargaining model under incomplete information are closely related to the standard spatial policy model of committee voting (Hinich and Munger 1997; Tsebelis 2002), previous findings on judicial politics in general, and the FCC in particular. The assumptions are:

Policy Space FCC negotiations take place in an *Euclidean policy space*, where all policy alternatives including the status quo policy, potential outcomes, and judges' ideal policies can be mapped into an n-dimensional policy space.[41]

The policy space is *complete*, i.e. it encompasses all relevant policy alternatives of the proceeding. I assume that there are no side-payments beyond the specific case. Indeed, there is a strong norm of no arrangements between judges before official consultation (Kranenpohl 2010, 173, 480ff) and log-rolling is clearly frowned upon (Rath 2013, 38).[42]

Policy dimensions represent *separable features* that structure the case's policy alternatives in a meaningful way. Depending on the nature of the case, this can be a conventional political dimension like "conservative vs. progressive" or "welfare state vs. market orientation". Or it can be a judicial dimension of constitutional theory like a preference on more vs. less judicial restraint or a dimension dividing those who regard basic rights as defensive rights against state intervention vs. those who regard them as an objective scale of values with implications for all fields of law (cf. Limbach 2001, 27). These judicially divergent views are either inherently political or at least prone to policy preferences (cf. the paragraph on legal factors on p. 41). The only content-related assumption on these dimensions is that they are somehow *policy-related*. All relevant issues are assumed to be separable and the spatial arrangement of dimensions is orthogonal.

[41] The assumptions on policy space and policy preferences are in line with the standard spatial model (Hinich and Munger 1997).

[42] See Brenner and Whitmeyer (2009, 103ff) for similar findings on the U.S. Supreme Court.

Dimensions are assumed to be *continuous sets of policy alternatives*. First, this implies a reasonable *order* of alternatives for each dimension, i.e. policy alternatives can be more or less progressive, expensive, EU-oriented, emancipated, restrictive, and so forth. Second, this implies a common understanding of "distance" between two policy alternative among judges. Third, this implies a virtually unlimited set of alternatives.

The U.S. Supreme Court is often assumed to either grant or reject a case (e.g. Bailey and Maltzman 2011). In contrast, the FCC is not an appellate court that regularly gives thumbs up or down for lower courts' rulings. FCC judges have a large set of potential outcomes to choose from (cf. section 2.6). Hence, the conventional spatial policy model is more adequate than a case-space framework, where pending cases are allocated in a case-space based on case features and judges bargain about where to draw the line between grantable and deniable cases (Lax 2011; Lax and Cameron 2007).

In chapter 5, I will assume a *two-dimensional* policy space. This requirement is neither necessary for the theoretical model nor for empirical analyses. But the deduction of hypotheses via simulations would be much more costly and demanding for more than two dimensions. Previous studies in U.S. judicial politics differ with regard to the presumed number of dimensions. There is no consens on the best number of dimensions to represent judicial preferences at European constitutional courts either (Hönnige 2007, 66f). However, findings from one-dimensional analyses with a unique pivotal median player would not be generalizable (Tsebelis 2010, 14). So I opt for two dimensions as the most simple, non-trivial case. Qualitative evidence supports this presumption and suggests that FCC judges' preferences are rather more- than one-dimensional.[43]

Policy Preferences All judges have exogenous, single-peaked preferences over all case-relevant policies. These case-specific preferences are stable over time. They can be represented by quadratic utility functions in a common space of policy alternatives. Comparing different alternatives, a judge always prefers the policy that is closer to his or her ideal point. Preferences across different issues are separable and all issues

[43] An FCC judge reports:

> "You realize in many persons that they are not only one-dimensional. The first is left but with a neoliberal openness. The second is conservative and particularly bound to the welfare state. Depending on the topic, there can be very diverse constellations. You do not always fight at the same front-line" (No. 24, cited by Kranenpohl 2010, 241, own transl.).

are of equal salience. So indifference curves in a two-dimensional policy space are circles (Hinich and Munger 1997, chap. 3). Multidimensional utility differences are based on Euclidean distances.[44]

Preferences are assumed to vary between judges. Indeed, FCC judges have divergent historical, cultural, and social value systems and preferences (cf. Limbach 1999, 142). These differences are exogenously determined and at least partially explained by political ideology. People used to speak of the "red [first] senate" that was dominated by SPD-nominated judges, and the "black [second] senate", where CDU/CSU-nominated judges held the majority (Lamprecht 2011, 78; Menzel 2011, 17; Wesel 2004, 59f). Since a two-third majority is required for the election of FCC judges, successful candidates can be expected to be conservative or progressive but rather moderate than extreme (Wesel 2004, 216).

I assume that preferences are stable over time. While the empirical operationalization of FCC judges' preferences presumes stability over a judges' whole tenure (cf. chap. 6), the theoretical model merely requires preference stability over the particular course of consultation. This assumption is contrary to research on the U.S. Supreme Court showing that individual justices' preferences are dynamic (Epstein et al. 1998; Epstein, Landes and Posner 2013; Martin and Quinn 2002). These judge-specific dynamics even led to a change in collective Supreme Court decision-making in some periods (Baum 1992). For two reasons, I will reject this potential objection: First, significant preference changes in these studies mostly occured over a long time period that exceeds the typical duration of a single proceeding. Second, judicial preferences in the U.S. vary considerably more across issues than across time (Lauderdale and Clark 2012). So even if there were some preference dynamics involved, their impact on the course of a particular procceeding would be negligible.

Since preferences are assumed to be completely exogenous, there are no short-term preference changes due to learning or a discursive exchange of arguments. All judges are well prepared before they enter the consultation and the Votum includes all case-relevant perspectives and arguments (see section 2.5). Case-specific preferences can be expected to be completely defined before judges negotiate a common solution in the consultation process. Rather than learning about new arguments, facts of the case, and subjectively *preferred* outcomes, they learn about each other's preferences and collectively *feasible* outcomes.

[44] Multidimensional policy preferences could reasonably be modelled based on "city block" distances across issues (Humphreys and Laver 2010). For the sake of consistency, I will stick to the prevalent standard of Euclidean distances in contemporary political science applications of the spatial model.

Single-Mindedness I assume that judges are single-minded actors who do not seek any other goals than maximizing policy utility (cf. Brenner and Whitmeyer 2009, 26f). They might derive utility from other sources like income, leisure time, career opportunities, reputation or popularity (Posner 1993). But none of these alternative goals is assumed to influence individual behavior in FCC negotiations. FCC judges may not be reelected, their tenure is fixed, and FCC judgeship is the very top of a judicial career. So this assumption does not seem to be overly restrictive.

This assessment is in line with previous research. Epstein, Landes and Posner (2013) develop a judicial labor market model where judges are motivated by costs like effort, criticism or workplace tensions, and by benefits like leisure time, income, good working relations, esteem, reputation, prestige, influence, self-expression, celebrity, or future career opportunities. Applying their theory to the Supreme Court, they argue that further career opportunities and leisure time would not affect Justices' utilities due to unlikely promotions, a large and high-quality staff, and low caseload. Instead, they expect Justices' personal satisfaction with their work to be strongly influenced by ideological leanings (Epstein, Landes and Posner 2013, 102f). Caseload might be more important at the FCC, so I will control for workload in the empirical analysis. The general argument can be transferred to the FCC. Since judicial behavior at the FCC can hardly affect any of the other sources of personal utility, policy-orientation is expected to be the primary driver.

Strategic Rationality Judges act as strategic rationals who seek to maximize policy utility. They consider institutional rules and their colleagues' anticipated behaviour in their own choice of actions. Judges are assumed to optimize their proposals and voting decisions based on their knowledge of the bargaining situation without bluffing or cheating. Since they personally interact on a very regular basis, they soon know each other's bargaining skills and strategies well and bluffing would be ineffective.[45] As highly educated and experienced bargainers, judges are assumed to bring about the intellectual power that is necessary to determine optimal strategies.

Research on decision-making at the U.S. Supreme Court is often classified into different approaches (Hammond, Bonneau and Sheehan 2005, chap. 3; Maveety 2003): The *legal model* explains court decisions by the plain meaning of legal statutes or the constitution, the legislators' intent, and precedent decisions (Segal and Spaeth 2002, 44ff). *Attitudinalists* argue that individual attitudes and values are the primary driver of judicial behavior (Segal and Spaeth 1993; 2002). *Rational choice institu-*

[45] Compare to the similar line of argument by Cross (1977, 592).

tionalists regard judges as policy-seeking, strategic actors who consider other judges' anticipated behavior and the institutional context in their own decision-making (Epstein and Knight 1998; Hammond, Bonneau and Sheehan 2005; Maltzman, Spriggs II and Wahlbeck 2000).

Judicial politics research on the FCC is less advanced. We know that political attitudes and values drive judicial decision-making at the FCC (Hönnige 2006; 2007; 2009). Most FCC judges seem to realize this influence (Landfried 1984, 43). They strategically consider other political actors in their decision-making (Vanberg 2005). Senate proceedings are regularly negotiated and typically end in compromise (Lepsius 2011, 241). So judges will soon learn to deal with their colleagues' preferences in a rational way. No third actor can hold individual judges accountable for non-dogmatic behavior in confidential meetings. It is hard to imagine how professional negotiators would not develop rational strategies and high-level bargaining skills in such an environment. Hence, I opt for the rational choice institutionalist approach and assume FCC judges to be strategic, policy seeking actors who anticipate the institutional context and their colleagues' future behavior.

Absence of Legal Factors Non-political, legal factors do not affect the negotiation process.[46] This is not to say that FCC judges totally disregard legal standards and restrictions. I rather assume that the policy-motivated bargaining process takes place only on dimensions where judges have a certain leeway to decide. Judges negotiate within the arena of legally feasible outcomes.

Two types of legal principles can be distinguished:

- If a legal principle is *commonly accepted* among legal scholars, it is unlikely to be contested among FCC judges. Candidates with extreme views on otherwise uncontested legal standards would probably not gain the necessary two-thirds majority in the selection process of FCC judges. With all judges on the same position, such a legal issue would not constitute a relevant bargaining dimension. Even if legal doctrines only disallowed extreme positions on such a dimension, these positions would not be relevant bargaining alternatives between judges that have passed the balanced selection process.
- On the other hand, if a legal principle is *disputed* among legal scholars, a judge's position on this issue is likely to be prone to political preferences. E.g., conservative judges tend to stress other basic rights and legal doctrines than social

[46] "Where there is a political will, there is a judicial shrubbery" (Wesel 2004, 263, own transl.).

democrats.[47] Nominating parties have a high incentive to select candidates based on these preferences. Judicial methodology is a rather fuzzy constraint at the FCC (Kranenpohl 2010, 331ff). A large leeway of interpretation allows the desired outcome to lead the interpretation of norms (Hesse 2006, 97). As far as case-relevant legal doctrines are disputed among legal scholars, they are assumed to be represented by judicial positions on policy-related bargaining dimensions.

Two approaches from the U.S. Supreme Court literature challenge this view. First, Iaryczower and Shum (2012) present a model where partially policy-driven justices receive private information about whether the "meaning of the law" favors the plaintiff or the defendant. These judges will receive additional utility if they make the "right" choice. The FCC does not know such a plaintiff vs. defendant setting in most procedures. It does not target fact-related questions of guilt or innocence. Decision-making in FCC senate consultations is typically more about weighting opposing principles of the Basic Law and filling the gap of interpretation. All judges work with a very comprehensive Votum that includes all case-relevant facts and arguments. The subjectively perceived "private information" would be a normative evaluation of these facts based on personal values and preferences rather than some mysterious intuition on objective truth.

Second, Bailey and Maltzman (2008; 2011) show that legal preferences on doctrines like precedent, judicial restraint, and freedom of speech affect judicial behavior. They used statements by elected officials on Supreme Court decisions as bridge observations in order to isolate purely legal factors on judicial behavior. But the relevance and scope of freedom of speech will remain an inherently political issue, even if this dimension is not completely reflected in statements by elected officials. The norm of judicial restraint is likely to be less salient at the FCC, where there is no political question doctrine that allows judges to refrain from highly political disputes (Tomuschat 2001, 268f).

The judicial principle of precedent might be more relevant. There is a strong norm of *stare decisis*, i.e. respect for precedent, at the U.S. Supreme Court (Epstein and Knight 1998, 163ff). FCC judges seem to comply with a similar norm.[48] But several decisions suggest that this commitment to precedent is not very strong (Rath 2013, 25ff). Judges can deviate from previous decisions (Benda, Klein and Klein

[47] See Benesh and Czarnezki (2009) for empirical evidence on the U.S. Supreme Court.

[48] FCC president Andreas Voßkuhle claims: "We have to adhere to not only the wording of the Basic Law but also previous decisions by the Federal Constitutional Court" (cited by Rath 2013, 25, own transl.).

2012, 587). They did so in their jurisdiction on abortion and religious matters (Graf 2011; Limbach 2001, 53). The Court itself relativized the binding character of its precedent.[49] The former FCC president Jutta Limbach even called upon the legislator to give rejected rules a second try.[50] In a survey, FCC judges reveal diverging views on the Court's ability to correct its preceding decisions (Landfried 1984, 171f). So the widely recognized norm of precedent does not set absolute boundaries to FCC decisions. It is prone to political preferences and can be defied by a majority of judges. If judges have a preference on whether to respect precedent in a particular decision, it will be reflected by their case-specific policy preferences.

Incomplete Information Judges perfectly know their own preferences but they have limited information about their colleagues' preferences.

All judges intensely study the comprehensive Votum before the first consultation meeting (cf. section 2.5). They are well informed about all relevant dimensions of the case, the legal state-of-affairs, and potential outcomes. Based on their general views and value systems, they consciously form their opinion on the ideal outcome. In terms of game theory, players have perfect information about the policy space, the status quo location, the common discount factor, and their own utility function.

However, their knowledge about other judges' preferences is limited. Models of judicial politics typically assume perfect information about other judges' preferences. But scholars recognize the relevance of subjective uncertainty: "[..] it would be desirable to construct a model involving how strategic justices make decisions under uncertainty" (Hammond, Bonneau and Sheehan 2005, 252).[51] Hence, I distinguish two types of preferences:

1. *Prior* preferences refer to a judge's general views, attitudes, and value systems. Since FCC judges personally interact on an almost daily basis in a very small group, prior preferences are likely to be common knowledge.

2. *Case-specific* preferences are a judge's preferences on the very specific issues of the case. They are only partly determined by a judge's general views. Judges only have a rough idea about each other's case-specific preferences. Unlike chamber proceedings, the content of senate proceedings is genuinely new and

[49] "FCCA §31 and the legal force of norm-rejecting FCC decisions do not bar the legislator from passing a new regulation of the same or of similar content" (BVerfGE 77, 84, own transl.).

[50] "In the event of new insights and social requirements, the Federal Conditutional Court depends on the legislator's spirit of contradiction. The legislator must not give up his readiness to learn just because the Court has once declared a legal regulation unconstitutional" (Limbach 2001, 54, own transl.). See also Limbach (1999, 135ff).

[51] See also Maltzman, Spriggs II and Wahlbeck (2000, 20).

touches yet undissolved constitutional questions (Benda, Klein and Klein 2012, 78). So judges can not recall their colleagues' behavior from prior negotiations on the same question. *Uncertainty* refers to the remaining variance in case-specific ideal preferences that can not be explained by prior preferences.

This assessment is in line with previous findings. FCC judges cannot foresee the course of consultations (Kranenpohl 2010, 170ff). They know each other well but they do not know their colleagues' precise notions on a case in advance.[52]

Status Quo There is an exogenous, case-specific, and stable status quo policy. This policy remains enacted until an alternative proposal is accepted by a majority of judges. It can be thought of as "the current legal state of affairs in the country on the case under consideration" (Hammond, Bonneau and Sheehan 2005, 83). The status quo might be precisely defined by a specific legislative regulation or previous court rulings. But it might also be a state of legal ambiguity or the absence of any regulation at all. The status quo generally is the legal state of affairs that prevails until the Court publishes its decision.

Despite its major impact on the final outcome, the status quo has been largely ignored in judicial politics research (Hammond, Bonneau and Sheehan 2005, 23f). This is surprising, given the importance of status quo policies in spatial models of collective decision-making. The whole proceeding is about moving the status quo. When complainants or plaintiffs file a case at the FCC, they seek to change the legal status quo. If judges are policy-oriented, they are likely to compare each alternative policy to the status quo. Once a decision is published, it defines the legal status quo for upcoming legislative and judicial policy-making processes.

The status quo is case-specific like the set of relevant policy dimensions. Different legal states of affairs matter for different proceedings. While some labor legislation might define the status quo of the first proceeding, it might be completely irrelevant for the second.

I assume the status quo to be stable over the course of the proceeding. Only in rare cases would the legislator be expected to change regulations just because a

[52] FCC judges report:

> "You always notice a certain 'direction' of a judge's thinking. It is very often hard to predict how this will finally realize in the case" (No. 5, cited by Kranenpohl 2010, 172, own transl.).
>
> "The outcome? I virtually never know!" (No. 28, cited by Kranenpohl 2010, 172, own transl.).

case is pending at the FCC. If the political majority feared an opposing decision by the Court that much, the opposition's plain thread of filing a request to the Court should have been enough incentive to proactively change legislation. If other factors like changing parliamentary majorities caused a new status quo and rendered the proceeding completely obsolete, judges would simply close it. In most cases, politics would rather await the FCC's decision in order to avoid additional effort and the risk of having the new reform declared unconstitutional just after its adoption.

The status quo is assumed to be exogenous. As long as the final decision is not published, the Court can not self-determine or change the legal state of affairs. Parallel proceedings on the same issue are usually conjoint. One might regard temporary injunctions as an exception. They either freeze the status quo in order to prevent irrevocable external shocks, which would at least support the assumption of stability. Or they might indeed be a first change to the status quo. Either way, they are a procedural measure of limited scope and do not relieve the Court from its obligation to find a main decision on the merits. For the sake of simplicity, I assume general exogeneity of the status quo.

Costs of Bargaining Delay Bargaining delay is costly. Judges prefer to pass mutually benefitial outcomes sooner than later. Their future payoffs are discounted by a common *discount factor*. Judges might be more or less patient. Since such a personal trait is unrelated to political preferences, I opt for the simplified version of common discount factors. It is assumed to be case-specific, as some issues are more urgent than others. Again, this difference is likely to affect all judges. If a judge was directly involved in a case, he or she would need to be recused (Benda, Klein and Klein 2012, 108ff).

There is a variety of conceivable costs of bargaining delay. Cross (1965; 1969) distinguishes three types: a discount of future benefits, a time-variant utility of the agreement itself, and a fixed cost of each bargaining period (see also Cramton 1991, 1221f; Rubinstein 1982, 99). I assume that only the first type of costs (i.e. discounting future payoffs) matters for FCC negotiations. The second type might apply to the division of a shrinking pie. But in policy negotiations, the value of an agreement is determined by subjective utility functions. So the agreement as such does not have an objective or inherent value.

For the sake of simplicity, I assume that the third type of bargaining costs, i.e. fixed opportunity costs, is not relevant. There are no opportunity costs of continued bargaining, making proposals, and repeated voting. In contrast, Lax and Cameron

(2007) argue that high-quality opinion-writing is very costly. But opposing proposals in FCC negotiations can be made at very low costs. A judge would only have to raise his voice in a consultation meeting. The decision draft and the final decision are written by the rapporteur, with extensive support by legal assistants.

This last assumption of no opportunity costs probably is the most restrictive one with regard to the enormous caseload and a humane need for leisure time. The main reason to stick with this simplification is practical: Hypotheses will be derived via simulations (cf. chapter 5). The computational resources available for this study do not allow for the estimation of subjectively expected numbers of future bargaining rounds (i.e. the expected total opportunity costs of continued bargaining) at all stages of the game for a sufficiently large number of simulations. While the time-varying caseload is controlled for in the empirical analysis, the inclusion of fixed opportunity costs in the model remains up to future research.

Decision-Making Rules Judges alternately vote on policy proposals with equal voting weights until a proposal is accepted by a predefined number of judges. For the sake of simplicity, I disregard both the possibility of ending a proceeding by a status quo-upholding 4:4 vote and the possibility of ex-post changing a vote until the decision is published. Both eventualities can be expected to be rare exceptions from the conventional procedure, given the Court's collaborative mode of operation (Kranenpohl 2010).

Formally, most FCC decisions require a simple majority of judges. The effective target quorum may be higher, though. FCC judges seek high majorities in order to increase the Court's legitimacy or public support (Kranenpohl 2010, 402, 407). There is a norm of consensus that varies between senates and across time (Kranenpohl 2010, 183).

The use of separate opinions serves as an indicator of a changing preference for consensus. The prevailing norm is that separate opinions should only be published in the case of deep personal convictions (Kommers and Miller 2012, 29). The significant decline in separate opinions since its introduction in 1971 (Hönnige 2007, 51) used to be explained by an increased caseload (Lamprecht 1992, 298). But this approach does not account for the increase of dissents in the 1990s (Kommers and Miller 2012, 29) despite a simultaneous increase of docketed cases (Bundesministerium der Justiz 1998). Indeed, the Court's preference for visibly consensual decisions seems to change over time.

Research on the U.S. Supreme Court reveals a similar picture: The level of cohesion

varies over time and these changes are rather long-term (Caldeira and Zorn 1998). There was a radical and enduring increase of dissenting and concurring opinions in the early 1940s that many scholars trace back to a dramatic decline of the norm of consensus (Epstein, Segal and Spaeth 2001). While some consider different Chief Justice leadership styles to be the driving force behind changing levels of cohesion (Caldeira and Zorn 1998; Haynie 1992; Walker, Epstein and Dixon 1988), others point to the impact of the Court's composition with more or less conflicting legal mindsets (O'Brien 1999) and to the Court's caseload.[53] Recent findings show that decisions are unanimous when ideological stakes are low (Epstein, Landes and Posner 2013, 124ff).

The model presented in this chapter does not explicitly account for a norm of consensus. But it is flexible in terms of the majority threshold. While negotiations under unanimity come close to proceedings in times of a strong norm of consensus, simple majority voting is more realistic in other decades.

Independence From External Political Actors and Public Opinion Policy negotiations between judges are independent from external constraints by political actors or the public. The consultation process is not affected by interaction with external players, anticipation of external reactions, or strategic signalling considerations betweem institutions.

This assumption is contrary to previous studies both on the U.S. Supreme Court (Bailey and Maltzman 2011, 95ff) and the FCC (Vanberg 2005). The Court "does not have any marshals" (former FCC president Ernst Benda, cited by Rath 2013, 35, own transl.). It has no coercive means and "no influence over either the sword or the purse" (Hamilton [1788] 1987, 437). The FCC depends on support by the public and political institutions for its decisions to be implemented (Herrmann 2010; Limbach 1999; Schaal 2004; Vanberg 2005). So the assumption of complete independence from external actors needs to be justified.

The present model focuses on the Court's internal negotiation process. The importance of external actors should not be overestimated. FCC judges are personally independent in light of their long tenure without reelection prospects (see section 2.3). German citizens are more confident in the FCC than in any other political institution (Vorländer and Brodocz 2006).[54] The FCC is said to be one of the most

[53] "As demands on the Court increase, the justices lose the luxury of ample time to build consensus" (Walker, Epstein and Dixon 1988, 366).

[54] The police, which scores slightly higher, should not be classified as a "political" institution (Vorländer and Brodocz 2006, 261f).

independent constitutional courts worldwide (see chapter 1). It enjoys great autonomy as an independent and self-administrated constitutional organ with its own budget (Benda, Klein and Klein 2012, 55ff). So the Court can be assumed to be a largely unconstrained actor that does not fear immediate repression or interference by external *political actors* (Hönnige 2007, 67).

Public support seems to be a key premise for such political independence. The U.S. literature supports this conjecture. Shifts in public ideology are strongly related with changes in *collective* Supreme Court decision-making (Mishler and Sheehan 1993) and with *individual* justices' voting behavior (Flemming and Wood 1997). The undisputed empirical association misses a clear causal link, though. Three commonly proposed explanations are:

1. Shifting political majorities favor different candidates to be selected as justices (Segal and Spaeth 2002, 424ff). This causes collective decisions to gradually follow changes in public ideology.
2. Individual justices are motivated to maintain institutional trust and compliance with their decisions. The generally high level of public support is sensitive to disagreement with particular decisions (Caldeira 1986; Durr, Martin and Wolbrecht 2000; Grosskopf and Mondak 1998). So justices might seek to avoid negative attention and public opinion directly influences judicial behavior (Casillas, Enns and Wohlfarth 2011).[55]
3. Justices are part of the public just as anyone else. Their attitudes respond to the same social forces that shape public opinion in general, reducing the empirical association to a statistical artefact without substantive meaning (Giles, Blackstone and Vining, Jr. 2008; Segal, Spaeth and Benesh 2005, 326ff).

The previously introduced assumptions on judicial preferences are consistent with potential changes in the selection process (1) and long-term shifts in individual preferences (3). The model would need to be extended only if the second explanation was of great significance. Recent empirical evidence on the U.S. Supreme Court does not consistently support this claim. Despite very comprehensive research over decades it is still unclear whether public opinion exerts a *direct* influence on Supreme Court decision-making (Epstein and Martin 2010).

There are similar findings on the FCC. The Court has enjoyed a very high level of public support in all decades under study (Schaal 2006; Vorländer and Brodocz 2006). At this high level, it is sensitive to reactions on particularly controversial

[55] See Staton (2010) for very similar line of argument on the Mexican Supreme Court.

decisions. It reached a low mark in the mid-1990s crisis around the *Classroom Crucifix* decision but has recovered afterwards. Such short-term reactions and strong disagreements with particular decisions have not affected general trust in the FCC in the long run (Vorländer 2006*a*; Vorländer and Schaal 2002). FCC judges realize the importance of public support for their decisions (Kranenpohl 2010, 400ff) and they are concerned about declines in institutional trust.[56] Public awareness of specific decisions seems to foster the judges' trust in political implementation of their decisions. FCC judges are more likely to veto legislation if public awareness is high (Vanberg 2005). The more popular the parliamentary opposition's position in a pending proceeding, the more likely will the FCC vote in favor of that position (Sternberg et al. 2014).

However, research on public opinion effects at the FCC faces similar (or even more severe) theoretical and methodological issues as the previously discussed U.S. literature. Again, judges might vote in line with public opinion just because they are part of the public and inherently share the same views. Most conjectures are hard to prove given the rare collection of relevant survey data (Schaal 2004, 130). Vanberg (2005)'s operationalization of public attention raises concerns about potential endogeneity.[57] The public might become aware of a case just because it is controversial[58] and a veto is more likely.

With regard to these methodological concerns, very limited findings on long-term effects, and similar conclusions in the U.S. literature, public opinion is not assumed to have a relevant direct impact on FCC decision-making. Indirect effects via judge selection or long-term preference changes are consistent with previous assumptions. The assumption of FCC bargaining independence from public opinion should be relaxed in future, more general versions of the model.

In summary, I assume single-minded, policy-seeking judges to strategically bargain about moving the legal status quo in a multi-dimensional policy space without external constraints by legal doctrines, political actors, and the public. Judges have an incomplete understanding of their colleagues' case-specific preferences and the game continues until

[56] About one year after the *Classroom Crucifix* decision, the then leaving FCC judge Ernst-Wolfgang Böckenförde feared: "Today the FCC is not anymore what is used to be until August 10, 1995 [when the Classroom Crucifix decision was published]" (Böckenförde 1996, 281, own transl. and comment).

[57] Vanberg (2005, 103) operationalizes public awareness as (a) whether an oral argument was held and (b) as the total number of amicus briefs filed by interest groups, lower courts, or governments. First, the Court might hold an oral argument just because it seeks to prepare the public for a controversial veto decision. Second, third actors might have a higher incentive to file amicus briefs in proceedings where they anticipate the realistic chance or risk of a veto.

[58] Casillas, Enns and Wohlfarth (2011, 81) make the same argument.

a proposal has reached the necessary majority.

Now that these basic assumptions are stated and justified, I will present Banks and Duggan (2006)'s model of dynamic policy bargaining under *complete* information in the following section. This model is extended to a dynamic policy bargaining game under *incomplete* information in section 4.3. The extension will allow for an explanation of variance in bargaining duration beyond immediate agreement and across different kinds of proceedings.

4.2. Dynamic Policy Bargaining with Complete Information

Banks and Duggan (2006) present a dynamic policy bargaining model under complete information. The actors or "legislators" are impatient and continue to bargain in a multidimensional policy space until a decisive coalition agrees on a new proposal to replace the status quo. My theory of FCC negotiations closely builds on Banks and Duggan's model. I introduce and discuss their work before the model is extended in section 4.3.

Complex formal models of political science like the one at hand sometimes lack communicative accessibility for a broad audience of empirical scholars. For the reader's convenience, I do not discuss some of the model's less relevant technical details. Instead, I add some further commentary on equations that Banks and Duggan consider "straightforward to derive" (2006, 56). Readers with particular interest in formal theory are strongly advised to study this undervalued piece of game theory in original.

Banks and Duggan (2006, 53ff) set up their "general bargaining model of legislative policy-making" as follows.

$X \subseteq \Re^d$ denotes a nonempty, compact, convex set of policies with at least two policy alternatives. $q \in X$ is the *status quo* policy. There are $n \geq 2$ legislators $i \in N = \{1, \ldots, n\}$ and they play an infinite-horizon policy bargaining game.

Each period t comprises three consecutive steps: (1) Legislator i is randomly selected with *recognition probability* ρ_i (2) to make a *proposal* $p_i \in X$.[59] (3) All legislators $j \in N$ then simultaneously vote either to *accept* or *reject* the proposal. If a *decisive coalition*[60] of judges accepts the proposal, the game ends in period t and the adopted proposal p_i

[59] Recognition probabilities $\rho_i \geq 0$ are exogenously fixed throughout the game and normalized to $\sum_{i \in N} \rho_i = 1$.

[60] A decisive coalition is any set of legislators whose collective agreement will lead to the adoption of the proposal. See Banks and Duggan (2006, 53) for a more explicit definition. They hardly impose any restrictions on voting rules or weights.

will replace the status quo. Otherwise, the status quo remains in force and steps 1-3 are repeated for period $t+1$.

Each legislator i's temporary utility $u_i(x_t)$ of policy $x_t \in X$ in period t is described by a continuous, concave von Neumann-Morgenstern utility function $u_i : X \to \Re$ with a unique ideal point $\tilde{x}^i \in X$.[61] Future utilities are discounted by a common *discount factor* $\delta \in [0, 1)$ per period. Legislator i's payoff $u_i^{seq}(X_{seq})$ of a sequence of policies $X_{seq} = (x_1, x_2, \ldots)$ over time is defined as

$$u_i^{seq}(X_{seq}) = (1-\delta)\sum_{t=1}^{\infty}\delta^{t-1}u_i(x_t). \tag{4.1}$$

If $X_{seq} = (x, x, \ldots)$ is a sequence of identical policies, the temporary utility of x will be equal to the payoff of having policy x enacted from period $t = 1$ onwards:

$$u_i^{seq}\left((x, x, \ldots)\right) = (1-\delta)\sum_{t=1}^{\infty}\delta^{t-1}u_i(x) = u_i(x). \tag{4.2}$$

Now equation 4.1 can be further simplified. If policy $x \in X$ is adopted in period t, the status quo remains enacted until period $t-1$. The first $t-1$ elements of such a game's policy sequence X_{seq} are q and all other elements are x. Legislator i receives temporary utility $u_i(q)$ each period until $t-1$ and $u_i(x)$ from period t onwards. Then legislator i's total payoff term is

$$u_i^{seq}(X_{seq}) = (1-\delta^{t-1})u_i(q) + \delta^{t-1}u_i(x). \tag{4.3}$$

Legislator i's strategy σ_i defines what policies to propose in the event of recognition and what proposals to accept at the voting stage. Strategies are assumed to be *stationary* in that they do not depend on bargaining history or length. So there is no signalling or bluffing involved. Legislators are willing to propose and accept the same sets of policies in all periods of the game. Strategies are *mixed* in that proposals are randomly selected based on a predefined probability distribution π_i over subsets of X.[62] $A_i \subset X$ denotes the set of proposals that i would vote to accept. Then i's strategy $\sigma_i = (\pi_i, A_i)$ consists of his mixed proposal π_i and his acceptance set A_i and is the same for all periods of the game.

[61] See Banks and Duggan (2006, 54 and 73) for more precise conditions on the utility function. I use a more extended notation in order to explicitly distinguish between temporary policy utilities and payoffs from policy sequences.

[62] Such a probability distribution might also determine a single policy to be selected with probability 1.

A *stationary equilibrium* of the game requires two conditions:

1. A legislator will accept a proposal if and only if it *weakly dominates* continued bargaining. In other words, legislator i will vote to accept proposal x if and only if he prefers x at least as much as rejecting the proposal and opening another bargaining period $t = 2$. The payoff realized in $t = 2$ cannot be perfectly predicted because proposal-makers are randomly recognized. Legislator i's *expected* utility to be achieved in $t = 2$ is specified by the *continuation value* $\upsilon_i(\sigma)$ with $\sigma = (\sigma_1, \ldots, \sigma_n)$ denoting the *profile* of all legislators' mixed stationary strategies.

   Now the expected total utility of both alternatives can be derived from equation 4.3. If the proposal is accepted, the game will end and i's utility will be $u_i(x)$. If the proposal is denied, the status quo will prevail for another period and the total expected utility will be $(1 - \delta)u_i(q) + \delta\upsilon_i(\sigma)$. So i's acceptance set in stationary equilibrium is

$$A_i = \{x \in X \mid u_i(x) \geq (1 - \delta)u_i(q) + \delta\upsilon_i(\sigma)\}. \tag{4.4}$$

2. Legislators are *sequentially rational*. Their strategies must be best responses at every stage of the game (Kreps and Wilson 1982). Hence, the recognized legislator will consider the *social acceptance set* A of all policy alternatives that would be passed by a decisive coalition:

$$A = \bigcup_{C \in D} \bigcap_{i \in C} A_i, \tag{4.5}$$

   where $C \in 2^N \setminus \{\emptyset\}$ is a coalition of at least one legislator and $D \subseteq 2^N \setminus \{\emptyset\}$ is the set of decisive coalitions. Legislator i will propose a most preferred outcome $y \in A$ if he prefers y over continued bargaining. Formally,

$$\pi_i \left(\arg\max \{u_i(y) \mid y \in A\}\right) = 1 \tag{4.6}$$

   if $\sup\{u_i(y) \mid y \in A\} > (1 - \delta)u_i(q) + \delta\, \upsilon_i(\sigma)$. If continued bargaining makes him better off than any outcome $y \in A$, he will make a socially unaccepted proposal $y \in (X \setminus A)$ to be rejected. If he is indifferent, he will choose any of these two options.

Now i's continuation value $\upsilon_i(\sigma)$ is the only unknown. If a new bargaining period starts, legislator $j \in N$ will be recognized with probability ρ_j. He will propose a socially accepted outcome $z \in A$ with probability $\pi_j(z)$. So the cumulated probability of j proposing *any*

socially accepted outcome is $\int_A \pi_j(z)\mathrm{d}z$. The proposal z would be passed and legislator i's payoff would be $u_i(z)$. With a probability of $\pi_j(X \setminus A)$, the recognized legislator j will make a socially unaccepted proposal. The status quo would prevail, yet another bargaining round would be needed, and i's payoff would be $(1-\delta)u_i(q) + \delta\, \upsilon_i(\sigma)$. If legislator j is recognized, i would expect a total payoff of

$$\int_A u_i(z)\pi_j(z)\mathrm{d}z + [(1-\delta)u_i(q) + \delta\, \upsilon_i(\sigma)]\, \pi_j(X \setminus A).$$

Considering all potential proposal-makers and their recognition probabilities, we get a total continuation value of

$$\upsilon_i(\sigma) = \sum_{j \in N} \rho_j \left[\int_A u_i(z)\pi_j(z)\mathrm{d}z + [(1-\delta)u_i(q) + \delta\, \upsilon_i(\sigma)]\, \pi_j(X \setminus A) \right].$$

This implicit function can be solved for $\upsilon_i(\sigma)$:

$$\upsilon_i(\sigma) = \frac{\sum_{j \in N} \rho_i \left[\int_A u_i(z)\pi_j(z)\mathrm{d}z + (1-\delta)\pi_j(X \setminus A)u_i(q) \right]}{1 - \delta \sum_{j \in N} \rho_j \pi_j(X \setminus A)}. \tag{4.7}$$

A stationary equilibrium of the game is defined by the coupled set of equations 4.4 to 4.7. Legislators are strategically rational. They are completely informed about the set of legislators n, decision rules, decisive coalitions D, policy space X, the status quo q, all players' preferences $u(x)$, the common discount factor δ, and recognition probabilities ρ. Strategies are stationary, so they do not depend on the history of the game. Legislators will have the same information and strategies in all periods. They anticipate other players' strategies and form their own strategy as follows.

A legislator's vote choice depends on his continuation value for continued bargaining (equation 4.4). The continuation value depends on all legislators' proposal strategies (equation 4.7). These proposal strategies in turn depend on both continuation values and socially accepted outcomes (equation 4.6 with further specifications). The set of socially accepted outcomes depends on individual vote choices (equation 4.5) and we have come full circle. The stationary mixed strategy profile σ is in equilibrium for all self-consistent solutions of these equations.

Banks and Duggan (2006, 65ff) prove that there always exists a stationary equilibrium with immediate agreement in the first period. There may be multiple no-delay equilibria with different payoffs. Delay can only occur under very specific circumstances and the authors conclude that "there will typically be immediate agreement in multidimensional settings" (Banks and Duggan 2006, 52).

The assumption of *strategic voting* probably is the most important deviation of Banks and Duggan's model from more established models of spatial policy-making. At first sight, Hinich and Munger (1997)'s example of committee voting reads very similar:

> "Each member can make any proposal [...] New proposals are compared against the *status quo*, using majority rule. [...] If a new proposal loses, it is discarded. If it wins, the proposal becomes the new status quo" (Hinich and Munger 1997, 25, original emphasis).

But then they require all committee members to "vote based only on their preferences for the proposals then under consideration" (Hinich and Munger 1997, 25). Members decide "regardless of what other proposals might later be raised if y becomes the new status quo" (Hinich and Munger 1997, 27). Though less explicitly, Tsebelis (2002)' veto player model builds on the same assumption of *sincere voting*.

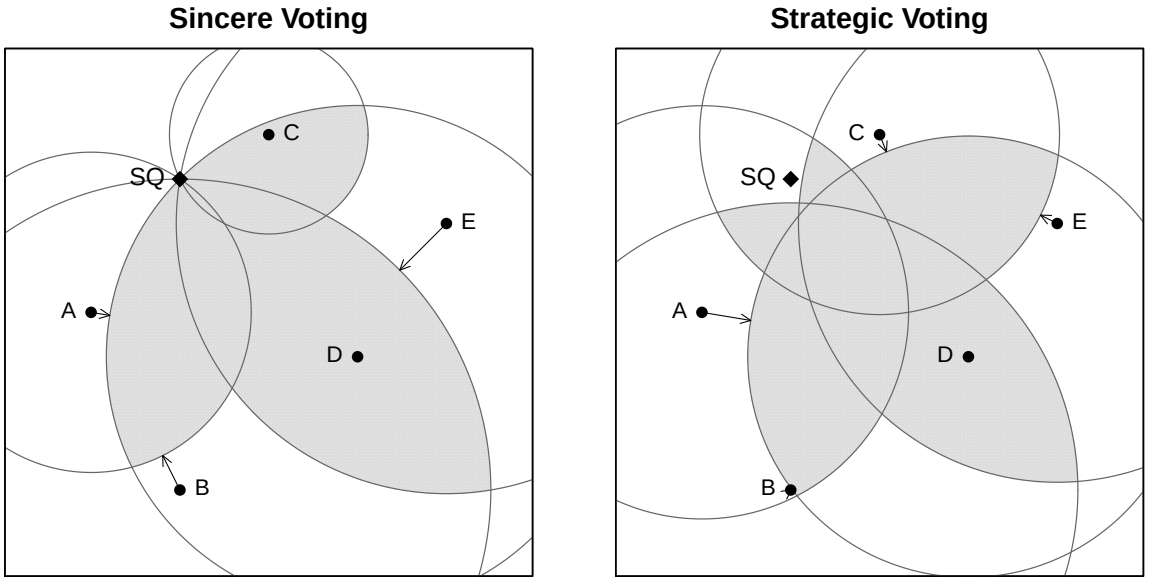

Figure 4.1.: **Sincere vs. strategic voting:** Estimated winsets of a five-player policy bargaining game in two dimensions. Sincere voting (Hinich and Munger 1997; Tsebelis 2002) on the left. Strategic voting (Banks and Duggan 2006) on the right. SQ: status quo policy. A-E: players' ideal policies. Circles: indifference curves. Grey area: majority winset. Arrows: proposals by players outside the winset.

All of these scholars assume players to be rational and strategic. This assumption has a significant impact on predicted bargaining processes and their outcomes. But it will not be consistent with the assumption of sincere voting if the agendasetter is not fixed. Why

would a player consider other players' future behavior in proposal-making but not in his voting behavior? If strategic players care anything about future policies (i.e. the discount factor is $\delta > 0$), there is no reason to expect sincere voting in absence of a predefined agendasetter. Different agendasetters can be expected to make more or less advantegous proposals in future bargaining periods. So strategic players would compare proposals against expected gains from continued bargaining rather than against the status quo.

Figure 4.1 illustrates an example policy bargaining situation to clarify this point. Five players bargain about moving a given status quo policy in a two-dimensional policy space. A policy alternative requires a simple majority of at least three players to replace the status quo. Preferences are defined by quadratic utility loss functions with circular indifference curves. In the standard spatial policy-making model on the left, the status quo is included in the winset. All players' sincere indifference curves intersect at the status quo (Hinich and Munger 1997; Tsebelis 2002). A player will vote to accept any proposal that is closer to his ideal point than the status quo. If the proposal is more distant, he will reject. Players C and D will successfully propose their ideal point if they are recognized. Predicted proposals by players A, B, and E are indicated by arrowheads at the winset's boundary.

The right figure illustrates the same bargaining situation in stationary equilibrium as defined by Banks and Duggan's dynamic policy-making model with strategic voting.[63] Here, indifference curves do *not* cut the status quo. Players compare proposals against expected utilities rather than against the status quo. Players B, D, and E would not accept a status quo proposal. Bright prospects of future bargaining make them more demanding. In contrast, players A and C would even vote for some policies they prefer *less* than the status quo. Continued negotiations might result in very distant policy outcomes. So these players prefer a moderate utility decline over the risk of facing more severe losses in the future. If recognized, D will successfully propose his ideal policy. Players A, B, C, and E will propose policies with moderate concessions, as indicated by the arrowheads. Their proposals are more "right" on the first dimension as compared to the previous figure. So the assumption of sincere vs. strategic voting has remarkable implications on the predicted bargaining process and outcome.

Banks and Duggan have provided a spatial bargaining model that accounts both for the dynamics of policy-making and for strategic voting. They have moved spatial theory beyond the inconsequential assumption of sincere voting. Eight years have passed, since their model was published (Banks and Duggan 2006). An earlier version had been published in the *American Political Science Review* (Banks and Duggan 2000). But still, the

[63] The stationary equilibrium was solved via the estimation method presented in section 5.2.1 with discount factor $\delta = 0.5$. Similar results are obtained with alternative discount factors $0 < \delta \leq 1$.

scientific community does not recognize the great value of their theory. State-of-the-art models of policy-making are typically based on sincere indifference curves and winsets as promoted by Tsebelis (2002) and Hinich and Munger (1997). Banks and Duggan's abtract, formal style of presentation might have hampered a more widespread use of their model. The present study provides an example of how to apply their model to empirical phenomena of political decision-making.

In this section, I have introduced Banks and Duggan's model of dynamic policy bargaining under complete information. Players bargain about moving a multidimensional status quo by alternating proposals and votes until a collective decision is reached. The assumption of strategic voting most distinguishes this model from the static model of spatial policy bargaining. Indifference curves do not necessarily cut the status quo. There always exists a no-delay stationary equilibrium and the game typically ends in the first period. In a footnote, Banks and Duggan (2006, 52) suggest that more substantive delay may be obtained by adding incomplete information to the model. I will take this hint and extend their model to a version with incomplete information about other players' preferences in the following section.

4.3. Dynamic Policy Bargaining with Incomplete Information

The following model of policy bargaining with incomplete information is a modification of Banks and Duggan (2006)'s dynamic bargaining model as presented in section 4.2. It is primarily designed to fit the assumptions on policy bargaining at the FCC (cf. section 4.1). Largely institution-free senate consultations are at the core of FCC proceedings (cf. section 2.5). Judges engage in detailed discussions about the case until at least a majority of them agrees on the final outcome. They are well informed about the case and potential outcomes. But uncertainty about each other's preferences remains. FCC senate discussions are represented in the dynamic policy bargaining model with incomplete information, where alternating players make policy proposals, vote on each proposal and learn throughout the game.

"Proposals" can be thought of either formal proposals (e.g. the very first proposal in the Votum) or as informal suggestions in the oral debate. "Votes" can either be formal (e.g. on a potentially final decision) or informal, continuous feedback on previous propositions in the ongoing oral debate (explicit statements, facial expressions etc.). "Recognitions" of proposal-makers can either be formal (the rapporteur is formally assigned) or informally

determined by the order of speakers at any point in the discussion. A specific "policy" can be any combination of statements on a (partial) legal norm's constitutionality, legislative interpretation, deadlines, directives, obiter dicta, etc. (cf. section 2.6). The general outline allows to apply this model to policy-making processes (e.g. in legislative committees) beyond the context of the FCC.

Banks and Duggan's model is modified in two ways. First, I assume quadratic utility loss functions and majority voting with equal voting rights and weights. The more general model by Banks and Duggan can easily be applied to a great variety of institutional decision-making rules and preference representations. This flexibility comes with the downside of overly abstract formalism. The additional assumptions of quadratic utility loss functions and plain majority voting simplify the formal presentation of the game. They are by no means necessary for modelling durable negotiations under incomplete information. The following account could easily be re-modified to a more general version.

Second, I assume players to be incompletely informed about other players' preferences. All players have commonly known general positions on issues (e.g. political ideology, a general set of attitudes, value systems, ...) that I call *priors*. All bargaining-relevant policy dimensions can be assigned to one of these priors. A player's concrete policy position on that dimension is only roughly determined by that prior.[64] In terms of game theory, I model a *Bayesian game* where nature draws all players' ideal positions on bargaining-relevant policy dimensions from a normal distribution around that player's prior (Harsanyi 1967). The normal distribution's variance corresponds to the degree of uncertainty. The greater the variance, the less precise concrete policy positions can be determined from a player's prior. Players' beliefs about each other's preferences are represented by probability functions and updated based on observed behavior.

The extended model of dynamic policy bargaining with incomplete information is presented in the following.

Let $X \subseteq \mathbb{R}^d$ denote a nonempty, compact, convex set of policies with at least two policy alternatives in an n-dimensional space. $q \in X$ is the *status quo* policy. There are $n \geq 2$ players $i \in N = \{1, \ldots, n\}$ who play an infinite-horizon policy bargaining game.[65]

In each period $t \in \mathbb{N}$, player i is randomly selected with a fixed and commonly known *recognition probability* ρ_i to make a *proposal* $p_i^t \in X$. All players $j \in N$ then simulta-

[64] E.g., a judge might be known to be rather conservative, so he probably opposes same sex marriage equality in income tax but his stance on equality in inheritence taxes might be less clear. Another legislator might be a known moderate welfare state supporter. Would he prefer the child benefit to be increased by 20, 30, or 40 euros per month?

[65] Unlike Banks and Duggan, I choose "players" as the more general term. These acting entities will be "judges" in my empirical application and might be "legislators" in others.

neously vote either to *accept* or *reject* the proposal. There is a fixed decision rule. If at least m players with $0 < m \leq n$ accept the proposal, the game ends in period t and the adopted proposal p_i will replace the status quo. Otherwise, the status quo remains in force and a new period starts.

Before negotiations start, nature draws player i's most preferred policy $\tilde{x}^i$ from a normal distribution around i's prior $\mu_i \in X$:

$$\tilde{x}^i \sim \mathcal{N}_d(\mu_i, s^2), \tag{4.8}$$

where $s^2 \geq 0$ is a common degree of uncertainty.[66] Player i's utility of policy $x \in X$ is described by a quadratic von Neumann-Morgenstern utility function $u_i(x) = -(x - \tilde{x}^i)^2$, where $\tilde{x}^i \in X$ is player i's most preferred policy. Future utilities are discounted by a common *discount factor* $\delta \in [0, 1)$ per period. Player i's total payoff of a sequence of policies $x_1, x_2, \ldots$ over time is

$$u_i^{seq}\left((x_1, x_2, \ldots)\right) = (1 - \delta) \sum_{t=1}^{\infty} \delta^{t-1} u_i(x_t).$$

If policy x is passed in period t, the status quo q prevails until period $t - 1$ and the total payoff term is simplified to

$$(1 - \delta^{t-1}) u_i(q) + \delta^{t-1} u_i(x).$$

Players perfectly know their own preferences but they can only estimate each other's $\tilde{x}^i$. They will assess the more general definition of i's utility function:

$$u_i(x, x_i^*) = -(x - x_i^*)^2, \tag{4.9}$$

where $x_i^* \in X$ is i's *presumed* ideal policy. Players build and constantly update subjective expectations $\theta = \{\theta^1, \theta^2, \ldots\}$ about each other's ideal positions $\tilde{x} = \{\tilde{x}^1, \ldots, \tilde{x}^n\}$, where θ^t denotes preliminary expectations in period t. Rational players take these expectations into account so that their strategies depend on previous observations. These strategies are not stationary. By assumption, observed voting behavior is the only cause of changing expectations and strategies in the bargaining process.[67]

[66] Conceptually, the degree of uncertainty could be player- and dimension-specific. The change in notation would be trivial. Here and in the following chapters, I assume a common degree of uncertainty for reasons of simplicity.

[67] This implies that there are no tit-for-tat coordination strategies and the like. A player's voting decision is least likely to be manipulated. One could alternatively assume players to learn from proposals. But since proposals allow for a much more accurate estimation of real preferences, they would be more

Player i's strategy $\sigma_i = \{p_i, v_i\}$ consists of a mixed proposal strategy $p_i = \{p_i^1, p_i^2, \ldots\}$ and a pure voting strategy $v_i = \{v_i^1(x), v_i^2(x), \ldots\}$. p_i^t denotes the policy alternative that i would propose in period t if i was recognized, given θ^t. i's proposal strategy is *mixed* in that i may randomly choose p_i^t from a set of alternative proposals. For each period t, i's voting strategy v_i includes a function $v_i^t \colon X \to \{0,1\}$ of whether i would vote to *accept* (=1) or *deny* (=0) policy $x \in X$, given θ^t. The social acceptance set of all proposals that would be passed by a majority of at least m players in period t is

$$A^t = \left\{ x \in X \;\middle|\; m \leq \sum_{i \in N} v_i^t(x) \right\}. \tag{4.10}$$

Any other player j's expectation in period t about player i's ideal policy is represented by the probability distribution $\theta_i^t \colon X \to [0,1]$ with $\int_X \theta_i^t(x)\mathrm{d}x = 1$ and $j \in N \setminus \{i\}$. More precisely, $\theta_i^t(x)$ gives the expected probability of $x = \tilde{x}^i$ as estimated by any other player j in period t. In the first period $t = 1$, no voting has been observed yet and $\theta_i^1(x)$ corresponds to the probability distribution of nature's draw:

$$\theta_i^1(x) = \mathcal{N}_d(\mu_i, s^2), \tag{4.11}$$

where μ_i and s^2 are common knowledge so that all players $i, j \in N$ can estimate $\theta_i^1(x)$. In every following period $t > 1$, $\theta_i^t(x)$ is updated based on i's observed voting behavior in $t-1$. Let $\omega_i^t \colon X \to \{0,1\}$ be a function of whether i's voting decision on proposal p^t in period t is consistent (=1) or inconsistent (=0) with the assumption of $\tilde{x}^i = x$. Let $f(p^t, x)$ be an indicator function of whether player i is expected to vote for proposal p^t in period t, based on the assumption that x is i's true ideal point: $x = \tilde{x}^i$. Then

$$\omega_i^t(x) = \left| v_i^t(x) + f(p^t, x) - 1 \right|. \tag{4.12}$$

In each period $t > 1$, players erase observation-inconsistent expectations. Previous expectations on player i's ideal point in period $t-1$ are represented by the probability distribution $\theta_i^{t-1}(x)$. Probabilities for previously presumed ideal points that turned out to be inconsistent with actual voting behavior are set to 0 by multiplicating $\theta_i^{t-1}(x)$ with $\omega_i^{t-1}(x)$. The denominator standardizes the updated probability distribution $\theta_i^t(x)$ to a

prone to signalling and bluffing incentives. With the scientific aim of complexity reductive models in mind, I assume that learning is limited to observed voting behavior.

cumulated probability density of $\int_X \theta_i^t(x)\mathrm{d}x = 1$:

$$\theta_i^t(x) = \frac{\theta_i^{t-1}(x)\omega_i^{t-1}(x)}{\int_X \theta_i^{t-1}(x)\omega_i^{t-1}(x)\mathrm{d}x}. \tag{4.13}$$

Players are assumed to be strategically rational. In equilibrium, a player will accept a proposal if and only if he prefers it at least as much as continued bargaining. For each player i and each period t,

$$v_i^t(x) = \begin{cases} 1 & \text{if } u_i(x) \geq (1-\delta)u_i(q) + \delta\, v_i^t(\sigma) \\ 0 & \text{else} \end{cases}, \tag{4.14}$$

where $v_i^t(\sigma)$ is the *continuation value* of rejecting the proposal and proceeding to a new bargaining period $t+1$. Other players $j \in N \setminus \{i\}$ can only estimate i's voting strategy. Their expectation of i's voting strategy in period t is

$$Ev_i^t(x) = \int_{z \in X} \theta_i^t(z) f(x,z) dz \tag{4.15}$$

with

$$f(x,z) = \begin{cases} 1 & \text{if } u_i(x,z) \geq (1-\delta)u_i(q,z) + \delta\, Ev_i^t(\sigma) \\ 0 & \text{else} \end{cases}, \tag{4.16}$$

where $Ev_i^t(\sigma)$ is any other player j's expectation of i's continuation value in period t.

Having estimated all other players' voting strategies, a player $j \in N$'s estimate of the social acceptance set in period t is

$$EA_j^t(x) = \sum_{C \in M} \left[\left(\prod_{i \in C} Ev_i^t(x) \right) \times \left(\prod_{i \in N \setminus C} \left(1 - Ev_i^t(x)\right) \right) \right] \tag{4.17}$$

with the set of majority coalitions $M = \left\{ C \in 2^N \setminus \emptyset \;\middle|\; |C| \geq m \right\}$ and complete information about j's own voting strategy $Ev_j^t(x) = v_j^t(x)$. $EA_j^t(x)$ is a cumulated Poisson binomial distribution. It describes the subjectively expected probability of at least m players voting in favor of x in period t as perceived from j's perspective.

Players are sequentially rational. In each period t, the recognized proposer $i \in N$ will propose the policy alternative that maximizes his subjectively expected utility. If policy $y \in X$ is proposed, it will be enacted with subjectively expected probability $EA_i^t(y)$

and i's payoff will be $u_i(y)$. Otherwise, i.e. with a subjectively expected probability of $1-EA_i^t(y)$, the status quo will prevail for another period, bargaining continues in $t+1$, and i's subjectively expected payoff will be $(1-\delta)u_i(q) + \delta\, Ev_i^t(\sigma)$. Proposer i's subjectively expected utility of proposing y in period t then is

$$Eu_i^t(y) = EA_i^t(y)u_i(y) + \left(1 - EA_i^t(y)\right)\left((1-\delta)u_i(q) + \delta\, Ev_i^t(\sigma)\right). \tag{4.18}$$

The sequentially rational proposer i will propose policy

$$p_i^t \in \arg\max\left\{Eu_i^t(y)\right\} \tag{4.19}$$

in period t. This conjecture implies that i will propose a socially unaccepted proposal if he favors continued bargaining over any socially accepted proposal, consistent with Banks and Duggan's model under complete information. If there is a tie between several expected utility-maximizing policies, i's eventual proposal is randomly chosen from the set of optimal proposals with equal probabilities.[68]

The *continuation value* $v_i^t(\sigma)$ denotes player i's subjectively expected payoff from continued bargaining in period $t+1$. Players can not perfectly predict future bargaining because all players' strategies $\sigma^{t+1} = \{\sigma_1^{t+1}, \ldots, \sigma_n^{t+1}\}$ in period $t+1$ depend on the then available sets of information θ^t. In the complete information model, strategies are stationary and $v_i(\sigma) = v_i^t(\sigma) = v_i^{t+1}(\sigma)$. So the continuation value can be represented by equation 4.7 (Banks and Duggan 2006, 56). This does not hold for the incomplete information model.

From a purely theoretical perspective, one would expect strategically rational players $i \in N$ to estimate θ^{t+1}, $v_i^{t+1}(\sigma)$, θ^{t+2}, $v_i^{t+2}(\sigma)$, etc. of continued bargaining periods with incomplete information for all potential preference constellations $x^* = \{x_1^*, \ldots, x_n^*\}$ and to weigh these estimates by θ_i^t. With contemporarily available computational ressources, such a model would not be solvable for a sufficient number of simulated negotiations within reasonable time and at reasonable costs (see chapter 5). For pragmatic reasons, I therefore assume that players estimate their continuation values based on the assumption of complete information in $t+1$. For each presumed preference constellation, players would expect a total payoff equal to what they would gain from complete information bargaining with the very same preferences. Uncertainty remains about each other's preferences, i.e. about which game they actually play.

[68] Since proposer i likes all $p_i^t \in \arg\max\{Eu_i^t(y)\}$ equally well, there is no reason to assume non-random choice. Banks and Duggan (2006, 56) are less specific and only conclude that the proposer would choose *any* optimal proposal. The additional assumption of random choice does not affect continuation values but it might affect the course of bargaining.

This heuristic is a reasonable approximation of the continuation value under incomplete information. First, real-world players' computational capacities are not unlimited. So more complexity would not necessarily add any realism. Second, players learn about each other's preferences each period. Their expectations converge to a game with complete information. So future bargaining becomes more and more similar to complete information games, indeed.

Let $v_i^C(\sigma, x^*)$ denote player i's continuation value in the equivalent game under complete information with presumed ideal positions $x^* = \{x_1^*, \ldots, x_n^*\}$ and utility functions as described by equation 4.9. The stationary equilibrium of $v_i^C(\sigma, x^*)$ then is defined in equation 4.7. Player i's continuation value in period t is

$$v_i^t(\sigma) = \sum_{x^* \in X^n} \left(v_i^C(\sigma, x^*)\, \Phi_{\tilde{x}_i}(x_i^*) \prod_{j \in N \setminus \{i\}} \theta_j^t(x_j^*) \right). \tag{4.20}$$

For each potential preference constellation $x^* \in X^n$, i estimates his payoff $v_i^C(\sigma, x^*)$ from continued bargaining under complete information in period $t+1$. Player i perfectly knows his own ideal position. So the indicator function

$$\Phi_{\tilde{x}_i}(x_i^*) = \begin{cases} 1 & \text{if } x_i^* = \tilde{x}_i \\ 0 & \text{else} \end{cases} \tag{4.21}$$

effectively limits the set of relevant preference constellations to those with $x_i^* = \tilde{x}_i$. The continuation values from all these continued games under complete information are weighted by i's current expectations $\theta_j^t(x_j^*)$ about other players' real preferences and sum up to i's continuation value in period t.

Finally, players estimate each other's continuation value in order to determine expected voting strategies and social acceptance sets. In period t, player $h \in N$ expects player $i \in N \setminus \{h\}$ to have a continuation value of

$$Ev_i^t(\sigma) = \sum_{x^* \in X^n} \left(v_i^C(\sigma, x^*) \prod_{j \in N} \theta_j^t(x_j^*) \right). \tag{4.22}$$

In this section, Banks and Duggan (2006)'s dynamic model of legislative bargaining has been extended to a dynamic policy bargaining model with incomplete information. The model fits the assumptions on policy bargaining at the FCC (section 4.1) and will be

tested against empirical evidence in part III.

The policy bargaining model with incomplete information assumes rational, strategic players to bargain about replacing the status quo in a multi-dimensional policy space. They bargain in sequential periods of proposals and votes. Players know their own preferences but they can only estimate their opponents' preferences by their commonly known ideology and observed voting behavior. Best-response proposal and voting strategies depend on these temporary subjective expectations about each other's preferences. Players learn over time and update their beliefs each period.

The incomplete information model is highly complex. The game's sequential equilibria are clearly defined but an equilibrium solution is hard to find. The game's infinite horizon inhibits backwards induction. Strategies are non-stationary and highly interdependent. Each period starts with a recognized proposal-maker. In equilibrium, a player's proposal strategy depends on the subjectively estimated social acceptance set, which in turn depends on the expected voting strategy of other players. Such an expected voting strategy again depends on these other players' expectations about everyone else's strategies. These "*second-order* expectations" (Harsanyi 1967, 163f) – subjective expectations about other players' expectations – make it hard to derive clear conclusions. An analytic solution of the game is not feasible. I will conduct computer simulations in chapter 5 in order to derive explicit hypotheses.

5. Simulation of Dynamic Policy Bargaining

In this chapter, computer simulations are conducted in order to derive hypotheses on policy bargaining at the FCC. A dynamic policy bargaining model with incomplete information has been formulated in chapter 4. At every stage of the game, there is an enormously complex set of equations to be balanced in equilibrium. Non-stationary strategies and the high number of players' interdependent higher-order expectations render an analytical solution impossible.

Fortunately, modern-day computer simulation techniques offer a feasible alternative. In order to derive concrete hypotheses from the model, I simulate a high number of negotiations under varying parameters. The main independent variables such as players' preferences, the amount of uncertainty, the status quo position, the majority rule, and the number of players are varied. For each setting, an equilibrium course of the bargaining process is simulated. The results allow to analyze these independent variables' effects on bargaining duration and to derive specific hypotheses for empirical tests.

The present chapter first gives a short introduction into the scientific methodology of simulation techniques (section 5.1). Then the setup of simulations of dynamic policy bargaining with complete and with incomplete information is presented (section 5.2). Finally, simulated results are presented and discussed for a range of parameters that will be relevant for the subsequent empirical application (section 5.3).

5.1. Simulation Techniques

Numerical computer simulations have been applied in social sciences for a long time (Troitzsch 2000). They have been conducted to solve large game theory sets of equations even at a time when computational ressources were much scarcer than nowadays (e.g. Baron and Herron 2003; Grossman and Perry 1986). Today's computational capacities allow for a great potential of analyzing non-trivial political and social processes. Despite these technical advance, there still are few applications of computer simulations in po-

litical science. The German Scientific Council has recently called upon social scientists to expand the use of modern-day simulation techniques in both research and teaching (Wissenschaftsrat 2014). This chapter shall contribute to the promotion of simulation techniques in political science.

Computational models are generally accepted as a scientific method to investigate problems, when analytical deduction fails (De Marchi and Page 2008). Scholars have divergent views on whether simulation should be classified as a purely deductive method. Axelrod (2007) argues that simulations do not prove theorems. They start with assumptions and generate data that can be analyzed inductively. So he considers simulation to be a "third way of doing science" besides deduction and induction (Axelrod 2007, 92).

I disagree and go with Epstein's line of argument that "every realization of an agent model is a *strict deduction*" (Epstein 2006, 56, original emphasis). Every part of the simulation's setup is strictly deduced from explicit theoretical assumptions. The set of simulated realizations of the theory is stochastic and depends on the explicitly selected parameters. But random probability distributions are part of the theory. Just because one induces statistical patterns over a large sample of individual realizations of the theory, does not make these conclusions any less derived from pure theory (Epstein 2006, 66f). The conclusions in section 5.3 are purely theory-based hypotheses for the selected range of parameters, strictly derived from the bargaining model in section 4.3.

Hypothetical bargaining outcomes derived via computer simulations are even *more* convincing than a purely analytical account that is limited to the description of stable equilibria. Concepts like the Nash equilibrium may explain why actors would not deviate from their state, once they are in equilibrium. But they do not give an explanation of whether and how actors will *reach* that equilibrium in the first place (Coddington 1968, 24ff). It is important to show how human actors will attain a specific outcome: "If you didn't grow it, you didn't explain it" (Epstein 2006, xii). Simulation models are not limited to predictions of the bargaining outcome. They allow to explain and predict the whole course of bargaining processes. The simulation model starts with clearly defined initial conditions and explains all the way up to the final bargaining decision.

The literature distinguishes different types of simulation techniques, of which two come close to the requirements for the dynamic policy bargaining model: discrete-event simulation models and agent-based models.

Discrete-event simulation models are stochastic, dynamic, and discrete-event in that significant changes occur at discrete time instances only (Leemis and Park 2006, 3). The dynamic bargaining model formally fits these requirements. The recognition rule is a stochastic element, dynamic bargaining takes place over time, and bargaining periods

are discrete time instances. But discrete-event simulation techniques are more tailored towards investigating queues, production lines, and logistics. Even though there is a very broad range of potential applications (Allen 2011), their flow system-oriented setup is not suitable for our purpose.

Agent-based models are a more recent simulation technique that has been applied by political scientists with great success (Laver and Sergenti 2012; Lorenz 2012). In agent-based models, autonomous agents are assumed to dynamically interact with each other and with their environment according to a set of rules (De Marchi and Page 2008). General patterns and structures of interaction typically emerge from individual behavior of numerous, oftentimes heterogeneous actors (Macal and North 2010). So agent-based models are a good tool to do the "micro-to-macro mapping" (Epstein 2006, 21). Whereas top-down discrete-event simulations model the macro flow of passive entities through a centralized, queue-related system, bottom-up agent-based simulations show how macro behavior emerges from micro decisions of active individuals and their decentralized interactions (Siebers et al. 2010, 207). This interaction most distinguishes agent-based models from previous techniques (Macy and Willer 2002).

The dynamic policy bargaining model with incomplete information formally fulfills all basic characteristics of an agent-based model (Macal and North 2010): Players are autonomous, heterogeneous, uniquely identifiable, and self-directed individuals with limited information. Their voting decisions are specified by an abstract set of rules and reveal some information about their preferences. Players have a large set of attributes including policy preferences, subjective expectations, and discount factors. Negotiations can be regarded as ongoing interactions in a given environment.

However, it differs from typical agent-based models in two important ways: First, the bargaining interaction of judges involves all players all the time. Players do not merely locally interact with ideological "neighbors" (Epstein 2006, 52; Macal and North 2010, 154). They always have the entire group of players in mind. Second, whereas agent-based models typically involve a very large set of agents (Laver and Sergenti 2012, 5) with rather simple rules of behavior (Macy and Willer 2002, 146), the dynamic bargaining model involves very complex decision rules and possibly few players.[69] Once all actors' strategic behavior is defined, the emergent pattern is quite obvious at all stages of the game: The proposal will be passed if and only if a majority of judges agrees. Complexity is imputed by the choice of optimal strategies rather than by the system.

In summary, the dynamic policy bargaining model with incomplete information does

[69] Between six and eight judges negotiate a proceeding at the FCC (chapter 2).

not fit any of the standard types of simulation. None of the standard simulation software packages seemed suitable and simulations are hand-coded in R (Development Core Team 2008, cf. section 5.2). Nevertheless, the standard procedure of sound simulation analyses can well be transfered to our application.

Lorenz (2012, 34f) specifies six major steps to proceed in simulating agent-based models:

1. Definition of **agents and parameters**
2. Definition of **behavioral rules**
3. Choice of **initial parameters**
4. Implementation of the **simulation process** in a computer programm
5. Definition of relevant **macro variables**
6. Conducting **mass simulations**

All these steps and a variety of validity and consistency checks are conducted. Agents, parameters, and behavioral rules have been defined in chapter 4. Initial parameters are discussed at the beginning of section 5.3. The simulation process is implemented in a hand-coded script that is discussed in section 5.2 and attached in appendix A. The macro variable of interest is bargaining duration. In the bargaining model, duration is defined as the number of bargaining periods until a proposal is passed. Finally, mass simulations are conducted and results are discussed in section 5.3.

The following section gives an overview of how the computer-based dynamic bargaining simulations are set up and proceeded.

5.2. Implementation of the Simulation Process

A Monte Carlo simulation is conducted in order to derive hypotheses for a large variety of independent variables. Some initial parameters like the number of judges, the majority threshold, or the degree of uncertainty are varied in order to uncover systematic effects on bargaining duration. Other factors like policy preference constellations and the sequence of proposers are random as assumed by the bargaining model. In order to distinguish robust systematic effects from random noise, a very high number of simulation runs is necessary.

Numerous runs have been conducted for developing, testing, and refining this model. The final mass simulations (section 5.3) alone are based on more than 2 million separate runs of simulated negotiations with incomplete information. This includes about

20 million simulated bargaining periods and more than 90 billion simulated games with complete information. A modern-day single core computer would have needed more than a century of computational time to deliver these results.

These numbers make clear three points:

1. A simulation model's complexity comes with high economic and ecological costs. Despite a tremendous increase over the last decade, computational ressources still effectively limit a researcher's flexibility. Exponentially more simulations would have allowed for the estmation of more precise continuation values or expected opportunity costs in future bargaining. With current ressources, such extensions would not be feasible without a loss in precision for individual sets of parameters. Facing these restrictions, I opt for a limited model and reliable predictions rather than potentially random noise on a more complex theory.

2. A computing time-efficient way of programming is essential. The simulation model is coded in R 2.15.3 (Development Core Team 2008), an established open-source statistical software with sufficient flexibility to set up all routines and analyses in one program. Other programming languages might have been more efficient. But R is a good choice in terms of personal prior experience, programming flexibility, platform independence, and accessibility by other quantitatively oriented social scientists. I sought to optimize the code by efficient structures, commands, and the use of matrices rather than loops. The code is attached in appendix A and ready to be further improved.

3. A large network of computers was necessary to perform these calculations. Mass simulations were conducted on computers made available by bwGRiD (2007-2010), mainly on the bwGRID clusters located at the universities of Freiburg, Heidelberg, and Mannheim. The simulation R code and further scripts to define starting values, detect errors, aggregate results, and manage data in the clusters' linux environment were coded as run-alone routines. Parallel simulations were conducted over a period of four months on up to 1100 processors at peak time.[70] The computing time required for a single simulated run varied from about 10 minutes to three weeks, depending on initial parameters and the number of bargaining periods. In order to prevent any bias towards low computing time-consuming negotiations, all initiated runs were followed up and included in the final dataset.

[70] At the Mannheim/Heidelberg cluster, computer nodes of eight cores are exclusively assigned to one batch job at a time. A computing routine of parallel simulations ensured that all cores were used to capacity.

A player's continuation value in the incomplete information policy bargaining model depends on his expected payoff from games with complete information. Both models – the complete and the incomplete information versions of the dynamic policy bargaining model – need to be coded for computer simulations. The simulation R code with complete information could well be used independently in order to estimate attainable equilibria of Banks and Duggan (2006)'s model. For the present purpose, it merely serves as a subroutine in simulating bargaining with incomplete information. The following subsections explain the setup of both simulation models.

5.2.1. Simulating the Complete Information Model

The simulation model of dynamic policy bargaining with complete information is based on the coupled set of equilibrium equations in section 4.2. Any self-consistent solution of these equations describes a stationary equilibrium. As announced in the model's assumptions, the simulation model is restricted to two policy dimensions as the most simple, non-trivial case of a multidimensional policy-space (cf. section 4.1).[71] I further assume quadratic utility loss functions and majority voting with equal voting rights and weights as defined in the incomplete information model (section 4.3).

The number of players n, the majority threshold m, the set of ideal points $\tilde{x}$, the status quo policy q, the discount factor δ, and recognition probabilities ρ are exogenous input parameters. Based on this information, a set of "relevant policies" is determined and an equilibrium solution is estimated in an iterative way. I discuss both steps in the following.

Determination of Relevant Policies

The prevalent method to solve bargaining games like this one is to reduce the policy space to a finite grid of possible policy alternatives. E.g., Duggan and Kalandrakis (2011) estimate social acceptance sets and proposal strategies in equilibrium for a very similar dynamic policy bargaining model based on a policy grid of $51 \times 51 = 2601$ alternatives. Similarly, Selck (2004) assumes 100 possible positions per issue dimension in a computer simulation of legislative bargaining. With more 90 billion repetitions of the complete information model in mass simulations, policy grids are no feasible option for the present simulation study. Very fine grids with a high number of nodes would be necessary in order to gain precise results (Duggan and Kalandrakis 2011, 635f). Instead, I develop a

[71] The estimation procedure presented in the following is based on circular indifference curves in two dimensions. Transfers to more than two dimensions would require a more advanced estimation method and more computing time. A one-dimensional model could be estimated by assigning the same policy position on one dimension to all players.

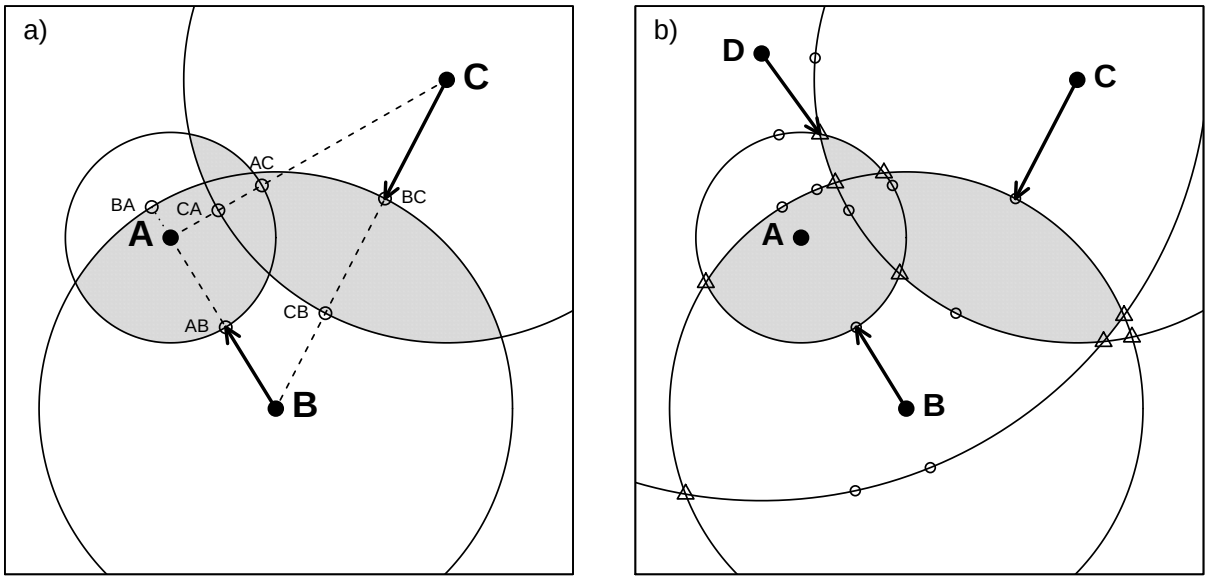

Figure 5.1.: **Relevant policy alternatives:** The policy space is reduced to potentially rational proposals for simulation purposes. A-D: players' ideal policies. Large circles: indifference curves. Grey area: social acceptance set. Arrowheads: proposals. Small circles/triangles: relevant policies.

new method to reduce the set of policy alternatives to be considered by the simulation procedure to "relevant" policy alternatives.

Relevant policies are a limited set of policies that includes all rational proposals for a given set of ideal points and indifference circles in an otherwise unlimited policy space $X = \mathbb{R}^2$.[72] Figure 5.1 illustrates how the set of relevant policies is defined:

1. Consider the three-player example of the left. The grey area indicates the social acceptance set A of all policies that will gain a two-thirds majority if the circular indifference curves are rightly estimated. Player `A`'s ideal position is inside A. If recognized, `A` would propose his ideal policy to be voted on. More generally, all ideal positions inside A are potentially rational proposals. As the more computing time-efficient way, I consider all ideal positions to be relevant policies.

2. Players `B` and `C` both hold ideal positions outside A. If recognized, they would each

[72] The concept of relevant policies can be transferred to any number of policy dimensions and to bounded dimensions as well. A transfer to $d > 2$ dimensions would complicate the estimation of and enlarge the set of relevant policies. E.g. in a three-dimensional policy space, the intersection of indifference spheres would be circles. The intersection point of such a circle with the connection line between the circle's center and any ideal point would be a relevant policy. With regard to limited computing time, the present estimation method assumes two dimensions.

The assumptions on FCC bargaining (section 4.1) do not suggest restrictive boundaries to the policy space on otherwise negotiable dimensions. So I do not impose any boundedness of policy dimensions either.

propose the policy alternative at A's boundary that comes closest to their ideal point. Most segments of A's boundary are defined by a single player's indifference curve. Consider B's proposal. The shortest distance of B's ideal point to A's indifference curve is on the straight line that connects B and A. The intersection of A's indifference circle with the half-line (or ray) $\overrightarrow{\texttt{AB}}$ constitutes a rational proposal. Any other policy would either be beyond A's indifference curve or more distant from B. The same logic applies to all combination of players. So for all combinations of players $\{i, j\}$ with $i \in N$ and $j \in N \setminus \{i\}$, the intersection of i's indifference curve with the half-line $\overrightarrow{\tilde{x}^i\tilde{x}^j}$ is considered to be a relevant policy.[73]

3. Now consider the right part of figure 5.1. There is a new player D and a three-fourths majority voting rule. D's expected proposal is at the northern edge of A. No other socially accepted policy is closer to D's ideal point. Hence, a third category of relevant proposals is to be added. Any intersection point of two indifference curves, as indicated by triangles in the figure, is considered to be a relevant policy.[74]

4. The status quo policy is added to the set of relevant policies for pragmatic reasons. Games with very small social acceptance sets are prone to difficulties in the simulation model's execution due to rounding errors. These technical difficulties have been eased with the consideration of the precise status quo position as a relevant policy. Under these circumstances, the status quo is almost identical to other estimated relevant policy positions. So this last extension can be disregarded from a theoretical point of view.

The set of relevant policies is defined as the set union of all players' ideal positions, the status quo position, all intersections of i's indifference curve $I(\tilde{x}^i)$ with the half-line $\overrightarrow{\tilde{x}^i\tilde{x}^j}$ that connects i's and i's ideal positions, and all intersections of indifference curves:

$$X_R = \bigcup_{i,j \in N} \left\{ \tilde{x}^i, q, \left(I(\tilde{x}^i) \cap \overrightarrow{\tilde{x}^i\tilde{x}^j} \right), \left(I(\tilde{x}^i) \cap I(\tilde{x}^j) \right) \right\}$$

with $i \neq j$. X_R includes all rational proposals but not all $x \in X_R$ are rational proposals. Being a rational proposal is not a necessary but a suffient condition for a relevant policy $x \in X_R$. If ideal point and indifference curve estimates are right, there will be no socially

[73] In this particular example, intersection points CA and AC could be disregarded because they are not at a boundary of A. Point BA could be ignored if the set of relevant policies was restricted to indifference curve intersections with line segments $\overline{\tilde{x}^i\tilde{x}^j}$. In terms of computing time, the more general definition turned out to be more efficient.

[74] This includes intersection points outside A, non-boundary intersection points within A, and concave edges of A. Again, a more restrictive selection would consume more computing time.

accepted policy outside this set that is more preferred by any potential proposer under complete information.

The precision of relevant policy estimates is limited only by the maximum number of decimal places in the software's computation process. At the same time, this new method requires far less policy positions to be used for further computation than the standard policy grid approach. With eight players, the number of relevant policies sums up to a maximum of 121 as compared to 2601 in Duggan and Kalandrakis (2011)'s less precise policy grid estimation.

In the following, I describe the applied procedure to derive the location of relevant policies by linear algebra. Ideal policies and the status quo location are exogenously determined and do not need to be derived. Intersection points depend on the size of indifference curves. They have to be reestimated at each iteration stage in the simulation process at minimum computational costs.

For each combination of players i and j, the intersection point $x_{int1}^{i,j}$ of i's indifference circle and half-line $\overrightarrow{\tilde{x}^i\tilde{x}^j}$ is determined by

$$x_{int}^{i,j} = \tilde{x}^i + \frac{r_i}{|\overline{\tilde{x}^i\tilde{x}^j}|}(\tilde{x}^j - \tilde{x}^i),$$

where r_i is the radius of i's indifference curve as defined in equation 4.4 and $|\overline{\tilde{x}^i\tilde{x}^j}|$ is the length of line segment $\overline{\tilde{x}^i\tilde{x}^j}$. In terms of linear algebra, the vector that points from i's ideal point to j's ideal point is rescaled to a length of i's indifference circle radius. The sum of this rescaled vector and i's ideal point vector then defines the intersection point.

The intersection points of indifference curves are a little more complicated to derive. Figure 5.2 illustrates all potential combinations of relative positions of two players' indifference circles:

1. In figure 5.2a, $r_A + r_B < |\overline{AB}|$. Indifference curves do not overlap, so there is no intersection point.

2. In figure 5.2b, $r_A + r_B = |\overline{AB}|$. Indifference curves touch at a unique intersection point C on the line segment $\overline{AB}$. This intersection point is already covered by the previous set of intersections between indifference curves and half-lines.

3. In figures 5.2c-d, $|r_A - r_B| < |\overline{AB}| < r_A + r_B$. Indifference circles partially overlap and there are two intersection points C and C'.

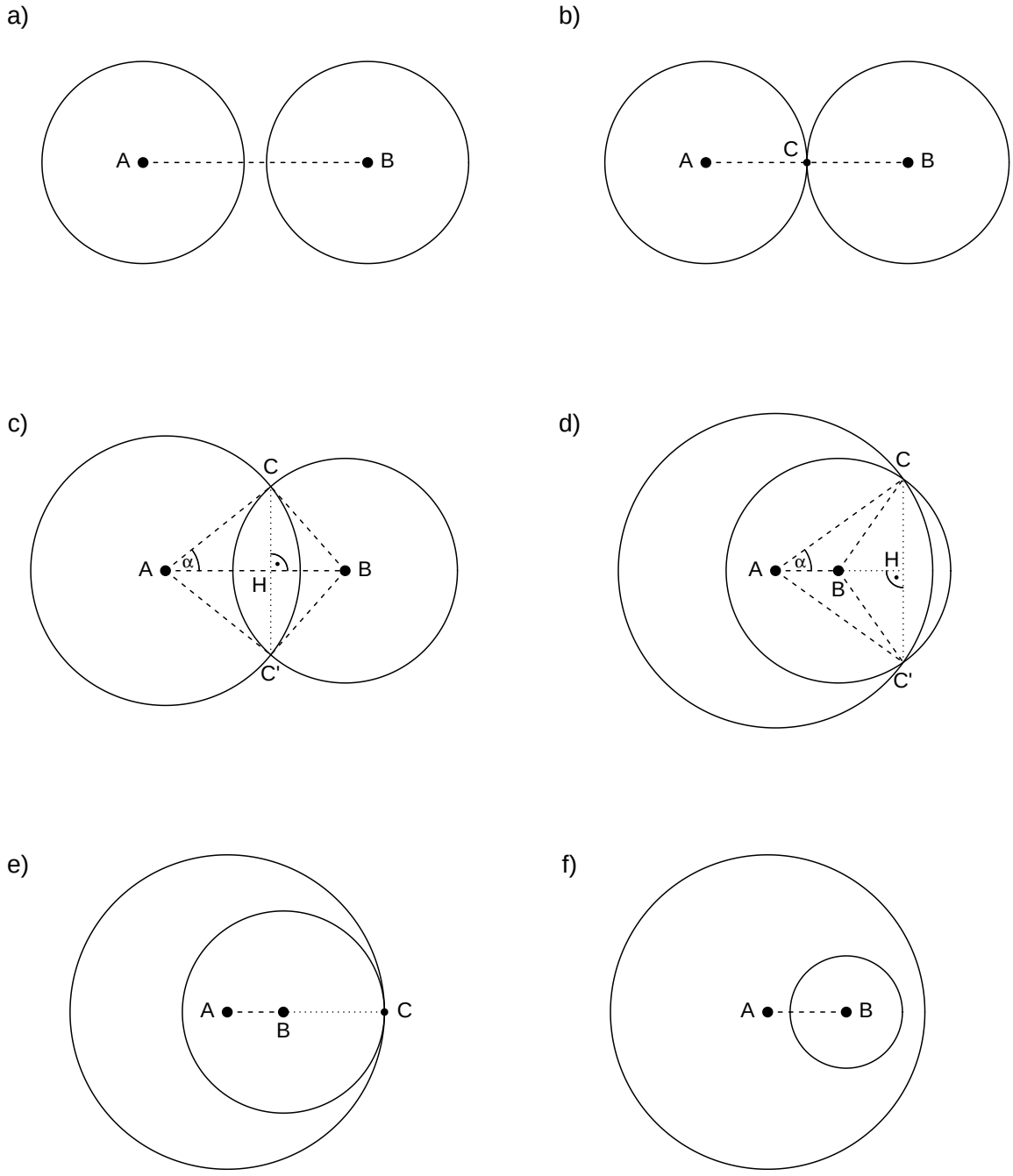

Figure 5.2.: **Intersection of indifference curves:** Potential combinations of two indifference circles. A, B: players' ideal policies. C, C': intersection points.

4. In figure 5.2e, $|\overline{\mathrm{AB}}| = |r_\mathrm{A} - r_\mathrm{B}|$. Indifference curves touch at a unique intersection point C on the half-line $\overrightarrow{\mathrm{AB}}$. In the special case of $|\overline{\mathrm{AB}}| = |r_\mathrm{A} - r_\mathrm{B}| = 0$ and $r_A = r_B$, both indifference circles would be identical and there would be infinitely many intersection points. Either way, there are no relevant policies to add that are not already covered by the previous set of intersections between indifference curves and half-lines.

5. In figure 5.2f, $|\overline{\mathrm{AB}}| < |r_\mathrm{A} - r_\mathrm{B}|$. B's indifference circle is completely absorbed by A's indifference circle. There is no intersection point to be calculated.

Only in the case of $|r_\mathrm{A} - r_\mathrm{B}| < |\overline{\mathrm{AB}}| < r_\mathrm{A} + r_\mathrm{B}$ (figures 5.2c-d) are there any intersection points to add to the set of relevant policies. Basic geometry helps to determine the positions of C and C'. Consider the dashed triangle in figure 5.2c. A and B are exogenously given, $|\overline{\mathrm{AB}}|$ can be derived. $|\overline{\mathrm{AC}}|$ is the radius of A's infifference curve and $|\overline{\mathrm{BC}}|$ is the radius of B's indifference curve. So the lengths of all sides of the triangle are known.

The law of cosines gives

$$\alpha = \arccos \frac{|\overline{\mathrm{AC}}|^2 + |\overline{\mathrm{AB}}|^2 - |\overline{\mathrm{BC}}|^2}{2 \cdot |\overline{\mathrm{AC}}| \cdot |\overline{\mathrm{AB}}|}.$$

The length of the height then is $|\overline{\mathrm{HC}}| = \sin(\alpha) \cdot |\overline{\mathrm{AC}}|$, where H is the foot of the height on $\overline{\mathrm{AB}}$. The Pythagorean theorem gives $|\overline{\mathrm{AH}}| = \sqrt{|\overline{\mathrm{AC}}|^2 - |\overline{\mathrm{HC}}|^2}$ and the position of H is determined by $\mathrm{H} = \mathrm{A} + \frac{|\overline{\mathrm{AH}}|}{|\overline{\mathrm{AB}}|}(\mathrm{A}-\mathrm{B})$.

Let $R(\pi/2)$ be the rotation matrix

$$R(\pi/2) = \begin{pmatrix} \cos\frac{\pi}{2} & -\sin\frac{\pi}{2} \\ \sin\frac{\pi}{2} & \cos\frac{\pi}{2} \end{pmatrix} = \begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$$

that turns a vector by $\pi/2$ or 90° counter-clockwise. Then the position of C is given by $\mathrm{C} = \mathrm{H} + \frac{|\overline{\mathrm{HC}}|}{|\overline{\mathrm{AH}}|} R(\pi/2)(\mathrm{H} - \mathrm{A})$. Analogously, the position of C' is determined by $\mathrm{C'} = \mathrm{H} + \frac{|\overline{\mathrm{HC}}|}{|\overline{\mathrm{AH}}|} R(\pi/2)(\mathrm{A} - \mathrm{H})$.

The same procedure can be applied to preference constellations where $\beta > \pi/2$ (see figure 5.2d). If $\alpha > \pi/2$, the position of H will be determined by $\mathrm{H} = \mathrm{A} - \frac{|\overline{\mathrm{AH}}|}{|\overline{\mathrm{AB}}|}(\mathrm{A}-\mathrm{B})$ and the otherwise unchanged procedure will be conducted. For any combination of ideal points $\tilde{x}^i$ and $\tilde{x}^j$ with $i, j \in N$ and $i \neq j$, the presented approach allows to derive indifference curve intersection points $\{\mathrm{C}, \mathrm{C'}\}$ at relatively low computational costs.

In summary, the set of relevant policies X_R includes all players' ideal points, the status quo, all intersection points of a player's indifference curve and the half-line from that

player's ideal point towards another player's ideal point, and all intersection points of two players' indifference circles. The set of relevant policies is a theoretically determined a priori reduction of policy space X. For a given set of indifference circles, X_R includes all players' rational proposals. This will either be the player's ideal point, if it lies within the social acceptance set, or the most preferred socially accepted policy at the boundary of A, else. With eight players, at most 121 positions are to be considered in further calculations. Numerical strategy estimations based on X_R are much more computing-time efficient than previous dependence on policy grids.

Iterative Solution of Bargaining Equilibria

In line with Duggan and Kalandrakis (2011)'s estimation approach on a very similar bargaining model, I estimate bargaining equilibria in an iterative procedure. Stationary equilibria are defined by any self-consistent solution of equations 4.4, 4.5, 4.6, and 4.7. Since there may be multiple equilibria, the choice of reasonable starting values is decisive.

Strategic incentives make players adjust their sincere behavior. But players can reasonably be expected to start their thoughts about rational strategies from what they would like to do if there were no constraints. So the initial, preliminary assumption of sincere voting is the most natural starting point for an iterative estimation of strategy equilibria.

The iteration proceeds as follows.

1. Each player i's continuation value is set to i's **status quo utility**: $\upsilon_i\sigma \stackrel{!}{=} u_i(q)$. This implies that i would compare any policy against the status quo only and vote sincerely before strategic constraints come into play.

2. Player i's **utility function** $u_i(x)$ is determined by $\tilde{x}^i$ and the presumed $\upsilon_i(\sigma)$. **Indifference curves** $I(\tilde{x})$ and the set of **relevant policies** X_R are determined accordingly.

3. Each player i's **acceptance set** A_i is determined over all $x \in X_R$ and based on the presumed $\upsilon_i(\sigma)$ (see equation 4.4).

4. The **social acceptance set** A is aggregated accordingly (see equation 4.5).

5. Each player i's **proposal strategy** π_i over X_R is determined based on A and $\upsilon_i(\sigma)$ (see equation 4.6). If there is more than one optimal proposal, the proposer is assumed to randomly select among optimal proposals.

6. Each player i's **continuation value** $\upsilon_i(\sigma)$ is determined based on π_i and A (see equation 4.7).

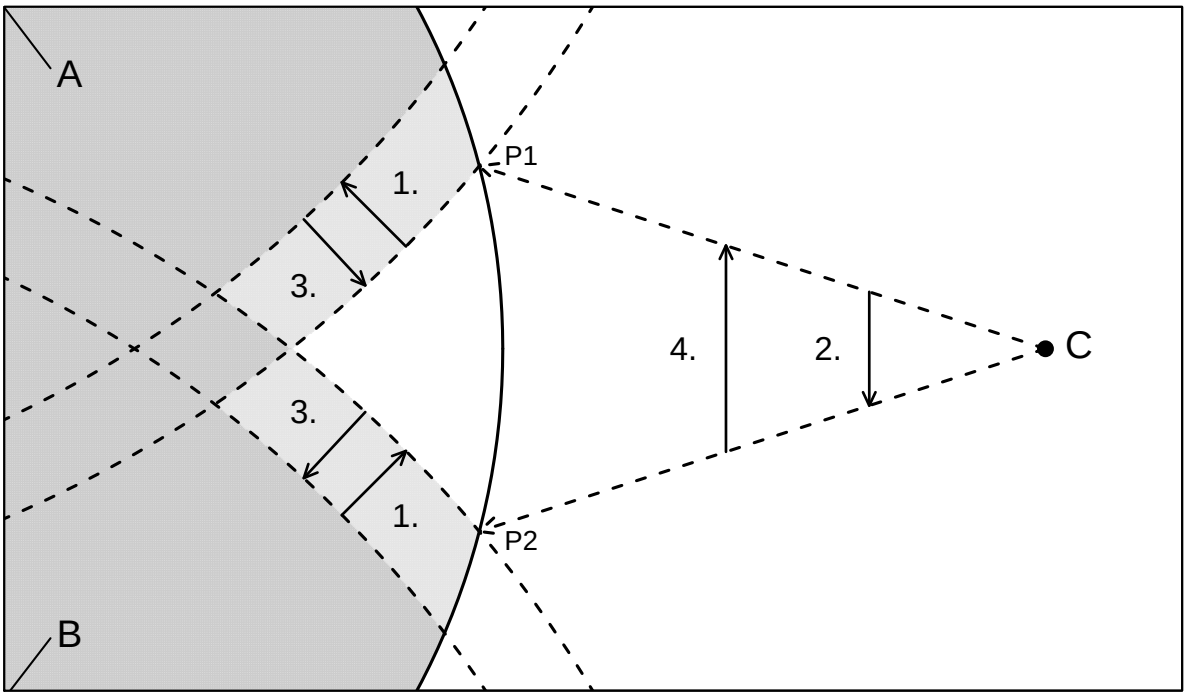

Figure 5.3.: **Flip-flop iterations:** Excerpt of an endless back-and-forth iteration process. A-C: players' ideal policies. Circles: indifference curves. P1/P2: player C's proposal strategies. Arrows 1-4: iteration steps.

7. Steps 2-6 are repeated at every subsequent iteration stage until the estimates of all continuation values $v(\sigma)$ are equal to the estimated set of $v(\sigma)$ at a previous iteration stage within a predefined degree of tolerance.[75]

For some preference constellations, a perfectly self-consistent solution, i.e. a stable stationary equilibrium, can not be estimated with this procedure. Figure 5.3 illustrates an example of such a constellation. At some point in the iteration process, player `C` is expected to propose policy `P1` if recognized. Based on this estimated proposal strategy, continuation values, indifference curves, and acceptance sets are updated for players `A` and `B`. In anticipation of a rather favorable proposal strategy, `A`'s updated indifference circle is estimated to be smaller than at the previous iteration stage. In contrast, `B`'s indifference circle is enlarged in light of the unfavorable proposal (step **1** in the figure). A new social acceptance set results and `C`'s proposal strategy switches to `P2` (step **2**). Based on the newly revised proposal strategy, `A` would be more willing to compromise and `B` would be more demanding. Their indifference curves are readjusted accordingly at the next iteration stage (step **3**). Based on the updated social acceptance set, `C`'s proposal strategy switches back to `P1` (step **4**). The iteration process would continue to flip-flop

[75] There is a payoff between estimate precision and computing time. In mass simulations, final continuation value estimates are precise to one decimal place.

between these estimates without ever reaching a self-consistent solution at two subsequent iteration stages.

This example illustrates a simple iteration flip-flop with one player's estimated proposal switching between two positions `P1` and `P2`. More complex bargaining settings may include more complex flip-flops. Estimates may recur over a higher number of iteration stages. Whenever a previous set of estimated continuation values recurs in the iteration process, equilibrium continuation values are approximated by the average estimates over the sequence of circular iteration stages. Technically, the iteration process stops as soon as all $v_i(\sigma)$ estimates at a new iteration stage τ_b are identical to the estimates of *any* previous iteration stage τ_a within a predefined degree of tolerance. The estimate of $v(\sigma)$ is averaged over all iterations $\tau \in \{\tau_{a+1}, \ldots, \tau_b\}$, where τ_{a+1} is the iteration stage directly following τ_a.

This solution might not deliver a perfectly stable equilibrium. For two reasons, this downside of the estimation procedure can be neglected. First, the estimated continuation value typically does not change much for most players in the course of such back-and-forth iterations.[76] So the estimate usually is a close approximation of a perfect stationary equilibrium. With a typically high number of complete information games to be conducted for the estimation of continuation values in incomplete information games, the relevance of perfect estimate precision in complete information games further diminishes.

Second, the iteration procedure is more realistic than any abstract equilibrium that is not attained from a natural starting point. Translated into the thought process of real-life bargainers, the iteration process would read as follows: "I know all our ideal preferences. If we all vote sincerely, only these option would gain a majority. So A would like to propose..., B would propose..., and I would propose... Our interest in continued bargaining then is... With this in mind, we would all vote strategically and propose... But wait, then A has more to gain from prolonged negotiations than B. So his strategy really is... and I should..." Real-world strategy-building is less about the very last decimal point in precision and more about making one's naive expectations consistent with everybody's strategic behavior.

In summary, continuation values in stationary equilibrium of the complete information model are estimated in an iterative procedure. We start with the assumption of sincere voting and update each player's strategy until they are mutually consistent. If a perfectly consistent equilibrium solution is not attained, the estimate will be approximated by

[76] Results from a high number of manual runs of the iteration procedure prior to mass simulations support this conjecture. With higher numbers of players, individual proposal strategies only have a minor impact on total continuation values.

the last set of iteration stages that lead to back-and-forth predictions. For each set of input parameters, the simulation routine returns the vector of estimated continuation values. The procedure is deterministic in that every repetition delivers the same output for identical input parameters. The source code is attached in appendix A.1.

5.2.2. Simulating the Incomplete Information Model

Bargaining processes in the incomplete information model depend on initial parameters and the partially random course of the game. Strategies are not stationary and players learn from observed voting behavior. The random sequence of proposers can have a large impact on the outcome and duration of negotiations. So a large number of repetitions needs to be conducted for each set of initial parameters in order to gain reliable estimates.

Initial parameters are the number of players n, the majority threshold m, recognition probabilities ρ, the discount factor δ, players' ideological priors μ, the degree of uncertainty s, and the status quo position q. At each period of the game, rational strategies are defined by the coupled set of equations 4.9-4.22. An equilibrium is defined by a self-consistent solution of these equations at each period of the game. In equilibrium, no rational player has an incentive to deviate from predicted strategies, given the subjective sets of information available in each period.

Since predicted strategies depend on previous observations, all periods of the game are simulated separately in chronological order. Note that iterations in the estimation procedure of the complete information game refer to the stepwise calibration of rational strategies in stationary equilibrium. No actual bargaining course is simulated by these iterations. The estimation's output simply gives rational continuation values to be expected from such a game for each player. This will be different in the following simulation model with incomplete information. A precise bargaining trail with concrete actions (proposals and votes) is simulated based on rational expectations. The equilibrium is not just proven but also "grown" (see p. 65). Repetitions of the following procedure refer to the passing of durable bargaining periods rather than to an iterative estimation procedure.

The simulation procedure starts in period $t = 1$ and is set up as follows:

1. **Ideal points and subjective expectations:** Monte Carlo simulations generally conduct numerical computations on random draws from predefined probability distributions. Accordingly, subjective expectations on player i's ideal point are represented by a large set X_θ^i of random realizations of $\theta_i(x)$.[77] In the first period,

[77] A high number of $k = 500$ potential ideal points is drawn for each player in mass simulations. This number turned out to be a reasonable payoff between estimate precision and computing time.

$\theta_i(x)$ corresponds to the normal distribution around i's prior (see equation 4.11). $x^i_\theta \sim \mathcal{N}_d(\mu_i, s^2)$ for all $x^i_\theta \in X^i_\theta$ in the first period.

Player i's real ideal position $\tilde{x}^i$ is assumed to be drawn from the same normal distribution by nature (see equation 4.8). Technically, $\tilde{x}^i$ is randomly drawn from X^i_θ so that the set of expected ideal points includes the actual one.[78]

2. **Expected continuation values:** For every realization x^i_θ of expectations on player i's ideal point, i's expected continuation value $Ev^t_i(\sigma)$ in period t is estimated (see equation 4.22). At least $l > 30$ complete information simulations are conducted for each realization x^i_θ. Each of these simulations combines i's presumed ideal point x^i_θ with other all player j's ideal points randomly drawn from X^j_θ. Player i's average continuation value over all these complete information simulations estimates $Ev^t_i(\sigma)$ for $x^*_i = x^i_\theta$.

   A sufficient number l of simulated complete information games per presumed ideal point x^i_θ is neccessary because the distribution of estimated continuation values is left-skewed. The expected continuation value for a given x^i_θ is likely to be overestimated (i.e. biased upwards to a less negative level of utility) if estimated on the basis of one random set of preferences only. The central limit theorem implies that largely unbiased estimates can be achieved with a sufficient number of repetitions.[79]

   In subsequent periods $t > 1$, expectations on some players' ideal positions typically are more precise than for other players. At least l complete information simulations are conducted for every $x_\theta \in A_\theta$. If the number of observation-consistent presumed ideal points is reduced more for player i than for player j, continuation values for i's presumed ideal points will on average be estimated based on more than l complete information simulations.

3. **Continuation values:** By definition, all players' ideal points are included in the set of presumed ideal points: $\tilde{x}^i \in A^i_\theta$ for all i. Thus, i's continuation value $v^t_i(\sigma)$ (see equation 4.20) is extracted from the results of the previous step.

4. **Recognition of proposer:** A proposer $j \in N$ is selected with recognition probability ρ_j.

[78] Since $\theta^1_i(x) = \mathcal{N}_d(\mu_i, s^2)$ (equation 4.11), this procedure corresponds to a direct draw of $\tilde{x}^i$ from $\mathcal{N}_d(\mu_i, s^2)$ from a theoretical perspective. With regard to the limited number k of numerical realizations, this procedure prevents technical estimation inconsistencies in the case of unlikely but possible ideal positions far off the prior.

[79] For mass simulations, $l = 50$.

5. **Set of potential proposals:** Proposal and voting strategies are numerically estimated and the policy space is represented by a limited set of proposals $X_P \subset X$. With incomplete information on players' preferences, indifference curves are unknown and the policy space can not be reduced to a small set of relevant policies. With unbounded policy dimensions, a limited policy grid would exclude extreme policies without theory-based justification. A very high number of potential proposals is drawn from a normal distribution that approximates the distribution of players' ideal positions.[80] This way, extreme outcomes are possible but estimated proposals and outcomes will be more precise in the region where bargaining typically takes place.

   Players can not infer any information about each other's ideal preferences from the distribution of potential proposals. So the normal distribution's dependence on subjectively unknown ideal positions does not bias predictions.

6. **Voting strategies:** Proposer j's voting strategy $v_i^t(x)$ over all $x \in X_P$ is determined based on his utility function $u_j(x)$ and his continuation value $v_i(\sigma)$ (see equation 4.14).

7. **Expected voting strategies:** All other players' expected voting strategies $Ev^t(x)$ as expected by the proposer j are estimated over $X_\theta \setminus X_\theta^j$ based on expected continuation values $Ev^t(\sigma)$ (see equations 4.15 and 4.16).

8. **Expected social acceptance set:** For each potential proposal $x \in X_P$, the probability $EA_j^t(x)$ of x gaining a majority as expected by proposer j is estimated (see equation 4.17).

9. **Proposal strategy:** For all $x \in X_P$, proposer j's expected utility $Eu_j^t(x)$ is estimated (see equation 4.18). The proposer then selects the most preferred proposal p_j^t (see equation 4.19). If there is more than one most preferred proposal, the first most preferred proposal in the random list of potential proposals is selected.

   Two marginal modifications go beyond the theoretical model as defined in section 4.3. First, if no proposal $x \in X_P$ is expected to find a majority, j will randomly propose a *subjectively preferred* proposal rather than *any* proposal. This assumption hardly ever leads to an immediate aggrement. In only 0.01% of all mass simulation repetitions did a majority of players agree on a proposal, when no proposal was

[80] For mass simulations, 10 000 potential proposals are considered each round. The status quo position q and the proposer's ideal point $\tilde{x}^j$ are added to X_P in order to improve predictive precision. Graphical illustrations of hypothetical bargaining situations show that this number is sufficient to cover all relevant regions of the policy space.

expected to find a majority. The apparent logical inconsistency is explained by technical rounding errors. In all of these cases, at least one player's ideal position was still as unknown as in the first bargaining period and the expected probability of social rejection of the proposal was very close to zero. The assumption of proposing a subjectively preferred rather than any policy in the case of expected gridlock is justified by the marginal but existent technical (as well as human) degree of imprecision.

Second, I assume a very small preference at the eighth decimal place for immediate aggreement. This implies that the status quo will be proposed if it is the only socially accepted outcome. Otherwise, the proposer's expected utility would be 0 over all $x \in X_P$ and negotiations would continue virtually forever. This non-theory based modification is a marginal attempt to account for the debatable assumption of no opportunity costs.

10. **Collective voting:** All players' voting decisions on proposal p_j^t are determined based on their voting strategy (see equation 4.14). If at least m players agree, the simulation procedure ends in period t with outcome p_j^t.

11. **Updated expectations:** If no majority has been reached, the simulation procedure continues. For all presumed ideal points x_θ^i of all players $i \in N$, the consistency of x_θ^i with i's just observed vote $v_i^t(p_j^t)$ is determined (see equation 4.12). All observation-inconsistent presumed ideal points $\{x_\theta^i | \omega_i^t(x_\theta^i) = 0\}$ are dropped from X_θ^i. The simulation procedure advances to period $t+1$ and steps 2-11 are repeated until a proposal is accepted by at least m players.[81]

Figures 5.4-6 visualize example bargaining processes as derived with the help of the presented simulation procedure. Unanimity voting and a discount factor of $\delta = .9$ are assumed throughout. For each player, $k = 100$ presumed ideal positions are estimated. Consider the first example in figure 5.4. There are three players with clearly distinguishable preferences. Player A has a "southern" prior and A's ideal position can well be estimated by the prior. B's ideology is moderate and his ideal position is closer to A than one would have expected in the first period. C has a very "northern" ideology but an

[81] In mass simulations, a very small number of extremely durable simulated negotiations or "repetitions" has been stopped at some point after period 200. At first, repetitions were continued until they reached period 900. There was a gradual decrease in open repetitions over the whole range of periods. This very late stage of bargaining processes depends on marginal differences in decimal places and the assumption of no opportunity costs. It does not deliver any valuable predictions.

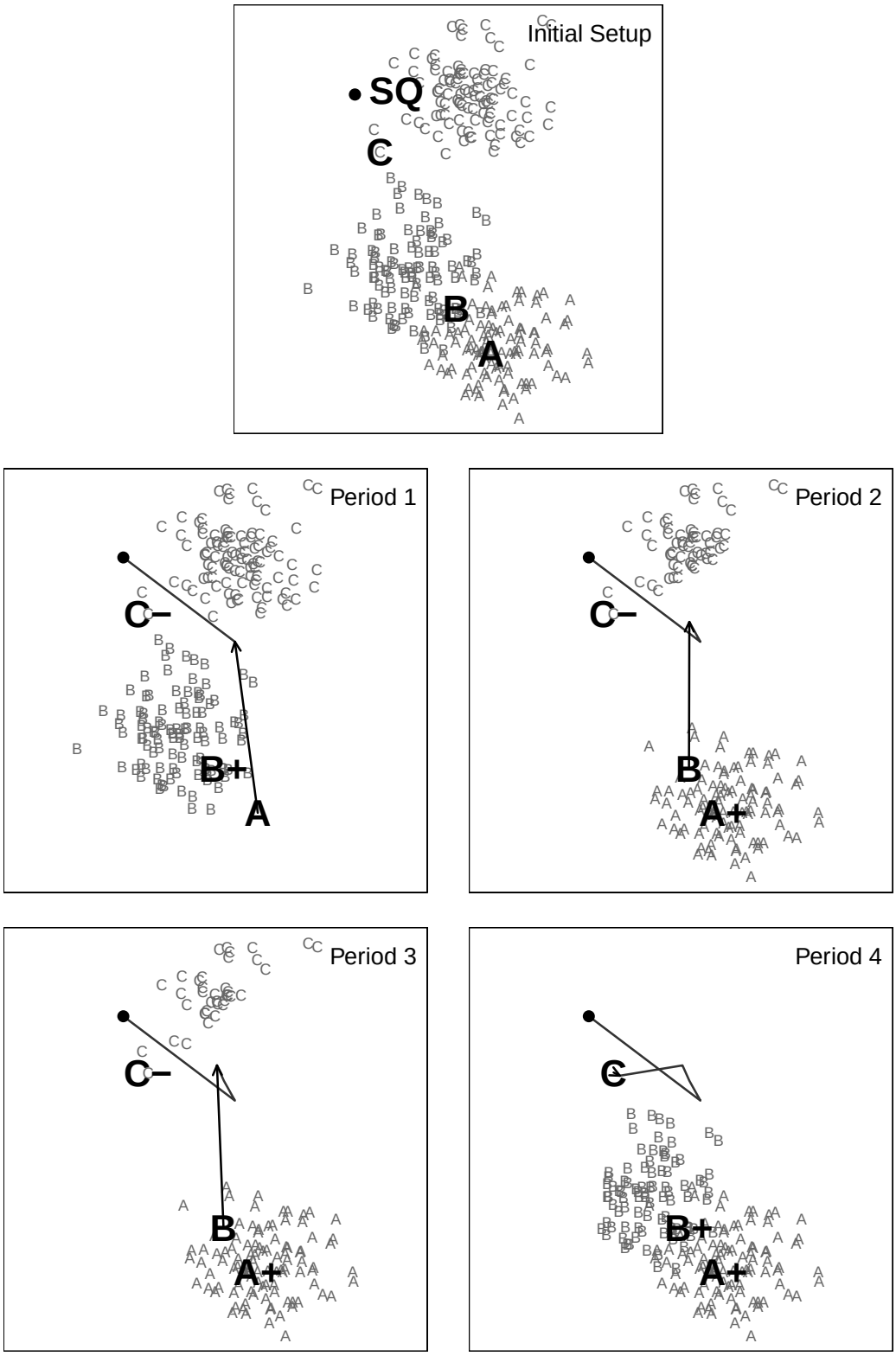

Figure 5.4.: **Simulated Policy Bargaining with Incomplete Information:** A three-player unanimity example. SQ: status quo. Big letters A-C: players' ideal policies. Small letters A-C: ideal policies as presumed by proposer. Arrow: proposal. +/-: voting decision. Line segments: proposal history.

unexpectedly moderate ideal position on the issues at stake. The status quo is located close to C.

In period 1, A is recognized and proposes a moderate policy. This is rational, given A's continuation value and the possibility of a rather south-eastern ideal position of C. Note that A's proposal would not be Pareto optimal if players were completely informed. In the light of A's more eastern subjective expectations on C's preferences, the proposal is strategically rational. A and B vote to accept the proposal, C denies. Players learn from observed voting behavior. B's agreement is not surprising, given his close position to A. Obviously, C's ideal point is less south-eastern than A would have hoped for. C's denial of A's proposal is inconsistent with some of the presumed ideal points. So the set of C's presumed ideal points is reduced to the upper left region around his prior as depicted in the "Period 2" picture.

In period 2, player B is recognized. His proposal is a little closer to C's presumed ideal points. Most of these presumed ideal points were close to the expected threshold of agreement and B hopes to get C on board with a small degree of compromise. A and B agree but C denies. Again, players learn from observed voting behavior. In period 3, B is recognized again. Realizing that his last offer was not sufficient to win C over, he overs more consession in a renewed proposal. Again, C rejects.

In period 4, C is recognized. He has not learned a lot about A's and B's ideal positions since the first period. Their voting decisions have been consistent with almost any of their presumed preferences. Proposer C utilizes his very privileged veto position between the status quo and the other players' presumed locations. He makes just enough concession to win the other players' expected approval. Players A and B agree. Bargaining ends in period 4 and the outcome is almost identical to C's ideal point.

Figure 5.5 illustrates another bargaining example with eight players. There is a high degree of uncertainty and a very homogeneous set of ideologies. At the beginning, the presumed preference setting is unclear. In period 1, A makes a proposal slightly north of the status quo. All players except for H agree. Players learn from observed voting behavior. In period 2, player H remains to be the only player who is considered to be located south of the status quo.

Player F is the next proposer. Hoping for a rather eastern ideal preference of H, he makes a proposal closer to his own ideal point. Preferences still are very unclear, so the proposal is worth a try. Players A, G, and H deny. With each additional vote, players' expectations get more and more precise. In period 5, player D finally makes a successful proposal close to the status quo.

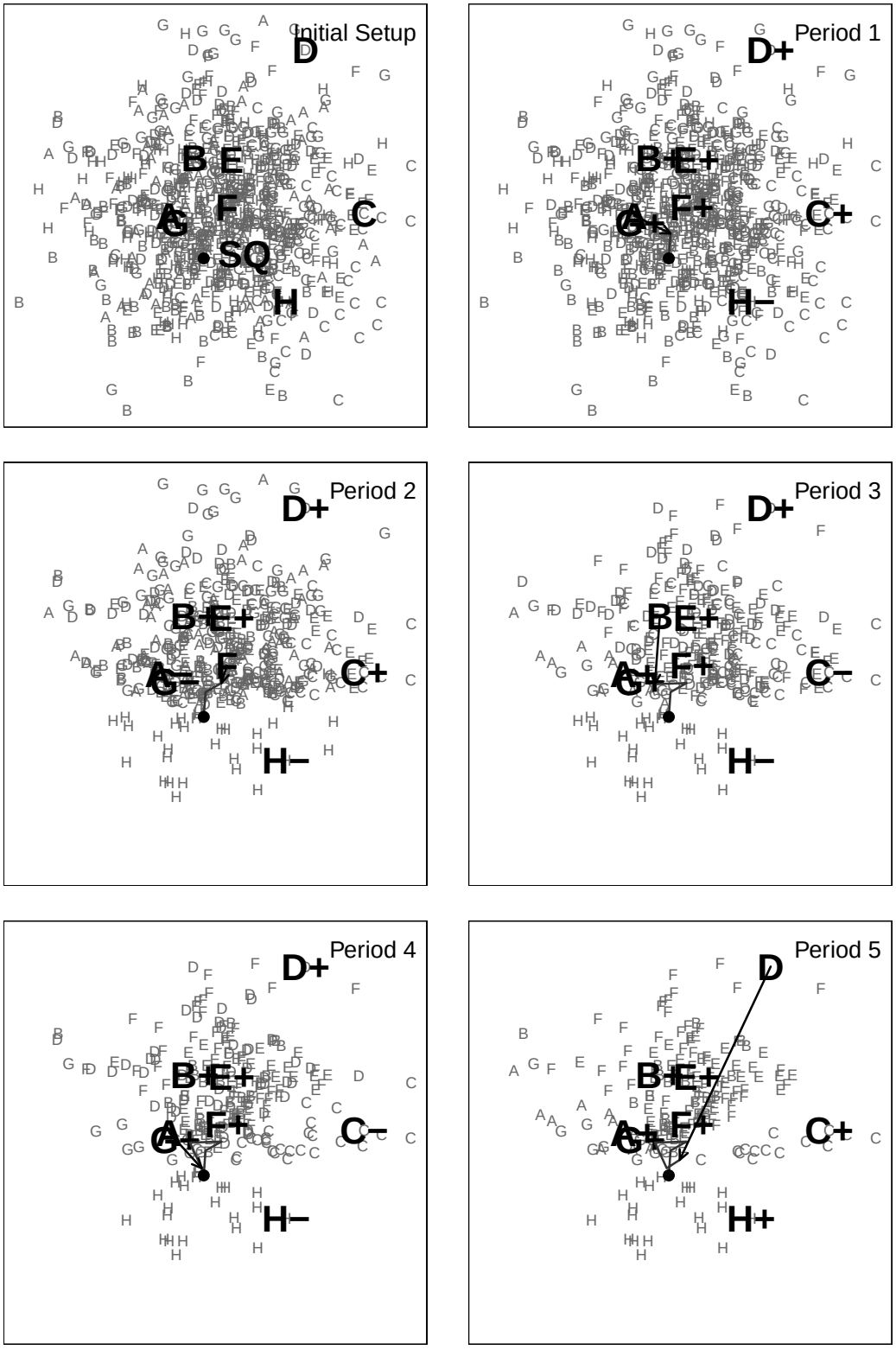

Figure 5.5.: **Simulated Policy Bargaining with Incomplete Information II:** An eight-player unanimity example. SQ: status quo. Big letters A-C: players' ideal policies. Small letters A-C: ideal policies as presumed by proposer. Arrow: proposal. +/-: voting decision. Line segments: proposal history.

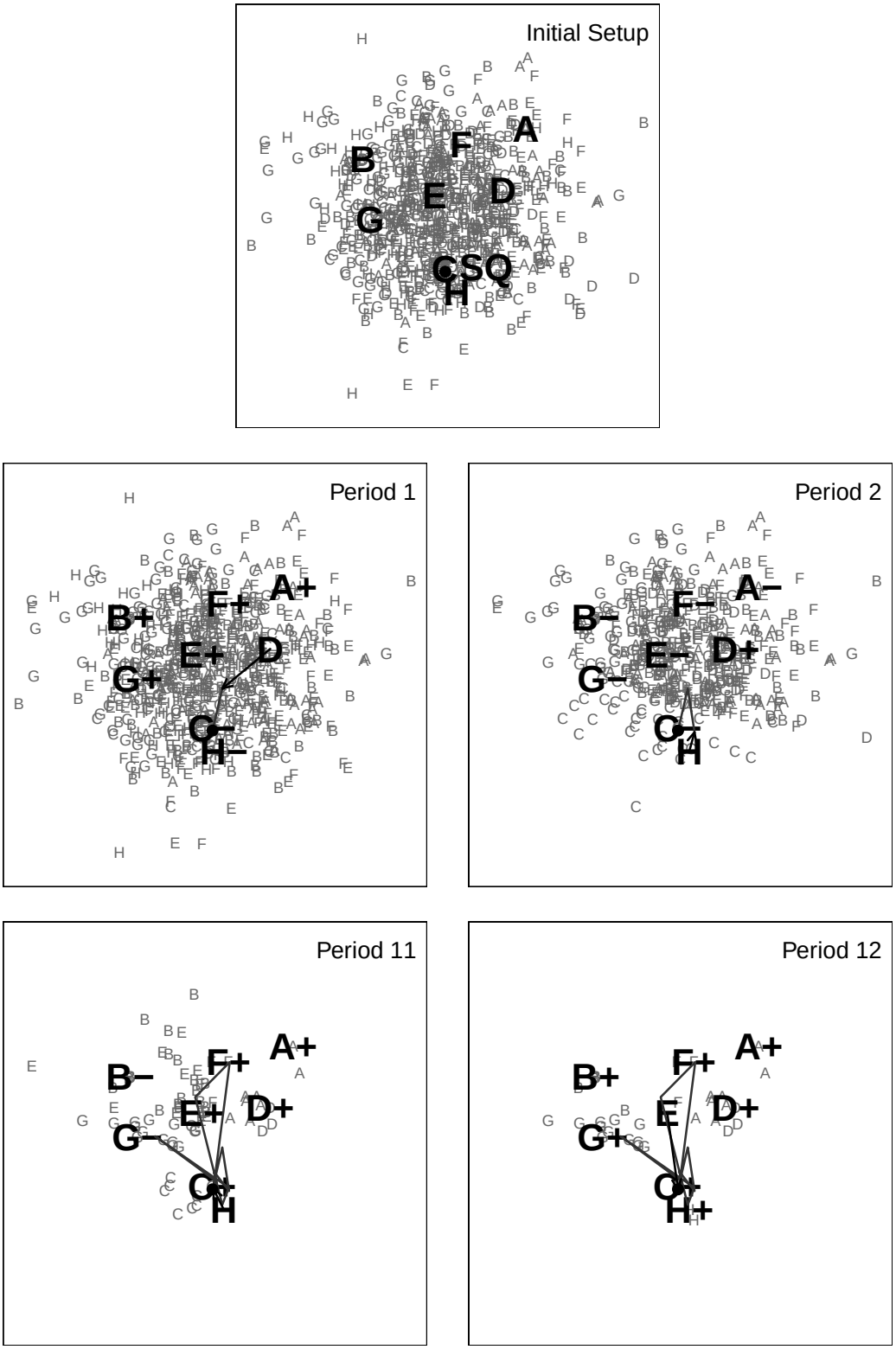

Figure 5.6.: **Simulated Policy Bargaining with Incomplete Information III:** A more durable eight-player unanimity example. SQ: status quo. Big letters A-C: players' ideal policies. Small letters A-C: ideal policies as presumed by proposer. Arrow: proposal. +/-: voting decision. Line segments: proposal history.

A more durable example with eight players is depicted in figure 5.6. Again, the perceived preference constellation is very unclear in the beginning. With each period, players gradually update their expectations. Proposals switch around a lot and it takes until period 12 to reach a unanimous decision. In the end, all players have a very precise understanding of each other's ideal position. Just one period before, the remaining uncertainty was marginally higher and player H's almost identical proposal has been rejected.

These examples make clear the complexity of bargaining behavior. A precise theory of dynamic policy bargaining with incomplete information can be of enormous explanatory power. Simulation techniques are a valuable instrument to predict the course of bargaining processes.

More general hypotheses beyond the scope of particular examples need to be derived. The simulation procedure is applied to mass simulations with a very high number of repetitions. The selected starting parameters and simulation results are presented in the following section. The complete source code of the simulation procedure with incomplete information is attached in appendix A.2.

5.3. Simulation Results

The simulation setup for the bargaining model with incomplete information has been described in the previous section. A total of 2.015.373 single bargaining processes is simulated for a selected range of starting values. In this section, starting values and simulation results are presented in order to derive theory-based hypotheses on bargaining duration in FCC senate consultations.

5.3.1. Starting Values

Unlike analytical solutions, computational results only hold for the range of tested values (Laver and Sergenti 2012, 6; De Marchi and Page 2008, 72; Morton 1999, 50ff). They can not be generalized beyond the starting values chosen for bargaining simulations.[82] It is important to carefully define these parameters. Since all hypotheses will be applied to senate consultations at the FCC, I choose ranges of starting values that correspond to the assumptions made in section 4.1. Variable starting values are the number of players,

[82] It is important to keep this in mind. For example, the bargaining model might lead to totally different predictions in legislative bargaining settings with more veto players. A separate simulation study with the same R code but different starting values would need to be conducted. A heavily reduced number of simulation runs will be sufficient if a researcher is interested in outcome parameters like votes or policy outcomes with less variance than for bargaining duration.

the majority threshold, recognition probabilities, the set of prior positions, the degree of uncertainty, the status quo position, and discount factors:

1. **Number of players:** Eight FCC judges typically participate in senate consultations. But the number of involved judges can go down to a minimum six. In 82% of all simulation runs, I assume eight players. Another 7% of all bargaining simulation runs is computed with six or seven players. Five, nine, or ten players are assumed in all other cases for robustness checks at the margins. Results from these latter simulations runs correspond to the general picture for **6-8 players** and will not be further discussed.

2. **Majority Threshold:** A simple majority is formally required in senate consultations. The effective threshold can be higher when there is a strong norm of consensus. A majority threshold of **five players** is assumed in 46% of all eight-player simulation runs. In another 46%, **unanimity voting** is assumed. The remaining eight-player simulation runs are based on majority thresholds of six or seven players. Since computational ressources are restricted, the majority threshold is not varied in simulation runs with more or less than eight players. Unanimity voting is assumed in these cases.

3. **Recognition probabilities:** Once the Votum is introduced, there is no fixed, exclusive or privileged agenda-setter in senate consultations. **Equal recognition probabilities** for all players are assumed throughout.

4. **Prior positions:** FCC judges are selected in a political procedure that heavily favors candidates with moderate beliefs and value systems. In each simulation run, each player's prior position is randomly drawn from a normal distribution $\boldsymbol{\mathcal{N}(0, \sigma^2)}$ for both dimensions separately. The prior distribution's standard deviation $\boldsymbol{\sigma}$ varies between simulation runs and is randomly drawn from a set $\boldsymbol{\{0, 1, 2, \ldots, 100\}}$ with equal probabilities. So the simulated bargaining settings vary in the level of policy preference heterogeneity. In line with the center-biased political selection process of FCC judges, the normal distribution implies that players' priors are typically spread around a common center rather than separated into extreme, clearly distinguishable camps.

5. **Degree of uncertainty:** FCC judges know their colleagues well but they can not perfectly predict each other's precise notion on a case. In other words, there typically is a moderate degree of uncertainty. In the bargaining model, each player's ideal position is drawn from a normal distribution around his prior with variance

s^2, the degree of uncertainty. For each simulation run, the standard deviation s is randomly drawn from a set $\{0, 1, 2, \ldots, 100\}$ with equal probabilities.

6. **Status quo position:** The study focuses on FCC proceedings that object German federal legislation. Hence, the legal status quo is determined by the German legislator. The same political parties in the Bundestag and Bundesrat both select FCC judges and adopt legal statutes. So the status quo is likely to be biased towards the same political center as players' prior positions.[83] For each simulation run, the status quo position is randomly drawn from normal distribution $\mathcal{N}(0, 50)$ on both dimensions separately. Moderate status quo positions are input more often than extreme positions.

7. **Discount factors:** FCC judges might have any kind of discount factors. If a policy is only relevant for singular historical events (e.g. German Reunification), discount factors will be low. If a policy has long-term implications, discount factors will be close to 1. I do not impose any ex-ante restriction on the range of discount factors. They are theoretically limited to a range of $[0, 1)$. For each simulation run, the discount factor is randomly drawn from a set $\{0, 0.02, 0.04, \ldots, 0.98, 0.999999999\}$ with equal probabilities.

Mass simulations are computed based on this FCC-oriented set of starting values. The simulated dataset is used to derive hypothesis on how these independent variables affect bargaining duration. The results are discussed in the following section.

5.3.2. Hypotheses on Bargaining Duration

Predictions based on simulated data are valid for the selected range of starting values only, as discussed in the previous section. Eight players and unanimity voting are the baseline bargaining situation. Variations with less players, lower majority thresholds, varying prior preference distributions, degrees of uncertainty, status quo positions, and discount factors allow for analyzing effects on bargaining duration. Since recognition probabilities are constant across all simulation runs, no agenda-setter effect can be inspected.

The dependent variable of interest is bargaining duration, defined as the number of bargaining periods needed until a proposal is adopted. The minimum number of bargaining periods is 1. The sequential bargaining game is infinite-horizon, so the dependent variable

[83] Since a two-thirds majority is required, candidates for FCC judgeship depend on the support of both christian and social democrats. Depending on the type of legislation and majorities in the Bundestag and Bundesrat, federal legislation often does not require such a broad coalition. So the *strength* of center-bias might be lower for status quo positions than for judicial priors.

can take any positive integer value. The main research question is whether and how judicial policy bargaining affects the duration of FCC senate consultations. The analysis of simulated data starts with a look at the relation between prior preferences and duration.

Preference Heterogeneity, the Status Quo, and Bargaining Duration

FCC judges' prior policy preferences are generally assumed to be biased towards the political center. Hence, judicial preference constellations can best be distinguished in terms of preference heterogeneity.[84] Technically, prior positions are drawn from a normal distribution with a standard deviation that varies across simulation runs. For the following analysis, preference heterogeneity is operationalized as the mean Euclidean distance of players' prior position to the average prior position of all players.[85] The analysis of direct effects is limited to prior preferences. Player's case-specific ideal positions are partly determined by the degree of uncertainty. It would be hard to disentangle preference and uncertainty effects if we focused on case-specific ideal positions. The question of interest is: How does prior preference heterogeneity affect the expected number of bargaining periods?

Figure 5.7 illustrates the simulated relation of both variables for eight-player games with unanimity voting. The upper graph depicts the shares of simulated bargaining processes classified by the number of periods for each level of preference heterogeneity. The continuous preference heterogeneity measure is rounded to integer values. If preference heterogeneity is close to 0, about 60% of all simulated bargaining processes will last longer than two periods and 20% of all bargaining processes will end in periods 3-5. If the mean prior distance to the average prior position is about 80 Euclidean policy units, the first proposal will be adopted in 20% of all cases. The diffuse jittering at the right end of the graph is due to limited number of simulation runs. Relatively few runs have been conducted for extremely high levels of policy heterogeneity so that predictions are less precise for this range of starting values.

The predicted bargaining duration first *increases* and then *decreases* with preference heterogeneity.[86] But the pattern heavily depends on the location of the status quo. If the Euclidean status quo distance to the average prior position is very small, the expected

[84] If there was no center-bias, the number and relative strength of preference clusters might be more suitable criteria to classify preference constellations.

[85] This operationalization allows for a straightforward comparison to the "relative status quo position" measure that will be introduced later. If preference heterogeneity was operationalized as the variance or standard deviation of prior positions instead, or if it was based on Euclidean distance to the political center 0, the main conclusions would be identical.

[86] This result is robust for different numbers of players, discount factors, and levels of uncertainty. No clear pattern emerges with reduced majority thresholds.

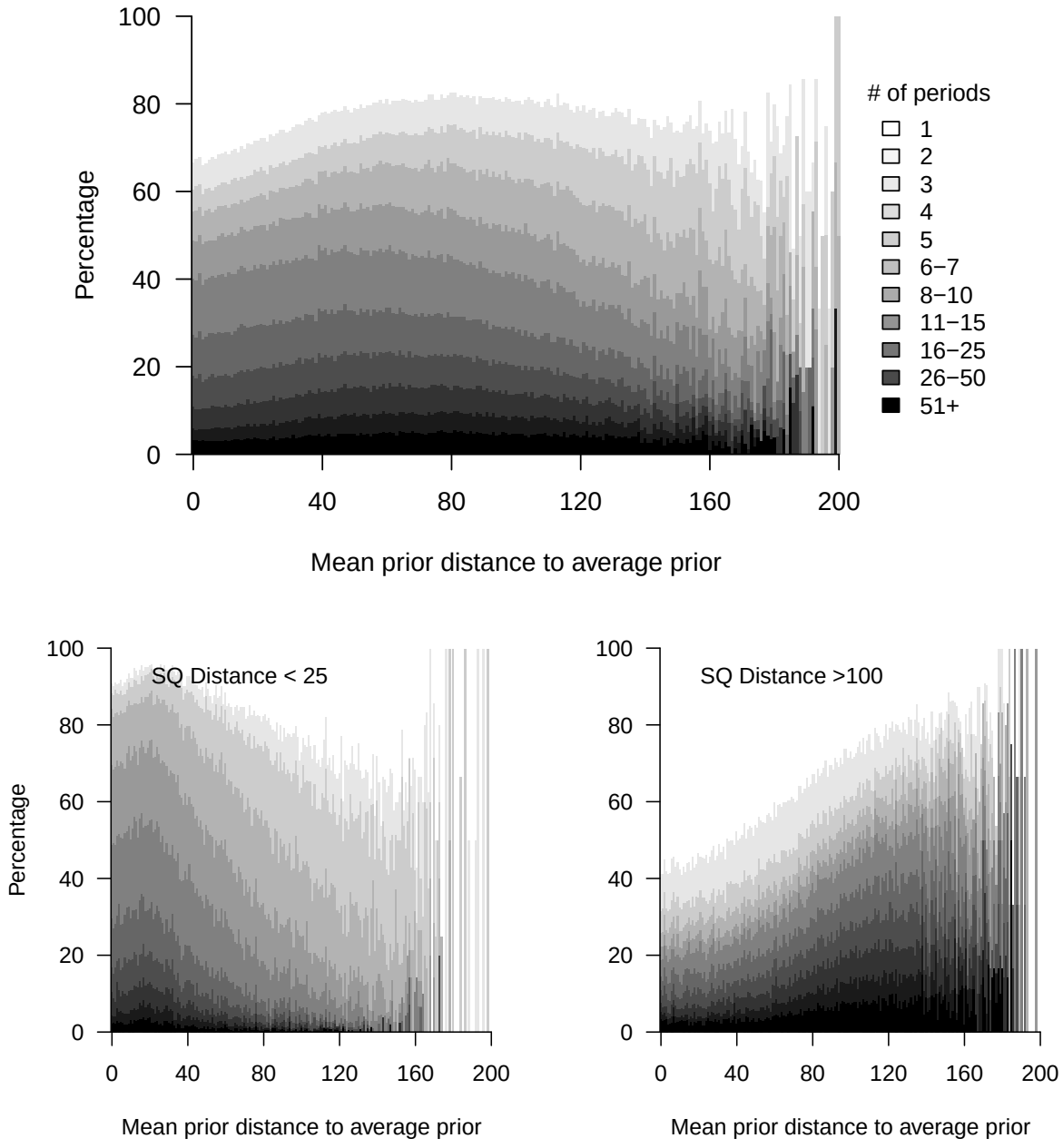

Figure 5.7.: **Preference Heterogeneity and Duration:** Eight players, unanimity voting. The preference heterogeneity effect on bargaining duration is conditional on the status quo location.

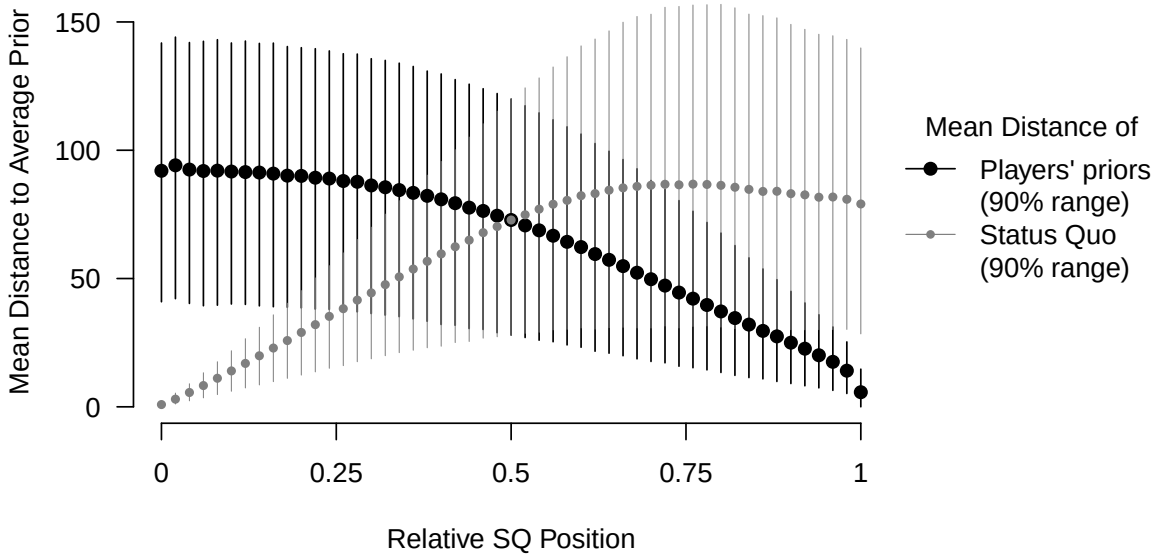

Figure 5.8.: **Relative Status Quo Positions:** Eight players, unanimity voting. Low relative SQ positions are associated with central status quo policies and heterogeneous prior preferences. High relative SQ positions are associated with distant status quo policies and homogeneous prior preferences.

bargaining duration mostly *decreases* with preference heterogeneity (see lower left chart in figure 5.7). If the status quo distance to the average prior is large, preference heterogeneity *increases* bargaining duration (see lower right chart in figure 5.7).

This clear result is remarkable. Preference heterogeneity clearly affects bargaining duration. But the effect is *conditional* on the location of the status quo. Empirical scholars have often stated general hypotheses on the effect of policy preference on bargaining duration (see section 3.2) with a cursory reference to veto player theory. None of these more or less ad-hoc explanations has revealed such a clear but conditional pattern. There could be no better argument for the necessity of a sound theory than such non-obvious insights.

A closer inspection of the simulated data reveals that the "peak" of long-lasting negotiations in figure 5.7 simultaneously wanders from left to right with the selected level of status quo distance. It seems like the status quo distance to the average prior is a good measure to mark the turning point of the heterogeneity effect.

A new measure is introduced in order to account for this direct dependence. Let $\bar{\mu} = \frac{\sum_{i \in N} \mu_i}{n}$ be the average prior position across all players. Then $c_i = \|\mu_i - \bar{\mu}\|$ is the Euclidean distance of player i's prior position to the average prior. Accordingly, $c_n = \frac{\sum_{i \in N} c_i}{n}$ is the mean prior distance to the average prior. Let $c_q = \|q - \bar{\mu}\|$ denote the

Euclidean distance of the status quo position to the average prior. Then the ratio of the status quo distance to the mean prior distance is given by $\frac{c_q}{c_n}$. For practical reasons, this measure is rescaled by a monotonous transformation to a the interval $[0, 1)$ and rounded to steps of 0.02. The **Relative Status Quo Position** is defined as $r = 1 - 2^{-\frac{c_q}{c_n}}$. For $0 \leq r < 1$, the status quo is closer to the mean prior than players are on average. For $r > 1$, players are closer to the mean prior on average than the status quo.

Figure 5.8 illustrates how this new measure combines information on players' preference heterogeneity and the status quo location in a single number. For each value of relative SQ positions, the graph depicts the distribution of status quo distances and mean prior distances in simulated bargaining processes with eight players and unanimity voting.[87]. Dots indicate mean values of these distributions and vertical lines indicate inner 90% ranges. As the relative SQ position approaches 0, the status quo is typically very close to the average prior *and* players' preferences are very divergent. With relative SQ positions around 0.5, the status quo and players' preferences are about equally dispersed. As the relative SQ position approaches 1, the status quo is more extreme than most players' preferences.

In the dynamic policy bargaining model with incomplete information, the final outcome partly depends on the random order of agenda setters and players' subjective information. There is no objective "core" of indefeasible status quos as in Tsebelis (2002)' static veto player theory. Nor does the relative status quo position perfectly define the boundaries of such a complex, more-dimensional set. But the general idea may help to understand the causal mechanism behind the conditional heterogeneity effect. The lower the relative SQ position, i.e. the more centrally the status quo is located in relation to players' prior preferences, the more likely the status quo is surrounded by players' ideal positions and the sooner players will learn that there is no collectively preferred alternative to the status quo. Players would then end the game by proposing and adopting the status quo policy.

A different mechanism is at work whenever the status quo is very distant to the set of all players' preferences. The larger the relative SQ position, the more likely the status quo is far away from what players collectively prefer. They will soon realize that there are feasible alternatives to the status quo. The more similar their ideal preferences are in comparison to the status quo, the sooner they will realize their common interest, the larger will be the individual utility from adopting any other player's preferred policies quickly, and the sooner a player will propose a socially accepted alternative. The more divergent their preferences become (maintaining the outlying status quo), the larger will be individual utility differences between potential policy alternatives and the higher will

[87] The relation is robust for the number of players and the majority threshold.

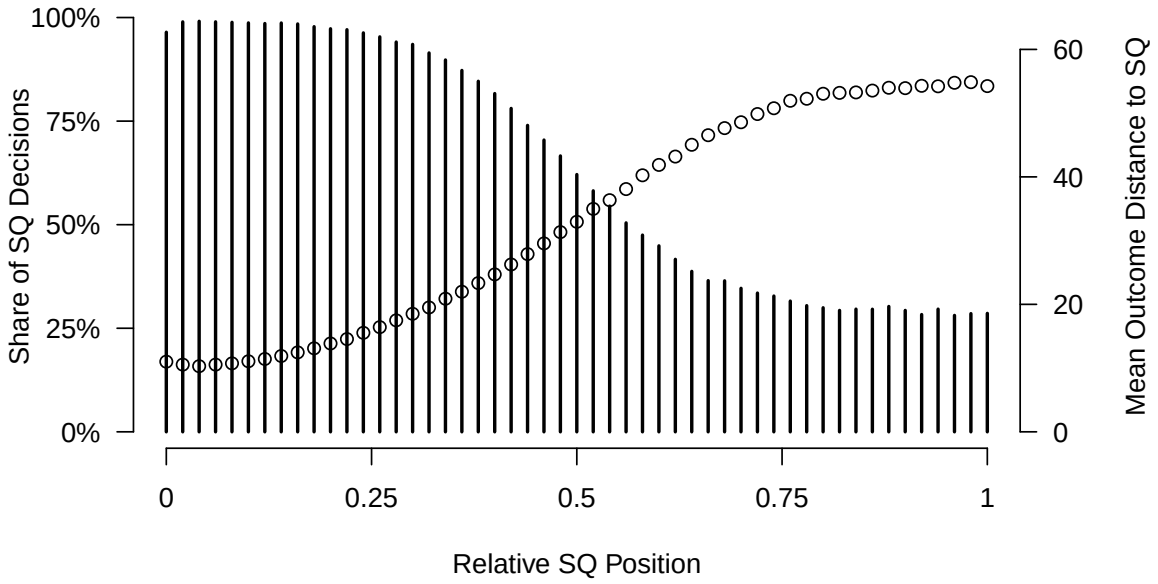

Figure 5.9.: **Relative Status Quo Positions and Policy Outcomes:** Eight players, unanimity voting. Vertical bars: share of status quo decisions. Circles: mean distance of the final outcome to the status quo.

be the incentive to find an even better but still socially accepted agreement in another bargaining period. The policy alternative will ultimately replace the status quo.

The data depicted in figure 5.9 confirms this point.[88] With low relative SQ positions (e.g. $r < 0.3$), almost all simulated negotiations end with the adoption of the status quo policy. Accordingly, the mean distance of the bargaining outcome to the status quo policy is very low. In contrast, when the relative SQ position is high (e.g. $r > 0.7$), the status quo policy is adopted in only one-fourth of all cases and the mean distance of the policy outcome to the status quo is five times as high.

Figure 5.10 provides a very clear picture of how preference heterogeneity and the status quo position collectively affect bargaining duration. Remember that extreme status quo positions are associated with higher "relative SQ position" values, whereas preference heterogeneity *decreases* with relative SQ position values. The upper graph in figure 5.10 confirms the previous line of argument for unanimity voting with eight players. When the status quo is centrally located inside the region of players' prior preferences ($r < 0.3$), preference heterogeneity *decreases* bargaining duration. When the status quo is very distant to the region of players' preferences ($r > 0.7$), preference heterogeneity *increases* bargaining duration. At the turning point, when the status quo and players' preferences

[88] Similar results are obtained with less players. With lower majority thresholds, the general relation is confirmed. But the pattern is less clear, since a policy can be adopted irrespective of the most extreme players' preferences that still heavily influence the relative SQ measure.

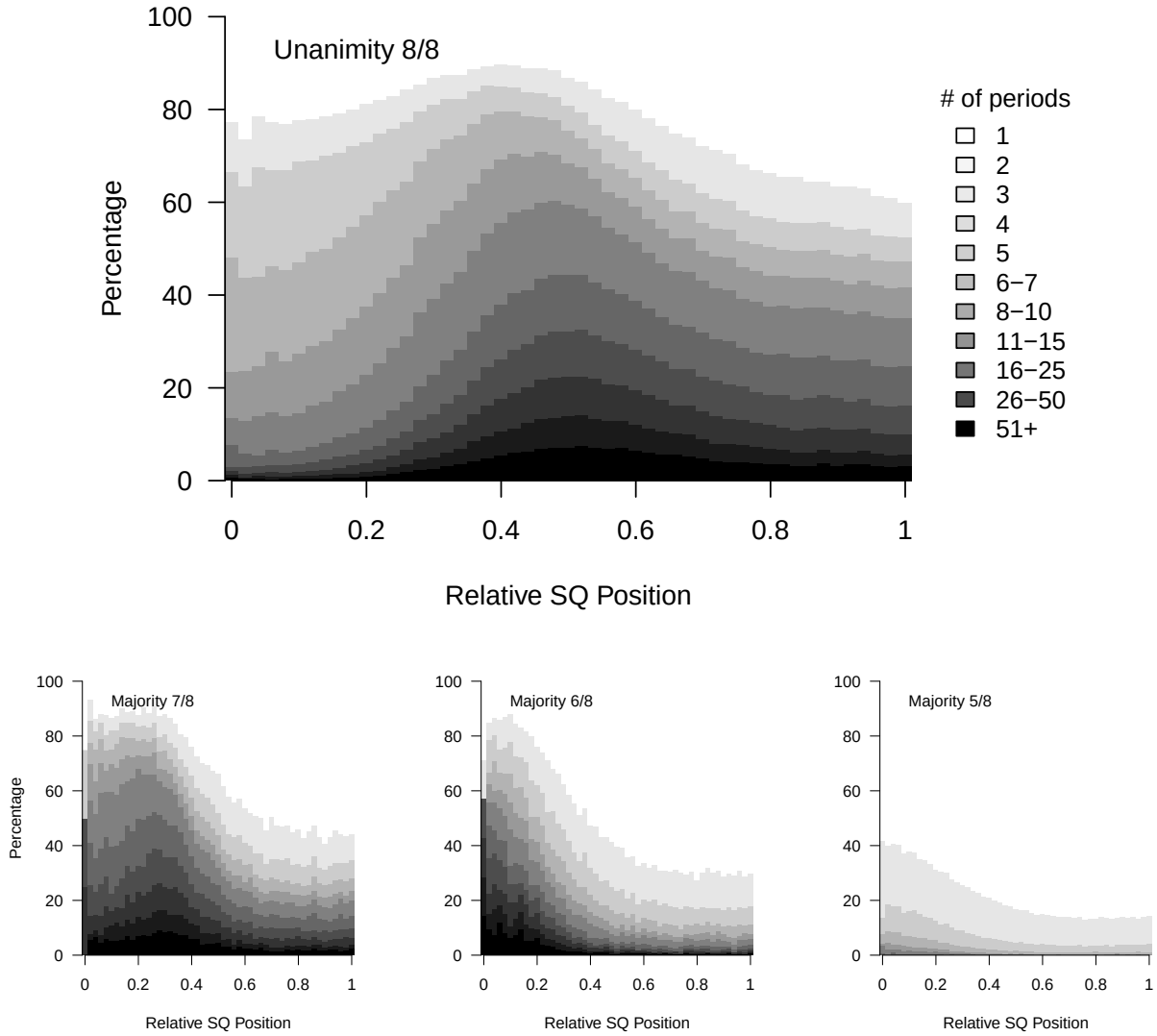

Figure 5.10.: **Relative SQ Position and Duration:** Preference heterogeneity decreases duration, when the status quo is very central. It increases duration, when the status quo is distant. As the majority threshold decreases, the positive preference heterogeneity effect becomes prevalent.

are about equally dispersed ($0.3 < r < 0.7$), no clear pattern emerges. This conclusion is robust for different numbers of players, varying levels of uncertainty, and discount factors. The size of the effects increases with decreasing levels of uncertainty (see figure B.1 in appendix B).

Until now, we have focused on the preference heterogeneity effect under unanimity voting. The lower three graphs in figure 5.10 show how the majority threshold affects our conclusions. As the majority threshold decreases, the "peak" or turning point of the heterogeneity effect wanders to the left and the positive heterogeneity effect becomes more prevalent. This is not surprising. The relative SQ position measure relates the status quo position to the preference heterogeneity of all players. It is strongly determined by preferences of extreme players who are likely to effectively veto moderate proposals under unanimity voting. Under majority voting, these players' consent is not needed for proposal adoption. The relative SQ position measure then is a rather unreliable indicator of whether a status quo can be replaced under majority voting. In fact, indefeasible status quo policies hardly ever exist under majority rule. Whereas the status quo policy is finally adopted in 58% of all simulated eight-player unanimity negotiations, players agree on an alternative policy in 99,9% of all simulated eight-player games with simple majority voting. This conclusion is in line with Tsebelis' static veto player model, where increased majority thresholds are associated with increased policy stability (Tsebelis 2002, 54). As the majority threshold approaches simple majority voting, preference heterogeneity increases bargaining duration.

In summary, the following hypotheses on bargaining duration are derived:

Hypothesis 1. *Under unanimity voting, bargaining duration will increase with preference heterogeneity if the status quo is very distant to the region of players' prior preferences.*

Hypothesis 2. *Under unanimity voting, bargaining duration will decrease with preference heterogeneity if the status quo is centrally located within the region of players' prior preferences.*

Hypothesis 3. *Under simple majority rule, bargaining duration increases with preference heterogeneity.*

Two more hypotheses are derived on the bargaining outcome:

Hypothesis 4. *Under unanimity voting, the adoption of the status quo policy will be more likely if it is centrally located within the region of players' prior preferences than if it is very distant to the region of players' prior preferences.*

Hypothesis 5. *The adoption of the status quo policy is more likely under unanimity rule than under simple majority.*

This paragraph has discussed the impact of preference heterogeneity and status quo positions on bargaining duration. Four potential factors of varying bargaining duration in the simulated dataset remain: The majority threshold, the number of players, preference uncertainty, and the discount factor. The analysis of simulation results proceeds with a look at the impact of majority thresholds.

Majority Threshold and Duration

The upper graph in figure 5.11 illustrates the bargaining duration of all simulated eight-player games by majority thresholds. There are four different levels of majority thresholds: either five, six, seven or all eight players are needed to adopt a proposal. The small number of categories allows for a more detailed presentation of bargaining duration patterns in this figure. The graph can be interpreted as a cross section to a contour line graph like the one in figure 5.10. For each level of majority thresholds, a step function indicates the proportion of unsettled negotiations in each period.[89] Before period one, all negotiations are pending. 23% of all unanimity cases end in period 1 and the unanimity step function drops to 77%. Another 8% of all unanimity cases end in period 2, the step function drops to 69%, and so forth.

The general picture is that bargaining duration increases with majority threshold. Learning about other players' preferences takes time. The higher the majority threshold, the more sensitive a collective voting decision is to each subjectively misjudged ideal position. 81% of all first-period proposals are accepted under simple majority rule. Virtually none of the simple majority bargaining games proceeds beyond period 4. In contrast, only 47% of all unanimity games end within the first four periods.

Robustness checks for different levels of discount factors, degrees of uncertainty, and relative status quo locations mostly confirm this conjecture (see figure B.2 in appendix B). The two lower graphs in figure 5.11 depict the only two exceptions from this regularity. Let us consider the left graph first. When the relative SQ position is low ($r < 0.3$), unanimity games are settled *faster* than 7/8-majority games and, from period 5 onwards, even faster than 6/8 majority games. This clearly visible exception from the rule can be explained by the causal mechanism discussed in the previous paragraph. The positive preference heterogeneity effect on bargaining duration is hardly affected by the status

[89] Vertical 95% bootstrap confidence intervals have been computed. The width of these condidence intervals is marginally greater for majority thresholds 6/8 and 7/8 than for simple majority and unanimity voting due to a lower number of simulation runs. All confidence intervals hardly exceed the line width of the printed step functions, so they are not displayed in the graphs. All clearly visible differences between these step functions are statistically significant. The same is true for the step function graphs in figures 5.12, B.2, and B.3

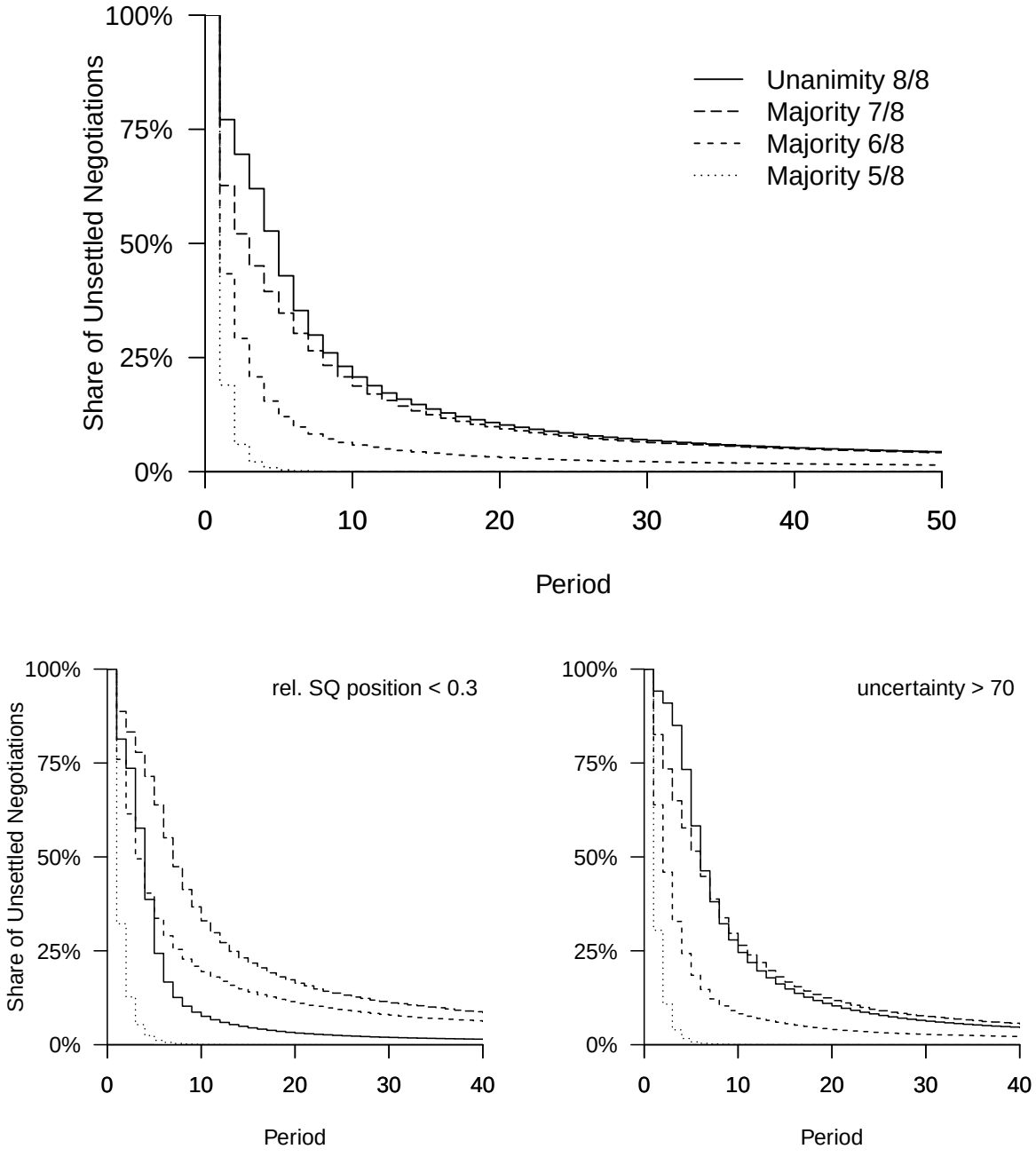

Figure 5.11.: **Majority Threshold and Duration:** Eight-player games. Higher majority thresholds are typically associated with longer bargaining duration. Exceptions occur with central status quo positions and high degrees of uncertainty.

quo position in majority games. However, as soon as unanimity is required, games with a central status quo are settled quickly because players soon realize that there is no feasible alternative to the status quo.

The same mechanism causes the exception in the lower right graph. If uncertainty is very high, players' ideal positions will be even more dispersed than their prior positions. The status quo becomes more likely to be surrounded by veto player preferences in all directions. In these cases, players will realize the anticipated gridlock and adopt the status quo. The effect of high uncertainty on the likelihood of a subjectively perceived indefeasibility of the status quo is rather indirect. Accordingly, the deviation from the general pattern is less distinct than in the left figure. When games with low relative SQ positions are exluded, the deviation completely diminishes.

The relatively small difference in bargaining duration between unanimity games and 7/8-majority games can be traced back to the same mechanism. For large SQ positions ($r > 0.7$), the predicted increase in bargaining duration is similar to the differences associated with an increase from 5/8 to 6/8 or from 6/8 to 7/8-majority thresholds (see figure B.2).

The general result is that bargaining duration increases with the required majority threshold. This does not hold true for unanimity voting if the relative SQ position is low or the degree of uncertainty is very high. The following hypothesis is derived:

Hypothesis 6. *If the status quo is not centrally located within the region of prior preferences, bargaining duration will increase with the required majority threshold.*

Number of Players and Duration

Figure 5.12 displays the simulated association of the total number of players and bargaining duration. The upper graph includes all simulated unanimity games with six, seven, or eight players. No clear pattern emerges. Again, the effect is conditional on the relative SQ position. If the relative SQ position is low, more players accelerate the bargaining process (see the lower left graph). With more players involved, the chance of subjectively recognizing policy gridlock is higher and players will adopt the status quo earlier. This effect is robust for variations in discount factors and uncertainty (see figure B.3 in appendix B).

The opposite is true for relatively distant status quo policies. An increased number of players then consistently leads to a slight increase of bargaining duration (see the lower right graph). Players soon expect the status quo to be replaced by an alternative policy. In order to make an optimal socially accepted proposal, players need to estimate more ideal positions of other players. The chance of misjudging the ideal position of a required

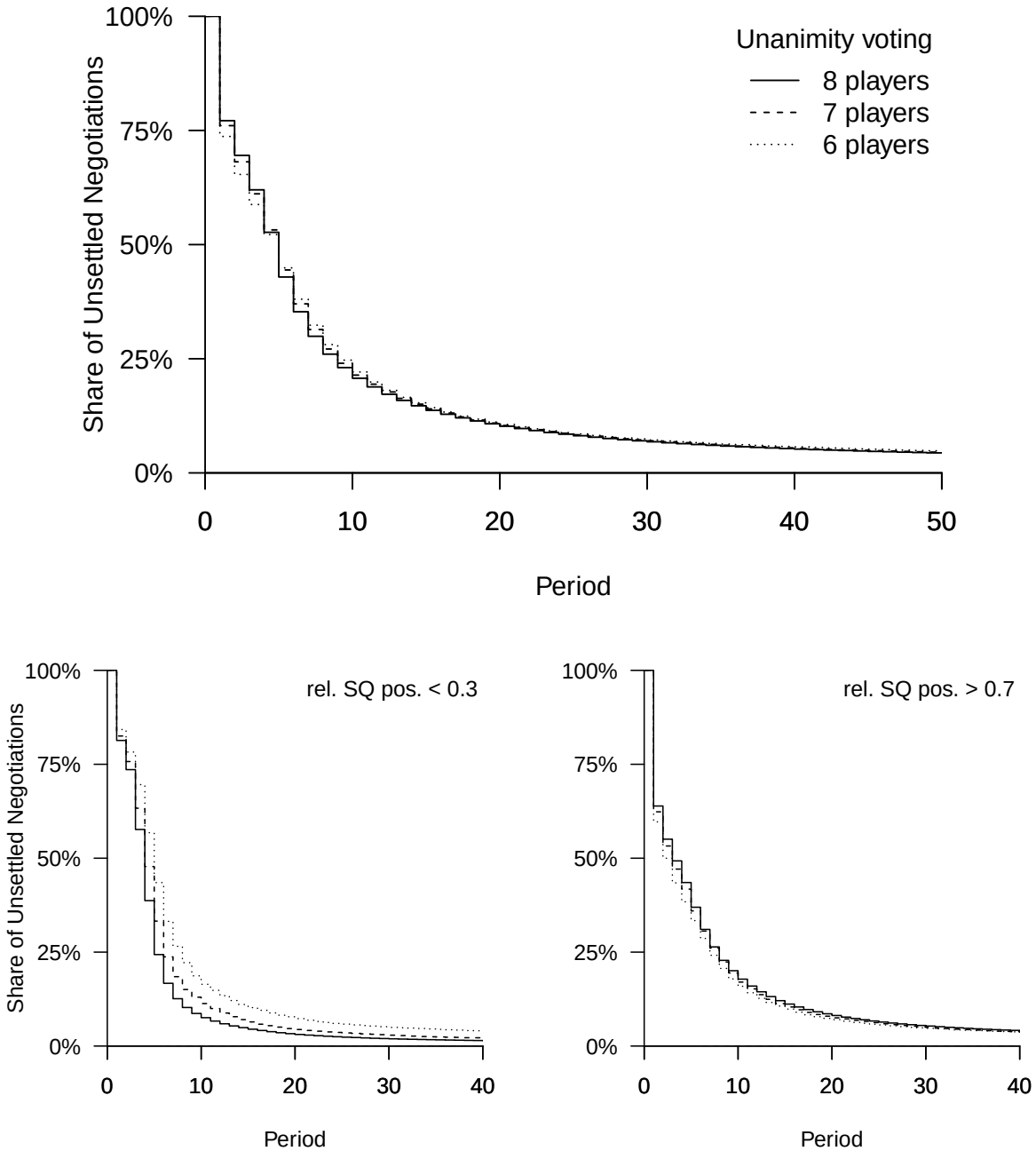

Figure 5.12.: **Number of Players and Duration:** Unanimity voting is assumed throughout. If the relative SQ position is low, more players will decrease bargaining duration. The opposite is true for outlying SQ positions.

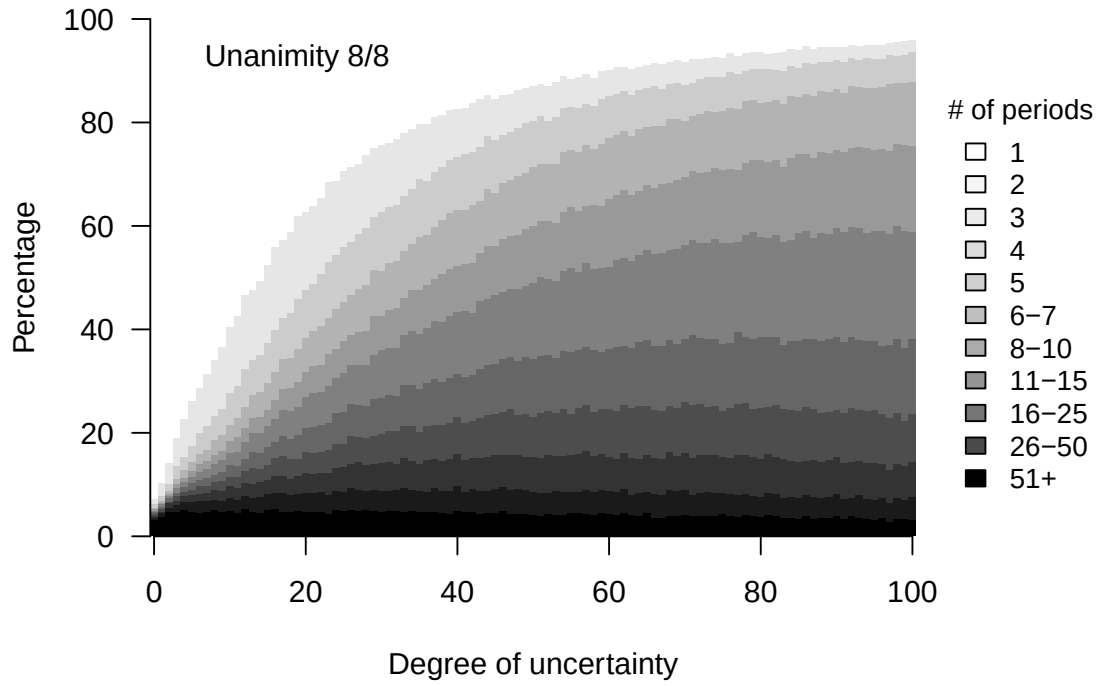

Figure 5.13.: **Uncertainty and Duration:** Bargaining duration increases with the degree of preference uncertainty.

veto player increases with each additional players involved. This effect is rather small and vanishes with very high degrees of uncertainty.

The following hypotheses are derived:

Hypothesis 7. *If the status quo is centrally located within the region of prior preferences, unanimity bargaining duration will decrease with the number of players involved.*

Hypothesis 8. *If the status quo is very distant to the region of players' prior preferences, unanimity bargaining duration will increase with the number of players involved.*

Uncertainty and Duration

Uncertainty is the key driver of bargaining duration (see section 3.3). Figure 5.13 reveals a very clear pattern for eight-player games with unanimity voting. If there is no uncertainty, players will be completely informed about each other's preferences and the first-period proposal will be accepted. The higher the degree of uncertainty, the longer will be the expected bargaining duration. Players learn from observed voting behavior. With increasing uncertainty, they will need more time to adequately predict each other's preferences and to make socially accepted proposals. The positive relation is robust for all simulated majority thresholds, numbers of players, discount factors, and relative status quo positions (see figure B.4 in appendix B).

The following unconditioned hypothesis is derived:

Hypothesis 9. *Bargaining duration increases with the degree of uncertainty.*

Discounting and Duration

The discount factor is a measure of how much importance players attach to future utilities as compared to present utilities. Figure 5.14 illustrates the simulated effect of players' discount factor on bargaining duration. The upper graph includes all simulated eight-player unanimity games. The larger the discount factor, i.e. the more patient players are, the longer will be the bargaining duration. The effect is rather moderate and most pronounced when the discount factor is close to 1. It is robust for the number of players, the level of uncertainty, and qualified majority threshold of 6/8 or 7/8 players (see figure B.5 in appendix B).

The second row of graphs in figure 5.14 reveals a more distinguished picture. The positive discount effect on duration is strongest for high relative SQ positions and diminishes with low relative SQ positions. When the status quo is very distant to the region of prior preferences ($r > 0.7$), players broadly agree on the general direction of policy change. The more distant the status quo, the higher will be the individual utility gain from adopting any other player's preferred policy. Even if a player expects to gain more preferable policy outcomes from continued bargaining, this additional gain is marginal compared to the overall utility increase from replacing the status quo by any policy close to all players' preferences. The more impatient a player is, the more willing he will be to compromise within that region in order to replace the status quo immediately. In such a situation, players' acceptance sets increase with impatience. More potential policies become socially accepted and minor misperceptions of other players' preferences are less likely to affect the ultimate adoption of a proposal.

This logic does not apply to bargaining situations with a more central status quo. Then the status quo is close to expected alternative policy outcomes. There is less to gain from immediate agreement. Players' subjective continuation values do not differ a lot from their status quo utilities. So the discount factor has little leverage. As the relative SQ position decreases, expected future utility gains go down and players become more and more indifferent between immediate settlement and continued bargaining. Hence, the discount effect diminishes with decreasing relative SQ positions.

The mechanism is a little different under simple majority rule (see the last row of graphs in figure 5.14). The first graph depicts all simulated eight-player games with simple majority rule. The predicted bargaining duration first decreases and then increases with the discount factor. Again, this is due to the different nature of bargaining situations with

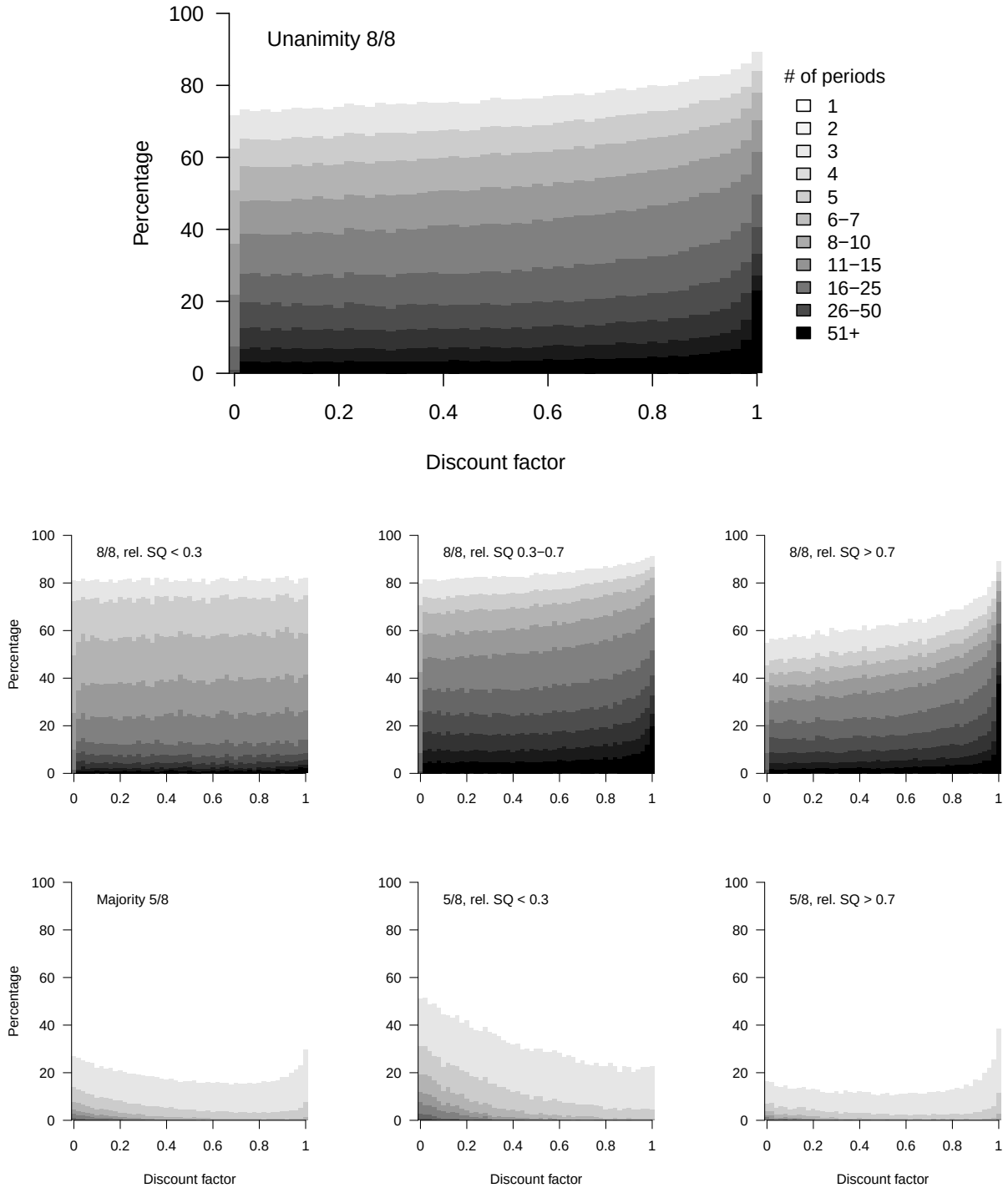

Figure 5.14.: **Discounting and Duration:** The discount factor will prolong bargaining if the SQ is distant. Under simple majority voting, the discount factor will decrease bargaining duration if the SQ is centrally located.

central vs. distant status quo policies (cf. the remaining two graphs). When the status quo is distant to a relatively homogeneous region of prior preferences ($r > 0.7$), bargaining duration increases with player's patience. Players broadly agree on the preferred direction of policy change and expected utility gains are high. They will only opt for the the chance of marginal improvements in continued bargaining if they hardly care about present utilities. So the causal mechanism is the same as with similar bargaining setting under unanimity voting.

When the relative SQ position is low ($r < 0.3$), players' ideal positions are likely to be spread around the status quo. Typically, no other policy alternative would be accepted by all players. But some alternatives might be supported by a majority of players. Players with disadvantageous policy preferences are likely to end up with a policy outcome they prefer less than the status quo. Now their voting behavior strongly depends on the discount factor. Assume that such a player faces a proposal that makes him slightly less off than the status quo. He anticipates that future proposals might be even less advantageous. He prefers the status quo over the present proposal and both of them over expected future outcomes. If the discount factor is sufficiently low, he will reject the proposal and accept even worse prospects in future bargaining in order to keep the status quo for one more period. If the discount factor is high, he will accept the proposal in order to prevent the risk of even higher losses in future bargaining. With increasing patience, he will be more willing to compromise and the adoption of particular proposals becomes less vulnerable to minor preference misperceptions. The expected bargaining duration then is expected to *decrease* with the discount factor. The lower the majority threshold, the more players are likely to be in such a disadvantageous position and the more pronounced will be the effect. Based on the set of selected starting values, the negative discount effect on duration turned out to be visible under simple majority rule only.

The size and direction of the discount effect is conditional on both the relative status quo position and the majority threshold due to opposing causal mechanisms. The following hypotheses are derived:

Hypothesis 10. *If the status quo very distant to the region of players' prior preferences, bargaining duration will increase with the discount factor.*

Hypothesis 11. *If the status quo is centrally located within the region of players' prior preferences, the discount factor will not affect bargaining duration under unanimity rule.*

Hypothesis 12. *If the status quo is centrally located within the region of players' prior preferences, bargaining duration will decrease with the discount factor under simple majority rule.*

In this chapter, I have introduced a simulation procedure to derive hypotheses from the dynamic policy bargaining model with incomplete information. I have derived several hypotheses on bargaining duration related to players' preferences and the bargaining setting. These hypotheses will be applied to the case of FCC senate consultations. They are not generalizable beyond the range of selected starting values.

The results reveal a very distinguished picture of conditional hypotheses and opposing causal mechanisms. For the range of starting values relevant in FCC senate consultations, the degree of uncertainty generally prolongs the bargaining process. If the status quo is distant, bargaining duration *increases* with preference heterogeneity, the majority threshold, the number of players, and the discount factor. If the status quo is centrally located in the region of prior preferences, duration *decreases* with preference heterogeneity under unanimity rule and with the discount factor under simple majority rule. Preference heterogeneity generally increases duration under simple majority rule.

Preference heterogeneity affects bargaining duration. But the effect is indirect and conditional on the type of the bargaining situation. More divergent policy preferences make bargaining situations with central status quo positions more likely. Depending on whether the status quo is central or distant, marginal raises in preference heterogeneity either accelerate or delay bargaining settlement. Empirical scholars of policy bargaining duration should take the variety and conditionality of these conclusions seriously and focus on more explicit and careful hypothesis-building.

Part III.

Empirics

6. Research Design

In part II, I have developed a dynamic policy bargaining model with incomplete information. Hypotheses on bargaining duration in FCC senate consultations have been derived via simulation techniques. These hypotheses shall be tested on empirical data. I conduct an event history analysis of FCC senate proceedings with reference to federal legislation from 1972-2008. The dataset on FCC senate decisions is linked to an existing dataset on German federal legislation so that policy-related information is available.

The present chapter introduces the research design including case selection (section 6.1), the statistical model of analysis (section 6.2), and choices of operationalization (section 6.3). Empirical results will be presented in chapter 7.

6.1. Case Selection

The FCC sometimes combines separate pending proceedings to a conjoint proceeding, when they refer to similar or identical issues. In such a case, judges bargain about a common solution to all proceedings in a single policy space. The outcome is published in a single decision on the merits (*Hauptentscheidung*). So conjoint proceedings are treated as one and the same bargaining process. In the following, I refer to (conjoint) proceedings as identified by a published decision on the merits as "proceedings" and to initially separate proceedings as identified by unique file numbers as "initial" or "partial" proceedings. A senate's final decision on the merits marks the end of a proceeding. Closed senate proceedings are the unit of analysis.

The analysis includes all proceedings that have been filed before 2009, decided, and resulted in a published decision on the merits between January 1972 and August 2014. The set of cases is further reduced to proceedings on constitutional complaints (file number reference BvR), concrete judicial reviews (BvL), abstract judicial reviews (BvF), and disputes between constitutional bodies (BvE), where at least one federal law is fully or partially objected. I will briefly discuss these selection criteria.

- The FCC's greatest power is to effectively declare a law unconstitutional. FCC consultation outcomes are most relevant whenever a proceeding might result in

such a decision. Chambers do not have the power to annul legal statutes. Plenary decisions are binding for the submitting senate in answering the initial proceeding. But they rarely occur and only a senate can come to an externally binding decision (Benda, Klein and Klein 2012, 82). Therefore, I focus on **senate decisions** only.

- There are numerous kinds of senate decisions dealing with procedural aspects of a case. This includes the recusal of judges, directives of enforcement, and reimbursment of expenses. None of these aspects directly affects legal norms. Temporary injunctions might be targeted against a legal norm. But they typically refer to preliminary measures until a decision on the merits is made. The inherent time pressure of temporary injunctions would make it hard to compare their bargaining dynamics and duration with the standard case of policy bargaining. Therefore, the analysis is limited to **decisions on the merits**, where potential long-term consequences for the legal status quo are typically determined.

- The analysis considers **published decisions** only. Obviously, non-published decisions would be hard to observe. This criterion is not a big constraint, though. Senate decisions are generally published in the official Collection of FCC Decisions (BVerfGE). Judges might have excluded particular decisions from being published (§31 GOBVerfG Abs. 2; Benda, Klein and Klein 2012, 167). But these decisions are unlikely to affect politically relevant issues. It is hard to imagine how the Court could keep a politically salient decision secret. The FCC has an interest in making decisions public. If a decision with regard to a legal norm was not known of outside the Court, it would not have any effect. Published decisions are collected from BVerfGE (2012) and complemented by more recent decisions from the FCC (2014*b*)'s online decision database.

- The set of cases is limited to proceedings that have been **filed before 2009**. Decisions on proceedings that have been filed in 2009 or later are excluded for methodological reasons. The inclusion of more recent but already closed proceedings would have caused a selection bias on the dependent variable towards less durable proceedings (see section 6.2 for details). For conjoint proceedings, I require that the oldest initial proceeding has been filed no later than in 2008 as indicated by file numbers.

- The data contains **decisions made between 1972 to August 2014**. Older decisions are excluded for two reasons. The first reason is data availability. Some information beyond the published decision document is not available for very old FCC decisions. E.g., the legislation database that I will refer to only dates back to the 7^{th} election period of the German Bundestag.

Second, the selected time period largely ensures institutional stability. Important institutional changes with a potentially large impact on the nature of FCC bargaining processes had been enacted just before the selected time frame. The Fourth Reform of the Federal Constitutional Court Act in 1970 set the total number of FCC judges to 16, abolished the possibility of re-election, fixed the length of a judge's term to 12 years and introduced the legal possibility of published Sondervoten.[90] Due to numerous previous reforms, the FCC had been under virtually permanent institutional change before.

In 2011, the German legislator amended the Federal Constitutional Court Act and introduced the instruments of delay objection (*Verzögerungsrüge*) and delay complaint (*Verzögerungsbeschwerde*)[91] against the FCC in the Legal Protection in Overlong Court Procedures Act[92]. These new means allow parties to the proceeding to sue the FCC for a fair compensation out of the Court's budget if the proceeding is delayed by at least 18 months. The Court itself decides on these complaint procedures in a complaint chamber (*Beschwerdekammer*) of four FCC judges and the rapporteur is to provide a formal statement on the delay. It is unclear how this amendment will affect FCC proceedings in practice. FCC judge Wilhelm Schluckebier (2012) considers the legal commitment to be a yet unresolved challenge to the Court. A time-dependent control dummy variable will account for potential effects on duration by this recent institutional reform.

- A decision is only considered if **at least one federal law is objected** by the plaintiff or complainant. The objection might affect single parts of a law or the entire statute. For decisions on conjoint proceedings, at least one partial proceeding is required to object to a law. This criterion mainly excludes a large number of constitutional complaints against ordinary courts' decisions (*Urteilsverfassungsbeschwerden*) that typically refer to particular circumstances of minor political relevance. The reference to legislative norms ensures that the proceeding is about policy-related issues rather than about procedural formalities at lower courts. Objected federal laws from 1972 onwards are directly linked to an existing database of federal legislation.

- The case selection is further reduced to constitutional complaint, concrete or ab-

[90] *Viertes Gesetz zur Änderung des Gesetzes über das Bundesverfassungsgericht* of Dec 21, 1970 (BGBl I, 1765).

[91] §§ 97a - 97e BVerfGG; see also Benda, Klein and Klein (2012, 512ff) and Schlaich and Korioth (2012, 233ff).

[92] *Gesetz über den Rechtsschutz bei überlangen Gerichtsverfahren und strafrechtlichen Ermittlungsverfahren* of November 24, 2011 (BGBl I, 2302).

stract judicial review, and dispute between constitutional bodies proceedings. This effectively excludes two proceedings on different forms of action. The first refers to two disputes between the federation and the Länder (*Bund-Länder-Streit*; BVerfGE 105, 185 - 2 BvG 1, 2/01). The second involves other public law disputes (*andere öffentlichrechtliche Streitigkeiten*; BVerfGE 49, 10 - 2 BvH 1/76). These forms of action might not be directly comparable to other cases. The additional degrees of freedom from these cases would be completely exhausted by two dummy variables controlling for the form of action. These proceedings would not add any explanatory value and are disregarded in the following.

6.2. Event History Analysis

The duration of FCC senate proceedings is the dependent variable of interest. Explanatory variables include time-variant data. Potential selection bias might occur at the lower and upper ends of the selected time period. Event history analysis is the method of choice because it is designed deal with these methodological challenges.[93]

In event history analysis, a hazard function is estimated. For each time interval, the hazard function expresses the probability of an event, given that the event has not occured before this time interval. In the present analysis, the final decision on the merits is the only relevant "event". It is unique for each proceeding and marks the end of bargaining duration. So the hazard function gives the probability of a proceeding being decided within a specified time interval, given that it is still pending at the beginning of this interval.

There is no theoretical reason to assume a specific form or time-dependence of the hazard function. Following Box-Steffensmeier and Jones (2004)'s recommendation, I regard time dependency of the hazard function as "statistical nuisance" and opt for a non-parametric model. A Cox proportional hazards model is applied.[94] The study focuses on whether and how policy bargaining factors affect bargaining duration in FCC senate proceedings. My approach is factor-centric (Gschwend and Schimmelfennig 2011). Rather than aiming at an all-encompassing explanation of duration in FCC proceedings, I am interested in the effect of policy preferences and other policy bargaining-related factors

[93] See Box-Steffensmeier and Jones (2004) and Hosmer, Lemeshow and May (2008) for application-oriented introductions to event history modeling. Box-Steffensmeier and Jones (1997) provide a compact overview for political scientists. The method originates from biostatistics and has successfully been applied to duration data in political science (e.g. Martin and Vanberg 2003; Warwick 1994).

[94] The sample is sufficiently large and there is enough empirical variation in senate proceeding duration to justify this choice. No more than three decisions (i.e. 0.4% of all cases) share identical values on the dependent variable. Ties are not an issue.

on bargaining delay. The underlying baseline hazard is not of major interest and the Cox proportional hazards model is a reasonable choice.

Dealing with duration data, careful case selection is necessary to avoid substantial selection bias on the dependent variable. Consider the lower end of the time period first. If all senate decisions from 1972 onwards were equally considered in the analysis, the data would be biased towards more durable decisions in the 1970s. E.g., a proceeding that entered the Court in 1968 and that was decided on the merits in 1973 would be included in the dataset. But a proceeding that was filed at the same time and decided in 1970 would not be included in the dataset. Statisticians speak of "left truncation" (Klein and Moeschberger 2003, 72f): cases that experience the event before the selected time interval of observation would not be considered in the analysis and results would be biased.

One alternative would be to select proceedings based on their dates of receipt instead of their dates of decision. The earliest date of receipt in the dataset is in December 1966. Dates of receipt for senate decisions from 1966-1970 are not available. Numerous cases would need to be dropped from the analysis. Therefore, I opt for the second alternative and modify the statistical analysis. The number of days that have passed between a proceeding's date of receipt and January 1, 1972 are defined as the case's "age" at study entry. The case is treated as left-censored for further analysis. For example, a proceeding that was filed 50 days before January 1, 1972 merely affects the estimated hazard function on the time interval from 51 days onwards. Predicted hazard rates over the first 50 days of a proceeding are not affected. This method allows to make most efficient use of the available data without risking systematic bias (Cain et al. 2011).

A different approach is required at the upper end of the selected time period. Data is currently available for all proceedings that have been decided until summer 2014. The inclusion of all these proceedings would cause a substantial bias towards less durable proceedings for recent years. Proceedings that were filed in 2011 would only be included in the dataset if they were finished within three years. The inclusion in the study would be conditional on the dependent variable and hazard rates would be overestimated. Data on pending proceedings is not available. So the only methodologically correct way is to select on the date of receipt at the upper end.

Proceedings are included if they were filed no later than 2008 and decided by 2014. For conjoint proceedings, the earliest date of receipt among all initial proceedings is considered (see section 6.1). According to the FCC's yearly statistics, eight constitutional complaints and one concrete judicial review proceeding from before 2009 were still pending at the end of 2013 (FCC 2014*a*). The first senate has decided at least one of these constitutional complaints in the meantime (1 BvR 3217/07). In August 2014, this leaves at most four

pending constitutional complaints from 2008 and one concrete judicial review from 2008 in the first senate. In the second senate, at most one constitutional complaint from 2007 and two constitutional complaints from 2008 might still be pending. Most constitutional complaints are closed by chambers, even if they have been pending for a long time. In addition, many of these proceedings do not target a federal law. Either way, they would not be included in the study. Overall, the remaining risk of selection bias is marginal. A maximum of eight falsely excluded cases would not cause substantial bias in the light of 694 cases in total. The actual number of false exclusions is likely to be lower or even non-existent.

6.3. The Data

The data is mainly collected within the DFG-funded project "The Federal Constitutional Court as a Veto Player".[95] The project's database includes FCC senate decisions from 1972-2010. I have extended this dataset by additional variables and by 14 decisions from 2011-2013. No decision from January-August 2014 fulfills all selection criteria for my study. Decision-related information is mostly collected from the Collection of FCC Decisions (BVerfGE 2012) and from the Court's website for more recent decisions (FCC 2014*b*).

In the following, I will discuss the structure of the study's underlying dataset (section 6.3.1) as well as operationalization choices for the dependent variable (section 6.3.2), and for independent variables (section 6.3.3).

6.3.1. Data Structure

Figure 6.1 describes the basic data structure and its multi-level setup. The example case is a conjoint proceeding on income tax subsidies. It is identified by the first senate's decision on the merits on November 11, 1989. The decision has later been published on pages 108ff in volume 81 of the Collection of FCC Decisions (BVerfGE 81, 108). Decision-related information like the responsible senate, participating judges, the date of decision etc. is added. The analyzed dataset comprises at total of 694 senate decisions. This includes 444 first senate decisions and 250 second senate decisions.

The example decision in figure 6.1 refers to two initial proceedings with file numbers "1 BvR 1402/87" and "1 BvR 1528/87". Initial proceedings are identified by unique file numbers. The first digit specifies the senate. "BvR" is an acronym for constitutional complaints. The last number relates to the year of receipt. "1402" and "1528" are consecutive

[95] See Gschwend and Hönnige (2011-2015) for a project description.

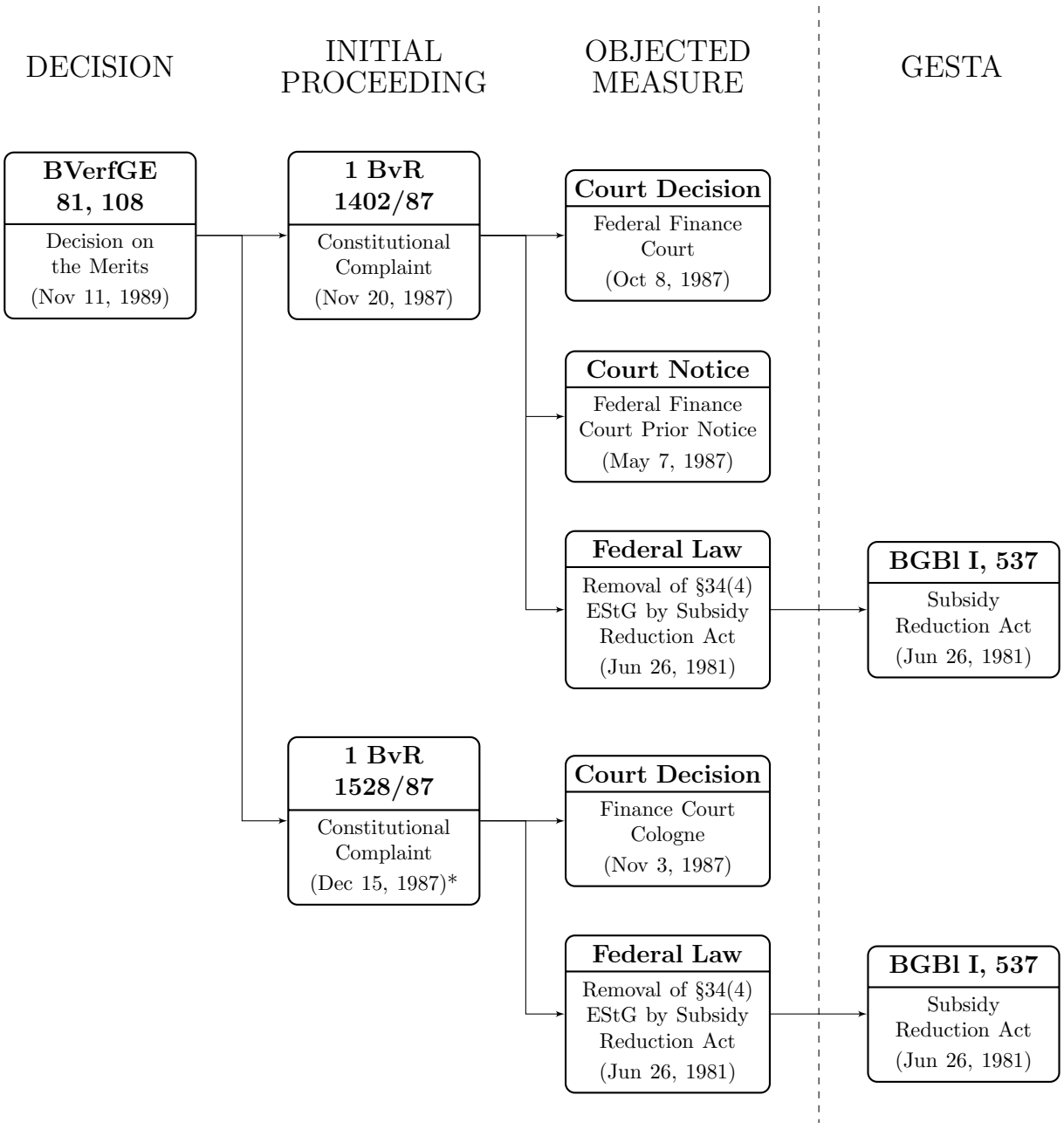

Figure 6.1.: **Basic Data Structure:** The example decision refers to a conjoint proceedings of two constitutional complaints. Both complainants object to the same federal law. The FCC decision database is linked to the GESTA database of German federal legislation. *The date of receipt is estimated.

numbers to specify docketed proceedings. The first complaint was filed on November 20, 1987, shortly after the objected Federal Finance Court decision. Based on the file number, the second complaint is estimated to be filed on December 15, 1987.[96] Both complainants are private individuals. Information related to the initiation of proceedings like the date of receipt and the form of action is added at this level of the database.

Both complainants objected to a number of measures as listed in the decision's rubrum. The set of objected measures defines the Court's external agenda and relevant policy issues in a proceeding.[97] The first complainant targets against a prior notice and a decision by the Federal Finance Court in 1987. He indirectly objects to the removal of §34(4) Income Tax Act that used to grant reduced income tax tariffs for auxiliary income from scientific, artistic, or literary activities. The Bundestag has removed this subsidy by adopting Art. 10 No. 3b Subsidy Reduction Act of June 26, 1981. The second complainant, a married couple, objects to a decision by the Finance Court Cologne of November 3, 1987. They indirectly object to the same legislative measure as the first complainant. Both complaints target the same policy issue and the joining of both initial proceedings is comprehensible. Information on the dates and types of objected measures is collected at this level of the database. There is a total of 1316 initial proceedings in the analyzed dataset. This includes 631 constitutional complaints, 597 concrete judicial reviews, 68 abstract judicial reviews, and 20 disputes between constitutional bodies. The FCC has connected 863 of these initial proceedings to 241 conjoint proceedings. 453 decisions refer to single file numbers only. 48 proceedings are left-censored because they were filed at the FCC before 1972.

Finally, objected measures with reference to federal law are linked to an external legislation dataset. If a complainant or plaintiff explicitly objects to particular articles or paragraphs of a federal law separately, these objections will be coded as separate measures. If he objects to a legal norm "in conjunction with" (*i.V.m.*, *in Verbindung mit*) one or more other legal norms, the conjunction will be coded as a single measure. Following Hönnige and Gschwend (2010)'s initiation, these objected federal law measures are linked to Burkhart (2008)'s GESTA dataset, which contains comprehensive data on German federal legislative processes from 1972-2005. The GESTA dataset includes both failed legislative initiatives and ultimately announced legislative acts but only ultimately

[96] The exact date of receipt is not available. Another initial proceeding with file number "1 BvR 1527/87" (BVerfGE 79, 80) was filed on Dec 15, 1987. So the date of receipt for "1 BvR 1528/87" can be estimated with a relatively high degree of precision. See section 6.3.2 for more information on the coding rule. In this case, the date of receipt is estimated for presentation purposes only.

[97] The FCC occasionally reviews and comments on measures that were not explicitly objected by the complainant or plaintiff. Complete and reliable data on these measures would be hard to collect. Unobjected but reviewed measures seem to be a rare exception and are not considered in the analysis.

announced acts are linked. Burkhart's dataset is extended to the 16^{th} legislative period 2005-2009 in order to account for more recent legislation.[98]

Objected measures in the area of federal legislation typically refer to a *legal situation* at a given point in time rather than to *legislative action*. Oftentimes, a law has been introduced and amended several times before it is objected in a FCC proceeding. In the example case, complainants directly target the legislative amendment act that has caused the alleged violation of the Basic Law. The legislative process that resulted in the named amendment act as announced in the 1981 Federal Law Gazette volume I, pages 537ff (BGBl I, 537) is linked. In other cases, complainants or plaintiffs merely target a legal norm without reference to specific legislative act.

A general coding rule is provided: Objected legal norms in the area of federal legislation are linked to the most recent legislative act that has amended, revised, or introduced the objected legal norm in a way that is relevant to the proceeding. If no case-relevant point in time is specified, the time of objection is decisive. In this legislative process, the legislator has determined, changed, or at least confirmed the legal status quo, which is relevant to the dynamic policy bargaining process in the proceeding. Frequent examples of non-relevant amendments are fine-related currency conversions from D-Mark to euro, the renaming of responsible ministries, and amendments of non-objected passages or wordings in the statute. The published reasoning of a decision with comments on the matter of dispute, the legal situation and legal history as well as the Federal Law Gazette are the most important sources to identify relevant amendments. Relevance to the proceeding is assumed in cases of doubt. The linked data provides reasonably valid data on the location and controversiality of the case-relevant status quo policy.[99]

The analyzed dataset includes a total of 2916 objected measures. Out of 2126 measures that relate to federal legislation, 1591 are linked to the extended GESTA dataset. The remaining 535 objected but unlinked measures relate to federal legislation that is not captured by the GESTA dataset. This includes legislative processes prior to the 7^{th} legislative period, one legislative act from 1977, and three legal norms originating from the former German Democratic Republic (DDR). 136 GESTA entries connect to at least one objected measure. Ordinary court decisions are objected 585 times. 12 objected measures relate to Länder legislation. The remaining measures comprise administrative and other acts or public authority.

For event history analysis, all legislation-, measure-, and file number-related information

[98] Credit is due to Christian Stecker and Philipp Broniecki who have done most of the extension work.

[99] The FCC typically reviews the constitutionality of a norm in the objected version or at a given point in time only. Even if it also decides on more recent amendments enacted after the objection has been filed, it will typically also decide on whether a complainant's rights were violated at the time of objection.

is aggregated to the (conjoint) proceeding-, i.e. the decision on the merits-level. The dataset is then transformed to long format so that time-variant explanatory variables can be specified. Each row in the ultimate data matrix refers to the case-time combination of a proceeding and a one-day time interval during the course of that proceeding. Detailed information on concept operationalization and rules of aggregation is presented in the following.

6.3.2. Dependent Variable: Duration

Until recently, there was hardly any public data on the duration of FCC available. Published senate decisions reveal the date of decision on the merits. With very few exceptions, dates of receipt for incoming requests could only roughly be approximated from file numbers. Thanks to the effort of diligent FCC staff, a long list of dates of receipt collected from historical records is now available for scientific investigation. This is the first study to analyze the rich source of information.

Until now, the Court's newly released data covers file number-related dates of receipt on senate decisions in the time period from 1971-2003. For 546 initial proceedings, the date of receipt of original files in the Court's office is collected from these records. The FCC has only recorded the first file number's date of receipt for most conjoint proceedings. This typically is either the most central initial proceeding to a decision or, if all requests are of similar importance, the earliest file number of a decision.[100] Either way, the recorded date of receipt provides a good measure of when the main issue of a case has first been docketed so that judges can start to find a decision. At least one date of receipt is available for 538 decisions on the merits in the analyzed dataset.

For all remaining proceedings - mainly those from 2004 onwards -, dates of receipt are added in the following order. First, the German Bundestag's Data Guide lists dates of receipt for all FCC proceedings from 1951-2012 that were initiated out of the Bundestag (Bundestag 2014; Schindler 1999). The data is consistent with the Court's record. Dates of receipt are added from this source for eight initial proceedings. Second, the date of receipt is mentioned in some decisions' published reasoning. This source contributes precise dates to an additional 16 proceedings. Third, the online press archives of the *Süddeutsche Zeitung* and the *tageszeitung* add dates of receipt for four abstract judicial reviews. Fourth, dates of receipt are estimated for the remaining cases.

Concrete judicial reviews enter the FCC on average 51 days after the ordinary court's order of suspension and referral (*Aussetzungs- und Vorlagebeschluss*).[101] Dates of receipt

[100] This conjecture is confirmed by a random sample of recorded file numbers that I have compared to the respective conjoint proceedings in the decision dataset.

[101] Dates of orders of suspension and referral are published in the rubrum of FCC decisions. This average

for 100 concrete judicial reviews are estimated accordingly. For the remaining proceedings, I refer to file numbers.

Let us consider constitutional complaints first. In most cases, the BvR-file number is consistent with the recorded order of received complaints. Let "1 BvR 354/01" be a complaint to be estimated. Then the closest complaints submitted before and after this file number in the same year and senate, of the same type, and with a known date of receipt are determined. Assume that dates are available for "1 BvR 295/01" received on March 3 and "1 BvR 380/01" on April 24, 2001. A uniform distribution of incoming requests is assumed, so the estimated date of receipt for our constitutional complaint would be April 8, 2001. The same procedure is applied for all remaining dates yet to be estimated. If, as a rare exception, the closest proceeding points to a date of receipt in a different year, the next closest complaint will be referred to. If there is no lower reference proceeding available, the constitutional complaint with consecutive number "1" will be assumed to be filed on January 1. If there is no higher reference proceeding available, the total number of received constitutional complaints in the respective year and senate is collected from the FCC (2014*a*)'s online statistics or from Bundesministerium der Justiz (1998)'s report. The last complaint will be assumed to be received on December 31. 126 dates of receipt for constitutional complaints are estimated this way. Dates for three abstract judicial reviews are estimated by a similar procedure.[102]

At least one recorded or estimated date of receipt is now available for all decisions on the merits. A case's duration is operationalized as the time difference in days between the earliest recorded or estimated date of receipt and the ultimate date of decision on the merits. On average, a senate proceeding in the analyzed dataset lasts 3 years and 2 months with a standard deviation of 2 years and 3 months. The total range is from 12 days (BVerfGE 82, 322) to 4355 days (BVerfGE 89, 132 and BVerfGE 89, 144).

A critical comment on the duration measure's content validity is needed. The policy bargaining model is tailored to explain the duration of senate consultations. Ideally, bargaining duration would be measured as the time period between the rapporteur's introduction of the Votum and the final decision on the merits (see section 2.5). This would exclude potentially long time periods of case preparation by the administration,

time period is computed based on the available data. The concrete judicial review proceeding with file number "2 BvL 10/82" was filed 1399 days after the respective order of suspension and referral. As an extreme outlier, it is excluded from calculation of the average. The average time period would have been 55 days, otherwise. The estimated time period is robust for classifications by decade or by federal vs. lower courts.

[102] The New Year's Day and New Year's Eve-assumption was slightly adjusted for these proceedings in order to account for the lower number of abstract judicial reviews per year.

the rapporteur, and involved judges. Since senate consultations are confidential, no such data is available. Instead, I measure the time period between the receipt of original files in the Court's office and the decision on the merits.

How does this affect measurement validity of my measurement? Random comparisons of the date of receipt to the partially available date of a proceeding's allocation to a rapporteur suggest that the administration typically forwards incoming request within few days. Administrative delay does not seem to be an issue. Complaints will enter the General Register only if they are obviously inadmissable or if they lack any chance of success. Even if a complainant insists on a decision by a judge, these complaints will most likely be closed by a chamber. Hence, I do not expect any major bias caused by the General Register either.

Constitutional complaint and concrete judicial review proceedings might have been in chamber consultation before they entered the senate. Even if the rapporteur has underestimated a proceeding's controversiality and opted for chamber consultation, the small group of three experienced judges would soon realize that there is no consensus and pass the proceeding to the entire senate. Chambers do not seem to be a major cause of delay in senate proceedings. Form of action-specific dummy variables will control for the formal possibility of chamber consultation.

Most of the non-senate consultation-related delay is likely to occur at the stage of rapporteur preparation. The rapporteur enjoys large discretion on when to introduce a case. The work pace of FCC judges is said to vary a lot (Kranenpohl 2010, 486). E.g., former FCC president Gebhard Müller allegedly complained about lazy colleagues, whereas Wolfgang Zeidler, one of his successors, is said to be a particularly hesitant judge (Lamprecht 2011, 90-97, 180). Unfortunately, the FCC does not publish data on rapporteur assignments that would allow for controlling this factor (Menzel 2011, 11). The rapporteur stage may cause a large proportion of unexplained variance in overall duration. But I do not expect systematic bias affecting the *direction* of preference-related effects. The more durable and intense a rapporteur expects a senate consultation to be, the more time he will invest into case preparation. A judge's general pace is independent from case-specific bargaining settings and can be regarded as random noise. If a major cause of senate bargaining duration is also related to delay in the rapporteur's preparation phase, it is likely to be in the same direction. A salience measure is included to control for the preponement of high-priority cases.

Senate bargaining duration is operationalized as the time period between a proceeding's earliest recorded or estimated date of receipt and the date of decision on the merits. This measure is imperfect but the best available. It is more precise than any previous data

on FCC proceeding duration. Control variables are included. There is substantial risk of underestimating the *size* of effects. A closer look at rapporteur incentives and the typical course of a proceeding suggests that the measurement is unlikely to bias the *direction* of predicted effects.

Hypotheses 4 and 5 refer to the adoption of the status quo as the dependent variable. The falsification of these hypotheses remains up to future research. FCC decisions have been hand-coded within the DFG project into four outcome categories from the plaintiff's or complainant's perspective: "no success", "partial success", "full success", and "other". One could argue that a non-success of the plaintiff typically indicates a status quo adoption by the FCC. However, in only eight out of 694 senate decisions under study has the plaintiff been coded as being completely unsuccessful in all partial proceedings. Such a limited variation in the dependent variable does not allow for a meaningful statistical analysis. The focus of this study is on bargaining duration and the development of a more direct measure to test hypotheses 4 and 5 is left for future analyses.

6.3.3. Independent Variables

All remaining hypotheses from section 5.3 shall be tested empirically. This section introduces empirical measures for each explanatory variable: the status quo position, preference heterogeneity, the number of judges, the majority threshold, preference uncertainty, and the discount factor. The section concludes with a set of control variables in order to prevent biased estimates. Table 6.1 (p. 134) gives an overview on all variables and their measurements.

Status Quo Position

Hypotheses 1-8 and 10-12 are conditional on the position of the legal status quo in relation to judges' preferences. I am not aware of any available measure that provides spatial policy positions for the whole set of German federal laws. It would be even harder to locate particular laws and empirical policy preferences of FCC judges on the same scales. Hence, there is no direct measure to the concept of relative status quo positions in FCC proceedings.

Instead, I rely on a set of auxiliary assumptions. FCC judges are nominated by the largest German political parties. Two-thirds majorities are necessary to elect a candidate (see section 2.3). Nominating parties have an incentive to propose candidates that are close to their own ideology and policy preferences. The two-thirds threshold makes compromise across party lines necessary so that ideologically extreme candidates would not

be elected. So there presumably is a moderate range of FCC judge preferences in relation to the policy space relevant to German legislative parties.

The second assumption is that policy positions of particular legislative acts can be approximated parties' voting behavior. Data in the extended GESTA dataset is summarized to a new dummy variable that indicates whether both CDU/CSU and SPD agreed (=1) to a law in the final vote by the Bundestag. This *broad legislative majority* variable serves as a proxy for low relative status quo positions, i.e. for bargaining situations where the legal status quo is located inside the set of FCC judge preferences. If a legislative act was more distant, at least one of the two major parties would be expected to disagree. For the 7^{th} legislative period, data on parties' voting behavior is not available. The broad majority variable then points to all enacted laws requiring the consent of the Bundesrat (*Zustimmungsgesetz*). The SPD/FDP coalition faced a CDU-dominated Bundesrat majority at that time. Laws requiring the consent of the Bundesrat could not be enacted without support by both christian and social democrats.[103]

A high relative status quo position, i.e. a legal status quo very distant to the set of FCC judge preferences is operationalized in a similar way. A new GESTA dummy variable *close legislative majority* indicates laws enacted against most votes of the large opposition party (SPD or CDU/CSU) the final Bundestag vote. No data is available for the 7^{th} legislative period. Enacted laws with ambigous information on voting behavior or abstentions by the large coalition party are coded 0 for both dummy variables.

Different objected measures in a proceeding can constitute separate policy dimensions. A single objected measure is sufficient to make judges bargain about a distant legal status quo. At the (conjoint) proceeding data level, the dummy variable *distant status quo* indicates whether at least one objected federal law was denied by either CDU/CSU or SPD in the final Bundestag vote (=1) or not(=0). The dummy variable *central status quo* indicates whether all objected federal laws were accepted by a broad majority of both CDU/CSU and SPD based on the previously discussed coding rule (=1) or not (=0). 284 proceedings are associated with a central SQ and 131 are associated with a distant SQ.

Preference Heterogeneity

The U.S. literature on judicial politics has developed numerous ways to measure ideological preferences of Supreme Court Justices (Epstein and Mershon 1996; Fischman

[103] A comparison to later periods shows that this is a valid proxy. When the federal government faced oppositional Bundesrat majorities in later periods, either SPD or CDU/CSU members of Bundestag voted against 10% of all enacted laws requiring the consent of the Bundesrat as opposed to 24% of all other enacted laws. A reasonable proxy for laws *not* requiring the consent of the Bundesrat is not available. Robustness checks show that the status quo operationalization for the 7^{th} legislative period does not substantially affect the main results of the analysis.

and Law 2009). Epstein, Landes and Posner (2013, 70ff) distinguish between *ex ante* preappointment measures of judicial ideology like the political party of the appointing president or senatorial courtesy, and *ex post* postappointment measures usually based on judicial voting behavior. For example, Segal and Cover (1989) analyze the content of newspaper editorials on Supreme Court justice nominees. For each justice, they derive a preappointment measure of perceived ideology.[104] Brace, Langer and Hall (2000) measure U.S. state Supreme Court judges' preferences based on elite and citizen ideology at the time of appointment.

Postappointment measures typically rely on observed voting behavior at the Court. Epstein, Landes and Posner (2013, 116ff) measure ideology as the fraction of a justice's conservative votes in non-unanimous cases. Martin and Quinn (2002) employ a dynamic item response model to Supreme Court voting data in order to estimate time-varying ideal points on a left-right dimension. Endogeneity problems will occur if this measure is used to explain a justice's voting behavior on the same cases (Epstein, Landes and Posner 2013; Martin and Quinn 2005). Lauderdale and Clark (2012) estimate a more dynamic voting behavior-based measure of judicial preferences. They show that preferences vary across time and issue dimensions. Bailey and Maltzman (2008; 2011) even locate time-varying preferences of Supreme Court justices, U.S. presidents, senators, and representatives in a common policy space. They make use of political statements on Supreme Court cases and judicial comments on precedent cases or votes as bridge observations. Bailey (2013) further extends and improves this approach.

No such distinct measure of judicial preferences is yet available on the FCC. Senate consultations are confidential and the Court does not reveal information on individual voting behavior. For most of the time, there was a tie between judges nominated by governing and opposition parties in both senates (Hönnige 2007, 172). So a simple dummy measure to indicate a judge's nominating party would not sufficiently describe preference heterogeneity across time and senates. FCC judges themselves do not view nominating parties or even party membership as reliable predictors of a judge's voting behavior (Kranenpohl 2010, 235f).[105] Wittig (2009) has coded ideological positions for FCC judges based on the ideological content of their own publications. Her method is similar to the operationalization by Segal and Cover (1989) but the data is limited to eight judges. Hönnige (2007; 2009, 174ff) operationalizes FCC judges' preferences as the nominating parties' ideological positions at the time of litigation. Shikano and Mack (2013) conduct

[104] See Segal et al. (1995) for an extended version.

[105] "Party political front-lines are less frequent at the FCC but there are different legal philosophies. Some are more 'thinkers of freedom' and others rather pronounce the welfare state" (FCC judge No. 29, cited by Kranenpohl 2010, 241, own transl.).

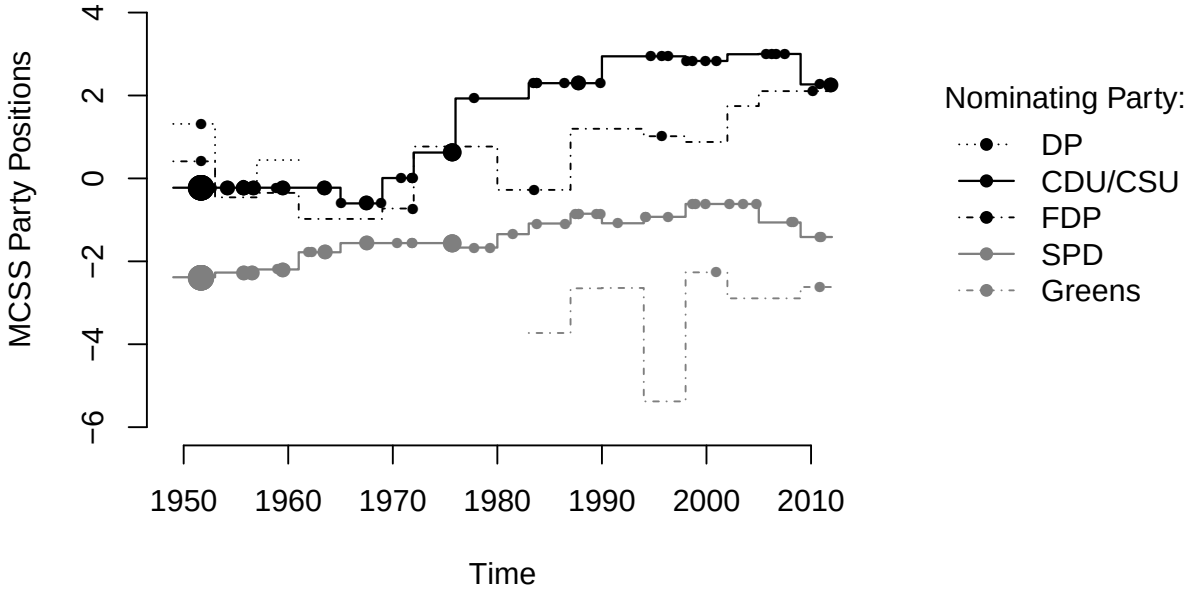

Figure 6.2.: **Party Positions and FCC Judge Elections (1951-2012):** MCSS party positions by legislative period (König, Marbach and Osnabrügge 2013). Solid circles mark elections of FCC judges nominated by the respective party. Circle area is proportional to the number of elected judges.

an item response analysis on published Sondervoten and derive a measure for FCC judges in the second senate. The latter two approaches allow to apply two alternative measures of judicial preferences in the study.

1. The preappointment measure by Hönnige (2007; 2009) is built upon and improved in two ways. First, a judge's prior preference is operationalized the nominating party's ideological position at the time of the judge's election.[106] Party leaders have a strong incentive to select ideologically close candidates (Benda, Klein and Klein 2012, 70). But once a judge is elected, the party does not have any control over his views. So there is no reason to expect that an elected judge would adjust his preferences to changing party ideology. A CDU-nominated judge will not become more conservative just because his party chooses to do so. Second, I use the more advanced measure of MCSS party positions provided by König, Marbach and Osnabrügge (2013). Their estimate combines information from party manifestos and expert surveys. Most importantly, they incorporate reasonable bridge observations so that party positions are comparable over time.

   Figure 6.2 illustrates the change of MCSS party positions over time. Solid circles

[106]Nominating parties are collected from Wild, Reislhuber and Rauchhaus (2011). Dates of election are collected from Badura and Dreier (2001*a*), Bundesrat records, and newspaper archives.

refer to elections of FCC judges by the respective party. Mostly due to a conservative shift by the CDU/CSU in the 1970s and 1980s, this measure indicates a historical increase in judicial preference heterogeneity.

2. The postappointment measure by Shikano and Mack (2013) is available for judges of the second senate only.[107] Their estimates of judicial positions are based on the occurence of published separate opinions. The measure substantially correlates with nominating parties. Both CDU- and SPD-nominated judges are more likely to publish separate opinions in favor of laws passed by their "own party" and against laws by the "other party" (Kneip 2009, 241). Following Kneip's data, 76% of all law-related separate opinions were in line with judges' affiliation to nominating parties. Technically speaking, Shikano and Mack's ideology measure is not entirely exogenous to the policy bargaining process. But since the dependent variable of interest is bargaining duration rather than individual voting behavior, I do not expect any substantial endogeneity bias.[108]

Figure 6.3 shows the empirical relation of these two judicial ideology measures. As expected, there is a strong overall correlation. The more conservative the nominating party's MCSS position at the time of judge election, the higher is the position estimate by Shikano and Mack. However, this association can largely be explained by the identity of the nominating party. There is no clear association between both measures *within* the subgroups of SPD- or CDU/CSU-nominated judges. So at least one of the measures does not quantify judicial ideology any better than a mere party dummy. Lamprecht (2011, 198)'s claim that former FCC president Wolfgang Zeidler's views on civic rights and duties were rather close to his conservative colleagues is more in line with the Shikano/Mack measure. A comparison to Wittig (2009)'s ideological values does not reveal a consistent picture. Since no measure is proven clearly superior to the other, both measurement alternatives are considered in the analysis.

At the proceeding level, prior preference heterogeneity is operationalized as the variance of all participating judges' preferences for each of these two measures. The set of participating judges is collected from published decisions. Time- and issue-specific estimates are desirable but yet unavailable.

The MCSS-based variance measure is slightly adjusted in order to prevent false conclusions. Since SPD and CDU/CSU MCSS party positions drift apart over time (see figure 6.2), the variance measure is strongly correlated with the date of decision. Now consider two proceedings that were docketed at the same time. The first enters senate consultations

[107] Many thanks to Susumu Shikano and Verena Mack for providing the yet unpublished data.
[108] The main results also hold for the subset of senate decisions without published separate opinions.

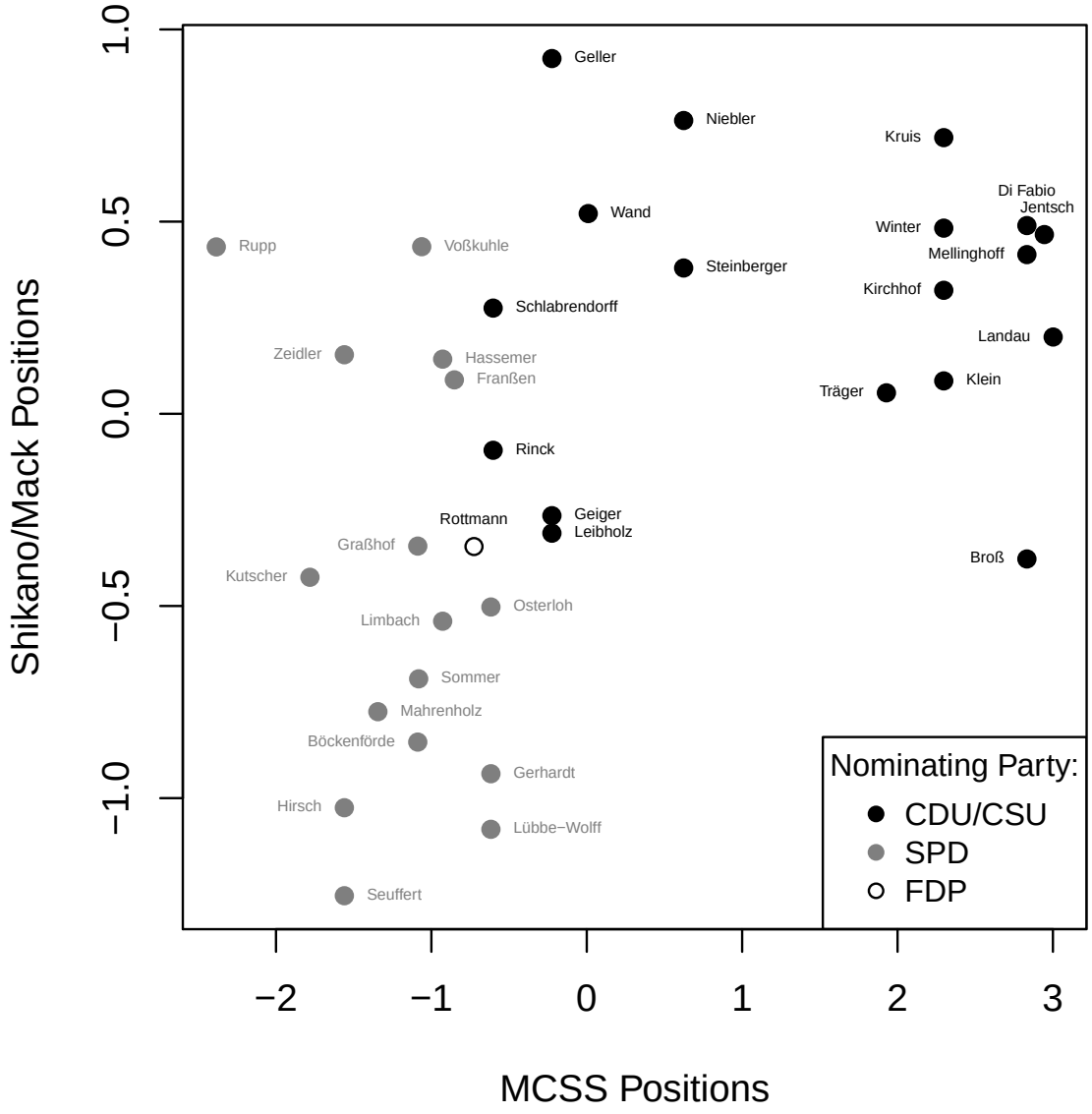

Figure 6.3.: **Comparing Judicial Ideology Measures:** FCC judge positions based on a) König, Marbach and Osnabrügge (2013)'s MCSS nominating party positions and b) Shikano and Mack (2013)'s estimates. Second senate only.

after two months and the second enters senate consultations after four years. Assume that the actual senate consultation process takes the same time in both proceedings. Within the first four years, at least one of the judges is likely to be newly elected. So preference heterogeneity in the eventual set of participating judges is probably higher for the second proceeding than for the first precisely because it spent more time in the pre-consultation process. The statistical analysis would show a positive heterogeneity effect on overall duration even though both consultation processes were equally long.

In order to minimize the risk of such false conclusions, the MCSS-based heterogeneity measure is included from the date of inauguration of the most recently elected judge of a proceeding only. From this point in time onwards, pre-consultation delay does not affect the set of participating judges. If a proceeding had been pending before at that point in time, the MCSS-based heterogeneity value for earlier time periods is set to the mean heterogeneity value of all pending proceedings at that time and in the same senate. As long as the final set of participating judges is unknown, this best represents the rapporteur's rational expectation on preference heterogeneity in the upcoming consultation process.

Number of Judges

The set and number of participating judges is collected from published senate decisions in BVerfGE (2012) and FCC (2014*b*). Judges that have initially participated in the consultation process but eventually dropped out due to illness or other reasons, are not listed in the final decision. So the measure tends to slightly underestimate the average number of judges along the entire bargaining process. So the analysis might slightly underestimate the size of the effect.

Majority Threshold

Senate decisions formally require a simple majority. The effective majority threshold depends on the prevailing norm of consensus at the time of the proceeding. Evidence from the U.S. literature suggests that Chief justice leadership is an important source of consensus orientation (see section 4.1).

The norm of consensus can not directly be observed and voting results on FCC decisions are rarely published. I will use the frequency of separate opinions as an indicator for the norm of consensus. The more prevailing the norm is, the less separate opinions are likely to be published. For each period of FCC presidents, I determine the senate-specific share of decisions on the merits with at least one published separate opinion.[109]

[109]Many thanks to Caroline Wittig for providing the data.

A three-level *norm of consensus* variable is derived. The first level includes senate-period combinations with a separate opinion share above 10%. This includes the second senate under the presidencies of Ernst Benda (1971-83), Wolfgang Zeidler (1983-87), Hans-Jürgen Papier (2002-10), and Andreas Voßkuhle (since 2010). The second level refers to separate opinion shares between 5% and 10%. This includes the second senate under the presidencies of Roman Herzog (1987-94) Jutta Limbach (1994-2002), and the first senate under Limbach and Papier. The third level refers to separate opinion shares below 5% and includes all remaining presidencies in the first senate. The measure is coded as a time-variant variable and the norm of consensus increases with higher levels. The higher the norm of consensus, the higher will be the effective majority threshold.

Preference Uncertainty

The longer judges know each other, the better they are able to predict their colleagues' preferences.[110] The variable *average contact time* describes for how long judges have been knowing each other on average. For each point in time and for each pair of participating judges, the duration in days of shared prior FCC judgeship is determined.[111] The case- and time-specific average of these values over all pairs of participating judges gives the average prior contact time. Negative values are set to zero.[112] The square root of these average values is computed so that differences in low contact time are weighted larger than differences at higher levels of contact time. Mutual learning effects per day are higher in the first months than after many years of working relations.

Increased contact time relates to lower levels of uncertainty. Hence, I expect a negative effect of contact time on bargaining duration. The longer judges know each other, the better they can estimate each other's preferences and the sooner they will find an agreement.

Discount Factor

The discount factor describes how much judges favor future policy utility over present policy utility. The higher the discount factor, the more patient judges are and the more decisive the long-term outcome of a proceeding is. Judges' case-specific patience is not directly observed and auxiliary assumptions are necessary. Short-term changes to the

[110] "The longer you are in there, the better is the basis for prediciton and the better you can foresee whether it will be *presumably* controversial or *presumably* unanimous" (FCC judge No. 19, cited by Kranenpohl 2010, 172, own transl., original emphasis).

[111] Dates of inauguration are collected from Badura and Dreier (2001*a*), the FCC website, and newspaper archives.

[112] This latter modification does not affect the main conclusions.

legal status quo will be more relevant for judges if the disputed legal norm is of urgent nature. 9% of all federal laws in the extended GESTA dataset were promulgated within three months after initiation. This includes non-trivial acts such as the Federal Electoral Amendment Act after German Reunification of Oct 8, 1990 (BGBl I, 2141 - eight days) and the Mad-Cow Disease Measures Act of Feb 19, 2001 (BGBl I, 226 - 15 days). In these cases, the legislator likely perceived some time pressure to accelerate the legislative process. If a policy is urgent to legislators, it will most likely also be urgent to FCC judges.

At the proceeding level, I take the average legislative duration over all objected federal laws as a proxy for discount factors. The dummy variable *low discount factor* indicates 50 proceedings with an average legislative duration of less than three months. A second dummy variable for particularly high discount factors is not included. A sample of promulgates laws suggests that very long-lasting legislative processes (> two years) are driven more by policy complexity and political controversy than by mere impatience.

Previous paragraphs have introduced empirical measures for the model's key explanatory variables. In the following, I will define a set of control variables and their operationalization. Procedural rules, issue salience, complexity, the Court's workload, and public awareness are often discussed factors in the judicial politics literature. They might be related to the key independent variables of this study and at the same time have a substantial impact on bargaining duration. I will control for these factors in order to gain largely unbiased estimates for the main effects of interest.

Procedural Rules

Formal and informal procedural rules might affect pre-consultation delay and the length of bargaining periods. E.g., concrete judicial review proceedings come with a pending lower court proceeding and might be dealt with a higher priority (Kranenpohl 2010, 91). Formal and informal procedures might differ between senates. The recently introduced instruments of delay objection and delay complaint might forestall overlong proceedings (see section 6.1). Dummy variables are included for the *form of action*, the *senate*, and years *since 2011*.

For conjoint proceedings, the form of action is coded based on the presumably most relevant form of action. The priorities are: If there is at least one abstract judicial review (BvF) or dispute between state organs (BvE) partial proceeding, the conjoint proceeding

will be coded BvF or BvE accordingly. No proceeding includes both of these forms of action. Else, if there is a concrete judicial review (BvL) partial proceeding, the conjoint proceeding will be coded BvL. If all partial proceedings are constitutional complaints (BvR), the conjoint proceeding will be coded BvR.

Salience

Issue salience is likely to affect pre-consultation delay. If a rapporteur considers a case to be salient, he will bring it forward to the senate with high priority. I expect the overall duration of salient proceedings to be shorter.

Epstein and Segal (2000) distinguish between measures of *retrospective* and *contemporary* salience in the judicial politics literature. Retrospective measures are typically based on constitutional law casebooks, official sources, Supreme Court citations, legal scholar articles etc. (Epstein and Segal 2000, 69). They identify decisions that are considered to be salient ex post. In contrast, measures of contemporary salience point to pending proceedings that actors perceived to be salient at that time. E.g., Epstein and Segal's salience measure indicates whether a case was covered by a New York Times frontpage article at the time of the proceeding.

No perfect salience measure is yet available for FCC decisions. Two alternative measures are selected for further analysis. First, a retrospective *decision salience* measure identifies whether a FCC decision is considered to be important by experts ex post. Experienced judges are likely to anticipate the long-term relevance of particular decisions and consider these proceedings to be salient. By definition, the measure is not exogenous to the proceeding under study. Since it does not directly depend on the *duration* of the proceeding, I do not expect substantial bias.

Second, a *policy salience* measure indentifies proceedings that deal with objections to historically important federal laws. The historical relevance of federal laws is judged by experts in retrospect. The measure is endogenous to the legislative bargaining process but not to the FCC proceedings.[113] The advantage of a reduced potential endogeneity bias as compared to the previous measure comes a downside. Objections at the FCC might refer to minor parts of generally salient laws. So the measure is less precise than the previous alternative. A clearly exogenous salience measure for FCC proceedings similar to the one by Epstein and Segal (2000) is desirable for future empirical analyses.

Both available measures are introduced in the following.

[113] In theory, ex post experts might consider legislative acts to be important just because these acts were confirmed or denied by the FCC. A random sample of legislative key decisions suggests that this criterion has not been of substantial impact for the selection of key decisions, though.

Decision Salience My first approach to measure FCC decision salience is very similar to the one by Cook (1993). She determines significant U.S. Supreme Court decisions by references in constitutional law casebooks and monographs. A factor analysis reveals the most valid measure. She generally prefers casebooks that appear in many editions to avoid bias towards more recent cases (Cook 1993, 1129f).

For the FCC context, I have evaluated twelve potential sources of retrospective decision salience measures:[114]

- Decisions mentioned in Wesel (2004, 373ff)'s comprehensive summary of FCC history. These decisions can be assumed to be of historical relevance. Wesel does not explicitly claim to name the most important decisions only, though.
- Decisions included in at least one of the three editions of the case collection "Decisions of the Federal Constitutional Court" by Grimm and Kirchhof (1993), Grimm and Kirchhof (1997), and Grimm, Kirchhof and Eichberger (2007). The collection targets law students and is supposed to cover the most important decisions on the main regulations of the Basic Law.
- Decisions included in at least one of the two editions by Menzel (2000) and Menzel and Müller-Terpitz (2011). This collection is supposed to include the FCC decision "classics", a cross-section over time and topics, and a mixture of dogmatically, historical-politically, and exemplarily important decisions (Menzel and Müller-Terpitz 2011, p. VI). The audience seems to be both general and academic.
- Decisions included in the collection "Decisions of the Federal Constitutional Court" by Schwabe (2004). According to earlier editions, this collection aims at first-year law students. More precise selection criteria are not available.
- "Featured cases" in the case collection by Kommers and Miller (2012, 833ff). The collection targets an international audience and covers selected topics of Basic Law jurisdiction.
- Decisions included in the *Süddeutsche Zeitung* online collection by Bentsche (2011). The interactive timeline collection is supposed to cover the 30 most important "decisions that changed Germany" between 1951 and 2011. *Süddeutsche Zeitung* is a leading, nationwide German newspaper with a general audience. So this list can be assumed to focus on historical, political and journalistic rather than purely academic judicial salience.

[114] Compare this approach to the list of 209 "key decisions" by Kranenpohl (2010, 104f).

- Decisions included in the collection by Robbers (2013). This source lists the most important basic rights-related decisions for law students attending Robbers' introductory lecture on constitutional law. It can be expected to have a rather academic focus limited to the subset of basic right cases.
- Decisions discussed by Säcker (2003, 101ff). This selection of decisions is part of a general introduction to the FCC published by the Federal Agency for Civic Education (*Bundeszentrale für politische Bildung*). The focus is likely to be on politically influential cases that can easily be assessed by a general audience.
- Decisions cited by Degenhart (2011). The law textbook focuses on constitutional law.
- Decisions cited by either Pieroth and Schlink (2006) or Pieroth and Schlink (2012). The law textbook focuses on basic rights.
- Decisions cited by Ipsen (2010*a*). The law textbook focuses on constitutional law.
- Decisions cited by Ipsen (2010*b*). The law textbook focuses on basic rights.

A principal component analysis is conducted for these measures. Figure 6.4 depicts the results for data on FCC decisions published in BVerfGE volumes 1-109.[115] All measures load positively on the first component, which accounts for 32.5% of overall variance. The first component seems to be related to overall decision salience. Textbook sources with a very academic target group have the lowest loadings, whereas the Grimm et al. and Menzel sources load highest.

The second component clearly distinguishes constitutional law-related sources with negative loadings from basic rights-related sources with positive loadings. Both the Grimm et al. and Menzel measures are almost neutral on the second component. A third component – not depicted in the graph – further separates academic sources with negative loadings (Degenhart, Pieroth/Schlink, Ipsen I/II) from popular sources with positive loadings (Süddeutsche Zeitung and - though less pronounced - Wesel, Kommers/Miller). Again, the Grimm et al. and Menzel measures are almost neutral.

The Grimm et al. and Menzel measures clearly qualify as the most preferred alternatives. They load highest on the first, general salience component. Epstein and Segal (2000, 68ff) discuss three sources of potential bias in salience measures: a selection will be *content biased* if it favors particular kind of issues. *Recency bias* will occur if it overweighs recent cases. *Time dependency* will be an issue if the instrument of interest was

[115]Data from Säcker (2003) is limited to volumes 1-100 and excluded from further analysis. A complete analysis for volumes 1-100 including Säcker's selection reveals almost identical results.

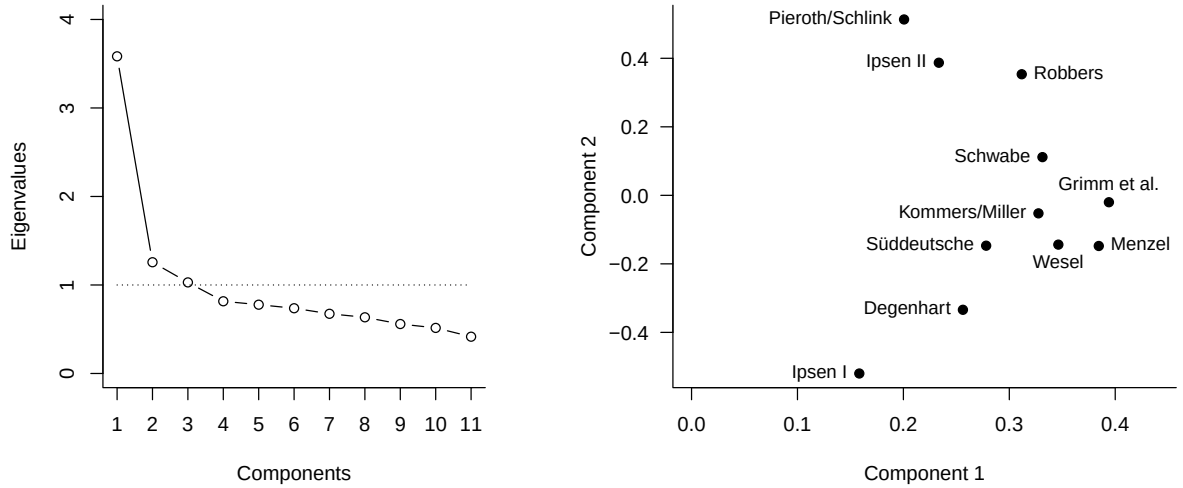

Figure 6.4.: **Principal Component Analysis of FCC Decision Salience Measures:** Salience measures on published FCC decisions in BVerfGE volumes 1-109. Scree plot on the left shows eigenvalues. Loadings of the first two components are depicted on the right.

more or less common over time. Both favored measures are largely unbiased in terms of legal area and academic vs. public audience, so content bias is unlikely. They both contain several editions so that the risk of recency bias is minimized (Epstein and Segal 2000, 68ff). Finally, the Menzel measure covers all FCC decisions until 2011, whereas the Grimm et al. measure is limited to BVerfGE volumes 1-115. In terms of completeness and time independeny, the Menzel salience measure is the most preferred one.

The dummy variable *decision salience* indicates all FCC decisions that are included in at least one of the two editions by Menzel (2000) and Menzel and Müller-Terpitz (2011).

Policy Salience The legislative act-based policy salience measure is collected from three different sources. First, Schindler (1999, 2595ff) provides a list of 177 most important federal laws in Germany from 1949-1994. This is an extended version of von Beyme (1998)'s list of "150 key decisions" as selected by legislative experts. Second, I add Reutter (2007, 304f)'s list of legislative key decisions in legislative periods 13-15 (1994-2005). He explicitly refers to Schindler's listing and aims to apply consistent criteria. Third, I add all federal laws from the 16^{th} legislative period (2005-2009) whose enactment is mentioned in Scharch's "Chronology of the Grand Coalition 2005-2009" (Scharch 2010).

With 30 laws mentioned in Scharch's chronology, the number of "key decisions" per period is much higher than in the previous sources. This does not heavily affect my analysis, though. Only five of these laws are dealt with by the FCC in the period under study: the Tax Amendment Act 2007 (BGBl 2006 I, 1652), the Health Care Reform of

2007 (BGBl I, 378), the Data Retention Act (BGBl 2007 I, 3198), the Economic Stimulus Package II (BGBl 2009 I, 416), and the Accompanying Act to the Treaty of Lisbon (BGBl 2009 I, 3022). All of these acts have been of major political relevance so that their classification as "key decisions" is reasonable.

The dummy variable *policy salience* indicates proceedings with objections to at least one legislative "key decision".

Complexity

The more complex a case is, the more time the rapporteur will need to prepare senate consultations. So issue complexity should be one of the control variables. Vanberg (2005, 104) operationalizes complexity of FCC proceedings based on policy area. He considers proceedings dealing with issues of economic regulation, state-mandated social insurance, civil servant compensation, taxation, the federal budget, and party finance to be complex. Issues from these policy areas typically touch several policy areas at once, they often involve technical regulatory questions and questions of revenue or ressource allocation. Vanberg codes institutional disputes, family law, the judicial process, individual rights, asylum rights, and military conscription as noncomplex policy areas.

The present study involves a larger set of FCC proceedings and information on policy areas is collected from the extended GESTA dataset. Vanberg's coding rule is adopted but slightly extended and adjusted to the GESTA categorization of policy areas. Following Vanberg's general line of argument, the policy areas labor and employment, foreign trade, foreign policy, international agreements, Europe and European Union, finance, budgetary policy, health, social security, and economy are considered to be complex. Noncomplex policy areas are education and research, family/women/seniors/youth, domestic policy including institutional issues and asylum rights, legal policy, culture, agriculture, regional planning, building and urban development, environment, abortion issues, transport and communication, and defense.

For each objected federal law, the policy area is collected from the extended GESTA dataset. The binary variable *policy complexity* indicates whether the majority of objected federal laws in a proceeding is from complex (1) or noncomplex (0) policy areas. 235 out of 470 proceedings with at least one link to the extended GESTA dataset are coded to deal with complex policy areas.

Caseload

In the first years of the FCC, the second senate came to decisions much faster than the first senate which was overloaded with constitutional complaints (Wesel 2004, 64). The

Court's caseload has heavily increased over time and still varies between senates. The higher a senate's workload, the longer a proceeding will likely be in the queue before it enters senate consultations. The opposite effect might occur, once a case enters senate consultations. The more alternative cases are pending, the higher will be the opportunity costs of continued negotiations. Either way, it is important to control for the overall caseload.

The variable *caseload* gives the number of docketed initial proceedings (in thousands) in the respective senate and year.[116] It is time-variant and varies from 5 cases in the second senate 1951 to 3710 cases in the first senate 2013. The data is collected from the FCC (2014*a*)'s online statistics.

Public Attention

Public attention on particular FCC proceedings might affect their overall duration. FCC judges are aware about the importance of public support (Kranenpohl 2010) and they learned from negative publicity in the 1970s, when the Court attracted attention due to controversial selections of judges, conflicting interviews and letters to the editor (Hermann 2010, 415). Yet, the direction of a potential public attention effect on delay is unclear. Judges have an incentive to speed up proceedings under public attention in order to appear as an efficient institution. On the other hand, they might be willing to invest more time into negotiating these proceedings in order to find an outcome that is more resistant to public opposition.[117]

Several measures of public attention on proceedings have been proposed before. Vanberg (2005, 103) measures public awareness by a binary variable of whether an oral argument was held and by the total number of amicus briefs filed by interest groups, lower courts, or governments. These measures are not suitable for the present study. Both the appointment of oral arguments and the number of amicus briefs are potentially endogenous to the dynamics of the bargaining process.

Vorländer and Schaal (2002) code newspaper articles from three leading German nationwide newspapers. They consider all articles from 1974-1998 with reference to FCC proceedings within about two months before and after the respective decision on the merits. A decision will be categorized as conflictual if it is mentioned in at least 10 articles (public awareness). Information on article types (reports, comment, and background

[116] The number of *pending* cases would be a better indicator for the overall caseload. Historical data is limited and this measure could not be collected or derived from related data for several years in the 1970s. Both measures are highly correlated and the number of newly *docketed* cases is a good proxy for overall caseload.

[117] Note that neither of these hypotheses is directly derived from the previously introduced bargaining model.

reports), lengths, and pages allows to further distinguish the measurement. Such a compelling measure for the whole period under study is preferable for future applications but yet unavailable.

Sternberg et al. (2014) provide a measure of specific public support on particular positions in FCC proceedings. They have collected public opinion survey data related to the topics of 94 FCC decisions involving abstract judicial reviews and disputes between federal organs and the Länder. These surveys have been conducted up to 18 months prior to the decision in order to ensure exogeneity. For each FCC decision, their measure gives the percentage of respondents in support of the opposition's position on the issue of dispute.

I will include Sternberg et al.'s public opposition measure as a proxy for public attention. It is coded only for forms of action that directly involve major political actors, i.e. for abstract judicial reviews and disputes between federal and Länder organs. These proceedings can be assumed to be of sufficient political salience to be recognized by public media. The higher the specific support for the opposition's position, the more interested the public will be in the outcome and the more likely the public will closely follow the proceeding. The variable *public opposition* indicates the percentage of respondents who support the opposition's position in that proceeding prior to the decision. It is available for 31 proceedings in the further analysis.

Table 6.1 summarizes the operationalization of all variables for further analysis. This chapter has discussed the research design including case selection, the statistical model, and choices of empirical measurements. An event history analysis is conducted in order to test the hypotheses derived in section 5.3. The duration of FCC proceedings is expected to depend on judicial preference heterogeneity, the relative location of the legal status quo, the effective majority threshold, the number of judges involved, the degree of preference uncertainty, and their discount factor. Results from event history analysis are presented in the following chapter.

Table 6.1.: **Operationalization of Key Variables**

Concept	**Measure**	**Data Source**	**Time-variant**
Dependent variable:			
Bargaining duration	Number of days between date of receipt and decision on the merits	FCC-provided data, Schindler (1999), Bundestag (2014), published decisions, Süddeutsche Zeitung, taz	
Independent variables:			
Distant status quo	Disagreement to at least one objected federal law by either CDU/CSU or SPD	GESTA	no
Central status quo	Agreement to all objected federal laws by CDU/CSU and SPD	GESTA	no
Preference heterogeneity	Nominating parties' MCSS positions	König, Marbach and Osnabrügge (2013)	yes
	Estimated judges' ideology positions	Shikano and Mack (2013)	no
Number of judges	Number of participating judges in final decision	Published decisions	no
Majority threshold	Norm of consensus (share of separate opinions)	Published decisions	yes
Preference uncertainty	Average mutual contact time	Badura and Dreier (2001*a*), FCC website, newspaper archives	yes
Discount factor	Legislative duration	GESTA	no
Control variables:			
Procedural rules	Form of action, senate, years $\geq$ 2011	Published decisions	no/no/ yes
Salience	Retrospective casebook	Menzel (2000), Menzel and Müller-Terpitz (2011)	no
	Key legislation	Schindler (1999), Reutter (2007), Scharch (2010)	no
Policy complexity	Policy area	GESTA	no
Caseload	Number of docketed cases	FCC (2014*a*)	yes
Public opposition	% of survey respondents	Sternberg et al. (2014)	no

7. Empirical Results

This study seeks to explain whether and how policy bargaining affects the duration of FCC proceedings. Chapter 6 has introduced the research design including case selection, the statistical model, the set of variables, and their measurements. An event history analysis is conducted in order to test the dynamic policy bargaining model with incomplete information as introduced in chapter 4.[118] The present chapter presents and discusses the empirical results.

The analysis is based on a Cox proportational hazards model (see section 6.2). Table 7.1 summarizes the estimated hazard ratios. At any given time in the bargaining process, the *hazard* is the probability of finding a collective bargaining outcome in that time period, given that judges have not found an agreement before. The *hazard ratio* is the factor by which the hazard of bargaining settlement increases with each unit in an independent variable.[119] If the hazard ratio is larger than 1, the independent variable will *increase* the hazard ratio and thereby *decrease* overall bargaining duration. If it is less than 1, it will increase overall bargaining duration. With bargaining duration as the dependent variable of interest in mind, hazard ratio estimates below 1 are associated with positive effects. The table shows hazard ratio estimates and their non-symmetric 95% confidence intervals for each independent variable.

Models 1 includes all independent variables except for the GESTA-related variables and the public opposition measure. Model 2 extends the set of independent variables by all measures related to the extended GESTA dataset. GESTA-related information is not available for FCC proceedings that refer to federal legislation prior to 1972. So model 2 is limited to a smaller set of proceedings to be analyzed, whereas all 694 proceedings with reference to federal legislation are included in model 1. There are two versions of model 1 with different measures of preference heterogeneity. Model 1a includes the preference measure derived from König, Marbach and Osnabrügge (2013)' MCSS data that is available for all proceedings. Model 1b is based on Shikano and Mack (2013)'s measure of judicial ideology and reduced to proceedings of the second senate.

[118] The R survival package (Therneau 2012) is used to run the statistical analysis.

[119] The assumption of proportional hazards has been checked an a graphical analysis of Schoenfeld residuals for all models.

Table 7.1.: Estimates from Event History Analysis on FCC Bargaining Duration

Hazard ratios	**Model 1**		**Model 2**	
[95% CI]	König et al.	Shikano/Mack	Central SQ	Distant SQ
Preference heterogeneity	.95		1.24	1.11
(König et al.)	[.85, 1.07]		[1.00, 1.54]	[.83, 1.50]
Preference heterogeneity		1.72		
(Shikano/Mack)		[.28, 10.51]		
Number of judges (7)	.78	.46	.53	.95
	[.58, 1.05]	[.26, .81]	[.29, .94]	[.39, 2.33]
Number of judges (8)	.80	.49	.53	.91
	[.60, 1.07]	[.29, .82]	[.31, .92]	[.39, 2.12]
Norm of consensus (2)	2.43	3.29	2.49	3.24
	[1.77, 3.34]	[2.22, 4.85]	[1.52, 4.08]	[1.62, 6.49]
Norm of consensus (3)	1.44		1.85	2.24
	[1.00, 2.08]		[1.02, 3.35]	[.83, 6.02]
Average contact time	1.13	1.14	1.15	1.16
	[1.11, 1.14]	[1.12, 1.17]	[1.13, 1.17]	[1.13, 1.20]
Short legislative duration			1.37	1.47
			[.91, 2.08]	[.69, 3.14]
Abstract judicial review	.58	.53	1.01	1.07
	[.29, 1.14]	[.26, 1.09]	[.35, 2.95]	[.22, 5.15]
Concrete judicial review	.55	.53	.75	.80
	[.29, 1.02]	[.28, 1.02]	[.33, 1.69]	[.16, 4.04]
Constitutional complaint	.54	.49	.68	1.03
	[.29, 1.00]	[.25, .95]	[.30, 1.55]	[.21, 5.09]
Second senate	1.34		1.46	1.98
	[.98, 1.83]		[.91, 2.37]	[1.04, 3.77]
Years since 2011	4.16	6.69	2.23	5.18
	[2.27, 7.61]	[1.51, 29.56]	[.87, 5.73]	[1.63, 16.43]
Decision Salience	1.00	.80	.60	1.28
	[.71, 1.43]	[.47, 1.38]	[.33, 1.11]	[.62, 2.66]
Key legislation			1.21	1.12
			[.91, 1.61]	[.74, 1.68]
Complexity			.81	1.00
			[.62, 1.06]	[.65, 1.54]
Caseload	.62	.48	.63	.66
	[.50, .77]	[.37, .61]	[.43, .94]	[.36, 1.20]
N	694	246	284	131
Likelihood ratio	883.3	305.6	405.8	212.6

The public opposition measure is available for only 31 abstract judicial review proceedings under study. Its estimated effect on duration lacks statistical significance and the main conclusions on other estimates of interest remain unchanged. Therefore, it will not be further considered in the following.

Most hypotheses derived in section 5.3 depend on further conditions like the relative location of the status quo or majority thresholds. Ideally, one could precisely test all these hypotheses with a large number of interaction effects. Given limited degrees of freedom and the very indirect measurement of most concepts, such an approach does not deliver any statistically meaningful results. Therefore, model 1 is limited to main effects: Model two offers two versions: The first is limited to the set of proceedings with a central location of the legal status quo (2a) and the second only includes proceedings with a distant status quo position (2b). Alternative combinations have been tested and they reveal a similar overall picture.

The empirical results presented in table 7.1 are analyzed in the following.

Preference heterogeneity is expected to prolong bargaining duration under simple majority rule and with distant status quo positions. When the status quo is central, it is expected to speed up the bargaining process (hypotheses 1-3). Neither measure of preference heterogeneity provides a clear picture. The point estimates of hazard ratios for the König et al. and the Shikano/Mack measures differ in direction. Due to very large confidence intervals that include the non-effect hazard ratio of 1 for both measures, no clear conclusion is derived. None of these two measures is superior[120] and model 2 is based on the König et al. measure with regard to its availability for both senates. The effect of preference heterogeneity in model 2a is right at the edge to statistical significance at the 95% level. Given a central status quo, bargaining duration thus decreases with preference heterogeneity – in line with hypothesis 2.

The **number of judges** is expected to increase bargaining duration when the status quo is distant and to decrease duration when the SQ is central (hypotheses 7-8). The empirical results are not in line with this expectation. All four models suggest that proceedings with seven or eight judges tend to be longer than proceedings with merely six judges. The hazard ratio estimate is closest to one in the distant SQ model (2b), just where it is expected to be negative. Surprisingly, there is hardly any difference between proceedings with seven versus eight judges. Merely 9% of all senate decisions under study were made by six judges and the estimates in 1a and 2b lack statistical significance. So the effect should not be overinterpreted.

[120]The likelihood ratio of model 1a being applied to the same restricted set of 246 cases as in model 1b is 308.3, i.e. almost identical to the likelihood ratio of 305.6 in model 1b.

The **majority threshold** is expected to prolong bargaining duration when the status quo is distant (hypothesis 6). Again, the empirical results are not in line with the expectation. Remember that the majority threshold is measured by the share of separate opinions in the respective senate and FCC chief judge period. When the status quo is distant, the duration of senate proceedings is predicted to *decrease* as the norm of consensus raises from level 1 to level 2. The large confidence interval and the change in direction from level 2 to 3 do not allow for a definite conclusion. The positive, i.e. duration-decreasing, and statistically significant hazard ratio estimates in models 1a, 1b, and 2a can not be explained by the dynamic policy bargaining theory.

Preference uncertainty is expected to increase bargaining duration (hypothesis 9). The more uncertain judges are about each other's preferences, the more time they will take to find an agreement. This is the only theoretically expected effect that is not conditional on further specifications of the bargaining environment. It is confirmed by empirical evidence: The average contact time consistently accelerates FCC proceedings in all models of analysis in table 7.1. The longer judges know each other, the more likely they are to agree immediately at any point in time and the shorter will be bargaining duration.

The **discount factor** is expected to increase bargaining duration when the status quo is distant. It will decrease duration when the status quo is central and judges decide by simple majority (hypotheses 10 - 12). Short legislative duration is a proxy for low discount factors (see section 6.3). The positive hazard ratio estimate in model 2b suggests that the discount factor decreases the hazard of immediate agreement and thereby prolongs bargaining duration. This is in line with hypothesis 10. But the large confidence interval includes the non-effect hazard ratio of 1, so the estimate is not statistically significant. Similar results are obtained in model 2a, where a slightly negative hazard ratio would be expected. The overall empirical evidence remains inconclusive.

Further estimates are related to **control variables**, which are not of major interest for our X-centered purpose. Caseload turned out to be the most important control variable. Both caseload and the König et al.-based preference heterogeneity measure are strongly related to time in an almost linear way. These two variables correlate with $r = 0.80$. Not controlling for caseload would have caused a strong, positive estimate for the preference heterogeneity effect. The large set of relevant control variables prevents from falling for such a false friend.

There is little empirical evidence for systematic impacts of political bargaining factors on the duration of FCC senate proceedings. Many hazard ratio estimates point to the expected direction and they are of substantive significance. E.g., figure 7.1 displays

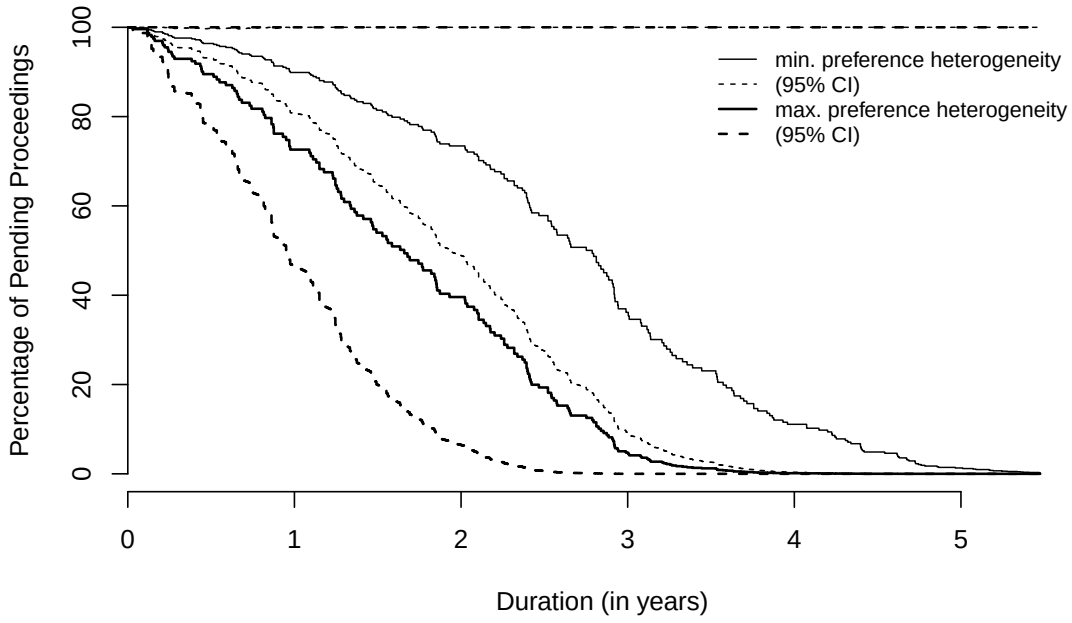

Figure 7.1.: **Predicted Impact of Preference Heterogeneity on the Duration of FCC Proceedings:** Predicted survival curves based on model 2a for minimum and maximum levels of empirical preference heterogeneity assuming eight judges, second senate, a concrete judicial review proceeding, norm of consensus level 2, all years before 2011, no short legislative duration, and all other parameters set to their empirical mean value.

predicted survival curves of FCC senate proceedings for different levels of preference heterogeneity based on estimates from model 2a. The prediction refers to eight judges in the second senate facing a concrete judicial review proceeding and a central status quo (see the figure's caption for further parameters). When the level of preference heterogeneity is highest, 50% of such proceedings are predicted to end within 1 year and 8 months. When preference heterogeneity is lowest, half of these proceedings last longer than 2 years and 10 months. More than one year of overall duration could be explained by preference heterogeneity in these extremes. But as discussed before, these estimates come with very large confidence intervals so that we can not draw definite conclusions.

The only robust and consistently statistically significant conclusion is on preference uncertainty: The longer judges know each other, the sooner they will come to collective agreements. Figure 7.2 illustrates predicted survival curves based on model 1a for two different levels of average contact time at the beginning of a proceeding (see the figure's caption for further parameters). If judges know each other for about one year at the beginning of a proceeding, the model predicts a 50% chance that the proceeding will end within 2.5 years. In contrast, if judges know each other for 5 years on day 1, they will find an agreement within 9 months with a 50% chance. Confidence intervals are relatively low

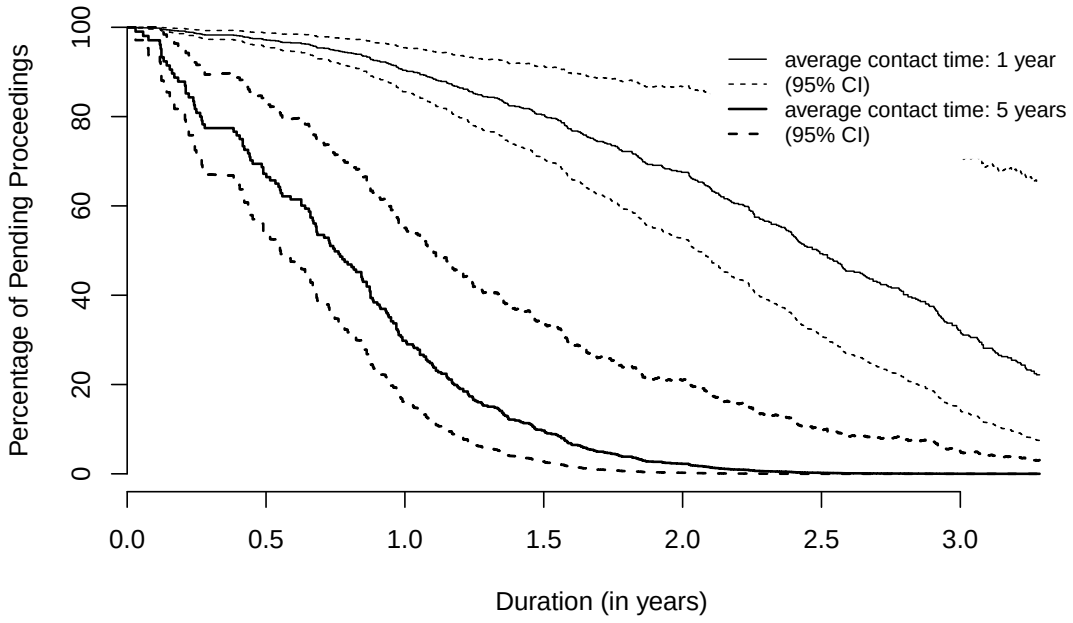

Figure 7.2.: **Predicted Impact of Preference Uncertainty on the Duration of FCC Proceedings:** Predicted survival curves based on model 1a. Predicted values for minimum and maximum levels of average contact time at the beginning of a proceeding. Further parameters: eight judges, second senate, concrete judicial review, norm of consensus level 2, all years before 2011, and all other parameters set to their empirical mean value.

so that these first differences are clearly distinguishable.

In summary, the dynamic policy bargaining model with incomplete information (see chapter 4) is applied to FCC senate proceedings. An event history analysis is conducted in order to investigate how preference heterogeneity, the number of judges, majority thresholds, preference uncertainty, and discount factors affect the duration of senate proceedings. For the first time, data on particular FCC proceedings has been linked to the extended GESTA dataset. The FCC administration has made dates of receipt available for scientific research for the first time. The data has been collected in the DFG project "The Federal Constitutional Court as a Veto Player" and will be publicly available.

There is little empirical evidence to support the dynamic policy bargaining theory, though. Bargaining duration in senate proceedings increases with preference uncertainty. Some further estimates point to the expected direction. They make a substantive difference in prediction but they often lack statistical significance. This might have two major reasons. First, senate consultations at the FCC might be less driven by policy preferences than we expect. Second, the very indirect measurements of central concepts might have

caused too much random noise to statistically filter out the associations of interest. Most importantly, the dependent variable includes a potentially long period of case preparation by the rapporteur that is not accounted for in the theoretical model. Some measures of independent variables like preference heterogeneity, majority thresholds, and discount factors depend on auxiliary assumptions instead of direct observation.

It is a challenge for future research to shed more light into the bargaining process of FCC consultations and to develop better measures of these concepts. For now, there is no definite answer to whether policy bargaining-related factors affect the duration of FCC proceedings. The impact of most of these factors on the overall duration of FCC proceedings has not been strong and systematic enough to clearly stand out from other causes.

Part IV.

Outlook

8. Summary and Conclusions

This thesis seeks to explain how judicial policy bargaining affects the duration of FCC senate proceedings. It starts off with building a new theory of dynamic policy-making with incomplete information. A new simulation method is developed in order to derive hypotheses. New data on FCC senate proceedings since 1972 is collected and combined to empirically test these hypotheses in an event history analysis.

Previous studies of policy bargaining processes do not provide a compelling, logically consistent answer to how and why policy preferences, the number of players, and majority thresholds affect bargaining duration (see chapter 3). The extension of Banks and Duggan (2006)'s sequential bargaining model by the assumption of incomplete information fills this gap (see chapter 4). In this new dynamic policy bargaining model with incomplete information, strategic players make alternating offers and votes until a collective outcome is found. They have incomplete information about each other's policy preferences and update their expectations each period based on observed voting behavior.

Due to a highly complex set of interdependent equations, an analytical solution of such a game is hard to derive. Instead, hypotheses are derived via computer simulations (see chapter 5). I develop a new estimation method of bargaining equlibria in games with complete information. The a priori, theory-driven reduction of potential outcomes to a small set of relevant policies in combination with a geometric, iterative solution procedure is much more computing-time efficient than previous estimation methods of complete, fine policy grids (see section 5.2.1). A simulation procedure tailored to the new dynamic policy bargaining model with incomplete information is developed (see section 5.2.2).

The simulation results reveal a much more complex picture of policy bargaining effects on duration than previous scholars have assumed (see section 5.3). For the selected range of starting values, bargaining duration will *increase* with preference heterogeneity, the majority threshold, the number of players, and the discount factor if the status quo is distant. But if the status quo is centrally located in the region of prior preferences, duration will *decrease* with preference heterogeneity under unanimity rule and with the discount factor under simple majority rule. Preference heterogeneity generally increases duration under simple majority rule. The degree of uncertainty prolongs the bargaining process.

These hypotheses are tested on empirical data on FCC senate proceedings. The database is new in that some variables like the list of inital proceedings' dates of receipt have never been available to scientists before. It is the first study that systematically links data on FCC proceedings to the extended GESTA database on German legislation as initiated by Hönnige and Gschwend (2010, see chapter 6). Despite these efforts on data collection, central measures remain indirect and most estimated results come with large confidence intervals (see chapter 7). The current database and the set of measurements only allow for limited conclusions. The longer judges know each other, i.e. the better they know each other's preferences, the sooner they will come to an agreement in senate proceedings. The impact of policy preference heterogeneity and other bargaining-related factors on the overall duration of FCC proceedings has not been strong and systematic enough to clearly stand out from other causes.

This thesis contributes to political science research in three important ways:

1. The new **model of dynamic policy bargaining with incomplete information** can be applied to almost any setting, where actors bargain about collectively setting a new status quo policy with at least some degree of preference uncertainty. This includes legislative decision-making, international politics, and coalition formation. No other model so far provides a more compelling and consistent explanation of how policy bargaining-related factors affect duration. Different, more distinguished hypotheses than in previous accounts are derived. Empirical scholars of policy bargaining duration should take the variety and conditionality of these conclusions seriously and focus on more explicit and careful hypothesis-building.

   Even if bargaining duration is not the feature of interest, such a model will better explain dynamic bargaining processes than classic, static veto player theory. Different outcomes and voting coalitions are predicted, so that scholars should carefully select their model of choice.

2. The study promotes the use of simulation methods in political science. The new **simulation procedure** based on set of relevant policies reduces required computing time and can be applied to solve other complex policy bargaining games. The R code of the simulation procedure is published in the appendix so that scholars can run their own simulations on both versions of the dynamic bargaining model discussed in this thesis.

3. The **empirical data** analysis offers a large set of measurements and combined data sources available for future studies on the FCC. Most data has been collected

within or in cooperation with the DFG project "The Federal Constitutional Court as a Veto Player" and will be available for further analyses. Scholars will benefit from combining these different sources of valuable data.

In all of these three core areas, potential improvements remain for future studies. First, some assumptions of the dynamic bargaining model should be relaxed. Opportunity costs of continued bargaining are obvious and they should be considered in future versions of this model. The role of public opinion and external actors should be considered explicitly in order to account for incentives of decision-makers that are embedded in an external institutional setting.

Second, the simulation procedure can be further improved. Most importantly, it should account for more than two dimensions so that hypotheses on the impact of issue complexity can directly be derived. Once we have more precise data on current judges' positions and currently pending cases, simulations could be used to predict courses of actual, not yet observed bargaining processes.

Third, much work is to be done on the improvement of empirical measures. The U.S. judicial politics literature is much more advanced in this respect. More precise measures of judicial preferences and the course of particular FCC proceedings would be most valuable. Once private notes of FCC judges become available, this rich source of information might be used for more revealing studies on judicial behavior – comparable to the work by Epstein and Knight (1998) who used private notes of four former justices. Until now, the FCC has not even published data on the voting behavior of individual judges. This restrictive manner will not sustain in the long run: The archival retention period of 60 years has already expired for the very first FCC decisions. The Court should soon make its internal notes on historical proceedings available (Benda, Klein and Klein 2012, 135f). So there is hope for future political scientists to get a closer look into internal negotiations at one of the world's most powerful constitutional courts.

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Part V.

Appendix

A. Simulation Source Code

The source code of both computer simulation models presented in chapter 5 is documented and commented in the following. The simulation was conducted in R 2.15.3 (Development Core Team 2008). No further packages are needed. See sections 5.2.1 and 5.2.2 for further comments.

The source code is commented in small packages of coding lines. The original code can be restored by merging the code snippets (presented in boxes) in the order of presentation.

A.1. Bargaining Model with Complete Information

The function `banksduggan` returns a vector $v^C(\sigma)$ of n continuation values in stationary equilibrium of the dynamic policy bargaining game with complete information. The input parameters are the number of players n (`n.judges`), the majority threshold m (`n.majority`), the number of dimensions $d = 2$ (`n.dim`), the $d \times n$ matrix of ideal positions X_{pos} (`Xpos`), the position vector of status quo q (`sq`), the discount factor δ (`discount`), the vector of recognition probabilities ρ (`rho`), and the degree of precision for returned continuation values as the number of identical decimal places (`round.digits`).

```
banksduggan <- function(n.players, n.majority, n.dim=2, Xpos, sq,
  discount, rho, round.digits){
```

In preparation of the iteration procedure, the iteration count variable `count` is set to 0. The status quo utility $u_i(q)$ is calculated for all players and saved as vector `Usq` of length n. Initial continuation values for the first iteration stage are defined by status quo utilities and saved as vector `contvalue` of length n. The matrix `cviterations` collects the estimated continuation value rounded to `round.digits` decimal places for each iteration stage.

If $\pi_i(X \setminus A) = 1$ for all i and $\delta = 1$, $v_i(\sigma)$ would need to be calculated dividing by zero. So equation 4.7 holds true only for $\delta < 1$. Larger input discount factors are set to .999999999.

```
count <- 0
Usq <- -colSums((sq-Xpos)^2)
contvalue <- Usq
cviterations <- round(contvalue,round.digits)

if(discount>=1){discount<-.999999999}
```

The iteration procedure is further prepared. Some computations do not need to be repeated for each iteration stage separately. They are conducted in advance in order to save computing time. The matrix `ijcountA` contains all order-sensitive combinations of two ideal points and is needed for further calculations of intersection points. The matrix `strlinesA` contains vectors of straight lines from all players j to i as listed in `ijcountA`. Vector `lengthstrlinesA` contains the length of these lines. The matrix `ijcountBfull` contains all unique combinations of ideal points irrespective of their order of appearance. The matrix `strlinesBfull` contains vectors of straight lines from all players i to j as listed in `ijcountBfull` and vector `cfull` contains the length of these lines.

The rotation matrix $R(\pi/2)$ is saved as `Rotmatrix`.

```
disc_Usq <- (1 - discount) * Usq
ijcountA <- which(!diag(n.players),arr.ind=T)
strlinesA <- Xpos[,ijcountA[,1]] - Xpos[,ijcountA[,2]]
lengthstrlinesA <- sqrt(colSums((strlinesA)^2))
ijcountBfull <- which(lower.tri(matrix(,n.players,n.players)),
  arr.ind=T)
strlinesBfull <- Xpos[,ijcountBfull[,2]] - Xpos[,ijcountBfull[,1]]
cfull <- sqrt(colSums((strlinesBfull)^2))
Rotmatrix <- matrix(c(0,1,-1,0),2,2)
```

The iteration procedure is coded in a `repeat`-loop and starts with increasing the iteration count variable by 1. The radii of indifference curves $I(\tilde{x})$ are computed and saved as vector `r` of size n.

In the following, the set of relevant policies X_R is determined. Most of the following lines deal with the intersection of two indifference curves. The ideal point combination matrix `ijcountB`, the vector of straight connecting lines `strlinesB` and the length of these vectors `c` are reset to their initial values. This will only be important at subsequent iteration stages. The vectors `a`, `b`, and `c` refer to the lengths of triangle sides |BC|, |AC|,

and |AB| in figure 5.2c. The vector `nointersect` indicates all ideal point combinations in `ijcountB` with non-intersecting indifference curves. A marginal tolerance is added in order to deal with potential rounding errors. Ideal point combinations with non-intersecting indifference curves are excluded from the lists and no further considered at this iteration stage.

For the remaining combinations, α (`alpha`), |HC| (`height`), and |AH| (`cAh`) are derived. The derivation is slightly adjusted for rare cases, where the triangle's height meets the ground line segment $\overline{AB}$ exactly at point A. The interim calculation of `Xpos_ijcountB1`. The position of the foot of the height H is computed and saved as vector `Hc` for each ideal point combination.

The set of relevant policies X_R is calculated as described in section 5.2.1. All relevant policies in X_R are saved as $d \times |X_R|$ matrix `X`, where $|X_R|$ is the cardinality of X_R. `X` is reduced to non-missing values in order to prevent calculation errors. Missing values can occur in the case of identical ideal points.

```
repeat{
  count <- count+1
  r <- sqrt(abs(disc_Usq + discount * contvalue))

  ijcountB <- ijcountBfull
  strlinesB <- strlinesBfull
  c <- cfull
  b <- r[ijcountB[,1]]
  a <- r[ijcountB[,2]]
  nointersect <- (c > a+b-0.00000001) | (c < abs(a-b)+0.00000001)
  if(any(nointersect)){
    ijcountB <- ijcountB[-which(nointersect),]
    strlinesB <- strlinesB[,-which(nointersect)]
    a <- a[-which(nointersect)]
    b <- b[-which(nointersect)]
    c <- c[-which(nointersect)]
  }
  alpha = acos((b^2+c^2-a^2)/(2*b*c))
  height <- b * sin(alpha)
  cAh <- sqrt(b^2 - height^2)
  if(any(cAh==0)){
    ijcountB[which(cAh==0),] <- ijcountB[which(cAh==0),2:1]
```

```
    strlinesB <- Xpos[,ijcountB[,2]] - Xpos[,ijcountB[,1]]
    c <- sqrt(colSums((strlinesB)^2))
    b <- r[ijcountB[,1]]
    a <- r[ijcountB[,2]]
    alpha = acos((b^2+c^2-a^2)/(2*b*c))
    height <- b * sin(alpha)
    cAh <- sqrt(b^2 - height^2)
  }
  Hc <- Xpos[,ijcountB[,1]] + rep(((-2*(alpha>pi/2)+1) * cAh / c),
    each=n.dim) * strlinesB

  X <- cbind(Xpos, sq, Xpos[,ijcountA[,2]] +
    rep(r[ijcountA[,2]]/lengthstrlinesA,each=n.dim)*strlinesA,
    Hc + rep(height / cAh,each=n.dim) * (Rotmatrix %*%
    (Hc-Xpos[,ijcountB[,1]])), Hc + Rotmatrix %*% (rep(height / cAh,
    each=n.dim) * (Xpos[,ijcountB[,1]]-Hc)))
  X <- X[,!is.na(colSums(X))]
```

The procedure continues with the estimation of players' voting strategies. Each player i's utility $u_i(x) = -(\tilde{x}^i - x)^2$ of each relevant policy $x \in X_R$ is computed and saved as $|X_R| \times n$ matrix `Ux`. The vector `A` indicates whether a relevant policy in `X` is socially accepted by at least m (`n.majority`) players. For the derivation of A, policy utilities are rounded to the sixth decimal place in order to prevent rounding error issues.

```
  Ux <- -colSums((aperm(array(Xpos,dim=c(n.dim,n.players,dim(X)[2])),
    c(1,3,2)) - array(X,dim=c(n.dim,dim(X)[2],n.players)))^2)
  A <- colSums(t(round(Ux,6)) >= round(-r^2,6)) >= n.majority
```

Proposal strategies are estimated. `maxUA` determines the maximal level of utility achieved from socially accepted policies for all players. The $|X_R| \times n$ matrix `PIi` indicates the optimal socially accepted policies for each player i. `PIicolsums` is a vector of length n that gives the number of optimal policies for each player that are aubjectively preferred over continued bargaining. The vector `sumrhoPcs` indicates all players that prefer no socially accepted policy alternative over continued bargaining. These players would propose a socially unaccepted policy $x \in X \setminus A$.

Each player's continuation value is computed as defined in equation 4.7 and saved to the vector `contvalue` of length n. The estimated continuation value is rounded to `round.digits` decimal places and added to the `cviterations` list.

```
    maxUA <- apply(matrix(Ux[A,],,n.players),2,max)
    PIi <- t((round(t(Ux)-maxUA,6)==0)*(round(maxUA,6)>round(-r^2,6)))*A
    PIicolsums <- colSums(PIi)
    sumrhoPcs <- sum(rho*(PIicolsums==0))

    contvalue <- (sumrhoPcs * disc_Usq +
      colSums(rbind(rep(rho/PIicolsums,PIicolsums) *
      Ux[which(PIi==1,arr.ind=T)[,1],])) / (1 - discount * sumrhoPcs)
    cviterations <- rbind(cviterations, round(contvalue,round.digits))
```

If the estimated (rounded) continuation values are identical to the estimates at the previous iteration stage, they are returned and the procedure ends. If the rounded estimates are identical to a previous set of estimates at any previous iteration stage, mean continuation values over all iteration stages following that previous duplication are computed and returned. The estimation procedure ends.

Otherwise, a new iteration stage starts with yet another set of relevant policies, acceptance sets, proposal strategies, and continuation values to be computed.

```
    if(all(cviterations[count+1,]==cviterations[count,])){
      return(contvalue)
      break
    }
    if(anyDuplicated(cviterations)){
      contvalue <- colMeans(cviterations[which(duplicated(cviterations,
        fromLast=T)):count,])
      return(contvalue)
      break
    }
  }
}
```

A.2. Bargaining Model with Incomplete Information

The function `bargainingsim` returns a list on all relevant input parameters and predicted features of the simulated bargaining process. The input parameters are the number of

players n (`n.players`), the majority threshold m (`n.majority`), the number of dimensions $d = 2$ (`n.dim`), the discount factor δ (`discount`), a $d \times n$ matrix of prior positions μ (`priors`), the status quo position q (`sq`), the vector of recognition probabilities ρ with a standard setting of equal recognition probabilities (`rho`), the square root of the degree of uncertainty $s = \sqrt{s^2}$ (`sd.pos`), the standard deviation of the normal distribution from which potential proposals are drawn from (`sd.proposals`), the number of potential proposals $x_P \in X_P$ to be drawn (`n.proposals`), the number $k = 500$ of presumed ideal points to be drawn for each player (`n.presumed`), the number $l = 50$ of estimated complete information continuation values per presumed ideal point (`n.cvsims`), the degree of estimated continuation value precision to be passed to the complete information procedure (`round.digits`). `sd.proposals` is set to $\sqrt{\texttt{sd.latent}^2 + \texttt{sd.pos}^2}$ so that the distribution of potential proposals approximates the distribution of players' expected ideal positions.

```
bargainingsim <- function(
  n.players,
  n.majority,
  n.dim=2,
  discount,
  priors,
  sq,
  rho=rep(1/n.players,n.players),
  sd.pos,
  sd.proposals=sqrt(sd.latent^2 + sd.pos^2),
  n.proposals=10000,
  n.presumed=500,
  n.cvsims=50,
  round.digits=1,
```

The `bargainingsim` procedure is nested and called for every bargaining period. Thus, further variables are defined in the command line that are not supposed to be user's input. A $d \times n \times k$ array of presumed ideal points is generated in the first round (`Xpos_subj`). A $d \times n$ matrix of ideal points $\tilde{x}$ is drawn from this array (`Xpos`).

```
  Xpos_subj=array(rnorm(n.dim*n.players*n.presumed,priors,sd.pos),
    c(n.dim,n.players,n.presumed)),
  Xpos=matrix(Xpos_subj,n.dim)[,(1:n.players)+n.players*(
    sample(n.presumed,n.players,replace=T)-1)],
```

Further initially generated variables are a period count variable t that is set to $t = 1$ for the first period (`period`), a $t \times d$ matrix to document the history of proposals (`prophistory`), a $t \times n$ matrix to document voting history (`votehistory`), a vector of length t to document the history of proposers p (`proposer`), an $n \times k$ matrix indicating vote consistency ω (`voteasexpected`), a vector of length n that indicates the current number of consistent presumed ideal points for each player (`n_expvotes`), and a vector of length t to document periods where no majority is expected to be reached for any proposal (`no_maj_exp`). In the first period, no vote has been observed yet, so no presumed ideal point is inconsistent with previous observations.

```
period=1,
prophistory=matrix(NA,1,n.dim),
voteshistory=matrix(NA,1,n.players),
proposer=NA,
voteasexpected=matrix(T,n.players,n.presumed),
n_expvotes=rep(n.presumed,n.players),
no_maj_exp=NA
){
```

At the beginning of each period's procedure, expected continuation values $Ev(\sigma)$ are estimated and saved as $n \times k$ matrix `contvalues_subj`. In preparation to do so, a $d \times n \times k \times l$ array is created. `Xpos_subj_sim[,,,1]` is equal to `Xpos_subj`. Each of these $n \times k$ ideal positions also exists in each of the $l - 1$ following elements of the 4th dimension, but in different order. So for each presumed ideal point in X_θ (`Xpos_subj`), the array `Xpos_subj_sim` contains l randomly generated games with complete information.

```
Xpos_subj_sim <- array(Xpos_subj,dim=c(n.dim,n.players,n.presumed,
  n.cvsims))
sample <- array(rep(1:n.presumed,each=n.players),c(n.players,
  n.presumed,n.cvsims))
for(m in 2:n.players){
  for(n in 2:n.cvsims){
    sample[m,,n] <- sample(n.presumed,n.presumed)
    Xpos_subj_sim[,m,,n] <- Xpos_subj_sim[,m,sample[m,,n],n]
  }
}
```

For each of these $k \times l$ complete information preference constellations, continuation values are estimates and saved as $k \times n \times l$ array `contvalues_subj_sim`

```
contvalues_subj_sim <- array(NA,c(n.presumed,n.players,n.cvsims))
for(i in 1:n.presumed){
  for(n in 1:n.cvsims){
    contvalues_subj_sim[i,,n] <- banksduggan(n.players=n.players,
      n.majority=n.majority, n.dim=n.dim, Xpos=Xpos_subj_sim[,,i,n],
      sq=sq, discount=discount, rho=rho, round.digits=round.digits)
  }
}
```

For all presumed ideal positions x_θ, the expected continuation value is computed by the mean estimate over all respective complete information procedures and saved as $n \times k$ matrix `contvalues_subj`. For subsequent period $t > 1$, the source code is slightly modified in order to account for varying numbers of consistent presumed ideal points for different players.

```
for(m in 2:n.players){
  for(n in 2:n.cvsims){
    contvalues_subj_sim[sample[m,,n],m,n] <- contvalues_subj_sim[,m,n]
  }
}

if(period==1){
  contvalues_subj <- rowMeans(contvalues_subj_sim,dims=2)
} else{
  contvalues_subj <- matrix(NA,n.presumed,n.players)
  for(i in 1:n.players){
    if(n_expvotes[period,i]==n.presumed){
      contvalues_subj[,i]<-rowMeans(rbind(contvalues_subj_sim[,i,]))
    } else{
      for(n in 1:n_expvotes[period,i]){
        contvalues_subj[n,i] <- mean(contvalues_subj_sim[which(
          colSums(Xpos_subj[,i,n]==cbind(Xpos_subj[,i,]))==n.dim),i,])
      }
      Xpos_subj[,i,((n_expvotes[period,i]+1):n.presumed)] <- NA
    }
```

```
  }
}
```

Continuation values $v^t(\sigma)$ are extracted from `contvalues_subj` (see p. 79).

```
contvalues_Xpos <- NA
for(i in 1:n.players){
  contvalues_Xpos[i] <- contvalues_subj[which(colSums(Xpos[,i]==
    cbind(Xpos_subj[,i,]))==n.dim)[1],i]
}
```

A proposer is selected based on recognition probabilities `rho`. The identity of the current proposer is saved as `proposer.id` and documented in `proposer`.

```
proposer.id <- sample(n.players,size=1,prob=rho)
proposer[period] <- proposer.id
```

The set of potential proposals X_P is generated.

```
proposals <- matrix(rnorm(n.dim * n.proposals, 0, sd.proposals),
  n.proposals, n.dim)
proposals[sample(n.proposals,2),] <- rbind(sq, Xpos[,proposer.id])
```

Expected voting strategies $Ev_i^t(x_P)$ are generated for all players i on all potential proposals x_P. The estimated probabilities of player i's agreement to policy x_P is saved as $n \times |X_P|$ matrix `agreementprobs`. Since the proposer is fully informed about her own position, her probabilities will be either 1 or 0.

```
agreementprobs <-
  colMeans(aperm((
    round(-colSums((
      aperm(array(proposals, dim=c(n.proposals, n.dim, n.players,
        n.presumed)), c(2,3,4,1))
      - array(Xpos_subj,dim=c(n.dim,n.players,n.presumed,n.proposals))
    )^2), 2)
  >=
    round(c((1 - discount) * -colSums((sq-Xpos_subj)^2)
    + discount * t(contvalues_subj)),2)
  ), c(2,1,3)), na.rm=T)
```

```
agreementprobs_as <- agreementprobs
agreementprobs_as[proposer.id,] <- round(-colSums((t(proposals)
  - Xpos[,proposer.id])^2), 2) >=  round((1 - discount) * -sum((sq -
    Xpos[,proposer.id])^2) + discount * contvalues_Xpos[proposer.id],2)
```

Based on these expected voting strategies, the estimate of the social acceptance set $EA_j^t(x_P)$ as expected by proposer j is derived. The array `combmat` lists all combinations of majority coalitions for each potential proposal. It is needed for efficient computation only. `majorityprobs_as` is a vector that indicates the probability of gaining a majority for each potential proposal as expected by the proposer.

```
if(n.players==n.majority){
  combmat <- aperm(array(unique(1 - matrix(0,n.players,1), MARGIN=2),
    c(n.players, sum(choose(n.players,(n.majority:n.players))),
    n.proposals)), c(1,3,2))
} else {
  combmat <- aperm(array(unique(1 - combn(c(1:(n.players+n.majority)),
    n.players - n.majority, tabulate, nbins=n.players), MARGIN=2),
    c(n.players, sum(choose(n.players,(n.majority:n.players))),
    n.proposals)), c(1,3,2))
}

majorityprobs_as <- rowSums(apply(combmat * c(agreementprobs_as)
  + (1 - combmat) * (1 - c(agreementprobs_as)),c(2,3),prod))
```

If the proposer expects no proposal to have any chance to find a majority, this is documented in `no_maj_exp` and he randomly chooses the first proposal that makes him better off. Otherwise, the proposer's expected utility is computed for all x_P and saved as vector `exputil_as`. The first proposal with maximum expected utility is selected with a marginal preference of 10^{-8} for immediate agreement. `exputil_as` is removed and `no_maj_exp` is set to FALSE for the current period. The proposal is saved as vector `prop` of length d.

```
if(sum(majorityprobs_as)==0){
  prop <- rbind(proposals[agreementprobs_as[proposer.id,]==1,])[1,]
  no_maj_exp[period] <- T
} else{
```

```
  exputil_as <- (-colSums((t(proposals)-Xpos[,proposer.id])^2) + 10^-8)
    * majorityprobs_as + ((1-discount)*-sum((sq-Xpos[,proposer.id])^2)
    + discount * contvalues_Xpos[proposer.id]) * (1-majorityprobs_as)
  prop <- proposals[which.max(exputil_as),]
  rm(exputil_as)
  no_maj_exp[period] <- F
}
```

Each player's voting decision on proposal `prop` is calculated and saved as vector `votes` of length n.

```
votes <- round(-colSums((prop-Xpos)^2),2) >= round((1 - discount) *
  -colSums((sq - Xpos)^2) + discount * contvalues_Xpos,2)
```

Variables that are no more needed are removed from working space in order to save memory for computations in subsequent periods.

```
rm(m,n,agreementprobs,agreementprobs_as,majorityprobs_as,combmat,
  contvalues_subj_sim,Xpos_subj_sim,sample,proposer.id,contvalues_Xpos)
```

Proposals and votes are documented in `prophistory` and `voteshistory`.

```
if(period==1){
  prophistory[1,] <- prop
  voteshistory[1,] <- votes
} else {
  prophistory <- rbind(prophistory,prop)
  voteshistory <- rbind(voteshistory,votes)
}
```

If the proposal is accepted, the procedure ends with the last proposal being the outcome. A list `results` of variables relevant for further analysis is generated.

```
if (sum(votes)>=n.majority){
  outcome <- prop
  results <- list(periods=period, outcome=outcome, n.players=n.players,
    n.majority=n.majority, n.dim=n.dim, discount=discount, rho=rho,
    priors=priors, Xpos=Xpos, sq=sq, sd.pos=sd.pos,
    sd.proposals=sd.proposals, n.proposals=n.proposals,
```

```
    n.cvsims=n.cvsims, round.digits=round.digits,
    prophistory=prophistory, voteshistory=voteshistory,
    Xpos_subj=Xpos_subj, votes=votes, proposer=proposer,
    n_expvotes=n_expvotes, no_maj_exp=no_maj_exp)
```

Otherwise, player's expectations are updated. For each presumed ideal point x_θ^i, the consistency with i's just observed vote is determined and saved as matrix `voteasexpected`. The variable `contvalues_subj` is not further needed and removed.

```
} else {
  voteasexpected <- (votes == (round(-colSums((prop-Xpos_subj)^2),2)
    >= round((1-discount) * -colSums((sq - Xpos_subj)^2) + discount *
    t(contvalues_subj),2)))
  rm(contvalues_subj)
```

Inconsistent presumed ideal points are removed from `Xpos_subj`. Presumed ideal points in `Xpos_subj` are reordered so that consistent entries are listed at the beginning for each player and the remaining cells are filled up with missing values `NA`. The `voteasexpected` matrix is adjusted accordingly. Columns that consist of missing values for all players, are dropped from both variables. For the upcoming period, k corresponds to the maximum number of consistent presumed ideal points over all players. So if there are updates on all players' ideal points, there will be less complete information estimations to be conducted in the next period.

With regard to next period's estimations, missing values in `voteasexpected` are set to `FALSE` in the remaining colums. Missing values in `Xpos_subj` are filled up with the respective player's randomly drawn consistent presumed ideal points from the remaining set of policies.

```
  for(i in 1:n.players){
    Xpos_subj[,i,] <- cbind(unique(Xpos_subj[,i,voteasexpected[i,]],
      MARGIN=2), matrix(NA,n.dim,n.presumed-dim(cbind(unique(
      Xpos_subj[,i,voteasexpected[i,]], MARGIN=2)))[2]))
  }
  voteasexpected <- !is.na(cbind(Xpos_subj[1,,]))

  voteasexpected <- matrix(voteasexpected[,colSums(voteasexpected,
    na.rm=T)>0],n.players)
  Xpos_subj <- array(Xpos_subj[,,colSums(voteasexpected,na.rm=T)>0],
```

```
      c(n.dim,n.players,dim(voteasexpected)[2]))

    voteasexpected[is.na(voteasexpected)]<-F
    for(i in 1:n.players){
      Xpos_subj[,i,!voteasexpected[i,]] <- Xpos_subj[,i,sample(sum(
        voteasexpected[i,]), sum(!voteasexpected[i,]), replace=T)]
    }
```

All these parameters are passed to the `bargainingsim` function for a downstream simulation of the next period $t+1$. Accordingly, the period count variable `period` is increased by 1. The outset conditions of the game (number of players, status quo, etc.) remain unchanged. k (`n.presumed`) is set to the maximum number of so far consistent presumed ideal positions per player. The number of consistent presumed ideal positions per player is documented in `n_expvotes`.

```
    results <- bargainingsim(n.players=n.players, n.majority=n.majority,
      n.dim=n.dim, discount=discount, rho=rho, sd.pos=sd.pos,
      sd.proposals=sd.proposals, n.proposals=n.proposals,
      n.presumed=dim(voteasexpected)[2], n.cvsims=n.cvsims,
      round.digits=round.digits, period=period+1,
      prophistory=prophistory, voteshistory=voteshistory, priors=priors,
      Xpos=Xpos, sq=sq, Xpos_subj=Xpos_subj, proposer=proposer,
      voteasexpected=voteasexpected,
      n_expvotes=rbind(n_expvotes, rowSums(voteasexpected)),
      no_maj_exp=no_maj_exp)
  }
```

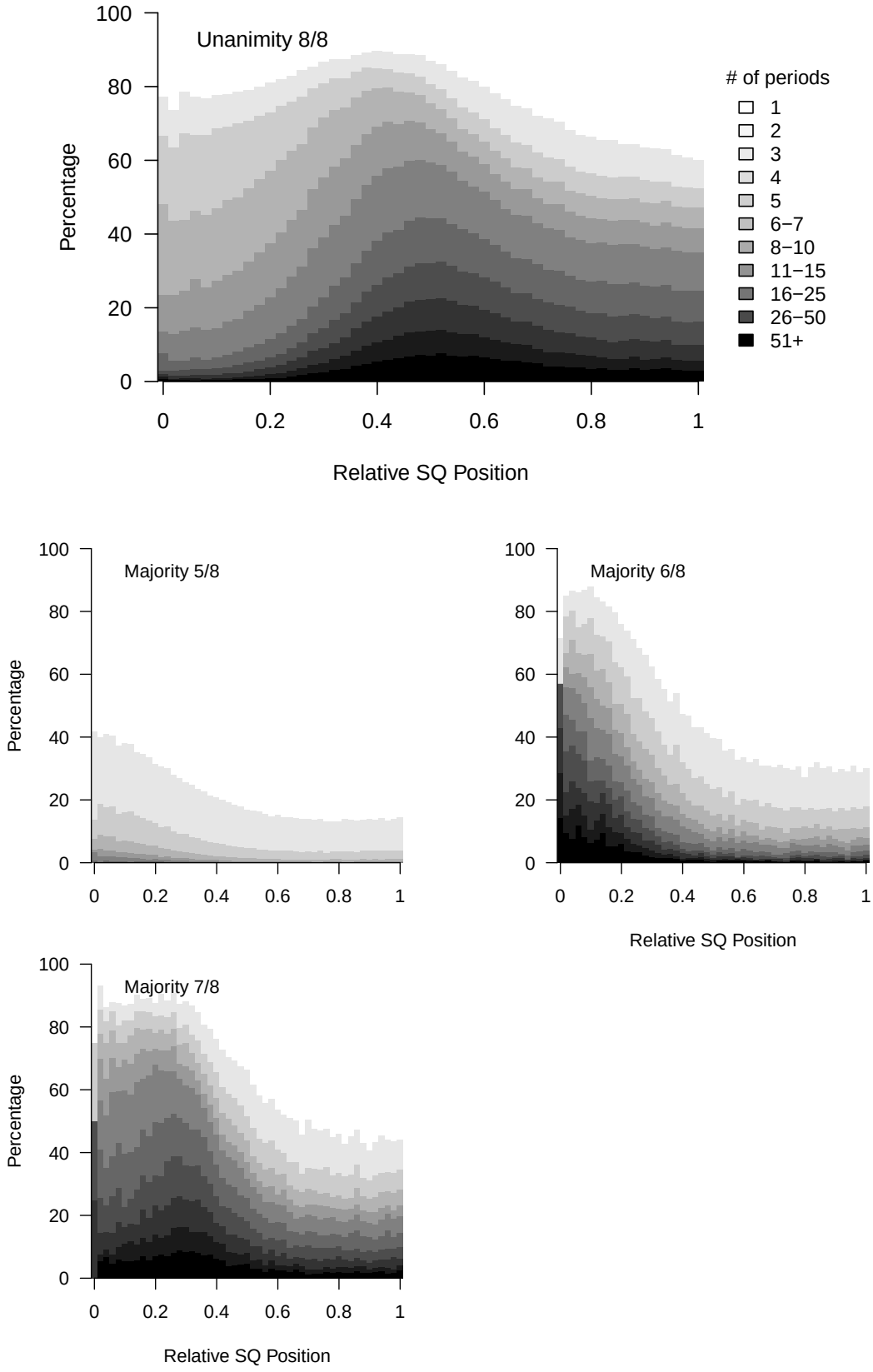
The procedure ends with returning the list `results` to the upstream procedure on the previous period and, finally, to the user.

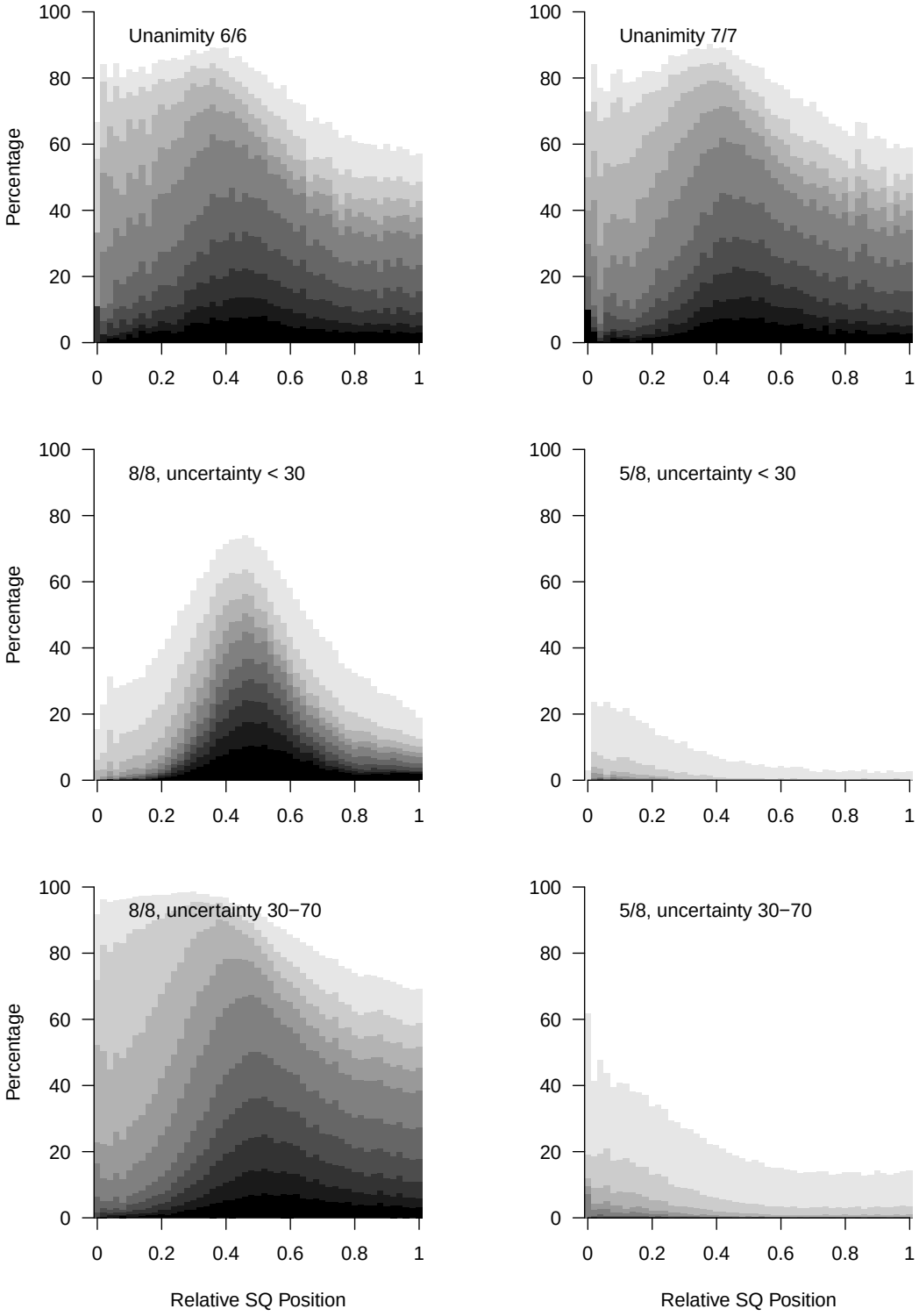
```
  return(results)
}
```

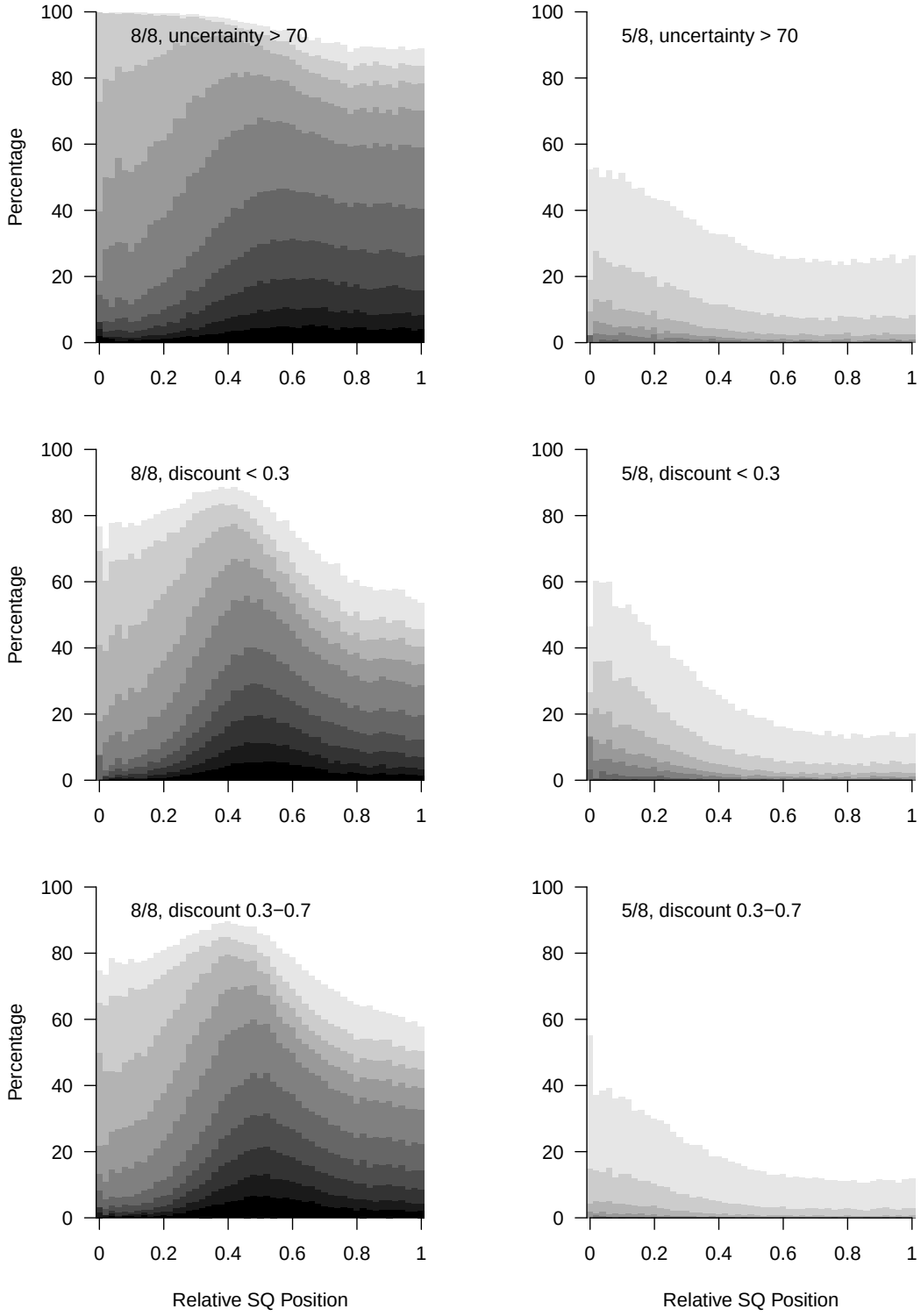
B. Supplementary Graphs on Simulation Results

The following figures illustrate more detailed simulation results as discussed in section 5.3. Robustness checks are conducted for duration effects of relative status quo positions, majority thresholds, the number of players, levels of uncertainty, and discount factors. Each association is reviewed for various subsets of the simulation dataset, based on values of other independent variables. The results are illustrated in the following figures.

Relative SQ location and Duration II




Unanimity 6/6
Unanimity 7/7
8/8, uncertainty < 30
5/8, uncertainty < 30
8/8, uncertainty 30−70
5/8, uncertainty 30−70
Percentage
Relative SQ Position
0
20
40
60
80
100
0.2
0.4
0.6
0.8
1


8/8, uncertainty > 70
5/8, uncertainty > 70
8/8, discount < 0.3
5/8, discount < 0.3
8/8, discount 0.3−0.7
5/8, discount 0.3−0.7
Percentage
Relative SQ Position
0
20
40
60
80
100
0.2
0.4
0.6
0.8
1

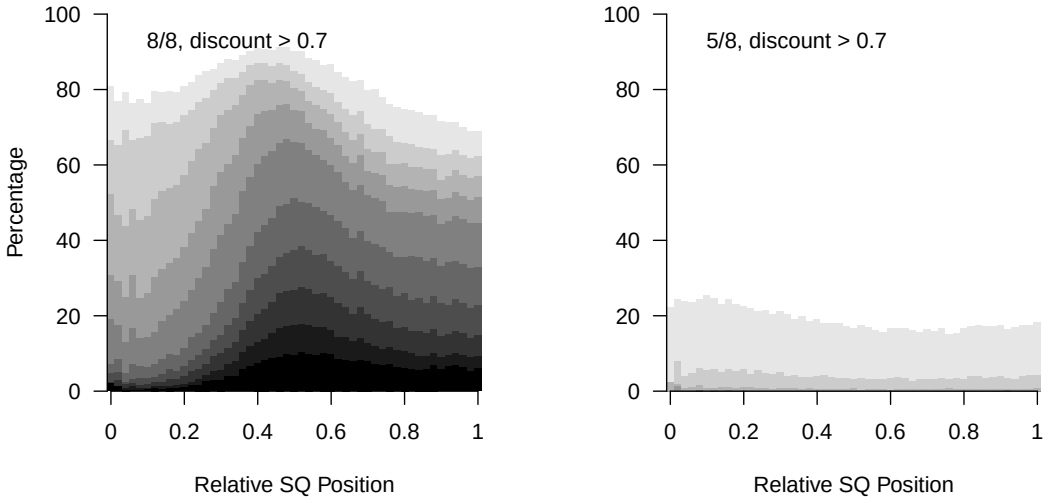
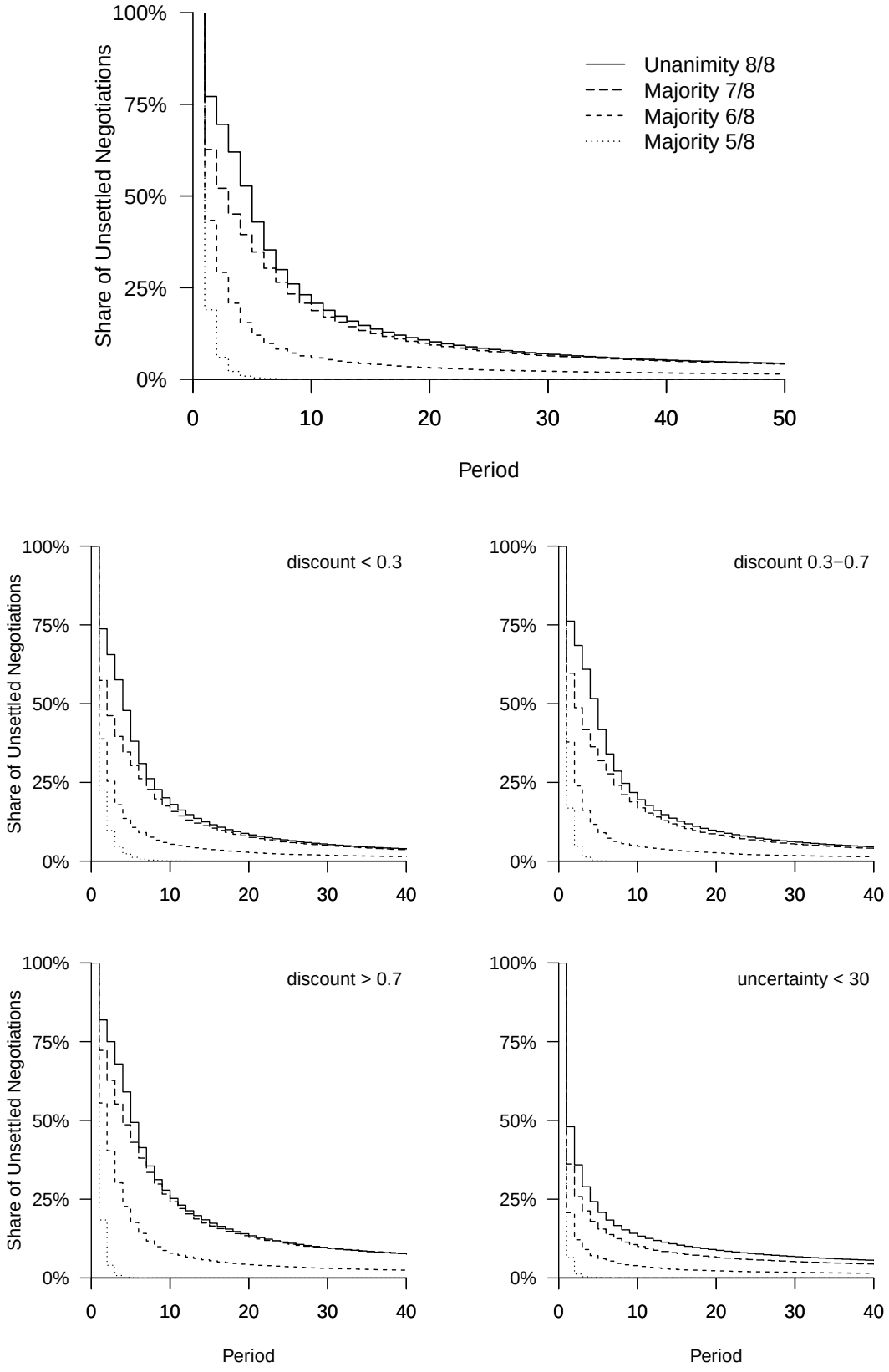


Figure B.1.: **Relative SQ location and Duration II:** Preference heterogeneity decreases duration, when the status quo is very central. It increases duration, when the status quo is distant. As the majority threshold decreases, the positive preference heterogeneity effect becomes prevalent.

Majority Threshold and Duration



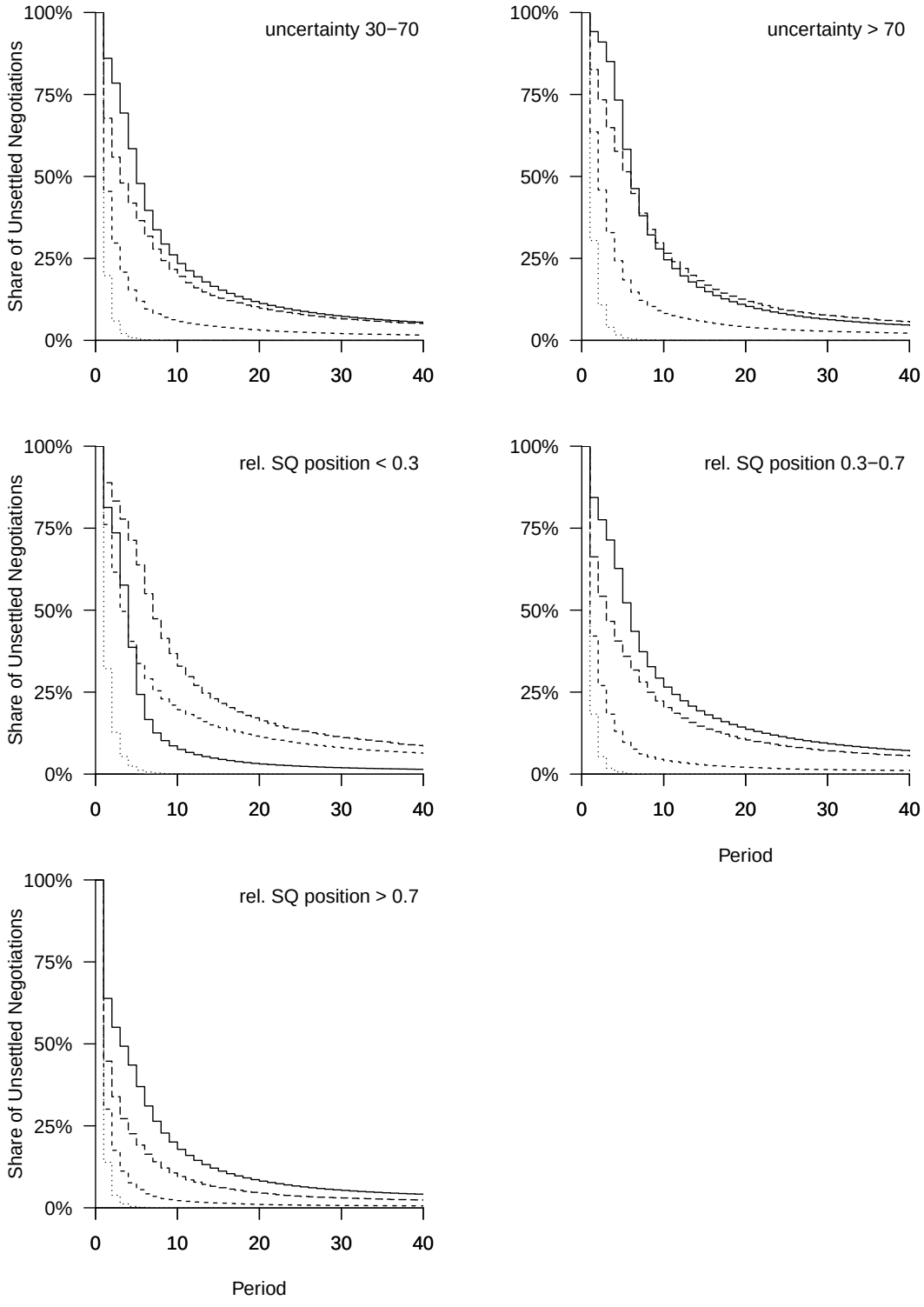
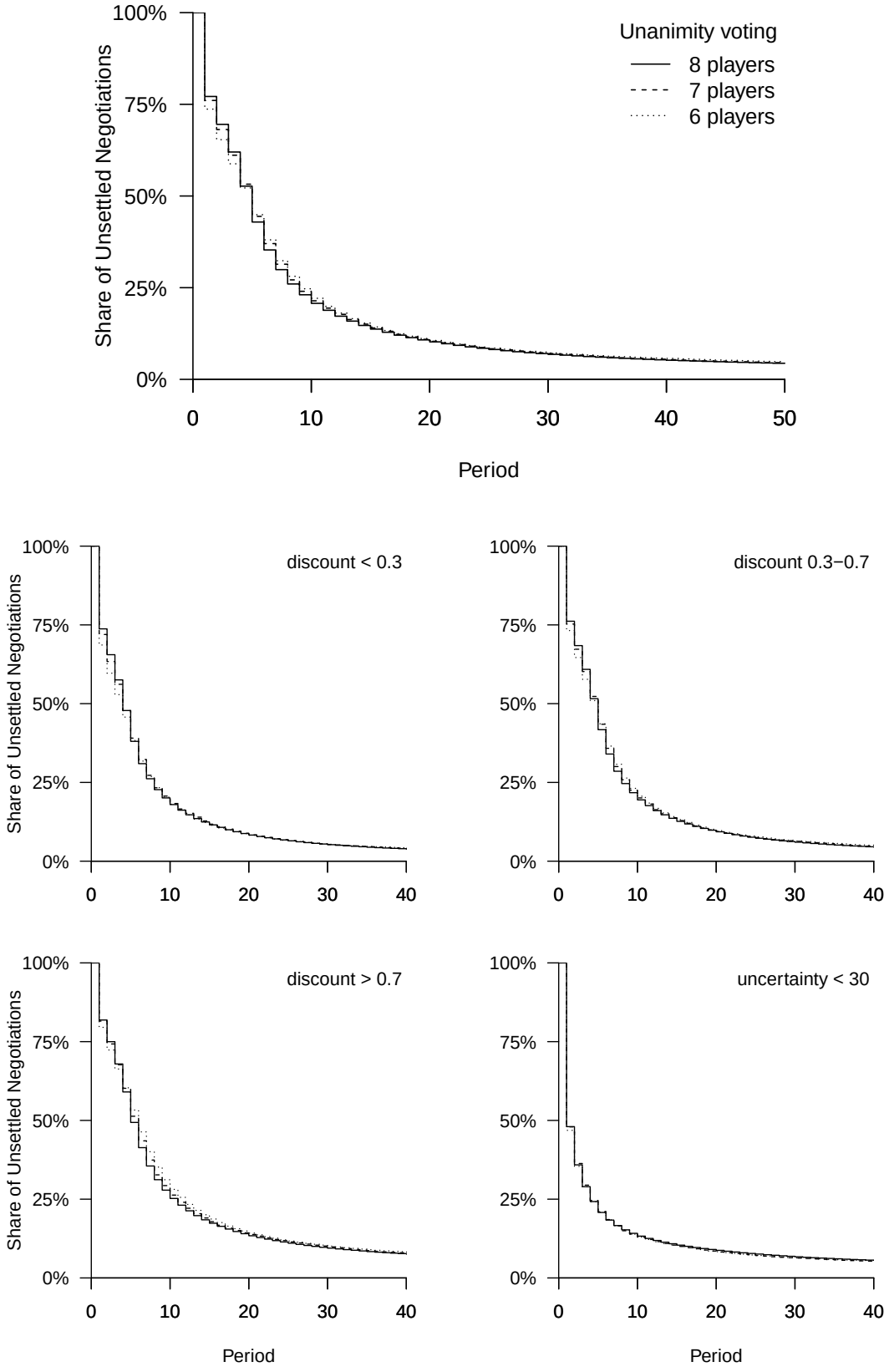


Figure B.2.: **Majority Threshold and Duration II:** Eight-player games. Higher majority thresholds are typically associated with longer bargaining duration. Exceptions occur with central status quo positions and high degrees of uncertainty.

Number of Players and Duration



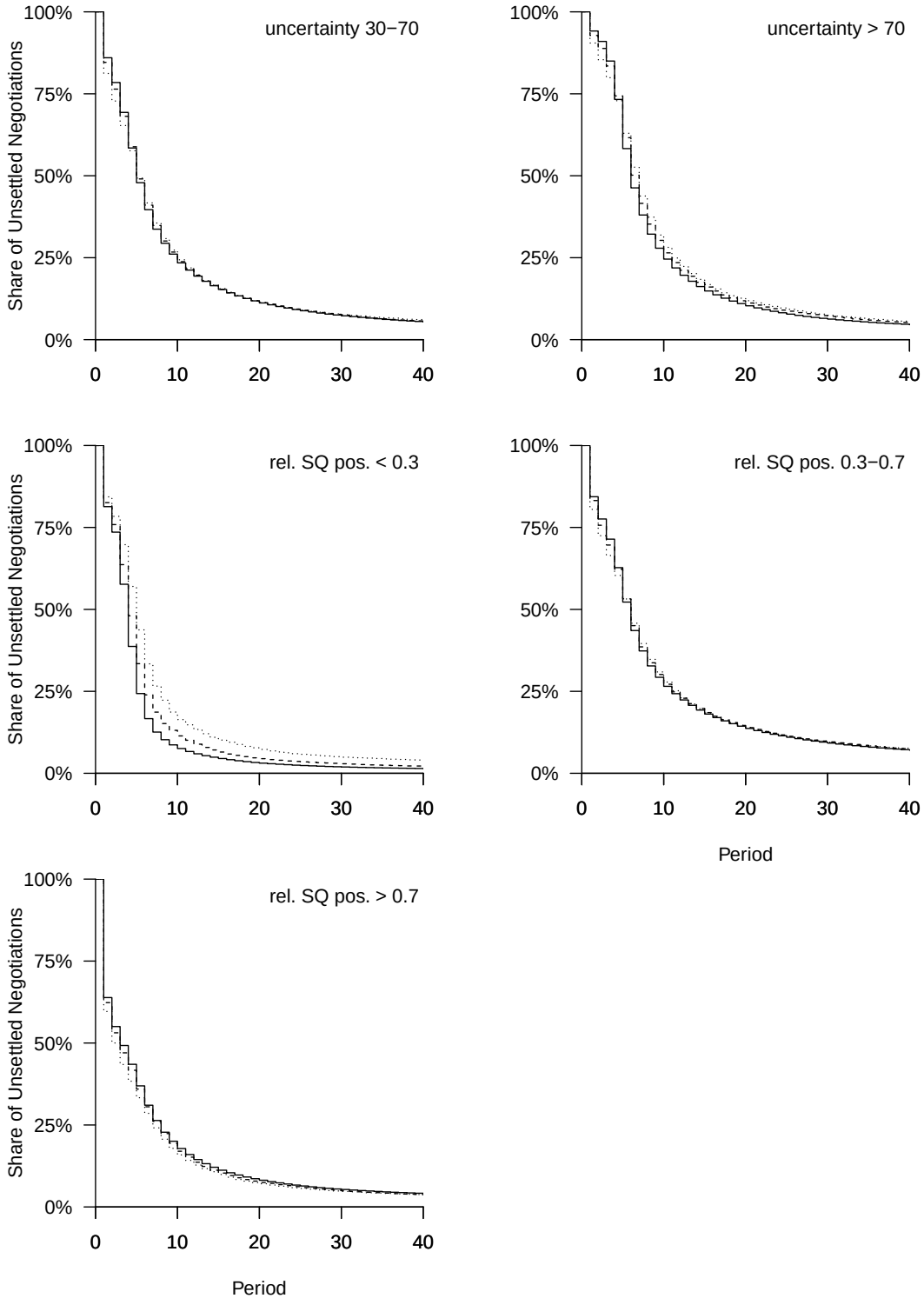
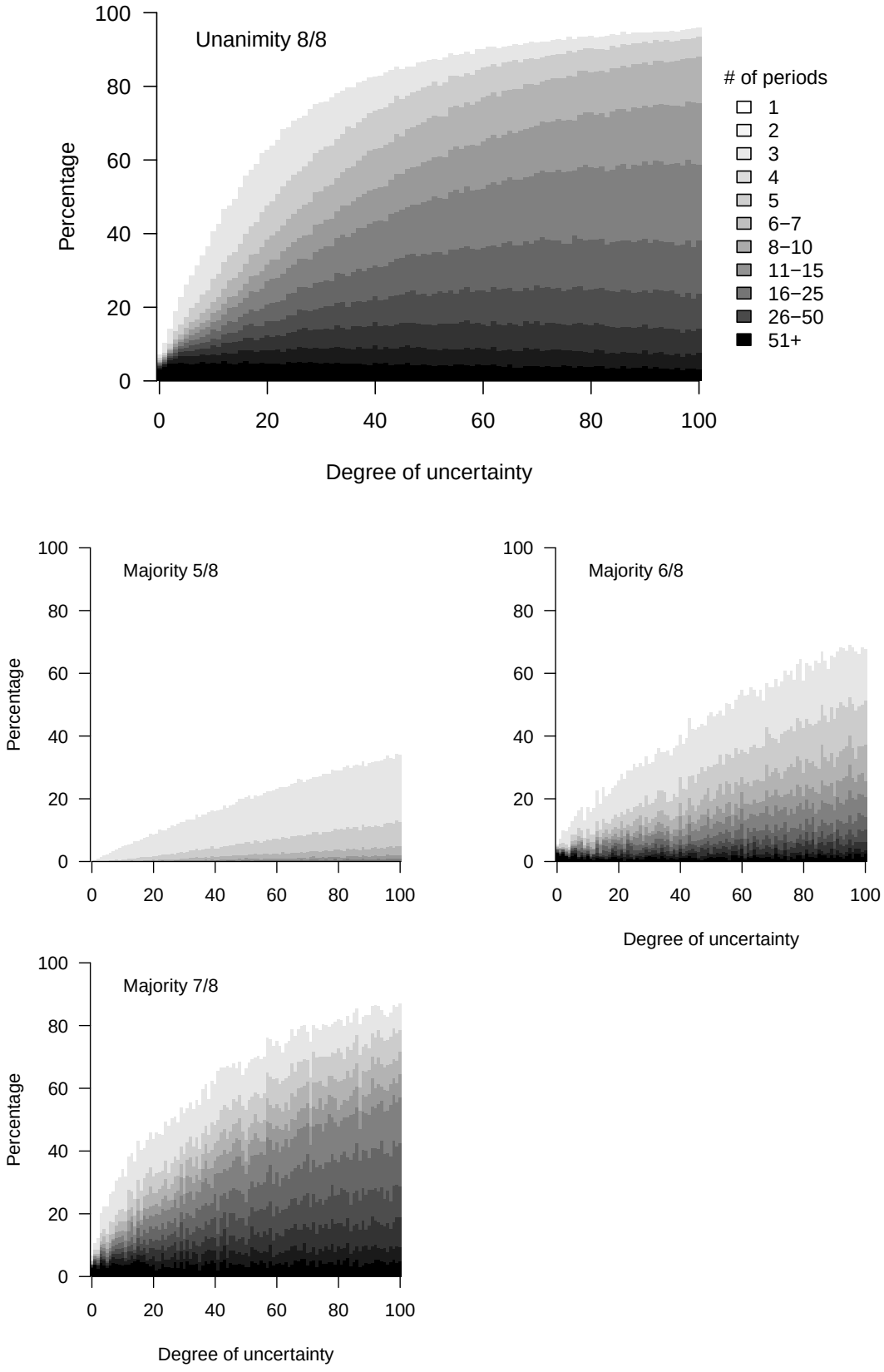
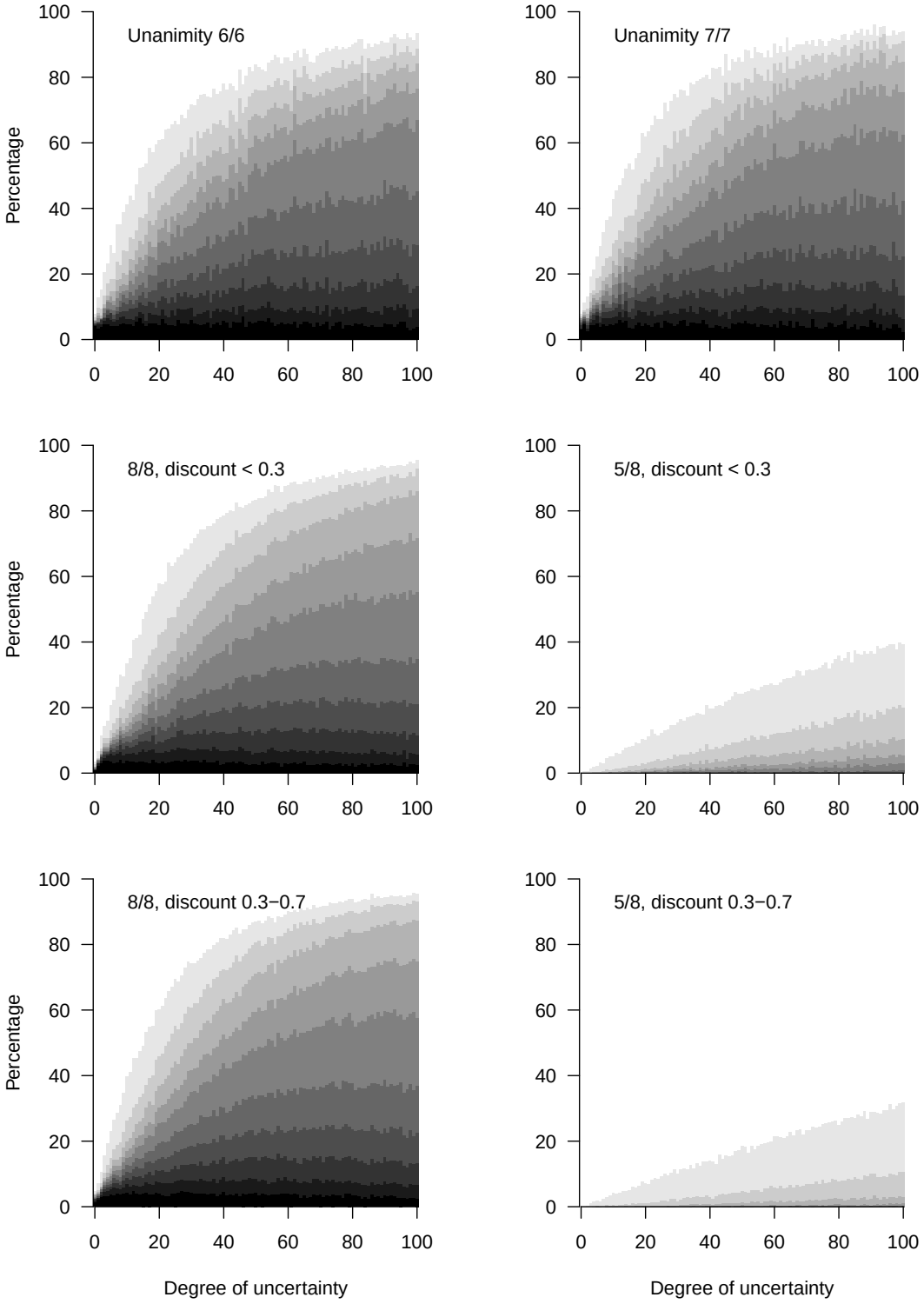
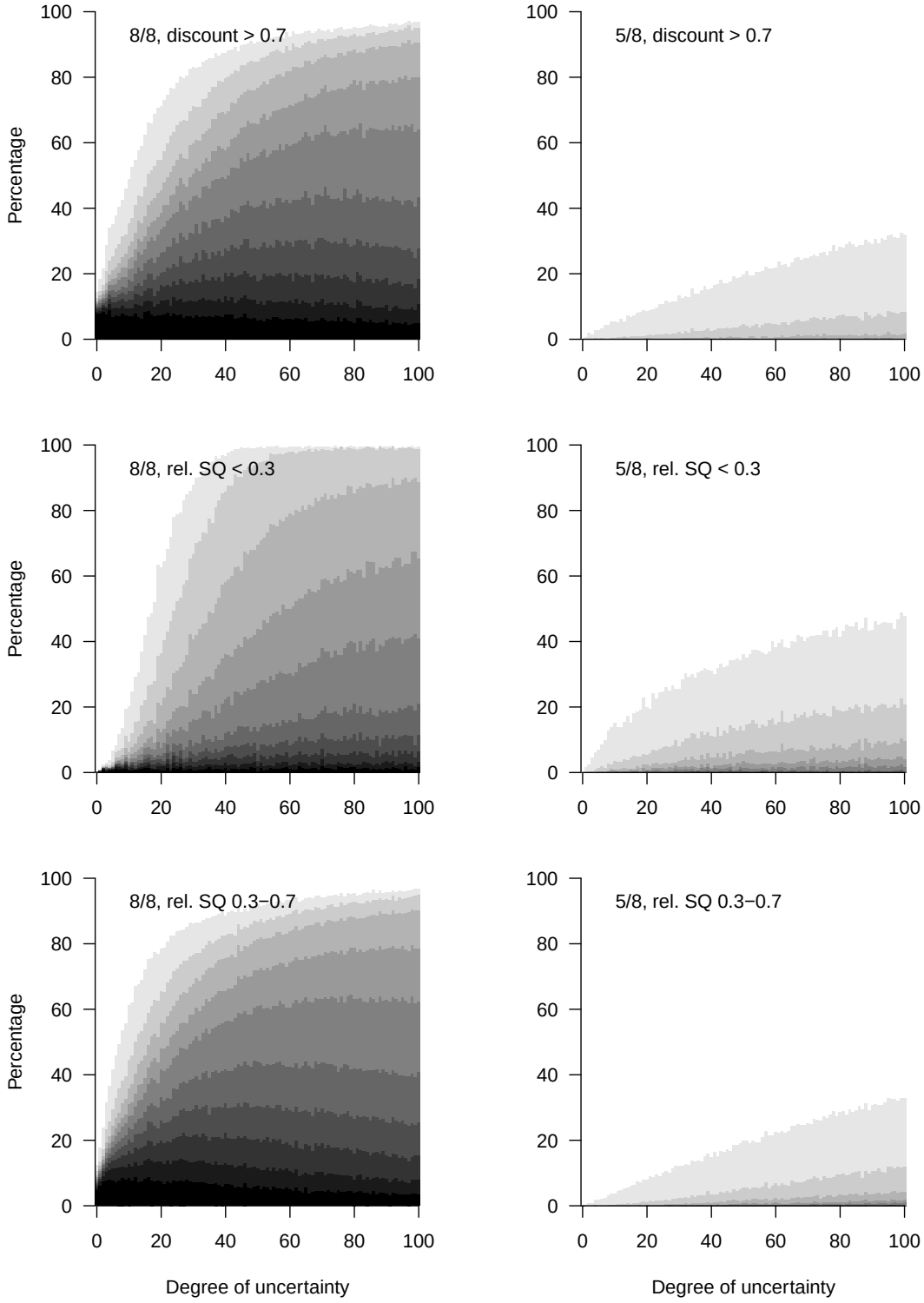


Figure B.3.: **Number of Players and Duration II:** Unanimity voting is assumed throughout. If the relative SQ position is low, more players will decrease bargaining duration. The opposite is true for outlying SQ positions.

Uncertainty and Duration




Unanimity 6/6
Unanimity 7/7
8/8, discount < 0.3
5/8, discount < 0.3
8/8, discount 0.3−0.7
5/8, discount 0.3−0.7
Percentage
Degree of uncertainty
0
20
40
60
80
100


8/8, discount > 0.7
5/8, discount > 0.7
8/8, rel. SQ < 0.3
5/8, rel. SQ < 0.3
8/8, rel. SQ 0.3−0.7
5/8, rel. SQ 0.3−0.7
Percentage
Degree of uncertainty
0
20
40
60
80
100

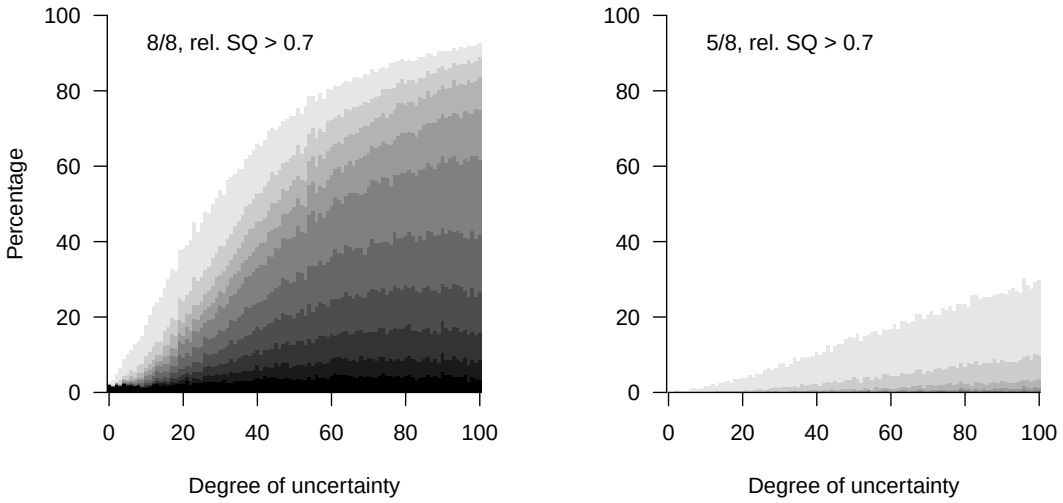
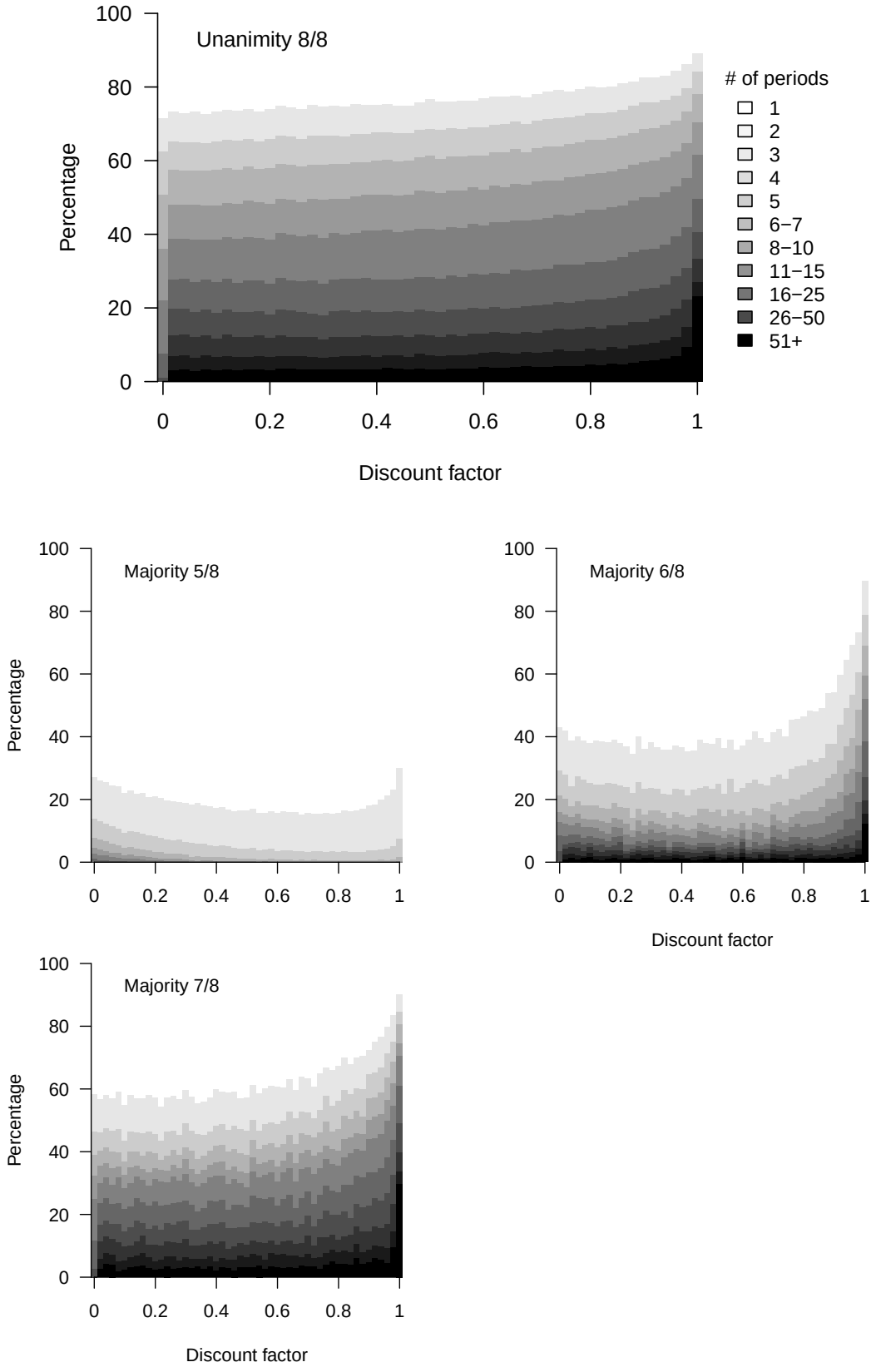
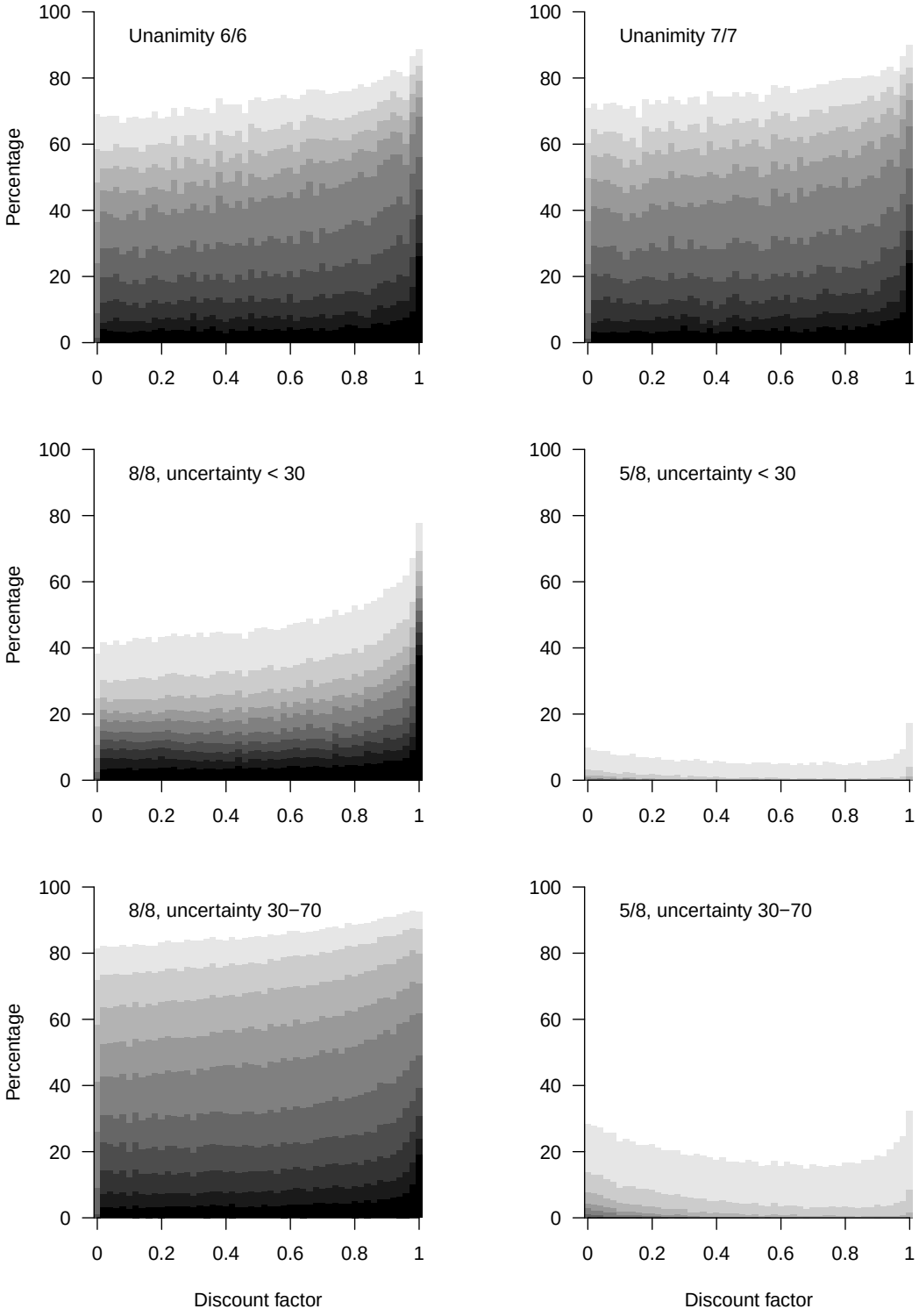
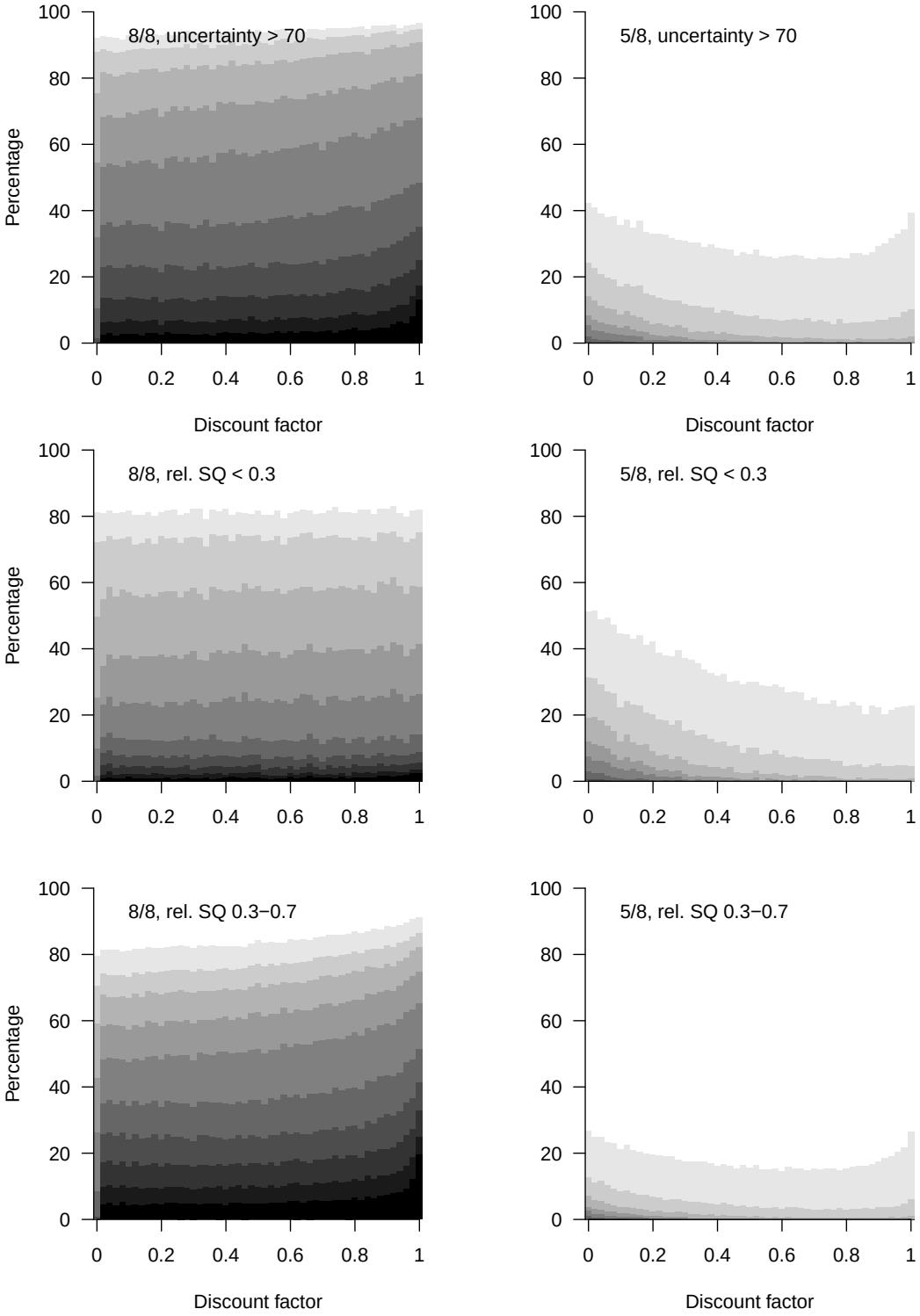


Figure B.4.: **Uncertainty and Duration II:** Duration increases with the level of preference uncertainty. This effect is robust for all simulated majority thresholds, numbers of players, discount factors, and relative SQ positions.

Discount Factor and Duration




Unanimity 6/6
Unanimity 7/7
8/8, uncertainty < 30
5/8, uncertainty < 30
8/8, uncertainty 30−70
5/8, uncertainty 30−70
Percentage
Discount factor
0
20
40
60
80
100
0.2
0.4
0.6
0.8
1


8/8, uncertainty > 70
5/8, uncertainty > 70
8/8, rel. SQ < 0.3
5/8, rel. SQ < 0.3
8/8, rel. SQ 0.3−0.7
5/8, rel. SQ 0.3−0.7
Percentage
Discount factor
0
20
40
60
80
100
0.2
0.4
0.6
0.8
1

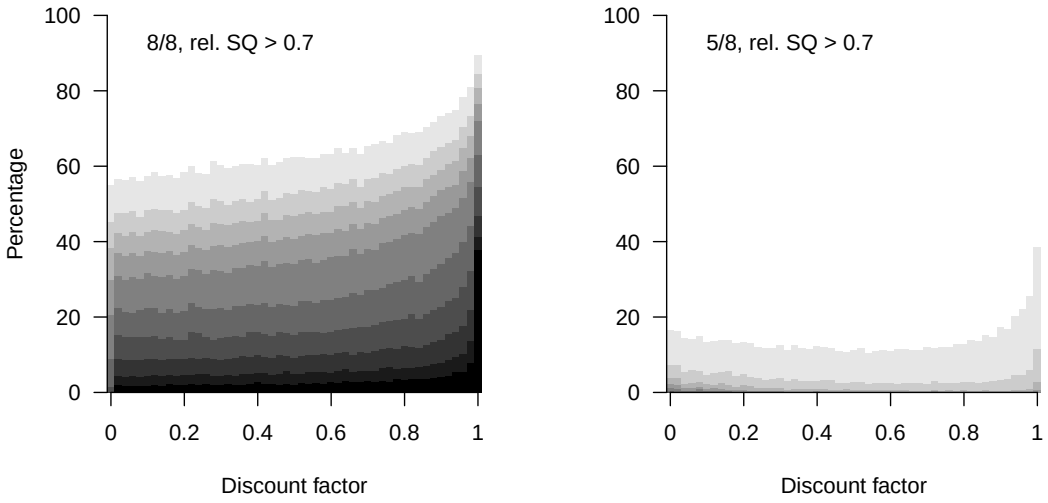


Figure B.5.: **Discount Factor and Duration II:** The discount factor will prolong bargaining if the SQ is distant. Under simple majority voting, the discount factor will decrease bargaining duration if the SQ is centrally located.