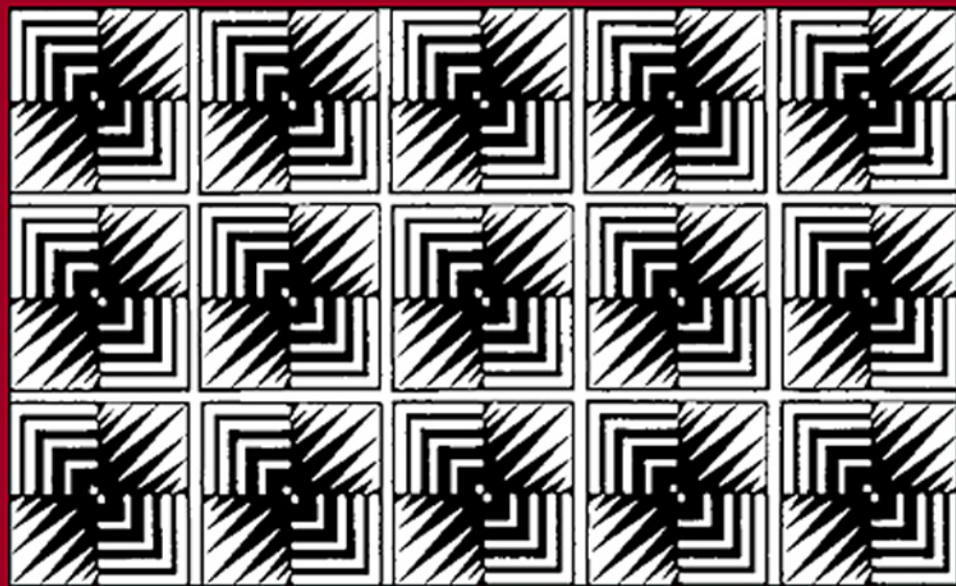




TOPICS IN ANALYTICAL POLITICAL ECONOMY



EDITED BY
**MELVIN HINICH AND
WILLIAM A. BARNETT**

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William A. Barnett
Series Editor

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Melvin J. Hinich is the Mike Hogg Professor of Government and Professor of Economics at the University of Texas at Austin. He is also a Research Professor at the Applied Research Laboratories of Utah.

He was born on April 29, 1939 in Pittsburgh, PA. He married Sonje Gregg in 1966 and they have one child, Amy Leksana, and two grand daughters Caitlin and Rachel Leksana.

He received his BS and MS degrees in Mathematics from the Carnegie Institute of Technology in 1959 and 1960, respectively. He earned his Ph.D. in Statistics from Stanford University in 1963.

He began his academic career with the Graduate School of Industrial Administration at Carnegie Institute of Technology in September 1963. He began a fruitful collaboration with Otto Davis in September 1963 on the development of the multidimensional spatial theory of the electoral process. This theory uses a voter utility that is proportional to the weighted Euclidean distance between a candidate's position and party's position in a latent ideological space whose dimensions are linked to real political issues.

In 1973, Hinich went on leave to the Department of Economics at Virginia Tech. He stayed on as a Professor of Economics at Virginia Tech. He spent the 1976–1977 academic year as a Sherman Fairchild Distinguished Fellow at the California Institute of Technology. Hinich began a long and fruitful collaboration with James Enelow in 1978 on both theoretical expansions of spatial theory and on using the Cahoon–Hinich method to estimate spatial maps of candidates in American politics using the thermometer scores from ICPSR surveys. The collaboration produced the first book on the modern spatial theory of elections: *The Spatial Theory of Voting* by J. Enelow and J. J. Hinich, Cambridge University Press (1984). Then they produced an edited volume on spatial theory: *Advances in the Spatial Theory of Voting*, J. Enelow and M. J. Hinich (eds.), Cambridge University Press (1990). The Enelow and Hinich collaboration was maintained at a distance since Enelow was at SUNY Stony Brook while Hinich was at Virginia Tech and then Texas. Enelow moved to the University of Texas at a time when both scholars were turning to different aspects of political science research.

He has supervised a number of Ph.D. theses in Statistics, Economics, and Political Science and has been co-chair of theses in Mechanical Engineering and Library Science.

In 1982, he moved to the University of Texas in the Department of Government. The next year he was made a member of the Department of Economics. Michael Munger was hired as an Assistant Professor in 1986 and soon began collaboration on extending the spatial theory of elections that has resulted in several papers and three books: *Ideology and the Theory of Political Choice*, University of Michigan Press (1994); *Analytical Politics* Cambridge University Press (1997); and *Empirical Studies in Comparative Politics*, Kluwer Academic Publishers (1999).

He has published papers in the fields of Statistics, Signal Processing, Economics, Political Science, Biomedical Engineering, Pharmacy, and Library Science. His signal processing papers deal with a variety of applications from geophysics to finance. He invented bispectral- and trispectral-based test for the presence of nonlinearity in stationary stochastic processes. He also developed tests for time reversibility and aliasing using higher order spectral methods. One of his most important signal processing accomplishments is a method to detect weak modulated periodic signals in noise and analyze the modulation processes using a concept he has called signal coherence.

He and Professor Douglas Patterson, Virginia Tech, used the Hinich bispectrum method to discover stochastic nonlinearity in daily rates of the returns from several NYSE stocks. They extended their work on nonlinearity to high frequency stock data. Using simple third-order correlation methods called the Hinich Bicorrelation and Cross Bicorrelation Tests, they found that the nonlinearity in asset returns appears to be episodic in nature.

The methods were extended and refined in collaboration with Professor Chris Brooks at the University of Reading in England and applied to foreign exchange data and UK financial data. The scope of this research on non-linearity has now been extended to the study of financial data in Asia and Latin America. He is working with Professor Claudio Bonilla, University of Chile on analysis of Chilean stock rates of return.

One of his contributions to time series analysis and signal processing is a simple and robust method for detecting and locating mean and slope changes in linear time series models.

He has also made contributions in the policy area of food regulation and has co-authored a book on food regulation with Professor Richard Staelin.

Hinich helped form the Department of Statistics at Carnegie Mellon. One of his statistics Ph.D. students, Lawrence Cahoon, developed a metric multidimensional scaling methodology that is based on the parametric weighted utility model for voting choice. This methodology was further developed by Hinich over many years and is now called the Hinich MAP Method.

He is a Fellow of the Institute of Mathematical Statistics, the American Statistical Association and the Public Choice Society.

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Notes on Contributors

Jonathan Bendor is the Walter and Elise Haas Professor of Political Economics and Organizations in the Graduate School of Business. His research has focused on three areas theories of bounded rationality, problems of collective action, and organization theory. Bendor was a fellow of the Center for Advanced Study in the Behavioral Sciences in 1999–2000 and 2004–2005. He is a member of the American Association of Arts & Sciences.

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Marianna A. Klochko, assistant professor of Sociology, Ohio State University at Marion, received her BS from Kharkiv State University (Ukraine) and Ph.D. in Sociology from Cornell University in 2002. Her current research interests include the analysis of time preferences among drug addicts and within prison populations as a function of alternative rehabilitation programs. Her most recent publication is *Endogenous Time Preferences in Social Networks* (with P.C. Ordeshook).

Sunil Kumar is a professor of Operations, Information and Technology at the Graduate School of Business at Stanford University. He obtained his PhD in Electrical Engineering in 1996 and has been at Stanford since then. His research focuses on the use of mathematical models to study systems affected by stochastic variability in order to estimate performance and design managerial policies. Application areas of his work range from communication systems and manufacturing operations to electorates.

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Tse-min Lin is associate professor of Government at the University of Texas at Austin. He received his B.S. in Electrical Engineering from National Taiwan University and Ph.D. in Political Science from the University of Minnesota. He held positions at SUNY Stony Brook, Duke University, Michigan State University and Academia Sinica. His fields of interest are methodology, formal theory and American and comparative politics. His work appeared in *American Journal of Political Science*, *American Political Science Review*, *Journal of Democracy*, *Journal of Politics*, *Political Analysis*, *Political Research Quarterly*, *Public Choice*, *World Politics* and other scholarly journals and edited books.

Peter C. Ordeshook, professor of Political Science, California Institute of Technology. He received his BS from MIT in 1994 and Ph.D. in Political Science from the University of Rochester in 1999. His authored or coauthored books include *An Introduction to Positive Political Theory* (with W.H. Riker); *Game Theory and Political Theory*; *A Political Theory Primer*; *Designing Federalism* (with O. Shvetsova and M. Filippov); *The Balance of Power* (with E. Niou and G. Rose); and *Endogenous Time Preferences in Social Networks* (with M.A. Klochko). His current research interests include the study of social complexity, the design of political institutions and constitutions, and the detection of election fraud in emerging democracies.

Fatih Özatay, graduated from the Middle East Technical University, Department of Mechanical Engineering in 1978. He held various positions at the State Planning Organization between 1979 and 1985. He received his Ph.D. in Economics from the Ankara University in 1986. After a two-year experience in the private sector, he joined the Research Department of the Central Bank of Turkey. In 1995, he started to work at the faculty of Political Sciences of the Ankara University. He lectured also at Bilkent and Middle East Technical Universities. Between 1995 and 1999, he worked as an advisor at the Turkish Treasury. Soon after he became Professor in May 2001, he was appointed as Vice Governor at the Central Bank of Turkey for a five-year term and also served as a member of the Monetary Policy Committee. As of April 2006 he joined the TOBB University of Economics and Technology. He published various articles in scholarly journals and books. His main areas of interest are stabilization programs, currency crises, monetary policy, reform processes and growth.

Brian Roberts is vice president for Information Technology and professor of Government and Economics at the University of Texas at Austin. He received his B.A. in Economics from Trinity College and Ph.D. in Economics from Washington University. His fields of interest are American political institutions, interest groups and positive political economy, with a focus on politics and financial markets, corporate political participation and distributive politics. He has published papers in the fields of political science, economics and finance.

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Introduction

The nine papers in this special issue are a diverse set of quality contributions to the field in economics that is called “political economy”. It is important to understand that social scientists hold different interpretations of the term political economy. Most mainstream economists expect a paper in the field to use the same models as are used in neoclassical economics, be it micro or macro. The field of political economy is seen by most economists to be exclusively the purview of their field.

The political system of a country determines the nature of its economic system. The economy feeds back to the political system but the rules of the game are determined by the political system. The study of politics is the hardest task in the social sciences. The political system defines the scope of the economics system while taking resources from the economy in order to run campaigns and produce the types of compromises that are required of a stable political system that allows economic agents to make sensible investments. Politics involves group choices as well as individual choices.

The paper by Bendor, Kumar and Siegel presents a dynamical model of the concept of “retrospective voting” that has become popular in political science as an explanation of how voters can relate to the policy choices of parties and politicians when they are at best partially informed about the political realities that well-informed political agents possess. Retrospective voting assumes that voters decide how to vote by linking their economic and social situation with actions of the incumbents. In addition to formalizing this concept the authors present a mechanism for the way party competition adapts to the endogenous reaction of voter preferences. They present some analytical results but they construct a computational model to develop implications about where the spatial locations of parties will locate in their game using an adaptation of the probabilistic voting model by Hinich in “Equilibrium in Spatial Voting: The Median Voter Result is an Artifact”, *Journal of Economic Theory*, **16** (2), 208–219 (1977).

The use of a computational model allows the authors to develop insights to possible outcomes of a complex political game when an analytical solution is only possible by imposing severe restrictions on the moves of the game and assuming common knowledge for all actors. This paper can be

categorized as a contribution to the growing field of evolutionary social science.

The Bonilla and Laengle paper of the linkage between campaign contributions and political payoffs in electoral politics. The model is a creative extension of the probabilistic spatial theory of electoral competition with campaign contributions and rent seeking developed presented in the referenced book by Hinich and Munger. Everyone knows that money plays an important role in elections but a coherent theory of how contributions affect votes is a relatively recent development. This paper is an important contribution to this theory and it also presents testable implications of the theory.

The paper by Ersel and Özatay present a two-sector growth model in which there is heterogeneity across individuals supplying labor. They use the steady-state solution of the model to analyze the welfare implications of government-led institutional reforms in Turkey taking into considerations the uncertainty of successfully joining the European Union (EU). The institutional reforms are driven by the negotiation process for Turkey between the EU and Turkey. They also discuss the politics of reform in Turkey.

The paper by Henning and Struve is based on a bargaining process within the legislature of a parliamentary system to develop agriculture policy formation. This paper builds on models of political policy formation in the political science and public choice literature as well as established economic theory. The paper also presents econometrically competent empirical results that support the theoretical developments in this paper. I consider this paper to be an excellent example of a work in analytical politics, a term that I prefer to political economy.

The paper by Klochko and Ordeshook is another contribution to evolutionary social science. They present what appears to be a simple model of endogenous time preference changes in an evolutionary investment game. Their model develops a social network game that depends upon assumptions upon choices of reaction functions. Their results show how a seemingly simple evolutionary model can lead to complex behavior. Their results present insight to the instabilities in market processes in Russia and the Ukraine.

My paper presents an overview of the modern spatial theory of electoral competition. All the above papers cite results in spatial theory. Most economists have some familiarity with the median vote result but they are unaware of its gross limitations and the developments of multi-issue spatial theory linked with a latent political space. My paper provides an introduction to this literature for readers who have not been aware of the developments beyond the median voter.

The HenningHinich and Shikano paper is a contribution to the multi-issue spatial theory of electoral competition voting first established by Davis

and Hinich. Our model incorporates the expectations of voters about post election bargaining into voter's policy preferences and derives a unified model of voting comprised of a proximity and directional component. Based on this theoretical model we derive interesting testable hypothesis on voter behavior, i.e. a voter's evaluation of parties is significantly affected by institutional environment of legislative bargaining and the electoral system.

Moreover, our theory contributes to the literature resolving the paradox of not voting via conceptualizing voting as a socially embedded action. Using German election data they are able to provide promising empirical evidence in support of this theory.

The paper by Gatica Arreola presents a model of patronage in a democracy where clientelism is used as a political strategy. He presents a simple probabilistic spatial model where an incumbent party and an opposition party compete to gain political support within a set of citizens in which ideological and programmatic policy preferences are private information.

The Lin–Roberts paper studies the intersection of market and politics in the 2000 Taiwanese presidential election. The study of U. S. financial markets has long assumed that market participants have a keen appreciation for politics and its economic consequences. Market participants must judge for any firm the relevance of any given political event to the firm's prospective fortunes. Using data generated by the Iowa Electronic Markets (IEM), the paper seeks to measure and explain the firm-level sensitivity of one of Asia's most sophisticated financial markets, the Taiwan Stock Exchange (TSE), to the outcome of the election on March 18, 2000 when Chen Shui-bian, the candidate of the pro-independence Democratic Progressive Party (DDP), was elected the president of Taiwan. Economic issues loomed large in the election. These issues ranged from high-minded concerns about the future of bilateral trade relations with China to charges of economic manipulation leveled at the incumbent government. Despite the uncertainty of the election outcome and the poor information environment traders in both the IEM and the TSE responded efficiently to a sequence of political events. Using a two-step statistical model, Lin and Roberts presented evidence from these financial markets to show a strong China connection to the observed political sensitivity.

Melvin Hinich

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Chapter 1

Rational Parties and Retrospective Voters

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Abstract

Many elections specialists take seriously V.O. Key's hypothesis (1966) that much voting is retrospective: citizens reward good performance by becoming more likely to vote for the incumbent and punish bad performance by becoming less likely. Earlier (Bendor et al., 2005) we formalized Key's verbal theory. Our model shows that people endogenously develop partisan voting tendencies, even if they lack explicit ideologies. However, that paper depicts parties as passive payoff-generating mechanisms. Here we make parties active, rational players with conventional goals: they either are pure office-seekers or have the usual mix of goals (office and policy preferences). The parties' optimal strategies reflect the incentives produced by retrospective voting. These incentives are powerful: for a wide range of parameter values they induce parties to select policies that differ not only from the median of the distribution of voter ideal points, but also from the mean. Further, by analyzing the complex dynamics of voter adaptation and party response, we can derive and characterize the endogenous incumbency advantage enjoyed by the party in power. We establish these properties both analytically and computationally.

1. Introduction

Most models of party competition assume fully rational voters. Many also assume that citizens are well-informed. These are shaky premises. Decades of empirical research have shown that few American voters have coherent, detailed ideologies and few know much about politics. Donald [Kinder](#)

(1998) summarized what we know about citizens' thinking about politics: "Precious few Americans make sophisticated use of political abstraction. Most are mystified by or at least indifferent to standard ideological concepts, and not many express consistently liberal, conservative, or centrist positions on government policy" (1998, p. 796). Regarding information he reports that "the depth of ignorance demonstrated by modern mass publics can be quite breathtaking" and "the number of Americans who garble the most elementary points is ... impressive" (p. 785). Luskin's (2002) summary is harsher: most voters "know jaw-droppingly little about politics" (2002, p. 282; see also Delli Carpini and Keeter, 1996).

Years ago, V.O. Key (1966) sketched out a theory of *retrospective voting* that appears to be consistent with the empirical regularities described by Kinder. His basic idea was elegantly simple. Citizens do not need well worked-out ideologies or realistic theories about how programs generate outcomes. Instead, they can decide how to vote for by assessing the performance of incumbents. Incumbents who have done well are rewarded by electoral support; those who have done poorly get fewer votes.

This is a plausible idea, but like many verbal theories it is somewhat vague and incomplete. In particular, how do voters evaluate governmental performance? How do they decide that an incumbent has performed poorly or well? And what are the effects of retrospective voting, either microscopic (e.g., the voting trajectories of individual citizens) or macroscopic (e.g., electoral outcomes)? Elsewhere we have addressed these and related questions by developing a deductive model of retrospective voting (Bendor et al. [henceforth BKS], 2005).¹

However in BKS (2005), the parties are represented as passive, payoff-generating mechanisms. This assumption makes the model more tractable but is clearly only a way station to a more plausible one. In this paper, we construct a model of party competition given retrospective voting.² Parties

¹ By focusing on how voters respond to realized payoffs, the present paper is similar to work on retrospective voting stimulated by Ferejohn's (1986) seminal paper. However, our model differs in several fundamental ways from such principal-agent formulations. Most notably, (1) we do not replace the empirically unreasonable Downsian informational assumptions by equally heroic assumptions about voters' rationality, (2) we consider a substantial population of voters and (3) we examine dynamics away from the steady state.

² For clarity and simplicity, we assume purely retrospective voting: the citizens' votes are based totally on politicians' past performances. Fortunately, one can easily prove that most of our results are robust: if electoral choice is a weighted average of retrospective and prospective voting then they continue to hold if most (but not all) of the weight is on the past.

understand how citizens behave and they respond rationally to the incentives created by retrospective voting, as in [Achen and Bartels \(2002\)](#).³

In most of the paper, we allow the aspirations of citizens to be endogenous, responding to experience (realized payoffs) in a way that is conventional in the emerging literature on aspiration-based models of behavior. (See [Bendor et al., 2001](#) for a review of this literature.) Models with endogenous aspirations are notoriously hard to solve analytically; hence, we construct a computational model as well as an analytical one. In both, we focus on the policies implemented by incumbents and on how long they stay in office. In Section 3, we derive several analytical results, at the price of some ruthless simplification. In Section 4, we turn to computation, complemented by simple analytic examples. This combined approach enables us to derive several key — and observably distinct — findings. Specifically, we find that voters' retrospective behavior often induces rational, office-seeking incumbents to locate away from not only the median voter (MV) but also from the mean of the voters' ideal point distribution. (Models with probabilistic voting tend to exhibit the former property but not the latter.) We characterize the length of time incumbents can expect to stay in office — an incumbency advantage derived endogenously from the basics of voter psychology rather than determined by exogenous factors. And we show why a party might want to play to its base even when it is not worried about turnout.

The rest of the paper is organized as follows. Section 2 presents the general ideas. It provides a free-standing introduction to retrospective voting⁴ and

³The present paper and that of [Achen and Bartels \(A–B\)](#) have the same goal: to analyze how retrospective voting affects the behavior of incumbents. The models differ in their assumptions about voters. In [A–B](#)'s multiple elections, individuals vote deterministically for the party that is expected to produce lesser losses when in office, as deduced via Bayesian updating from their priors and the payoffs received in previous periods. Though they get only a noisy signal of parties' behavior in office, voters make the best of it, collating information gleaned from payoffs under both parties over time into two separate measures of their respective expected performances in the future. Asymptotically, the voters become perfect Bayesians (p. 23). In contrast, voters in the [BKS \(2005\)](#) model are less sophisticated cognitively: they are assumed only to update a single aspiration level, and view repeated elections less as an opportunity to develop better expectations on each parties' behavior than as a series of mostly independent payoff draws about which they can be more or less satisfied. What learning there is occurs more indirectly, as aspirations adjust to match realizations over time, and the frequency of being satisfied drives their probabilistic voting behavior, which never asymptotes to optimality.

⁴It presumes no knowledge of either [V.O. Key's](#) verbal theory or [BKS's](#) formal model.

explains how candidates optimize in light of voters' behavior. Section 3 gives the analytical model; Section 4, the computational one. Section 5 concludes.

2. General Ideas⁵

2.1 Retrospective Voting

This type of voting is based on voters' evaluating the performance of an incumbent — either the party in power or a specific officeholder. The heart of Key's theory is that voters reward good performance by becoming more inclined to vote for the incumbent and punish bad performance by becoming less inclined to support the incumbent.

However, Key did not clarify the meaning of “good” and “bad” performance. To make these notions more precise, BKS (2005) posited that voters have *aspirations* (Simon, 1955, 1956): internal evaluation-thresholds that code an incumbent's performance as good or bad, satisfactory or unsatisfactory. Once an incumbent's performance has been assessed in this manner, the *direction* of the voter's stance toward the incumbent official or party is determined: good performance is rewarded with a higher propensity (probability) of voting for the incumbent; bad, with reduced support. These properties are formalized by the following axioms that define a class of *adaptive voting rules* (AVoRs).

In what follows, we assume that there are n voters. Let $\pi_{i,t}$ denote voter i 's payoff in period t and $a_{i,t-1}$, his current aspiration level, inherited from the previous period. (We assume that elections are held at the beginning of a period, so today's realized payoff is compared to the inherited aspiration level.) There are two parties, $\{D, R\}$, and a citizen's propensity to vote for party D at the start of period t is denoted $p_{i,t-1}(D)$. We assume that $p_{i,t-1}(D) = 1 - p_{i,t-1}(R)$. That is, everyone votes for one of the two parties with probability one. Moreover, the actual votes and thus the outcome of the election depends only on the propensities. Let W_t denote the winner of the election in t , determined stochastically from these propensities. Hence, the winning party is the incumbent both during period t (when it generates payoffs for voters), as well as during the election at the beginning of period $t+1$. We posit that the voters adjust their propensities to vote for the incumbent using rules that satisfy the following assumptions.

(A1) (positive feedback). If $\pi_{i,t} \geq a_{i,t-1}$ then $p_{i,t}(W_t) \geq p_{i,t-1}(W_t)$, and this conclusion holds strictly if $\pi_{i,t} > a_{i,t-1}$ and $p_{i,t-1}(W_t) < 1$.

(A2) (negative feedback). If $\pi_{i,t} < a_{i,t-1}$ then $p_{i,t}(W_t) \leq p_{i,t-1}(W_t)$, and this conclusion holds strictly if $p_{i,t-1}(W_t) > 0$.

⁵ Much of this is taken from BKS (2005).

Voters adjust aspirations via rules that satisfy (A3).

(A3). Each agent i has an aspiration level, $a_{i,t}$, which is updated so that the following conditions hold for all i , t , and all histories leading up to t :

1. If $\pi_{i,t} > a_{i,t-1}$ then $a_{i,t} \in (a_{i,t-1}, \pi_{i,t})$.
2. If $\pi_{i,t} = a_{i,t-1}$ then $a_{i,t} = a_{i,t-1}$.
3. If $\pi_{i,t} < a_{i,t-1}$ then $a_{i,t} \in (\pi_{i,t}, a_{i,t-1})$.

For simplicity, we have made a specific modeling decision about what happens when payoffs exactly equal aspirations. Since this concerns a knife-edge circumstance, it is not very important.

For tractability's sake we impose two other assumptions on the kinds of AVoRs voters may use.

(1) We restrict attention to AVoRs that are *deterministic*: given a particular history and a current state of affairs — in particular, a voter's current vote-propensity and his aspiration–payoff comparison — an AVoR must determine a unique new vote-propensity. For example, if $W_t = D$, $\pi_{i,t}$ is some specific value above $a_{i,t-1}$ and $p_{i,t-1}(D) = 0.8$, then $p_{i,t}$ must, with probability one, be some unique propensity value in $[0.8, 1]$. (Bush–Mosteller rules, often used in psychological learning theories, are deterministic in this sense.)

(2) We examine only Markovian AVoRs: those in which adjustment of both voting propensities and aspirations in period t depend only on the values of the state variables ($p_{i,t-1}(W_{t-1})$, $a_{i,t-1}$) at the beginning of the current period and on what happened in that period ($\pi_{i,t}$, W_t).

Finally, to avoid hardwiring any results, we confine attention to AVoRs that are *party-neutral*.⁶ Hence, citizens must learn which party to support; such tendencies are not hardwired by their adaptive rules.

Because all the AVoRs examined in this paper are deterministic, Markovian and party-neutral, we will not mention these properties as specific assumptions in the results that follow.

Optimal Responses to Retrospective Voting. Although below we consider candidates with different objectives (e.g., office-seeking versus ideological motives), it helps to fix ideas by sketching out the optimal behavior of just one type, the classical, purely office-oriented politician.

⁶ For a formal definition of party-neutrality, see BKS (2005). The following example illustrates the idea. Suppose citizens i and j , who are in different electorates, use the same retrospective AVoR. In t the incumbent in i 's district is D ; in j 's, R . If $p_{i,t-1}(D) = p_{j,t-1}(R)$ and $\pi_{i,t} = \pi_{j,t}$, then party-neutrality requires that i and j respond identically to D and R , respectively: $p_{i,t}(D) = p_{j,t}(R)$. (Note: this presumes a deterministic AVoR.)

Knowing that citizens vote purely retrospectively, politicians understand that elections are referenda on the incumbent; challengers' actions do not matter. Hence, we focus on the former.

The decision problem confronting an office-oriented incumbent is simple to state: what policy should she implement in order to maximize the probability of winning the current election? (Carrying out this optimization can be quite involved, of course.) This unpacks as follows. Suppose voters have ideal points in R^n , with payoffs decreasing the further the incumbent's implemented policy is from one's bliss point.⁷ In the benchmark context of complete information, an incumbent knows all this, and so can determine for any voter i the probability that implementing policy x will induce i to vote for him. So any contemplated policy produces a vector of such probabilities. The candidate then selects the policy that produces the best vector.⁸

In effect, then, the incumbent, as an agent of n adaptively rational principals, selects the policy that maximizes the probability that a majority of his bosses are satisfied with his performance.

We make optimization easier to attain (hence more plausible) by assuming throughout that the incumbent is concerned only with the present election. Thus, his policy-selection is a myopic best response to the electoral environment created by retrospective voters.

3. Analytical Results

We begin by stipulating the class of payoff functions that we consider in this paper, via (A4). Although (A4) is stronger than necessary for some of the analytical results obtained in this section, it is needed for the computational model. So we assume it here.⁹

⁷ Per Stokes' (1963) critique, our model of retrospective voting does not presume that this is how voters think about elections. It merely represents the relation between policies and payoffs. Voters get realized payoffs, compare these to aspirations, and so forth.

⁸ As is common in electoral models, we will often assume that an office-oriented incumbent is maximizing expected vote share rather than the probability of winning the election. This is a conventional move, driven by tractability demands. It is well-established (Aranson et al., 1974) that in some situations the two objectives are not equivalent.

⁹ Note that (A4) assumes stochastic payoffs. This is to enhance the empirical content of the model. Given deterministic payoffs, models of aspiration-based decision making say that almost anything can happen; i.e., folk theorems hold for such models (Bendor et al., 2003a).

(A4). Each voter i has an ideal point x_i^* in R^d . If the incumbent implements a policy x_t , also in R^d , in period t , then the payoff for voter i is $\pi_{i,t} = f_i(\|x_i^* - x_t\|) + \theta_i$, where θ_i is a R -valued random variable and $f_i : R \rightarrow R$ is strictly decreasing, and $\|x_i^* - x_t\|$ denotes the Euclidean distance between x_i^* and x_t . We further assume that θ_i is nondegenerate and has finite mean and variance. Payoffs for the same voter in different periods, as well as the payoffs for different voters in the same period, are independent of each other. That is, the shocks θ_i are obtained from i.i.d. draws for each i and t .

Proposition 1. Suppose (A4) holds. Vote-propensities are adjusted by some mix of AVoRs that satisfy (A1)–(A3). The incumbent knows the above, and wants to maximize the probability of winning the current election. Then, picking any policy outside the convex hull of the set of voters’ ideal points is a weakly dominated strategy.

Corollary 1. In addition to (A1–A4) suppose that there exists a uniquely optimal policy for the incumbent, x_t^* , in each period t . Then x_t^* is in the convex hull of the set of voters’ ideal points in every t .

The proofs of this and all other statements can be found in the appendix. Proposition 1 allows the incumbent to be ignorant of many facts: exactly how voters adjust vote-propensities or aspirations, the shape of their utility functions, and so forth. Despite this uncertainty, an office-seeking incumbent knows that there’s no reason to locate outside the Pareto efficient set. Here’s the intuition. For any policy, x_o , that’s outside the efficient set there exists another one, x' , that is closer to all the voters’ ideal points. So by (A4) x' delivers a vector of payoffs that, for *each* voter, first-order stochastically dominates the payoffs generated by x_o . Hence, no matter what is the value of (say) voter i ’s aspiration level, policy x' is at least as likely to satisfy it as x_o is.

Proposition 1 implies that the more similar are the voters (i.e., the closer their bliss points) the more tightly constrained is their agent. At the extreme — voters share the same ideal point — the office-seeking incumbent’s behavior is completely constrained: he will implement the common ideal point.¹⁰

¹⁰ Although this result holds in a very general setting, the assumption that parties optimize myopically is necessary here. To see why, consider the following simple example of an incumbent maximizing a sum of discounted future payoffs. Assume that $n = 1$ and the single voter (even for one voter, the algebra of the general case gets messy fast) initially has extremely low aspirations. Further, assume that he immediately resets his aspiration level to within epsilon of his most recent payoff, and that his payoff-shock is symmetrically distributed around 0. If the voter’s aspirations are sufficiently low then the incumbent party of the first period is almost guaranteed to win the next election, regardless of the position enacted. If this position is the voter’s ideal point, however, then the probability of winning the election

However, no good deed goes unpunished. The next result shows that even a perfect agent, who always does what's best for her principals, may be thrown out of office in every election.

Remark 1. Suppose the assumptions of Proposition 1. If the supports of the voters' payoff-shocks θ_i are not bounded below then every incumbent may be fired with positive probability in any period t .

Assuming that payoff-shocks are not bounded below is convenient but it does not drive the conclusion, as the next result shows. To sharpen this result, we assume that voters have the same ideal point. Even in this context — i.e., even when the incumbent is implementing what is unambiguously the best policy for all citizens — retrospective voting makes getting fired an ongoing risk for the agent. We use the notation $\underline{\pi}_i$ to denote citizen i 's minimum payoff if the politician implements x_i^* and θ_i 's support is bounded.

Remark 2. Suppose the assumptions of Proposition 1 hold; further, the voters have the same ideal point and politicians do not play weakly dominated strategies. Suppose that for all i , each θ_i has a continuous density that is strictly positive over some bounded interval and zero elsewhere. If there is a date T such that $a_{i,T} > \underline{\pi}_i$ for a majority of the voters then in every date after T every incumbent may be fired with positive probability.

Remarks 1 and 2 suggest that even a politician who does exactly what s/he should be doing will be fired eventually *with certainty*. The next result shows that this is true, for a wide range of stochastic environments, if aspirations are the simple average of payoffs and citizens do not become arbitrarily sluggish in adjusting their vote propensities in response to negative feedback. The latter property is formalized by (A2'), which strengthens (A2).

(footnote continued)

in period two falls all the way down to a fair coin flip in expectation: the party expects that the voter's new aspiration level would be satisfied exactly half the time if the incumbent were to again implement his ideal point. In contrast, enacting a policy some distance from the voter's ideal point would still produce a win in period one, but now the voter's aspiration after this election would stay at a more easily achieved level. Locating at the voter's ideal point during the second period would thus yield a considerably higher probability of victory than 50 percent, and so in period one a fully rational incumbent maximizing a discounted utility stream will not locate at the voter's ideal point (if future payoffs are not discounted too much, of course). But because solving such maximization problems gets extremely difficult even for a few voters, we think that assuming myopic optimization is eminently reasonable.

(A2') (negative feedback). If $\pi_{i,t} < a_{i,t-1}$ then with probability one $p_{i,t}(W_t) \leq p_{i,t-1}(W_t)$. Further, there exists an $\varepsilon > 0$ such that for all t and all histories leading up to t if $p_{i,t-1}(W_t) > 0$ then $p_{i,t} < (1-\varepsilon) p_{i,t-1}(W_t)$.

Replacing (A2) by (A2') yields the following result.

Proposition 2. Suppose, in addition to the assumptions of Proposition 1, (A2') holds. Voters have the same ideal point and politicians do not play weakly dominated strategies. Then every incumbent is thrown out of office eventually with probability one if either (i) or (ii) obtains.

- (i) The payoff-shocks (the θ_i 's) have continuous densities, and aspirations are formed by a simple averaging rule: $a_{i,t} = a_{i,0} + \pi_{i,1} + \dots + \pi_{i,t-1}/t$ for all i .
- (ii) All the θ_i 's are discrete random variables with finitely many possible values. The aspiration adjustment rules satisfy (A3) and $a_{i,0}$ lies strictly between the minimum and maximum value that the payoffs can take.

Thus, even an incumbent who implements the electorate's common ideal point will be fired eventually.¹¹ Proposition 2 does not tell us anything about the expected duration of an incumbent in office. Remark 3 allows us to estimate this, albeit under restrictive assumptions.¹²

Remark 3. Let n , the number of voters, be odd. Suppose the voters have the same bliss point $x_i^* \equiv x^*$ and identical loss functions f_i in (A4). Further suppose that they are simple satisficers: $p_{i,t}(W_t) = 1$ if $\pi_{i,t} \geq a_{i,t-1}$ and $p_{i,t}(W_t) = 0$ otherwise. If each θ_i is a continuous r.v. with a density and aspirations adjust immediately ($a_{i,t} = \pi_{i,t-1}$), then in every election after $t = 1$ the incumbent will be fired with probability $1/2$.

¹¹ Assuming that voters have the same bliss point is analytically useful: it and the assumption that politicians avoid weakly dominated strategies together imply that the incumbent uses a stationary policy. This makes analyzing the long-run properties of aspirations tractable. Further, it sharpens the point that an even unambiguously best agent cannot forever satisfy principals who respond retrospectively. However, common ideal points is not a *necessary* condition for the conclusion to hold. One can show that even if every citizen has a distinct bliss point, any incumbent who after finitely many periods settles down on a stationary policy will be fired eventually with probability 1. (We also suspect that any politician who settles down on any finite set of policies will eventually be thrown out of office, but this remains a conjecture.)

¹² For analytical convenience, Remark 3 assumes that aspirations adjust immediately to payoffs: $a_{i,t} = \pi_{i,t-1}$. Strictly speaking this does not belong to the set of aspiration-adjustment rules that satisfy (A3). However, continuity ensures that if citizens' aspirations adjust almost all the way to their most recent payoffs, then the incumbent will be fired with a probability that is very close to $1/2$.

Remark 3 tell us that the expected duration of an incumbent in office is two periods.¹³ Under the assumptions of Remark 3, the electorate votes incumbents out quite frequently, with long runs being quite unlikely.

Although retrospective voters are ungrateful they are well-served when they are ideological clones of each other. Though the new incumbent realizes that the electorate does not understand the situation and will eventually fire him even though he is doing as well as is humanly possible, being office-seeking and rational he makes the best of a difficult situation: he implements the voters' common ideal point.

This underscores the value of representative democracy. Given informed agents, retrospectively voting principals cannot do too much damage. Office-seeking politicians protect the public from itself.¹⁴ But in direct democracy the voters' displeasure falls on a policy rather than a candidate. This is bad.

Remark 4. Suppose the assumptions of Remark 2 hold, except that citizens vote directly for policies. If the status quo policy does not receive a majority of votes then it is replaced by some other policy.¹⁵ Then in every period after T , every status quo policy is overthrown with positive probability.

Thus, the combination of direct democracy and retrospective voting can lead the citizenry to take up suboptimal policies repeatedly. In representative democracy, informed and rational office-oriented candidates protect the voters from themselves. They will do so because pleasing the voters is the best way to continue enjoying the perks of office, per Adam Smith's famous remark: "it is not from the benevolence of the butcher, the brewer or the baker, that we expect our dinner, but from their regard to their own interest" (quoted in [Downs, 1957, p. 28](#)). Hence, a central part of the Smith–Downs argument about representative democracy does not require that voters be fully rational, at least not in all contexts. Instead, what is critical is that the incentives facing an office-oriented politician line up with the citizens' interests.

These can diverge, of course, if there are agency problems. A rational and informed incumbent has the capacity to do what's best for the electorate; one who is office-oriented also has the motivation to do so. But if the incumbent also has policy preferences, and these diverge from those of, say,

¹³ We assume n is odd to avoid ties, of course. But if we use the convention that for n even the winner of a tied election is selected by a fair coin toss, then Remark 3's conclusion will still hold.

¹⁴ Compare to Proposition 2 of [Achen and Bartels \(2002\)](#), which has a similar message under a different set of assumptions.

¹⁵ For present purposes, there is no need to be explicit about how policies are replaced.

the MV, then agency problems can arise. To analyze such issues we turn to the computational model.

4. Computational Results

The previous section provides analytical results that give us some insights into how rational, office-seeking parties will behave when facing retrospective voters. But many questions remain unanswered: Where, exactly, do parties locate? What are the advantages of incumbency in our setting? Do party-motivated policies behave differently from those driven purely by a desire for the perks of office? To answer these questions we must give up a level of generality, so in this section we make specific assumptions about utility functions. Further, we abandon the requirement of analytic tractability, and turn instead to computation, bolstering the intuition so derived with simple analytic examples when appropriate.¹⁶

4.1 Assumptions

The basic setting of the computational model is as described in Section 2. Each voter maintains an independent propensity to vote for each party, and an aspiration level. Each period begins with a majority rule election, which produces a new incumbent. This party's position yields a payoff for each voter, which causes all voters to update their propensities either upward or downward if these payoffs are either greater than or less than aspirations, respectively. Voters also update their aspirations based on these payoffs. Finally, parties choose positions for the next election and the cycle continues.¹⁷ Exact specifications for behavioral rules are given by the following computational analogues to earlier assumptions:

(A1c) (positive feedback for D /negative feedback for R). $(1-\lambda) * p_{i,t}(D) + \lambda$.

¹⁶ We focus in this paper on phenomenology (i.e., the range of outcomes observed in the system) rather than on understanding the effect of every model parameter on every other one. The latter analysis awaits future work; here we content ourselves with specifying behavior either common across model parameterizations, or dependent upon the same in a simple way.

¹⁷ Note that this choice is made to maximize the utilities arising from the outcome not of the next election, but rather the one after it. No action a party takes just before an election can affect the outcome of that election, as our voters are purely retrospective. (In the future, we will extend the model to citizens who vote both retrospectively and prospectively, which explains the slightly odd ordering. This choice only affects what happens in the first two periods, and has no impact on future outcomes.)

(A2c) (negative feedback for D /positive feedback for R). $(1-\lambda) * p_{i,t}(D)$.

(A3c) (aspiration adjustment). $a_{i,t} = (1-\nu) * a_{i,t-1} + \nu * \pi_{i,t}$.

(A4c) (voter utilities). $\pi_{i,t} = -0.5 * ((x_{i,t} - \text{bliss}x_i)^2 + (y_{i,t} - \text{bliss}y_i)^2 + \theta_{i,t})$,
 $\theta \sim N(0, \sigma^2)$.

(A5c) (party utilities). $\text{pay}_{j,t} = (1 - \text{partyIdeoLevel}) * \text{perq} * \text{voteshare}(x_{j,t}, y_{j,t}) + \text{partyIdeoLevel} * ((\text{voteshare}(x_{j,t}, y_{j,t})) * (-0.5 * ((x_{j,t} - \text{bliss}x_j)^2 + (y_{j,t} - \text{bliss}y_j)^2)) + (1 - \text{voteshare}(x_{j,t}, y_{j,t})) * (-0.5 * ((x_{\sim j,t} - \text{bliss}x_{\sim j})^2 + (y_{\sim j,t} - \text{bliss}y_{\sim j})^2)))$.

Each voter begins with a 50–50 propensity to vote for either party, and an aspiration level comfortably between her minimum and maximum payoffs (though see below). Voters are purely adaptive: they respond to payoffs according to (A1c)–(A4c). While not strictly rational, such behavior does tend over time to cause them to vote for the party closest to their own interests, as measured by their ideal points (BKS, 2005). Parties are myopically rational, maximizing their utility in every period. This maximization is accomplished via a simple iterated line search. Vote share is used as a proxy for the probability of winning for reasons of both tractability (exact solutions for the victory probability become unreasonable for even reasonable sizes of the electorate, and Monte Carlo methods do not yield sufficient variability for maximization at even a thousand draws) and empirical reasonableness (maximizing votes seems to approximate well the actual behavior of parties in the face of great uncertainty). Parties enact their own ideal point in the first election, which occurs before they have had a chance to act.

4.2 Convergence, but Not to the Median (and Not Always to the Mean, Either)

We begin by assuming that *partyIdeoLevel* (the degree to which parties care about the enacted position) is zero. Thus all parties are purely office-motivated, driven by the desire to obtain the perks conferred by holding power. A natural question in such a setting is: do the parties obey the MV theorem? That is, do they converge, and, if so, is it to the MV's position? As seen in other contexts,¹⁸ it turns out that convergence is a strong outcome of voting processes such as ours, occurring in every period for every parameterization of the model. Though it is interesting that this fundamental result continues to hold in a very different context than the standard Downsian model of prospective voting, it is not surprising that it does. After all, with two parties that are effectively clones of each other, each having the same utility

¹⁸ See Duggan (2005) for a survey of equilibrium analyses across a variety of spatial electoral models.

function, as long as the vote share is maximized at a single point each party should be expected to locate at that point in every period.

What is more interesting is where parties locate, an issue that the analytical model of the previous section could not completely resolve. While the exact point in policy space depends upon the distribution of voters and the parameterization of the model, certain aspects of party location are common across these. The first aspect is that, except for perfectly symmetric voter distributions in which the mean and the median are the same, parties do not locate at the median. Thus, the main part of the MV theorem does not hold.

Where they do locate is more complex, and requires an understanding of the aspiration-driven dynamics involved. As voters begin with equal probabilities of voting for either party, the first election is determined by an unbiased flip of a coin. Since the position chosen by each party in the first period is its own ideal point, this first winner does not necessarily receive a benefit from the win: enacting its own ideal point is unlikely to be optimal. Parties choose optimal positions (i.e., they maximize the expected vote share arising from the implementation of their announced policy) before the second election. This has no effect upon the outcome of the second election, as voters can only respond retrospectively to the payoffs received once one of these new positions is implemented. However, whichever party wins the second election has an immediate advantage in the future: the position on which it chose to run before the second election yields, by construction, the maximal expected vote share for that party in the third election.

In a large electorate, this advantage will be sufficient to guarantee electoral victory for a substantial number of periods. (How many is a function of the model's parameters, a property that will be discussed in the next subsection.) Thus, the model inherently includes a strong incumbency advantage: since voters only react to the incumbent's actions, a (myopically) rational incumbent can influence how voters will respond, and so force a victory for large electorates.

Yet, this advantage is not absolute, and the same dynamic that makes it possible also renders it ever more difficult. At first the party's chosen position is such that voters are often satisfied but, as (A3c) indicates, this implies that their aspirations also steadily increase. At some point they begin to expect the higher payoffs; hence there is less and less the incumbent can do to satisfy them with certainty.¹⁹ Individuals' aspirations settle near the expected payoff, and so whether they are satisfied in any period turns on a purely random draw from the exogenous shock term in (A4c). At this point it's only a matter of time before expected vote share falls enough so that the

¹⁹This dynamic, fundamental in our model, is absent in [Achen and Bartels \(2002\)](#).

incumbent loses, per the analytic results in the previous section. After this occurs, elections become more or less random.

Parties choose the positions on which they run in the presence of this dynamic. Consider for ease of explication an electorate divided cleanly into two groups: a left one located at -1 and a right one located at $+1$. The parties' initial choice of position places them either to the right or to the left of the mean, based on the quasi-random events after the first election. As aspirations adjust, however, parties must strive always to be one step ahead of the curve, and so they inch backward toward the mean in an effort to make more voters happy in every period. Eventually, they reach the mean and, in this example, stay close to it forever after as the incumbent's fortunes gradually decay.

That the mean rather than the median is chosen is no accident. Once aspirations have settled down, it is the point that best balances the various probabilities of success. Moving to one direction likely means increased propensities from those voters in that direction, since their chances of receiving a success will improve, but only at the cost of lowered propensities in the other direction. Since the normal PDF is symmetric, as are propensity adjustment rules around one-half, the vote-share benefit generally cancels out the cost.²⁰

This is the general pattern when the voters' bliss points are distributed exactly symmetrically, and it mirrors the outcomes observed in some probabilistic voting settings (e.g., Duggan, 2005). When it is asymmetric, however, more complicated behavior arises. Now the vote share function exhibits two local maxima, and either could become the global maximum at any time in response to changes in propensities and aspirations. One local maximum is still at the mean of the asymmetric distribution, but the other lies closer to the greater concentration of voters. Locating at the mean is still often the best course of action, but a brief foray much closer to the clustered voters can satisfy them with near certainty, leading to a nearly uniform increase in their propensities to vote for the incumbent party. When propensities are near one-half this boost can outweigh the loss in expected vote share from locating away from the smaller group of voters, and the two local maxima switch relative sizes. This action immediately changes the distribution of propensities, though, and as a result both parties move quickly back toward the mean. Thus, we see cycles of the following sort: the parties move toward the mean of the voter distribution, get close to it, then jump back to a point closer to the greater concentration of voters, and then repeat the cycle.²¹ Aspiration-based behavior therefore produces the convergence that

²⁰ This need not hold if parties maximize something other than voter share.

²¹ In Achen and Bartels (2002), parties can also locate away from the mean/median, though this occurs due to the influence of voters' priors rather than asymmetric voter distributions.

one expects of any reasonable theory when the two parties are clones of each other, but yields a much richer array of behavior than is seen with Downsian voters.

Analytical examples. Kollman and Page (forthcoming), Klochko and Ordeshook (2006) and others have cogently argued that computational modeling can aid our understanding of a phenomenon: instead of giving up when we fail to derive results analytically, we can turn to simulation. We fully agree with this position, as our use of a computational model of elections indicates. But the help can go the other way too: because the patterns generated by a computational model are often very complex, it is helpful to supplement them with examples that are simple enough to be solved analytically.²² Then we can see, starkly and directly, some underlying tendencies of the computational model.

Hence, here we provide some simple analytical results that we believe illuminate the harder-to-grasp patterns of these electoral simulations. These examples parallel the preceding computational subsection by focusing on the locational strategies of the incumbent party. In order to do this, we make two simplifying assumptions. First, we assume binary payoffs, l and h , with $h > l$. Second, we invoke the following result, established elsewhere (BKS, 2005), regarding the long-run behavior of endogenous aspirations.

Proposition 0. Consider a decision-theoretic problem in which the payoffs are either l or h , and every feasible action produces either payoff with positive probability. If aspirations adjust via (A3) then the following conclusions hold.

- (i) If $a_t \in (l, h)$ then with probability one $a_t \in (l, h)$ for all $t > t'$.
- (ii) Suppose aspirations start outside (l, h) : either $a_0 \leq l$ or $a_0 \geq h$. If additionally aspiration-adjustment is bounded away from zero uniformly in t , then a_t moves monotonically toward (l, h) and is absorbed into that interval with probability one as $t \rightarrow \infty$.

In the context of our model, Proposition 0 implies that all voters will come to regard h 's as satisfying and l 's as dissatisfying. This result enables us to have our analytical cake and eat it too: we may reasonably suppress aspirations, yet it remains true that vote-propensities are modified as if aspirations explicitly guided propensity-changes. Hence, here we replace (A1) and (A2) by simpler counterparts that depend only on whether a voter got a high or low payoff.

²²For a discussion of how simple analytical examples can help illuminate a complex computational model, see Bendor et al. (2003b).

(A1') (positive feedback). If $\pi_{i,t} = h$ then with probability one $p_{i,t}(W_t) \geq p_{i,t-1}(W_t)$.

(A2') (negative feedback). If $\pi_{i,t} = l$ then with probability one $p_{i,t}(W_t) \leq p_{i,t-1}(W_t)$.

The essence of spatial payoffs extends easily to the binary payoff setting.

(A4'). The probability that voter i gets a payoff of h is strictly decreasing in the distance between i 's bliss point and the incumbent's policy.

We will call the function that represents (A4') the probability loss function, or plf. This in effect parallels standard spatial utility functions, with expected utility replacing utility. To complete the parallel with the computational model, we assume that voters differ only in the location of their bliss points, i.e., they have the same plf.

The first two examples show why office-seeking incumbents often will not locate at the MV's ideal point. We can make the point crisply by assuming a very simple form of retrospective voting: a citizen votes for the incumbent if and only if she is satisfied, i.e., she received an h -payoff in the current period. This will be called simple satisficing.²³

There are two distinct causal mechanisms that produce non-MV behavior. The first one turns on voters' being very fussy, i.e., the incumbent is unlikely to satisfy citizen i unless she implements a policy very close to i 's point. Visually, a voter is fussy if her plf looks like a sunken tent, mathematically, if the magnitude of her plf drops off quickly away from her ideal point.²⁴

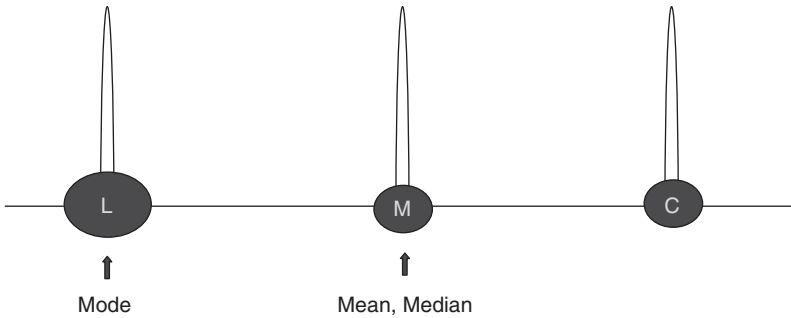
Example 1. Suppose (A4') holds and voters are simple satisficers. If they are sufficiently fussy and the distribution of ideal points is unimodal, then an office-seeking incumbent will locate at that mode.

The intuition of Example 1 is conveyed visually by [Figure 1](#). The dots correspond to the distribution of ideal points, with bigger dots implying a greater concentration of voters sharing that point. Thus, in the example there are more Liberal voters (L) than Moderate (M) or Conservative (C) voters. Overlaid on these points is the plf for voters at each point, which is almost maximally fussy: if the incumbent chooses any policy that differs from a voter's bliss point, then the probability of an h -payoff for that voter quickly drops to zero. (Strictly speaking the plf as drawn does not satisfy (A4'), but obviously the relevant kind of continuity allows us to draw a plf

²³ We use this name because the rule described in the text is, in fact, the simplest variant of the satisficing heuristic that one could imagine. Not all satisficing models assume that dissatisfaction triggers search for a new alternative with probability 1 (e.g., BKS, 2005).

²⁴ The limiting case of a fussy voter's plf would be a Dirac delta: a pure spike of zero width and infinite magnitude.

Figure 1: Example 1

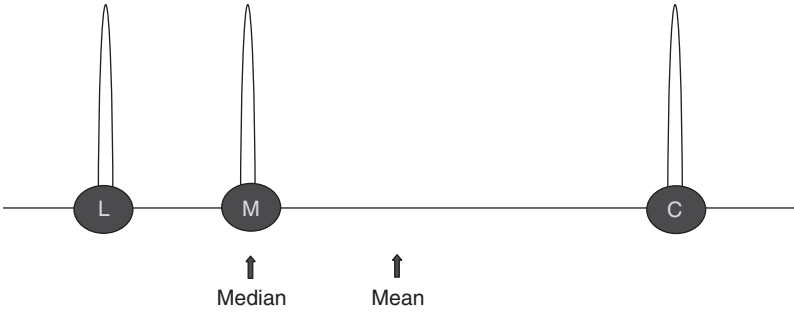


such that if the policy distance is more than δ then the probability of an h is less than ε , etc.) Since the incumbent has almost no chance of satisfying anyone if she locates between ideal points, she must locate at one of the bliss points. And since there are more liberals than moderates or conservatives, she locates at the liberals' ideal point, even though the moderate is the MV.²⁵

Of course, this example is very simple. In the more complex computational model, aspirations explicitly adjust to experience; hence, what voters regard as satisfactory payoffs varies over time. This produces much more varied behavior. However, this example can still help us understand the more complete model: as a snapshot of a complex dynamic, the example highlights the properties of voters that induce incumbents to locate closer to a mode than to the median or the mean. The cyclic pattern of party location described earlier, in which parties temporarily locate much closer to the greater concentration of voters, illustrates this. In both the full model and in the stylized example, the immediate benefits of locating closer to the greater number of voters (closer, i.e., to the mode) outweigh the votes lost by moving away from the median or the mean. The differences between the example and the computational model are clear. The former is simple enough so that we can say with certainty where the parties will locate in every period. The

²⁵ Since we are assuming that the median differs from the mode, there must be less than half the population in the liberal camp, and so the chance of any party's winning with this strategy is identically zero. Thus, the strong dominance of this strategy relies upon the assumption of vote share maximization rather than maximization of the probability of winning. However, the strategy remains weakly dominant in the latter case, and we can recover our stronger result by instituting lexicographic preferences: a party first maximizes the probability of winning and then maximizes vote share if still indifferent between policies.

Figure 2: Example 2



model, with endogenous aspirations coupled to a full range of payoffs, is sufficiently complex so that incumbents locational choices are only tendencies, not starkly identified certainties.

This argument applies equally well to a second cause of non-MV behavior, a sufficiently asymmetric distribution of ideal points. Again, suppose that there are three types of voters, liberal, moderate and conservative, with ideal points l^* , m^* and c^* , respectively. This time we assume that they are equally numerous, but that the distribution of ideal points is skewed sharply to the right: c^* is much farther from m^* than l^* . It is clear from Figure 2 that if the C's are sufficiently extreme then no policy will satisfy both them and the M's, let alone C's and L's. This leads to Example 2, displayed in Figure 2.

Example 2. Suppose (A4') holds and voters are simple satisficers. There are three types of voters. For any plf that asymptotes to zero, there exists a distribution of voters asymmetric enough so that an office-seeking incumbent will not locate at the MV.

Applying Example 2 to our example, for any given plf that asymptotes to zero and any fixed $\varepsilon > 0$, if the C's are sufficiently far from the M's and if the incumbent locates at $m^* + c^*/2$ then the probability of giving an h to either type is less than ε . A fortiori, the chance that an L gets an h will also be less than ε . Hence, a rational office-seeking party gives up on extremist principals: trying to please them is too costly.

Given this, and given that all three voter-types are equally common, it's easy to show that it cannot be optimal for an office-seeker to locate to the right of m^* . (Here's a sketch of why that must be true. Locating at m^* maximizes the chance of satisfying the M's, there's a greater chance of getting L's, compared to any $x > m^*$, and given that the chance of satisfying C's was negligible at the midpoint between m^* and c^* , the loss in C-support incurred by locating at m^* must also be negligible.) So x^* must be in $[l^*, m^*]$. The only

remaining question is whether it is always optimal for the incumbent to pick this interval's right boundary, m^* . We know from Example 1 that this *would* be best if the voters are sufficiently fussy. But if the plf is sufficiently concave over a big enough interval (over (l^*, m^*) will do) then an office-seeking party will locate to the left of m^* . The reason is that the plf's concavity makes attracting the support of L's an attractive possibility: moving a bit to the left of m^* increases the probability of producing h 's for L's faster than it reduces the chance of satisfying M's. And the C's are so extreme that the chance of satisfying them is already negligible for $x^* = m^*$, so there's virtually no cost on that front.

In effect, then, a rational office-seeking politician simply ignores the extremist C's. They are so far from everyone else that it is not worthwhile to try to satisfy them. Hence, the incumbent's future lies entirely in the hands of the other two blocs, the liberals and moderates. And under plausible conditions, it is optimal to avoid corner solutions, i.e., not to do exactly what is best for either bloc of voters. So again non-MV behavior prevails.²⁶ This illustrates the cyclic dynamics of the computational model, in which it sometimes becomes beneficial to downgrade the potential votes of the extremists in one's location calculations.

In light of work on location at the mean of the ideal-point distribution (e.g., Enelow and Hinich, 1984), it is worth noting that in the present example the incumbent does not locate at the distribution's mean either. Indeed, the distance between the mean and x^* grows arbitrarily large as $c^* \rightarrow \infty$. Retrospective voting, which is driving the present result, does not necessarily entail mean-seeking behavior by an office-seeking incumbent; the policy on which parties collocate depends fundamentally on the probability that voters are satisfied in any period. In these simple examples, this probability is driven by only one factor: the distribution of voters' ideal points. If they are too asymmetric either in concentration or in location, parties locate at neither the mean nor the median of the distribution. In the more complex computational model, changing aspirations play a role as well. Though the payoff function, (A4c), typically is such that for the voter distributions we examine parties collocate at or near the mean, they do not simply sit there as they would in a probabilistic voting model. Instead, at times the adjustment of aspirations alters the situation to match up more closely with these simple examples, resulting in policies chosen (albeit briefly) away from both mean and median.

²⁶ This behavior will persist indefinitely. Hence, whereas parties asymptotically converge to the MV in the Achens–Bartel model (2002, p. 24), this is not true in general of our model.

4.3 Incumbency Advantage

In the previous subsection, we spoke of the incumbent's natural advantage, given retrospective voting: since citizens react only to outcomes driven by the incumbent's behavior in office, the latter can influence, especially early on, how the former will respond.²⁷ This is an important point. Methodologically, it means we have recovered some of the near-invulnerability of many incumbents without invoking additional modeling structure. Substantively, it suggests that something far more central to human decision-making than a reaction to transient advertising bought with an incumbent's extra resources can produce extended terms in office. Given this, it bears further examination. In particular, our previous discussion does not examine just how long an incumbent can be expected to stay in office. While this is dependent on several parameters, the focus of this paper is on the effects that aspiration-based behavior has on elections, and we leave most analysis to future work. Here we concentrate on the impact that the parameters of propensity and aspiration adjustment, λ and ν , have on the length of time in office. (We briefly examine the impact of the initial aspiration level at the end of this subsection.)²⁸ Since the first period's occupant is random, as discussed previously, we calculate this length as the difference between the second election and the last election won by the incumbent before the party in power changes. The setting will be the same bipolar electorate described in the previous section: half of the electorate has an ideal point of -1 , the other half at $+1$.

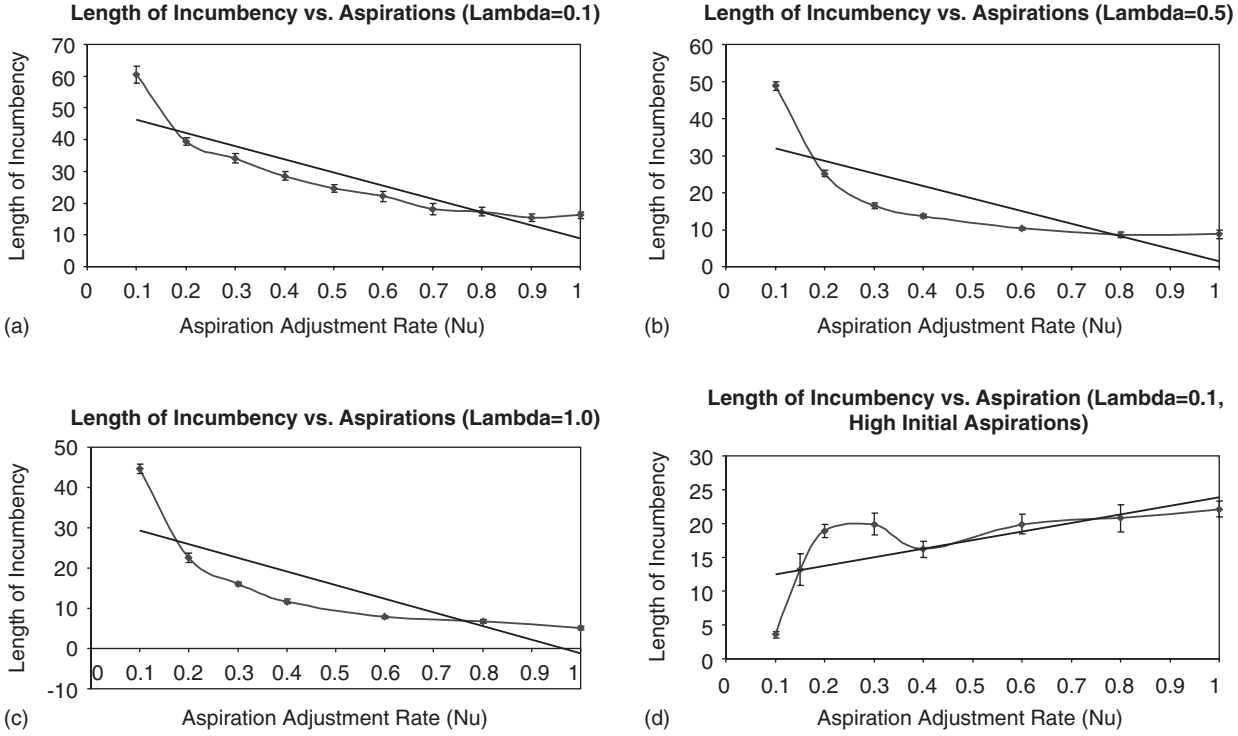
Figure 3a illustrates the effect that increasing the rate of aspiration adjustment has on the length of time in office, for a relatively slow propensity adjustment rate of 0.1. As the graph plainly shows, increasing ν decreases time in office. Slow updating of aspiration levels produces a powerful incumbency advantage, as it takes a long time for voters' aspirations to settle down to their mean payoff level. In contrast, as aspirations update faster, voters more quickly become accustomed to their typical payoffs ("what have you done for us lately?") and it becomes more difficult for the incumbent party to satisfy its constituents for any stretch of time.

If propensities adjust more quickly, the problem for incumbents only worsens. Figure 3b displays the same information as in Figure 3a, save that $\lambda = 0.5$. Again we find a weakening of the incumbency advantage as

²⁷ Achen and Bartels (2002) also find an incumbency advantage, though under different assumptions. Further, as learning progresses in their model, the advantage tends to increase over time, while ours eventually decreases as aspirations adjust.

²⁸ We do not discuss the impact of the number of voters on the incumbency advantage, though that is fairly clear: the more numerous the voters, the less stochastic are electoral outcomes, so incumbency advantage rises.

Figure 3: Length of Incumbency as a Function of the Speed of Voters' Updating



aspirations adjust more rapidly, but now the curve as a whole is lower than it was for slower propensity updating. Individuals respond more rapidly in their behavior (propensities) to changes in their beliefs (aspirations) here, and so the movement of their aspirations to the mean payoff level catches up to the incumbent more quickly. However, this effect is of lesser magnitude than the decrease driven by slowing down the rate of aspiration adjustment, indicating again that it is really the dynamic of aspiration adjustment that is driving the show.

In [Figure 3c](#), we look at the limiting case: propensities adjust immediately. A satisfied voter will with certainty vote for the incumbent party, while a dissatisfied voter will most assuredly vote against it. This behavioral extremum yields some real differences from more gradual updating — for one, the distribution of propensities at any time is bimodal at zero and one rather than tightly clustered around one-half — but the trend is the same. Again, increasing the rate of propensity adjustment decreases the incumbent’s average time in office, and again this effect is less than that produced by faster aspiration adjustment.

We see then that the general trend appears to be that faster updating reduces incumbency advantage. This is certainly true for the middling initial aspirations assumed in the above analysis, and also holds when initial aspirations are low. If initial aspirations are high, however, we see a reversal of the effect. [Figure 3d](#) is identical to [Figure 3a](#), save that voters’ initial aspirations are now high: just below the maximum. Voters thus expect a great deal, far more than any incumbent can deliver, and incumbency becomes a *disadvantage*. When aspirations adjust slowly, this disadvantage persists for a long time. But as aspirations update faster, voters learn more quickly to expect less, which rapidly eliminates this disadvantage.²⁹ As with any default choice, incumbents benefit from low aspirations.

Analytical examples. Though the complexity of endogenous aspiration adjustment implies that we cannot analytically derive the graphs in [Figure 3](#), a simplification can illustrate the computational model’s major points regarding how initial aspiration levels and the speed of aspiration–adjustment together impact how long incumbents stay in power. We consider the two extreme possibilities: that the speed of adjustment is minimal — $v = 0$ so $a_{i,t} = a_{i,t-1}$ — and that it is maximal — $v = 1$ so $a_{i,t} = \pi_{i,t}$. We start with the former. To keep the analytical example simple, we assume that the voters share the same ideal point and payoff-shock, θ .

In this environment, the ability of an office-seeking incumbent to stay in power depends entirely on the voters’ initial aspirations. If θ ’s support is

²⁹ Incumbency advantage is a consequence of the dynamics of the model, and so the fact that initial conditions alter it does not imply nonergodicity.

bounded and $a_{i,0} < \min(\pi)$ for all i , then whichever party is elected first will stay in office forever after: the incumbent will optimize by implementing the voters' common ideal point, which by (A4) and the assumption of bounded shocks must give everyone more than their minimal payoff. On the other hand, if everyone's initial (and fixed) aspiration level exceeds $\max(\pi)$, then in every election the incumbent is thrown out of office with probability one.

Now suppose that aspirations adjust immediately to payoffs: $v = 1$. If θ has a continuous density over a bounded support, then Remark 3 applies, so incumbents only have a 50–50 chance of staying in office, for all elections after the first two.

These simple analytical examples highlight properties of the computational model: speeding up aspiration–adjustment has different effects on incumbency advantage, depending on the level of initial aspirations. If initial aspirations are low, then incumbency advantage falls as aspirations adjust more rapidly. But if initial aspirations are high then the incumbent's duration-in-office rises as aspirations adjust more rapidly.

4.4 Policy-Motivated Parties

Thus far we have considered only parties motivated purely by the perks of office, so parties are effectively clones of each other. But what if this is not the case, and politicians, like other citizens, care about the policy enacted as well (so $partyIdeoLevel > 0$)? We will discuss two aspects of this question here.

The first, and the most natural, question to ask in this context is: Do the parties still converge? The answer to this is simply “no”. The objective functions each party maximizes are no longer identical, and so the maxima are generically no longer identical as well. How much the parties diverge depends on the relative values of the parameters $perq$ and $partyIdeoLevel$. The greater the perks enjoyed by the party in office, or the less parties care about the policy enacted, the closer they will locate, *ceteris parabis*. This is perhaps unsurprising; probabilistic voting introduces an element of chance just like uncertainty in position does, and, as Calvert (1985) showed, this along with policy-motivated parties suffices to induce policy divergence. Because we ground the notion of uncertainty in a specific behavioral model, however, we can go further and explore consequences of policy-motivation beyond convergence.

One such consequence is that the policies that parties select exhibit more interesting dynamics than is the norm in Downsian analyses, which leads to our second question: where do the parties locate? Earlier we saw cyclic behavior as voters updated their aspirations. The same general dynamic

holds in the policy-motivated regime, with some important differences. Consider again the bimodal voter distribution, with each party's ideal point matching the location of one of the modes.

As stated, the winning party locates further toward its ideal point than in the purely office-motivated case. At first the other party does the same, taking up the mirror image position of the first, due to the symmetry of the setup. This, however, does not last. Once one party begins winning, earning the incumbency advantage described above, the other party is forced to move closer to the center in an attempt to sway a greater proportion of the voters, were the challenging party to win. Of course, for reasonably slow aspiration adjustment the incumbency advantage is too strong; voters react only to the party in power, and the challenger's approach to the mean affects neither their aspirations nor their propensities. Still, the challenger tries to increase his chance of winning by moving closer to the other candidate (or, more precisely, its objective function dictates optimal positions closer to the other candidate), in some cases actually crossing the mean while doing so.

This behavior continues while the incumbent party keeps trying to increase the average propensity of the electorate to vote for it. After awhile, however, aspirations begin to reach mean payoffs, and the average propensity to vote for the incumbent begins to fall. Now the other local maximum for the challenger — its ideal point — begins to look more attractive. If the challenger were to win, after all, not only would at least some voters (those closer to the challenger's ideal point than the incumbent's position) be likely to be satisfied with its performance at its own ideal point, but it would receive the maximal payoff from the policy-related component of its utility. Eventually, this option becomes optimal, and the challenger adopts its own ideal point, in a maneuver that looks to outside observers much like quitting: with no apparent chance of winning, the challenger stops trying and just runs on its beliefs (e.g., the British Labor party in the Thatcherite era).

Unfortunately for the challenger, this behavior, though myopically optimal, is *not* dynamically so. As detailed above, as aspirations continue to move toward the mean of voters' payoffs, the expected vote share of the incumbent party declines. It moves closer to the mean in an attempt to recapture votes, and this works briefly, but inexorably there comes a time when the incumbent is removed from office. Were the challenger located at the same point as the incumbent, this would result in a more-or-less random sequence of subsequent electoral outcomes, but instead the challenger has retreated to its ideal point. It wins a single election — a moral victory, perhaps — and will win the occasional victory in the future as well, but on the whole is relegated to an existence of being a largely irrelevant opposition party. The incumbency advantage in this context is thus even greater than

without policy motivation.³⁰ The challenger's stubborn desire to be happy with the policy outcome were it to win prevents it from winning often, while the incumbent, willing to cater partially to the masses, reaps the benefit.³¹

5. Conclusions

How citizens vote is a central part of the electoral environment for parties. Therefore, if the latter are rational but the former are only boundedly so, then optimizing parties will take citizens' limitations into account. This paper has explored how retrospective voting — which in general is not perfectly rational behavior — affects parties' strategies. We show that rational, office-motivated parties will rarely find it optimal to locate at the MV's ideal point, and often will choose policies away from the mean as well. This deviation from the mean — atypical in models of probabilistic voting — gives a reason why a rational party would play to its base independent of turnout considerations. We also find an endogenous incumbency advantage, deriving from the way in which voters adapt, that offers an alternative explanation to standard exogenous factors — such as funding differentials — for the well-established empirical norm of robust incumbency.

On the methodological front, this paper adopts the view that analytical and computational methods are complementary. This is not meant as a way to make peace between warring academic factions; we mean “complementary” in the standard dictionary sense.³² On the one hand, it is very difficult to figure out analytically the dynamics of party behavior when (a) aspirations are endogenous, (b) one posits retrospective voting rules that are more complex than simple satisficing and (c) there are many different ideal points in the population. For such contexts, computation is extremely useful. On the other hand, simulation results can be hard to interpret, and supplementing them with analysis of simple, highly stylized contexts can often help us figure out exactly what's driving what in a complex computational model.

³⁰Note, however, that this is somewhat dependent on parameterization. In settings where the incumbent also locates near its own ideal point, the challenger party will be far more likely to win in the future after winning once.

³¹One can argue that this is merely a result of myopic optimization, and that more full characterization of the objective would rectify this. While quite likely true, as discussed in footnote 9, the choice problem becomes extremely complex very quickly as the size of the electorate increases, and we believe that full optimization of a discounted stream of utilities is empirically untenable.

³²The third definition of “complementary” in the Webster's Ninth New Collegiate Dictionary is “mutually supplying each other's lack” (1989, p. 269).

When problems are hard, it makes sense to tackle them with a variety of methods. Natural scientists have known this home truth for a long time;³³ it is time for social scientists to adopt this pragmatic perspective.

References

- Achen, C. and Bartels, L. (2002). *Ignorance and Bliss in Democratic Politics: Party Competition with Uninformed Voters*. Presented at the 2002 Annual Meeting of the Midwest Political Science Association.
- Aranson, P., Hinich, M. and Ordeshook, P. (1974). Election Goals and Strategies: Equivalent and Nonequivalent Campaign Objectives. *American Political Science Review*, 58, 135–152.
- Bendor, J., Diermeier, D. and Ting, M. (2003a). *The Empirical Content of Adaptive Models*. Presented at the 2003 Annual Meeting of the Midwest Political Science Association.
- Bendor, J., Diermeier, D. and Ting, M. (2003b). A Behavioral Model of Turnout. *American Political Science Review*, 97, 261–280.
- Bendor, J., Kumar, S. and Siegel, D. (2005). *V.O. Key Formalized: Retrospective Voting as Adaptive Behavior*. Presented at the 2005 Annual Meeting of the American Political Science Association.
- Bendor, J., Mookherjee, D. and Ray, D. (2001). Aspiration-Based Reinforcement Learning in Repeated Games: An Overview. *International Game Theory Review*, 3(2–3).
- Bridgman, P. (1947). New Vistas for Intelligence, in Winger, E. (ed), *Physical Science and Human Values*, Princeton University Press, Princeton.
- Calvert, R. (1985). Robustness of the Multidimensional Voting Model. *American Journal of Political Science*, 29, 69–95.
- Delli Carpini, M. and Keeter, S. (1996). *What Americans Know about Politics and Why It Matters*, Yale University Press, New Haven.
- Downs, A. (1957). *An Economic Theory of Democracy*, Harper & Row, New York.
- Duggan, J. (2005). A Survey of Equilibrium Analysis in Spatial Models of Elections. Mimeo.
- Enelow, J. and Hinich, M. (1984). Probabilistic Voting and the Importance of Centrist Ideologies in Democratic Elections. *Journal of Politics*, 46, 459–478.
- Ferejohn, J. (1986). Incumbent Performance and Electoral Control. *Public Choice*, 50, 5–25.
- Key, V.O. (1966). *The Responsible Electorate: Rationality in Presidential Voting 1936–1960*, Belknap Press, Cambridge, MA.

³³As the Nobel prize-winning physicist Percy Bridgman (1947) provocatively remarked, “there really is no scientific method ... [just people doing their] damndest with [their] minds, no holds barred” (pp. 144–145). Had any of his colleagues cavalierly dismissed a problem-solving method such as computation, Bridgman’s reaction probably would have been unprintable.

- Kinder, D. (1998). Opinion and Action in the Realm of Politics, in Gilbert, D., Fiske, S. and Lindzey, G. (eds), *The Handbook of Social Psychology*, 4th ed., McGraw-Hill, Boston, MA.
- Klochko, M. and Ordeshook, P. (2006). Endogenous Time Preferences and Social Complexity, in Hinich, M. and Barnett, W.A. (eds), *International Symposia in Economic Theory and Econometrics*, vol. 17, Elsevier, Amsterdam.
- Kollman, K. and Page, S. (2006). Computational Methods and Models of Politics, in Tesfatsion, L. and Judd, K. (eds), *Handbook of Computational Economics II*, Elsevier, Amsterdam.
- Luskin, R. (2002). From Denial to Extenuation (and Finally Beyond): Political Sophistication and Citizen Performance, in Kuklinski, J. (ed), *Thinking about Political Psychology*, Cambridge University Press, New York.
- Simon, H. (1955). A Behavioral Model of Rational Choice. *Quarterly Journal of Economics*, 69(February), 99–118.
- Simon, H. (1956). Rational Choice and the Structure of the Environment. *Psychological Review*, 63, 129–138.
- Stokes, D. (1963). Spatial Models of Party Competition. *American Political Science Review*, 57(2), 368–377.

Appendix

Proof of Proposition 1. Consider x_o not in the convex hull of the ideal points. Then there exists a point x_r in the convex hull such that for every voter i , $\|x_i^* - x_r\| \leq \|x_i^* - x_o\|$. From (A4), for each voter i , the probability that the payoff exceeds a threshold $P(\pi_{i,t} > a | x_r) \geq P(\pi_{i,t} > a | x_o)$ for any level a . From (A1) and (A2), it follows that $P(p_{i,t}(W_t) > p_{i,t-1} | x_r) \geq P(p_{i,t}(W_t) > p_{i,t-1} | x_o)$ regardless of $p_{i,t-1}$ or $a_{i,t-1}$, for every voter. Therefore, the probability that each voter votes for the incumbent (weakly) increases when x_r is implemented rather than x_o . Therefore, the probability of the incumbent winning the election (weakly) increases. QED

Proof of Remark 1. For any given vector of aspiration levels $a_{i,t-1}$ every voter can get a payoff such that $P(\pi_{i,t} < a_{i,t-1}) > 0$, since all payoff-shocks are not bounded below. Hence, by (A2) the probability that everyone has a vote-propensity less than 1 is strictly positive for every election. So the probability that a majority votes against the incumbent is strictly positive, in every given period. QED

Proof of Remark 2. Let $N(T)$ be the subset of $\{1, 2, \dots, n\}$ such that for any $i \in N(T)$, $a_{i,T} > \underline{\pi}_i$. Consider any i in $N(T)$.

Since θ_i 's density is continuous, the event $\pi_{i,t} = \underline{\pi}_i$ occurs with probability zero. Hence, (A3) implies that $a_{i,T+1} > \underline{\pi}_i$ almost surely, and by induction this inequality holds at every finite date.

Given this, and given that θ_i 's density is strictly positive over its support, $\Pr(\pi_{i,t} \in [\underline{\pi}_i, a_{i,t}]) > 0$ for each $t > T$ and all $i \in N(T)$.

So with positive probability i will be disappointed, whence (A2) implies that $p_{i,t+1}(W_t) < 1$. Since this holds for all i in $N(T)$ and the latter constitutes a majority of the electorate, the incumbent will lose the election with positive probability in $t+1$. QED

Proof of Proposition 2. We begin by showing the result under (i). We will then indicate how the proof under (i) can be modified to obtain the result under (ii). Fix an $\delta_1 > 0$. From the law of large numbers, we expect $a_{i,t}$ to converge to $\bar{a}_i = E[\theta_i] + f_i(0)$. To be precise, there exists a time T such that $P(a_{i,t} > \bar{a}_i - \delta_1) \geq 1/2$ for all $t > T$. Given that θ_i satisfy a continuous density and the arbitrary choice of δ_1 , for all $t > T$ we must have $P(\pi_{i,t+1} < a_{i,t}) > 1/2\delta_2$, for some $\delta_2 > 0$. That is, with positive probability each voter can be dissatisfied in every period after T .

By (A2') this implies that for all $t > T$, $P(p_{i,t+1}(W_t) < 1 - \varepsilon) > 1/2\delta_2$. Given that the actual votes only depend on the propensities, we have $P(\text{voter } i \text{ does not vote for incumbent in } t+1) > 1/2\delta_2\varepsilon$ for all $t > T$. Therefore, $P(\text{every voter does not vote for incumbent in } t+1) > (1/2\delta_2\varepsilon)^n > 0$. Therefore, $P(W_{T+1} = W_{T+2} = \dots = W_{T+k}) < (1 - (1/2\delta_2\varepsilon)^n)^k$ for every k . Letting $k \rightarrow \infty$ yields the result.

To mimic this argument under (ii), we note that it is sufficient to establish that $P(\pi_{i,t+1} < a_{i,t}) > 1/2\delta_2$, for some $\delta_2 > 0$ for all t beyond some T as above. This actually holds with $T = 0$ given the choice $a_{i,0}$ and (A3). That is, the aspiration can never reach the minimum value of the payoff and hence at every period each voter is dissatisfied with positive probability. The rest follows as in (i). QED

Proof of Remark 3. In each election after $t = 1$, the probability that any given voter votes for the incumbent is $P(\pi_{i,t} > \pi_{i,t-1})$. Since both parties situate themselves at x^* , the f_i are identical and the payoff-shocks θ_i are i.i.d., this probability equals $1/2$. Since each voter is equally likely to vote for either party, we have $P(n-k \text{ vote for incumbent}) = P(k \text{ vote for incumbent})$ for each $k = 0, 1, \dots, n$. In particular, we have $\sum_{k=(n+1)/2}^n P(k \text{ vote for incumbent}) = \sum_{k=0}^{(n-1)/2} P(k \text{ vote for incumbent})$. But the former is simply the probability that the incumbent wins and the latter is the probability that he does not. Hence, the result follows. QED

Proof of Remark 4. This follows exactly along the lines of Remark 2. We simply replace the party with a policy, and since the party identity or the number of parties do not affect the proof of Remark 2, the result follows. QED

Chapter 2

Campaign Contributions and Political Favors in a Spatial Model with Probabilistic Voting[☆]

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Abstract

This paper presents a model that analyzes political competition and campaign contributions in a probabilistic voting model. We depart from the usual “truth-telling” assumption found in the literature, allowing running candidates to signal self-qualities and opponent-flaws, no matter if what they say is true or not. Three important results arise from the political competition game. First, money matters for electoral outcomes. Second, candidates have incentives to provide too much political favors to contributors. Finally, big corporations are the ones that contribute to candidates the most. All these results support the idea that imposing limits to campaign contributions, campaign spending, and matching public funds can be socially desirable.

1. Introduction

Money and politics have been related since the concept of democracy has been accepted as “the best way” to organize a polity in the western hemisphere. Democracy requires competitive elections to select the leaders, but in order to participate in the political competition game, money is needed to run for office.

[☆] *We thank the comments of Melvin Hinich, Antonio Farias and Rafael Romero. The usual disclaimer applies.*

*Corresponding author.

In this paper, we develop a spatial model of political competition that highlights the importance of money in elections results. We model how the candidate with more resources has an advantage in the campaign that can be translated into a higher expected plurality. We also study the perverse incentive that candidates face to offer excessive amounts of favors to contributors or business interests (BI) in order to run for office and have a real chance of winning. In our model, money can be used not only for advertising how good each candidate is, but also how bad the other candidates are. The insights derived from the paper support the idea that it can be good for societies to limit campaign contribution, to provide public funds for campaigns or even to have only rich candidates running for office.

To do this, we develop a probabilistic voting model in which two candidates compete for a seat. To get resources for the campaign candidates offer policy favors in exchange. BI will then transform favors into revenue. BI are simple-minded, in the sense that they do not have political positions (they only maximize profits). Therefore, their contribution depends on the opportunity cost of the funds they provide to the candidates and the potential favor that the candidate would give back if elected. Voters have the usual Euclidean distance utility functions with ideal policy positions distributed in a one-dimensional policy space.¹ A voter is more likely to cast his vote for the candidate that provides the greatest expected net candidate differential (ENCD).² Candidates use their resources to run a campaign that is based in two concepts, first making themselves attractive to voters and second, making the opponents unattractive to voters. This produces a Nash political equilibrium in which each candidate tries to maximize his expected plurality.

The main results of the paper can be summarized as follows. First, the candidate with more money is the one more likely to get elected. Second, candidates have incentives to provide excessive amounts of favors to risk averse BI. Finally, BI with smaller opportunity cost are the ones that provides more resources for candidates.

The remainder of the paper is organized as follows. In Section 2, we give a brief look at the related literature. In Section 3, we present the model and the political equilibrium. Section 4 provides the main results of the paper. The conclusions are given in Section 5.

¹Multidimensional policy spaces make the algebraic treatment of our model more complicated without providing additional insights into the results.

²The ENCD is a measure of the relative distance that a voter has with a candidate, and it will become clearer later in the paper.

2. Related Literature

Since the publication of the classic works of [Tullock \(1967\)](#) and [Tollison et al. \(1988\)](#), political economists have been interested in questions like: Are political campaigns good for the society? Should the government partially finance competing candidates? Are limits to campaign spending desirable? To answer such questions, we need to understand the way voters react to political campaigns and the complex relationship between candidates and contributors.

In this sense, some authors have studied empirically the way that political campaigns inform the mass of uninformed voters ([Green and Krasno, 1988](#); [Holbrock, 1996](#); [Alvarez, 1998](#); [Gerber, 1998](#)). Others like [Schultz \(2003\)](#) have studied the importance of implementing direct advertising for the swing voters. Since swing voters receive a high degree of information and demand private benefits from parties, limiting campaign spending is desirable to prevent swing voters from extracting excessive benefits from the society.

In the opposite side, we find the classic work of [Aranson and Hinich \(1979\)](#), which using an election campaign contribution decision model, shows that any statutory contribution limit or enforced disclosure regulation is likely to make elections less competitive and discriminatory against incumbents, as well as minor party candidates. In consequence, limiting contributions are not necessary desirable. Instead, promoting electoral competition should be better for the society. [Barro \(1973\)](#) however, argues that since politicians are the ones who get to structure the political process, promoting competition will not help much, and organized interests will end up being benefited anyway because of politician's control of the rules of the game.

A different perspective assumes that voters are indirectly informed about candidates' qualifications for office. Voters use campaign expenditures as a signal of candidates' quality. Since the assumption is that contributors are better informed about candidates, voters expect contributors to contribute more to the good ones ([Potters et al., 1997](#); [Pratt, 2002a, 2002b](#)), voters would observe the contributions obtained by each candidate and then they will decide for whom to vote. In the literature, this perspective is called persuasive campaigns ([Baron, 1994](#)).

Recently, [Wittman \(2002\)](#) and [Coate \(2004\)](#) have argued in favor of the use of public funds in political campaigns because that allows qualified candidates to penetrate the electorate, increasing their chances of winning. These authors argue that campaigns are effective if they inform candidates' qualifications well. If there are unlimited amount of political advertising, however, the campaigns are not informative because elected candidates will implement mostly political favors in order to pay back contributors, in consequence no good candidate exists. Therefore, under this perspective, limiting contributions and providing public funds for political campaigns are socially desirable.

More recently, Vanberg (2004), using a similar model to Coate (2004), concludes the opposite. He shows that asymmetries in the access to funds do not affect electoral outcomes. Voters expect to receive advertising from a candidate only if that candidate is qualified. Therefore, if a candidate is not qualified the voter will not have information about him, no matter the amount of contributions received.

Coate (2004) and Vanberg (2005) assume that voters know party's affiliation of the candidates, but do not know if candidates are qualified or not (and it is difficult for the parties to find qualified candidates). However, once a candidate is chosen to compete, advertising campaigns inform the *true* qualifications of candidates, this way voters update (in a Bayesian way) the assessment of candidates. If a candidate is not qualified, his party will not do advertising, i.e. the party will not lie.

In our model, we depart from the strong assumption of “truth telling” to study the candidate–contributor game. In our model, we assume that candidates can inform about self-qualities and opponents-flaws no matter if what is said is true or not. This is a formal model of political competition, where the empirical fact of deceiving the electorate is taken into consideration (see Gonzalez (2000) for an example of the role of deception in politics).

3. The Model

This paper considers a spatial model of voting in the spirit of the classic Enelow and Hinich, (1984) with several modifications.

3.1 BI's Behavior

The model consists of a finite set of contributors or BI, indexed by $j = 1, 2, \dots, J$, that have no political preferences, but care only about profits.³ There exist two competing candidates in this economy, candidates r and d . Each candidate has an ex-ante probability of being elected p_r and p_d , respectively. An election is coming in the near future; therefore, political competition is taking place at this moment.

Before the election, candidates try to get money to run a campaign. BI provide with financial resources to each one of the candidates in a profit-maximizing fashion. Let us define c_{jk} as the contribution that BI j gives to candidate $k = r, d$, and let $a_{kj}c_{jk}$, with $a_{kj} > 0$, be the policy favors that candidate k gives to BI j if elected given the contributions received. BI can

³ We will concentrate in the bargaining game between candidates and BI; therefore, we will leave any political preference that BI may have out of the analysis.

transform policy favors into revenue in order to maximize profits. Let $R_f(a_{kj}c_{jk})$ be the twice continuously differentiable and strictly concave transformation function of policy favors into revenue ($R' > 0$ and $R'' < 0$), then BI j chooses c_{jk} in order to maximize the following expected profits function

$$E[\Pi_j(c_{jk})] = \sum_k p_k R_j(a_{kj}c_{jk}) - (1 + \rho_j) \sum_k c_{jk}$$

where ρ_j represents the opportunity cost of the funds invested in the firm (i.e. the cost of capital for BI j). The first-order condition of the above problem is $\partial E[\Pi_j(c_{jk})]/\partial c_{jk} = 0$ for $k = r, d$, which equals to

$$H(p_k, a_{kj}, (1 + \rho_j), c_{jk}^*) = p_k R'(a_{jk}c_{jk}^*)a_{jk} - (1 + \rho_j) = 0 \quad (1)$$

Equation (1) implicitly defines the optimum level of contribution c_{jk}^* , and it says that for BI j to be in equilibrium, the expected marginal revenue of the last unit contributed to candidate k must equal the opportunity cost of funds.

3.2 Voter i Behavior

Let the voters be a finite set indexed by $i = 1, 2, \dots, I$, \tilde{w}_k the random policy position of candidate k , and x_i the ideal policy position for voter i . Then, we define $u_i(\tilde{w}_k) = -(\tilde{w}_k - x_i)^2$ as the one-dimensional spatial utility that voter i derives from candidate k . Let us recall that our model is based on probabilistic voting, therefore, the policy position that a candidate embrace is stochastic and vote casting respond to a probabilistic decision made by voters. The policy positions possess the following probability distribution ($\tilde{w}_k \sim d(\mu_k, \sigma_k^2)$), where μ_k and σ_k^2 represent the mean and variance of the distribution. Then, voters have the following expected utility function derived from candidate k , $E(u_i(\tilde{w}_k)) = -E(\tilde{w}_k - x_i)^2$. Adding a convenient zero into the utility function we obtain

$$E(u_i(\tilde{w}_k)) = -E((\tilde{w}_k - \mu_k) + (\mu_k - x_i))^2$$

Expanding the expression and applying the expectation operator we get

$$E(u_i(\tilde{w}_k)) = -\sigma_k^2 + (\mu_k - x_i)^2$$

At this point a definition must be provided. A homogeneous polity is a polity in which political actors have achieved consensus in the important issues for the society; therefore, most voters share similar ideal policy positions in the relevant policy space. In our model, a homogeneous-polity is characterized by a unique ideal policy position x such that $x_i = x$ for all i . Candidates know that ideal policy position and they signal a distribution of \tilde{w} with the property of having a mean $\mu_k = x$ for $k = r, d$. That is, candidates will signal the unique ideal voter's position in order to show

themselves as the ideal candidates. Therefore, the real political competition in our model will take place in the *noise of the signal*, i.e. the variance. This simplifying assumption reduces the expected utility function in the homogeneous-polity case to the following expression

$$E(u_i(\tilde{w}_k)) = -\sigma_k^2$$

Let s_r be the amount of resources that candidate r spends in reducing his own variance and o_d the amount that candidate d spends in increasing the variance of his opponent (candidate r). Then, we can think of σ_r^2 as a function of s_r and o_d in the following form $\sigma_r^2 = f(s_r, o_d)$. This function must be decreasingly convex in s_r and increasingly concave in o_d for a solution to exist, that is $\partial f(\cdot)/\partial s_r < 0$, $\partial^2 f(\cdot)/\partial s_r^2 > 0$ and $\partial f(\cdot)/\partial o_d > 0$, $\partial^2 f(\cdot)/\partial o_d^2 < 0$. In order to illustrate our results, and without loss of generality, in the remainder of the paper we will use the following functional form that satisfies the previous assumptions $\sigma_r^2 = (o_d/s_r)^\alpha$, where $\alpha \in (0, 1)$.

Let us define the ENCD between candidate r and candidate d for voter i as $\text{ENCD}_{ir} = E(u_i(\tilde{w}_r)) - E(u_i(\tilde{w}_d))$. Using the functional forms given, this expression is transformed into

$$\text{ENCD}_{ir} = -\sigma_r^2 + \sigma_d^2 = -\left(\frac{o_d}{s_r}\right)^\alpha + \left(\frac{o_r}{s_d}\right)^\alpha \quad (2)$$

Notice that for the homogeneous-policy case, the ENCD is not i -specific, and the candidate who provides the highest expected utility is the one who provides the highest ENCD. In consequence, in our probabilistic voting model, voters are more likely to vote for the candidate with the highest ENCD. For that purpose we define $F_i(\text{ENCD}_r)$ as the population cumulative density function for the likelihood that voter i votes for candidate r given the ENCD. The function $F_i(z)$ has all the properties of a cumulative density function, i.e. $F_i'(z) \geq 0$ for all z , $F_i(-\infty) = 0$, and $F_i(\infty) = 1$. We will assume that $F_i(z)$ is a concave function (for instance, we can think of a cumulative uniform distribution that is non-decreasing, continuous and concave, but not strictly concave).

3.3 Candidate's Behavior

Let us take candidate r for a moment (candidate d has an analogous problem). We define

$$\begin{aligned} V_r(s_r, o_r, s_d, o_d) &= \frac{1}{I} \sum_i F_i(\text{ENCD}_{ir}) \\ &= \frac{1}{I} \sum_i F_i\left(-\left(\frac{o_d}{s_r}\right)^\alpha + \left(\frac{o_r}{s_d}\right)^\alpha\right) \end{aligned}$$

as the expected plurality function for candidate r . This function represents the average probability of being voted across voters.⁴ Then, the problem to solve by candidate r turns into maximizing the expected plurality subject to the resources constraint, i.e.

$$\text{Max}_{\{s_r, o_r, \lambda\}} : V(s_r, o_r, s_d, o_d) + \lambda \left(\sum_j c_{jr} - s_r - o_r \right)$$

and the first-order conditions for the problem are

$$\frac{\partial V}{\partial s_r} = \lambda \tag{3}$$

$$\frac{\partial V}{\partial o_r} = \lambda \tag{4}$$

$$\sum_j c_{jr} - s_r - o_r = 0 \tag{5}$$

Using the functional forms given in our model, the problem to solve becomes

$$\text{Max}_{\{s_r, o_r, \lambda\}} : \frac{1}{I} \sum_i F \left(- \left(\frac{o_d}{s_r} \right)^\alpha + \left(\frac{o_r}{s_d} \right)^\alpha \right) + \lambda \left(\sum_j c_{jr} - s_r - o_r \right) \tag{6}$$

and the specific first-order conditions are

$$\frac{1}{I} \sum_i F'(\text{ENCD}_{ir}) \left[\frac{\alpha}{s_r} \left(\frac{o_d}{s_r} \right)^\alpha \right] = \lambda \tag{7}$$

$$\frac{1}{I} \sum_i F'(\text{ENCD}_{ir}) \left[\frac{\alpha}{o_r} \left(\frac{o_r}{s_d} \right)^\alpha \right] = \lambda \tag{8}$$

$$\sum_j c_{jr} - s_r - o_r = 0 \tag{9}$$

Proposition 1. The previous problem has a Nash equilibrium.

Proof of Proposition 1. See the appendix.

4. The Results

In the literature review section of this paper, we discussed in details the unsettled dispute between those supporting restrictions to campaign finance,

⁴For instance, if there exists only two voters. Voter A has a probability of 0.8 of voting for candidate r , and voter B has a probability of 0.6 of voting for the same candidate, then, the expected plurality for candidate r is 0.7.

and those who think that restrictions should not be imposed because they do not help. The group supporting restriction (i.e. limits in campaign spending or matching public funds) argues that money must be prevented from deciding who is elected and who is not. On the other hand, the group against restrictions argues that asymmetries in access to funds does not influence election outcomes, therefore, the existence of restrictions is not justified.

In our model, we depart from the unrealistic assumption — used in the pervious literature (see Coate 2004a, 2004b; Vanberg, 2005) — that campaign advertising provides *truthful* information about candidates' positions. We exploit the fact that in the political campaign candidates signal good qualities about themselves and bad qualities about their adversaries. In this signaling game, truth does not really matters. What really matters is candidates' capacity to convince citizens about self-qualities and opponent's flaws. The art of deceiving in politics is a well-documented fact (Gonzalez, 2000), in consequence, we take that into consideration in our model. We do it in a homogeneous-polity, where the political game is played in the variance component of voters' utility functions.

4.1 Campaign Spending

We now analyze the issue of campaign spending in our probabilistic setting in which deceiving plays an important role.

Proposition 2. In a homogeneous polity, the candidate with more resources are more likely to win the election; in consequence, there exists incentives to spend an excessive amount of resources in the political competition game, with no gain for the society as a whole.

Proof of Proposition 2. See the appendix.

This means that a candidate with unlimited resources can always increase his expected plurality investing more resources in reducing his variance (or investing more resources in increasing the variance of his opponents), and therefore, he is the one most likely to get elected.

In our model, “money really matters” for electoral outcomes. This result is consistent with findings in the previous literature. In this case, however, we have characterized BI and the incentives they have to spend in big amounts of resources in political investments. Two questions arise here: what role does BI's risk aversion play? And what is the importance of the cost of funds for BI when they have to allocate contributions across candidates?

To respond to the previous questions, we should look at the candidates-BI contribution game in more detail. A BI with a high degree of risk aversion will probably have a higher propensity to invest in political favors in order to avoid wealth volatility. On the other hand, we expect that BI with lower

cost of fund are more likely to provide considerable amounts to contributions. We formalize this intuition in what follows.

4.2 Too Much Private Benefits

Let us recall that we have assumed that $R(\cdot)$ is twice the continuous differentiable and concave in the domain. We say that a BI is risk averse (see Huang and Litzenger, 1988) with respect to revenue if and only if $-R''(ac)ac/R'(ac)$ is less than 1 for all $c > 0$.

Going back to the contribution game between candidates and BI, we assumed that candidates offer policy favors in the form of $a_{kj}c_{jk}$ to BI j in order to obtain financial resources to run for office, and BI transform these policy favors into revenue. How much policy favors candidates are willing to give to BI? That is what we analyze next.

Proposition 3. If BI are risk-averse, candidates have incentives to provide excessive (socially suboptimal) amounts of favors to BI in order to increase the probability of being elected.

Proof of Proposition 3. See the appendix.

This result highlights a key aspect of our model. Since the candidate with more resources is the one more likely to get elected, and the bigger the private benefit given to BI, the more money they will contribute to the campaign; candidates have incentives to “give it all”. This translates into implementing public policy that favor private groups and their particular interest in an excessive way, and that go against citizens and social optimality.

This result supports the works of Wittman (2002) and Coate (2004) that assume that political campaign inform only about the true qualifications of candidates. An excessive amount of campaign spending in candidates with low qualifications can actually damage candidates with high qualifications, since the too much spending will end up in an uninformative campaign.

In summary, independently if the campaigns are truth-telling or not, an excessive amount of campaign spending is socially suboptimal for two reasons: First, elected candidates will tend to favor to BI that contribute most to their political campaigns, without considering what is really good for society. Second, too much campaign spending implies uninformative campaigns about the qualification of candidates, in the sense of Wittman and Coate.

In this context, the existence of limits to campaign contributions for individual BI, limits to campaign spending, and matching public funds seems to be a sound public policy to prevent money from deciding who is elected and who is not. Also, these restrictions help to prevent policy makers from getting too distanced from the social optimum.

4.3 The Influence of Big Companies

It is always argued that if politicians are influenced by someone, big corporations are the ones to blame. Big corporations usually possess international branches and have access to the international capital market. They obtain low interest rates to finance operations, and therefore, they usually present a lower cost of funds than small- and medium-size firms struggling to survive from the competition of the big ones.

Proposition 4. BI with low cost of funds will contribute more to finance candidates (*ceteris paribus*).

Proof of Proposition 4. See the appendix.

Our model corroborates the intuition that the big corporations are the ones that end up receiving political favors. And that is exactly the opposite an economy should do in order to achieve higher competition and efficiency in all the sectors. Therefore, we have another reason that supports the idea that limiting campaign spending and providing public funds can be socially desirable.

5. Conclusions

This paper presents a model that analyzes political competition and campaign contributions in a probabilistic voting model. We depart from the usual “truth-telling” assumption found in the literature, allowing running candidates to signal self-qualities and opponent-flaws, no matter if what they say is truth or not. In our model, deceiving the electorate is important, just like it is in real politics.

We obtain three important results from the homogeneous-polity case. First, we showed that the candidate with more resources is the one more likely to win the election. Therefore, money really matters for electoral outcomes in our context. Second, if BI are risk averse, then candidates have incentives to compromise excessive amounts of private benefits (political favors) to BI in order to get more resources for the campaign and this way increase the expected plurality, with no gain for the society. Third, the lower the cost of funds for a BI, the more the BI will contribute to campaign financing. In consequence, it is highly likely that big companies with access to the international capital market are the ones that receive most of the political favor, increasing big companies advantage in the market economy.

All these results support the idea that having restrictions to campaign financing in the form of limits to campaign contributions, limits to campaign spending, or even partially public funding for political campaign can be socially desirable.

References

- Alvarez, R. (1998). *Information and Elections*, University of Michigan Press, Ann Arbor.
- Aranson, P. and Hinich, M. (1979). Some Aspects of the Political Economy of Election Campaign Contribution Laws. *Public Choice*, 34, 435–461.
- Aubin, J. (1993). *Optima and Equilibria*, Springer, Berlin.
- Baron, D. (1994). Electoral Competition with Informed and Uninformed Voters. *American Political Science Review*, 88, 33–47.
- Barro, R. (1973). The Control of Politicians: An Economic Model. *Public Choice*, 14, 19–42.
- Coate, S. (2004a). Political Competition with Campaign Contributions and Informative Advertising. *Journal of the European Economic Association*, 2(5), 772–804.
- Coate, S. (2004b). Pareto-Improving Campaign Finance Policy. *The American Economic Review*, 94(3), 628–655.
- Enelow, J. and Hinich, M. (1984). *The Spatial Theory of Voting: An Introduction*, Cambridge University Press, New York.
- Gerber, A. (1998). Estimating the Effect of Campaign Spending on Senate Election Outcomes using Instrumental Variables. *American Political Science Review*, 92, 401–411.
- Gonzalez, J. (2000). *The Political Instinct: The Role of Deception in Chilean Transition to Democracy*. Ph.D. Thesis, The University of Texas at Austin.
- Green, D. and Krasno, J. (1988). Salvation for the Spendthrift Incumbent: Reestimating the Effects of Campaign in House Elections. *American Journal of Political Science*, 32, 884–907.
- Holbrock, T. (1996). *Do Campaigns Matter?*, Sage Publications, Thousand Oaks, CA.
- Huang, C. and Litzenberger, R. (1988). *Foundations for Financial Economics*, Prentice-Hall, New Jersey.
- Potters, J., Randolph, S. and Winden, F. (1997). Campaign Expenditures, Contributions, and Direct Endorsements: The Strategic Use of Information and Money to Influence Voter Behavior. *European Journal of Political Economy*, 13(1), 1–31.
- Pratt, A. (2002a). Campaign Advertising and Voter Welfare. *Review of Economic Studies*, 69(4), 999–1018.
- Pratt, A. (2002b). Campaign Spending with Office-Seeking Politicians, Rational Voters, and Multiple Lobbies. *Journal of Economic Theory*, 103(1), 162–189.
- Schultz, C., (2003). *Strategic Campaigns and Redistributive Politics*. Technical Report, University of Copenhagen.
- Tollison, R., Charles, K. and Tullock, G. (eds). (1988). *The Political Economy of Rent-Seeking*, Kluwer Academic, Boston, MA.
- Tullock, G. (1967). *Toward a Mathematics of Politics*, Michigan University Press, Ann Arbor.
- Vanberg, C. (2004). *The Implications of Funding Asymmetries in a Model of Electoral Competition with Informative Advertising and Rational Voters*. Technical Report, Cornell University.
- Wittman, D. (2002). *Rational Voters and Political Advertising*. Technical Report, University of Santa Cruz.

Appendix: Proof of Propositions

Proof of Proposition 1. Following Aubin (1993, p. 181) we have to verify that $V(s_r, o_r, s_d, o_d)$ is a continuous and concave function in the domain (s_r, o_r) , and that the restriction set is compact. It is obvious that the restriction set is closed and bounded, and therefore it is compact. Moreover, since $F_i(z)$ is non-decreasing and concave and $\sigma_r^2 = f(s_r, o_d)$ is decreasingly convex in s_r , then, applying Proposition 2.2 of Aubin (1993, p. 20), we conclude that $V(s_r, o_r, s_d, o_d)$ is continuous and convex in the domain. Therefore, the existence of a Nash equilibrium is demonstrated. *Q.E.D.*

Proof of Proposition 2. Let us remember that λ , from the first-order conditions of candidates optimization equations, represents the marginal increase in the expected plurality for an additional unit of resources obtained from BI. If the resources constraint is binding, then λ is a positive number, if the constraint is not binding, then λ takes a zero value. Let us suppose for a moment that candidate d has limited resources and candidate r has unlimited resources. Then, λ (the shadow price of the resources constraint) for candidate r is zero. This in turns implies that, if an interior solution is to exists, equations (3) and (4) turns into

$$\begin{aligned}\frac{\partial V}{\partial s_r} &= 0 \\ \frac{\partial V}{\partial o_r} &= 0\end{aligned}$$

However, analyzing equation (3) we see that

$$\frac{\partial V}{\partial s_r} = \frac{1}{I} \sum_i F'(\cdot) \left[\frac{\alpha}{s_r} \left(\frac{o_d}{s_r} \right)^\alpha \right] > 0$$

where $F(\cdot)$ is a cumulative density function, $F'(\cdot)$ is positive, α is a positive scalar, in consequence, $\partial V/\partial s_r$ is always positive (we get a corner solution). Then, the candidate with unlimited resources can always increase his expected plurality. *Q.E.D.*

Proof of Proposition 3. We know, by equation (1), that BI optimize contribution satisfying

$$H(p_k, a_{kj}, (1 + \rho_j), c_{jk}^*) = p_k R'(a_{jk} c_{jk}^*) a_{jk} - (1 + \rho_j) = 0$$

to see how contribution react to a change in policy favors given by candidates we apply the implicit function theorem to the above equation, and we look for dc_{jk}^*/da_{kj} .

$$\begin{aligned} \frac{dc_{jk}^*}{da_{kj}} &= \frac{-\partial H / \partial a_{kj}}{\partial H / \partial c_{jk}^*} = \frac{-p_k \left(R''(\cdot) a_{kj} c_{jk}^* + R'(\cdot) \right)}{p_k R''(\cdot) a_{kj}^2} \\ &= \frac{p_k R' \left(-R''(\cdot) a_{kj} c_{jk}^* / R'(\cdot) - 1 \right)}{p_k R''(\cdot) a_{kj}^2} \end{aligned}$$

where $-R''(\cdot) a_{kj} c_{jk}^* / R'(\cdot)$ represents the Arrow-Pratt relative risk aversion coefficient, which is less than one for a risk averse BJ j . Also $R'(\cdot)$ is positive and $R''(\cdot)$ is always negative. In consequence, $dc_{jk}^* / da_{kj} > 0$ *Q.E.D.*

Proof of Proposition 4. Again, the behavior of BI is described by equation (1)

$$H(p_k, a_{kj}, (1 + \rho_j), c_{jk}^*) = p_k R_j'(a_{kj} c_{jk}^*) a_{kj} - (1 + \rho_j) = 0$$

using the implicit function theorem we see that

$$\frac{dc_{jk}^*}{d(1 + \rho_j)} = \frac{-\partial H / \partial (1 + \rho_j)}{\partial H / \partial c_{jk}^*} = \frac{-(-1)}{p_k R_j''(\cdot) a_{kj}^2} < 0$$

$R''(\cdot)$ is negative and p_j represents the cost of funds of BI j . These results support the idea that the lower the cost of funds for BI, the more they will contribute to the candidates, and therefore, the biggest the private benefits they will receive in exchange. In consequence, big corporations with low cost of funds will be the ones that influence the most candidates and public policy. *Q.E.D.*

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Chapter 3

Electoral Systems, Postelection Bargaining and Special Interest Politics in Parliamentary Systems: The Case of Agricultural Protection

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Abstract

This paper studies the role of district magnitude and bargaining within legislature of parliamentary systems in determining the political success of agriculture in attracting government transfers. The model is based on a probabilistic voting environment where rural districts are less ideologically committed than urban districts. As a consequence, rural districts are pivotal in determining the coalition that obtains a majority, whereas urban districts are pivotal within the majority itself. In bargaining at the legislature, this generates a conflict between the prime minister, who will tend to favor rural districts, and its parliamentary majority, that will be dominated by urban concerns. As district size grows and the electoral system converges to a pure proportional system, both of these biases are attenuated. Overall, a non-linear relationship between district size and agricultural subsidies follows. Empirical results from CEE-countries support our theory.

1. Introduction

Special interest politics, i.e. the fact that policies often create concentrated benefits for a well-defined interest group while the costs diffuse in the society at large, is a common phenomena underlying inefficient policies observed across countries. Agricultural policy is certainly a prominent example of special interest politics. It is a common observation that agriculture is heavily subsidized in industrialized countries, while it is mostly taxed in developing countries. Existing political economy studies focus on classical public choice approaches (Peltzman, 1976; Zusman, 1976; Becker,

1983; Gardner, 1987; Krueger et al., 1988; Miller, 1991; Tyers and Anderson, 1992; Swinnen, 1994) to try to solve the puzzle why inefficient (biased) agricultural policies persist in both developing and industrialized countries, respectively. In particular, these studies understand agricultural policies as the results of political bargaining (competition) among various social groups for income/welfare redistribution. The final policy outcome is determined by both the relative political bargaining power of agrarian and non-agrarian groups and the economically determined transformation of welfare among these groups. The higher the political bargaining power of a particular social group and the more favorable political welfare transformation toward this group the higher is c.p. the politically redistributed income toward this group in political economy equilibrium. Although various political economy approaches differ in their detailed modeling strategy, they basically highlight three components determining agricultural protection levels in political economy equilibrium: (1) farmers' cost of organization to overcome the free-rider problem inherent in collective political action, (2) the cost of income redistribution, i.e. deadweight costs, and (3) the relative income of rural and urban population. Accordingly, empirical studies mainly focus on various demographic and economic variables influencing both deadweight cost and cost of organization (Gardner, 1987; Tyers and Anderson, 1992).

Although the existing political economy models certainly contribute to our understanding of biased agricultural policies, they still leave some puzzles unsolved. In particular, they fail to explain the variation of agricultural protection levels across nations with relatively similar economic and demographic structures, e.g. there exists a significantly higher protection level for the European Union (EU) when compared to the United States (Henning, 2004). At the theoretical level, classical public choice models lack a micro political foundation of political behavior, i.e. these approaches model political decision making assuming a unitary political actor maximizing a given political preference, voter support, or influence function. In contrast to classical public choice, taking the political decision-making process as a black box, more recent new approaches focus on explicitly modeling the political decision-making process as an interaction between a set of individually rational political actors. Within these new political economy approaches, biased policies result as specific incentive problems, where political institutions are considered as key factors influencing individual incentives of political actors. Thus, in the light of these new approaches, beyond general economic factors determining deadweight costs and demographic factors determining cost of interest in organization, political institutions are main factors in explaining observed variances of economic policies across countries (Persson and Tabellini, 2002). For example, Persson and Tabellini or Milesi-Ferretti et al. nicely demonstrate how the

electorate system and the organization of legislature determine general macroeconomic policies (Milesi-Ferretti et al., 2002; Persson and Tabellini, 2002). Nowadays it is commonly accepted that political institutions have a significant impact on policy outcome (Weingast et al., 1981; Binswanger and Deininger, 1997; Miller, 1997). Even international organizations such as the World Bank and International Monetary Fund often bind their financial aid to the existence of specific democratic institutions, e.g. free elections. However, theoretical as well as empirical analyses of the political economy of agricultural policy, taking explicitly political institutions into account, are still rather rare (Beghin and Fafchamps, 1995). Only some recent analyses have attempted to cover this gap (for example, see Beghin and Kherallah, 1994; Beghin et al., 1996; Olper, 2001; Swinnen et al., 2001; Henning, 2004). However, most of these studies analyze the general impact of democracy on agricultural protectionism, comparing agricultural protection levels in democratic and autocratic countries. An exemption is Henning (2004) who explained different protection levels observed for the U.S. and EU by taking the different legislative organization of agricultural policy decision making under the U.S. and EU regime into account.

Within this framework, the paper provides a further attempt to systematically analyze the impact of political institutions on agricultural policies at both the theoretical and empirical levels.

Pars pro toto it investigates the extent to which political institutions explain observed variances in the political power of the agrarian population in the parliamentary systems of the 10 new Central and Eastern European EU member states (CEE countries).

At the theoretical level, we suggest a simple political economy equilibrium model connecting postelection legislative bargaining among legislators with retrospective voter behavior. In detail, the voting model is based on a probabilistic environment where rural districts are less ideologically committed than urban districts. As a consequence, rural districts are pivotal in determining the coalition that obtains a majority, whereas urban districts are pivotal within the majority itself. In bargaining at the legislature, this generates a conflict between the prime minister (PM), who will tend to favor rural districts, and her parliamentary majority, that will be dominated by urban concerns. However, following Huber (1996) the outcome of this bargaining within a parliamentary majority is crucially determined by the capacity of the PM to offer specific political rents to majority members in exchange for political compromise. The former capacity is often interpreted as party or coalition discipline. Thus, overall equilibrium outcome is determined by the strength of the rural–urban conflict between the PMs and her majority and the level of party discipline. At the election stage, both the bias of the PM in favor of rural as well as the bias of its majority in favor of urban districts are attenuated, when district size grows and the electoral

system converges to a pure proportional representation, since district populations become more homogenous. Overall, a non-linear relationship between district size and agricultural protection follows: when the system is close to purely proportional, a decrease in district size increases agricultural subsidies, since it implies that the prime minister becomes more biased toward rural districts. As district size continues to decrease, urban legislators become less and less willing to support agricultural subsidies; at some point, this implies that despite party discipline they would be willing to break the coalition, and agricultural subsidies have to decrease in order to preserve unity.

Our model extends standard result of preelection politics models implying that majoritarian systems lead to higher target redistribution when compared to proportional representation (Persson and Tabellini, 2002). However, these models focus solely on the policy preferences of the party or government leader, neglecting postelection bargaining.

In the empirical part of the paper, we test our theory using data from 10 Central and Eastern European countries (CEEC). In contrast to most existing empirical studies we do not directly regress observed policies on political institutions, but explicitly control for non-linear interaction effects via applying a two-stage estimation procedure. The latter result from the fact that political institutions basically determine the relative political bargaining power of agrarian and non-agrarian groups, while for given relative political bargaining power agricultural protection is a non-linear function of economic factors determining deadweight costs.

Estimation results support our theory. In particular, we find a significant non-linear relationship between district magnitude and political power of agrarian population. However, applying simple linear regression models without controlling for non-linearity, no significant relationship between agricultural protection and district size could be found. The rest of the paper is structured as follows. The theoretical model is introduced and the hypotheses regarding the impact of political institutions on political power are derived in Section 2. Section 3 presents empirical analyzes, and Section 4 summarizes the main results.

2. Theoretical Model

2.1 The Population and Economy

Consider a society comprised of two groups: $I = A, M$. A represents the rural population and M the urban population. Each group has unit mass, and the share of each group in total population is denoted by α_i .

Society's economy is subdivided into two sectors, agriculture and manufacture. To model governmental transfers to the agricultural sector, we

assume that without any agricultural policy intervention the equilibrium income of rural and urban population is Y_A^0 and Y_M^0 , respectively. Agricultural policy is considered as a redistribution from the non-agricultural to the agricultural sector. For simplicity, we assume that income redistribution occurs via subsidization of agricultural and taxation of manufactural sector. However, due to spill over effects subsidization of agriculture increases income of total rural population. Let s denote the resulting per capita subsidization of rural population, while t denotes the per capita taxation of the urban population. Any feasible policy must satisfy the following budget constraint:

$$\alpha_A \tilde{\Gamma}(s) = \alpha^M t \Leftrightarrow t = \frac{\alpha_A}{\alpha_M} \tilde{\Gamma}(s) = \Gamma(s)$$

The function Γ includes deadweight costs. In particular, we assume Γ to be strictly convex and increasing in the level of subsidization, i.e. $\Gamma' > 0$ and $\Gamma'' > 0$. Deadweight costs significantly vary across various agricultural policy instruments. However, we do not focus on the choice of economically efficient redistribution instruments, although discussion on agricultural policy is to a large extent concerned about this issue (Becker, 1983; Lohmann, 1998; DeGroter and Swinnen, 2002).

Assuming identical individuals for both groups implies the following welfare function of each member given the policy s :

$$W^A = Y_A^0 + s; \quad W^M = Y_M^0 - \Gamma(s)$$

2.2 Political System

Legislative Decision Making

To systematically analyze legislative decision making, we first formally define a legislative system as a finite set of political agents, N , where $i = 1, \dots, n$ denotes a generic element of the legislative system. Within the political system specific institutions, i.e. the government, G , and parliament, P , are defined as specific subsets of N .

Furthermore, it has been nicely demonstrated by Huber (1996) as well as Diermeier and Feddersen (1998) that parliamentary systems are characterized by a stable ex ante majority coalition built among legislators where legislative decision making occurs solely within this majority coalition. The rationale of ex ante majority coalition building corresponds to the fact that this coalition at least weakly increases the utility of all majority members when compared to their utilities derived under a default outcome \bar{s} resulting under non-cooperative behavior of legislators. In particular, ex ante fixed parliamentary majorities are able to guarantee their members higher utilities

due to additional rent legislators realized from being part of a stable majority (Huber, 1996).

In the following, we suggest a rather simple legislative majority bargaining game that captures the essential characteristics of legislative bargaining in parliamentary systems, i.e. the existence of a stable ex ante majority coalition and proposal power of the government (Diermeier and Feddersen, 1998). To this end, we can concentrate on the PM and her majority in the parliament, M . M is a finite subset of legislators $g \in N$ and g is a generic element of M . Following Huber (1996), we assume that the PM's majority is ex ante identifiable. In general, M could correspond to a multi-party coalition or a single majority party. However, to simplify following analyses at the election stage we assume a two-party set-up, i.e. M corresponds to all parliamentary members of the majority party P_M , where P_O denotes the opposition party. Moreover, we generally assume that PM is also the party leader of the majority party.

The model has two stages. At the first stage, we model the default policy outcome \bar{s} . For simplicity, we assume that agricultural policy is one dimensional and is selected by the parliament by simple majority voting.¹ Formally, we denote the unidimensional policy space by $A = (0, 1)$. Further, we assume that agents' policy preferences can be represented by a single-peaked function $U_i(s)$. Let Y_i denote the ideal point of legislator i , i.e. Y_i is the maximum of U_i . According to their single-peaked policy preferences each political agent desires to achieve policy outcomes that are as close as possible to her ideal position Y_i . Obviously, under this assumptions the well-known median voter theorem applies, i.e. the unique equilibrium outcome of the non-cooperative legislative decision-making game neglecting any ex ante coalition building is the ideal point of the floor median (Black, 1958).

At the second stage, the bargaining improving legislators utility derived under the default outcome within the majority M occurs. In detail we assume two steps. At a first step, the PM proposes a policy, v_G , to her parliamentary majority and announces side payments γ being paid to the majority in case it admits the governmental proposal. Regarding content, we interpret these side payments as rent the PM can pay to the majority due to specific formal legislative procedures, e.g. issuing a confidence vote, or informal procedures, i.e. the possibility to generate favors in terms of political career for party members. In this paper, we are not specifically

¹Of course we could also assume more complex legislative decision-making procedures including agenda-setting power of the parliamentary committees or the government (see for example, Henning, 2004). However, this would not change our major results and therefore we keep analyses as simple as possible at this point and leave the analysis of more complex legislative institutions for future work.

interested in modeling exactly how the PM can generate rent valuable to her majority, but generally subsume this under the term party or coalition discipline, that is, exerted by the PM. In fact, the specific procedures for exerting party or coalition discipline vary across political systems. Our major point is that these procedures allow the PM to extract political favors from its majority and that is what we capture, introducing some party discipline in our simple modeling strategy.²

At the second stage, each individual majority member can decide whether or not to accept the governmental proposal. If all majority members accept the governmental proposal, the proposed policy, v_G , is the final legislative decision, and all majority members receive the announced rent. Otherwise, the default policy \bar{s} is the legislative decision and no rent is paid.

We assume that legislators value the rent γ offered by the PM, i.e. overall we assume that legislators maximize the sum of actual rent, γ , and the utility derived from policy, captured by the utility function $U_g(s)$:

$$u_g = U_g(s) + \gamma$$

Under these assumptions, the legislative majority bargaining game has a unique subgame perfect Nash equilibrium, where s^* denotes the equilibrium outcome that is characterized in Proposition 1.

Proposition 1. Assuming an one-dimensional agricultural policy choice, s , there exists a unique subgame perfect Nash equilibrium for our legislative majority bargaining game defined above. The equilibrium outcome, s^* , depends on the rent, γ , the default policy outcome, \bar{s} , and the policy preferences of the PM and the majority members. In particular, the following holds:

(i) In equilibrium agricultural policy choice, s^* , results from the following maximization:³

$$s^* = \underset{s}{\text{Max}} \quad U^{\text{PM}}(s) \quad \text{s.t.} \quad s \in \cup_g A^g$$

$$\text{with } A^g = \{s \in A \mid U^g(s) + \gamma \geq U^g(\bar{s})\} \quad (1)$$

Interestingly, if the rent, γ , is sufficiently large or if Legislators' preferences are sufficiently homogeneous, the final agricultural policy outcome

²Note further that we assume that at this stage the PM can commit to paying the rent. However, this assumption is not necessary; in a richer modeling set-up including the specific procedures it is possible to get essentially the same result without assuming this kind of commitment.

³Note that the maximization problem always has a unique solution, as long as the utility functions of legislators are strictly concave. Note that all sets A^g are compact and convex subsets of A .

corresponds to the ideal point of the PM. Hence, under this condition our model corresponds to preelection politics models which generally assume that governmental policy simply corresponds to political preferences of the party leader (becoming the omnipotent head of government after elections). However, if party discipline, i.e. the rent γ , is not sufficiently high or analogously, policy preferences of the PM and her parliamentary majority are sufficiently heterogeneous, agricultural policy outcome is no more fully determined by the PM's policy preferences. In contrast, under this assumption policy outcome is solely determined by the intersection set of the subsets A^g , i.e. the policy preferences of the majority member, the majority rent, γ , and the default policy \bar{s} .

Regarding the policy preferences of legislators, it is generally assumed these reflect agents' interest in political support by politically responsive interests located in their constituencies (see for example, Weingast and Marshall, 1988; Persson and Tabellini, 2002). Electoral competition induces political agents, at least in part, to represent the interest of their constituents. Since economic importance of the farm sector is not uniformly distributed across constituencies, farm interests also are not uniformly distributed over constituencies. We will explicitly derive legislators' policy preferences from electoral competition in the next section. In particular, we will demonstrate that the electorate system has significant implications on legislators preferences and thus on the final policy outcome of our legislative decision-making game.

2.3 Election Stage

In this section we derive policy preferences of legislators from electorate competition. In general, the literature includes two different approaches: pre- and postelection politics models. The classical preelection approach refers to Hotelling (1929) and Downs (1957). An extension of Downs' classical approach is probabilistic voting (Hinich, 1977). Probabilistic voting models have been successfully applied to explain special interest politics. In essence, these approaches argue that specific groups, such as farmers, are less ideologically biased when compared to other groups and therefore become a natural target for politicians who vie for electoral support. In models of preelection politics, agents' policy preferences can be directly derived from electoral competition assuming agents can commit to their promises made in election. In contrast, postelection politics models do not make the strong assumption that electoral promises are binding. However, elections still have an impact on legislators' behavior via retrospective voting, i.e. voters can discipline political agents by voting against them if they misbehaved. The advantage of postelection politics in comparison to preelection politics models is that no assumption regarding binding electoral

promises have to be made. Therefore, we derive legislators' preferences by applying a postelection politics model.

To this end, we assume that legislators are rent-seeking, i.e. legislators' behavior can be derived from the maximization of actual rent and future rent. Future rent depends on the probability of being re-elected. Let P_{rg} denote the probability that a legislator g will be re-elected. Obviously, this probability depends on voters' electoral response to observed policies. Therefore, we now turn to voter behavior in elections. To simplify notations we denote the majority party by M and the opposition party by O . Further, we define generic voting districts d as a family of distinct subsets covering total population. Further, any generic voting district d corresponds to a geographical subunit of the total nation. In general, the population composition might be different when compared to total society. Let α_d^J denote the share of group J in district d . Assume an individual incumbent $g \in M$ is re-elected in a generic voting district d . We generally assume that a voter votes for an incumbent if the utility she has derived under the implemented policy, s^* , is higher than her specific reservation utility. However, voters have ideological preferences for parties beyond economic welfare derived under observed policies, $W^J(s^*)$. Ideological preferences are exogenous and might correspond to different characteristics of parties or candidates, e.g. competence or appearance or positions regarding other policy domains.⁴ In this paper, we do not further analyze ideological preferences of voters; we only assume that ideological preferences can be subdivided in three components: a group-specific relative importance of ideology compared to economic well-being, K^J , a regional component μ^{id} , and a national component, δ . Thus, a voter $i \in J$ votes for the incumbent g if the utility she observes under the agricultural policy s^* is higher than a specific reservation utility, W_0^J , corrected by the ideological preferences for the incumbent party M :

$$W^J(s^*) > W_0^J(1 + K^J(\mu^{id} + \delta)) \quad (2)$$

Parameters μ^{id} and δ can take negative and positive values and measure the ideological bias of voter i toward the opposition party O . Thus, a positive value implies that voter i has a bias in favor of party O . The ideological preferences are uncertain at the time political agents have to make their

⁴ Analyzing partial policy choices like agricultural policy, ideology might also include candidates' preferences regarding the relative weight of other interest groups not explicitly concerned with the analyzed partial policy. For example, agricultural policies might be conceived by voters in terms of the relative interest of the rural and urban populations, while the relative interests of different groups within the urban population, e.g. workers versus employees, are not explicitly taken into account. Then these might be residually considered in the ideology.

policy decision. In detail, we assume that the parameter μ^{ij} has region-specific uniform distributions on

$$\left[\bar{\mu}^d - \frac{1}{2\chi}, \bar{\mu}^d + \frac{1}{2\chi} \right]$$

Thus two parameters, $\bar{\mu}^d$ and χ , fully characterize the regional distribution of ideological preferences. However, we assume that the density, χ , is the same for all regions and regions only differ in their average ideology captured by the regional means $\bar{\mu}^d$. Moreover, we assume that the relative importance of ideology, K^J , differs across groups. Note that assuming a different relative importance of ideological preferences implies that groups generally differ in their effective ideological homogeneity, i.e. have different effective densities $\phi^J = \chi/K^J$.

We make specific assumptions about the differences in these distributions. In particular, we assume that the rural population has less relative interest in ideology, i.e. $K^A < K^M$. Thus, we assume that the rural population is more ideologically homogeneous than the urban population, i.e. $\varphi^A > \varphi^M$.

Regarding the regional average ideology, $\bar{\mu}^d$, we assume that three cluster D_1 , D_2 and D_3 , exist. The cluster D_3 has an average ideological preferences in favor of party O, i.e. $\bar{\mu}^d > 0$ for $d \in D_3$ and the cluster D_1 has average ideological preferences for party M, i.e. $\bar{\mu}^d < 0$ for $d \in D_1$. The cluster D_2 is ideologically unbiased, i.e. $\bar{\mu}^d = 0$ for $d \in D_2$. Further, we assume that the strength of the average ideological bias is negatively correlated with the share of the rural population. For simplicity we assume that there are only two types of districts, rural and urban, the former are characterized by a higher share of rural population when compared to the latter, i.e. $\alpha_u^A < \alpha_r^A$. Rural districts are ideologically unbiased, i.e. form the cluster D_2 , while urban districts are ideological biased, with the bias split among the two parties. Thus, rural districts belong to cluster D_2 and urban districts belong to cluster D_1 or D_3 , respectively. Furthermore, we define $\bar{\mu}^d = \bar{\mu}^O > 0$ for all $d \in D_3$ and $\bar{\mu}^d = \bar{\mu}^M < 0$ for all $d \in D_1$. Finally, we assume that $\bar{\mu}^O + \bar{\mu}^M = 0$ as well as $\sum_d \alpha_d \bar{\mu}^d = 0$, where α_d denotes the share in total population of district d . We assume the same population shares, α_d , for all districts. Moreover, we assume that none of the regional clusters D_1 , D_2 and D_3 includes the majority of voter population, while any two clusters together include the majority of voters.

The idea behind these assumptions is that the voting decision of the rural population in comparison to the urban population is generally more sensitive to political redistribution. Moreover, individual districts might be ideologically biased toward a specific party, but overall total population is unbiased. For example, the total population can be subdivided into worker and employers, where worker possess no or only a little amount of quasi-fix factors. Thus, workers are biased toward a left wing party, say party O, and

employers' are biased toward a right wing party, say party M. However, it is conceivable that a left right ideology is more important for the urban when compared to the rural population, since rural workers perceive high spill-over effects from transfers to agricultural quasi-fixed factors. Under this assumption, an ideological bias over urban districts would result if the relative share of workers in an urban population varied accordingly across districts. Finally, our assumptions imply that a party wins the majority of all districts if it wins the majority in at least two district types.

We assume that political agents know the regional and group-specific distribution, μ^{id} and ϕ^J , when they decide on agricultural policy, while the electoral uncertainty derives from the uncertainty of the national components, δ . The parameter δ measures the average popularity of party M in comparison to party O. Here, we assume a uniform distribution on

$$\left[-\frac{1}{2\psi}, +\frac{1}{2\psi}\right]$$

Thus, on average, the national ideological shock is unbiased.

Given the assumption above, it follows that for the vote share, an incumbent g receives in group J running for election in a generic district d after the national ideological shocks δ have been realized results in:

$$\pi_d^J = \phi^J \left[\frac{W^J(s^*)}{W_0^J} - 1 \right] - (\bar{\mu}^d + \delta)\chi + \frac{1}{2} \quad (3)$$

Accordingly, the total vote share an incumbent g receives in district d after regional and national ideological shocks have been realized is

$$\Pi_d = \sum_J \alpha_d^J \pi_d^J = \sum_J \alpha_d^J \phi^J \omega^J - \chi[\bar{\mu}_d + \delta] + \frac{1}{2} \quad (4)$$

where

$$\omega^J = \frac{W^J(s^*)}{W_0^J} - 1$$

Given the electoral support of incumbents in a generic district d, the re-election probability of a political agent g crucially depends on concrete organization of the electoral system. In the following, we will derive the re-election probability of the PM and the decisive majority members assuming different electorate systems.

The Impact of the Electoral System on Agents' Preferences

Scholars of comparative politics define an electorate system mainly via the following three variables (1) electorate formula, i.e. the mechanism by which cast votes are transformed into parliamentary seats, (2) the district

magnitude or district size, i.e. the number of candidates to be elected in a voting district, and (3) the electorate threshold, i.e. the minimum of votes a party has to receive to be represented in the parliament (Lijphart, 1984). In general, proportional representation (PR) and a majoritarian election systems (MS) are distinguished as ideal-typical election systems. Focusing on the district magnitude, PR systems are characterized by candidates that are elected in one multiple-member national electoral district, while pure majoritarian systems are characterized by each candidate's election in a one-member electoral district. Thus, denoting the total number of parliamentary seats by N , PR systems correspond to a district size of N , while pure MS-systems correspond to a district magnitude of 1.

Between pure PR and MS systems, mixed electoral systems are characterized by multiple multi-member districts (Lijphart, 1984). Let k denote the number of parliamentary members elected in an electorate district. Then, a mixed electorate system is characterized by a district magnitude $1 < k < N$. Thus, normalization delivers an election system index corresponding to a normalized relative district size, $RDS = k - 1/N - 1$, measuring the extent to which a given system corresponds to a pure PR or a pure MS-system, respectively. In particular, this index is 0 for MS systems and 1 for PR systems. Thus, keeping the total number of parliamentary seats constant, the electorate system is perfectly defined by district magnitude k .

Pure Majoritarian System

Assuming a pure MS, i.e. $k = 1$, $RDS = 0$, implies that any member of the majority $g \in M$ is reelected in a one-member electoral district d . Thus, she is re-elected if it holds:

$$\Pi_d \geq \frac{1}{2} \quad (5)$$

Therefore, the probability of reelection of a majority member g running for election in district d under a pure majoritarian system, P_{rg}^1 is

$$P_{rg}^1 = P_d = \text{Prob} \left[\Pi_d > \frac{1}{2} \right] = \psi \left[\sum_J \alpha_d^J \frac{\phi^J}{\chi} \omega^J - \bar{\mu}_d \right] + \frac{1}{2} \quad (6)$$

Overall, maximizing the probability of re-election taking groups' reservation utilities as given implies that each legislator g re-elected in a district d has an additive social welfare function (SWF_d), where the absolute and relative weight of group J , g_d^J and \bar{g}_d^J just correspond to the following terms:

$$g_d^J = \alpha_d^J \phi^J \frac{\psi}{\chi} \frac{1}{\bar{W}_J} = \frac{X_J^d}{W_0^J}; \quad \bar{g}_d^J = \frac{g_d^J}{\sum_J g_d^J} \quad (7)$$

Thus, the relative and absolute weights of a group J in legislator's SWF_d is the higher the higher its ideological density, φ^J , the higher the group's share in district population and the lower group's reservation utility. Obviously, in a rational expectation equilibrium, groups' reservation utilities have to equal their implied equilibrium utility, i.e. the utility a group observed under the equilibrium policy, s^* , where the latter is implied by groups' reservation utilities $W_0^J = W^J(s^*)$.⁵ Therefore, the groups' reservation utilities are endogenous variables determined in equilibrium, i.e. the group weights in legislators' additive SWFs are by no means simple constants. For example, assuming that a political agent, who is reelected in a district d , could alone determine policy outcomes, then the equilibrium policy could be derived from a corresponding Nash SWF, where group weights just equal X_J^d . Analogously to additive SWF's weights, we can define relative Nash-SWF weights via normalization. Accordingly, we denote these relative Nash SWF-weights by \tilde{X}_d^J .⁶

Furthermore, since under a pure majoritarian system each majority member $g \in M$ is elected in a different district, majority members have heterogeneous policy preferences as long as districts are heterogeneous. In particular, it follows quite plainly that legislators who are re-elected in rural districts (type 2) have a higher relative political weight for the rural population and therefore prefer a higher agricultural subsidization level, when compared to legislators re-elected in urban districts, i.e. in a type 1 or 3 district. Further note that under our simplified assumptions, all urban districts have the same relative agricultural population share, i.e. legislators re-elected in an urban district of type 1 or 3 have the same agricultural policy preferences. Thus, overall only two different types of legislators' policy preferences exist, urban and rural preferences, respectively. So far, we have analyzed the re-election probability of the majority members. Next we analyze the re-election probability of the PM. In contrast to a majority member, the PM is only re-elected if party M wins the election, thus only if party M wins the majority of votes in a majority of the generic districts. To formally derive the probability of re-election of party M as the governmental party, we define the

⁵In general, groups are in a Bertrand game for redistribution preferences of an incumbent representing the district d . Thus, assuming group members can commit to any reservation utility would imply that both groups select their minimal utilities as their reservation utilities. However, selecting the minimal utility is not a rational expectation equilibrium, since in general the group's minimal reservation utility does not imply that this group actually realizes this minimal utility under the implied equilibrium policy outcome $s^*(w_0^J)$.

⁶However, legislators' ideal points, Y_g , are derived from maximization of their additive SWFs, where reservation utilities just correspond to the groups' economic welfare realized under the equilibrium policy outcome s^* .

following stochastic variable K_d for each election district:

$$K_d = \begin{cases} 1 & \text{with probability } P_d \\ 0 & \text{with probability } (1 - P_d) \end{cases} \quad (8)$$

Given the definition of K_d the probability that party M wins the election, i.e. the probability that PM is re-elected, P_{rPM}^1 , results:

$$P_{\text{rPM}}^1 = \text{Prob} \left[\sum_d \alpha_d K_d \geq \frac{1}{2} \right] \quad (9)$$

It is generally difficult to find an analytical expression for the the probability P_{rPM} that allows the derivation of induced policy preferences of the PM. Therefore, we follow [Persson and Tabellini \(2002\)](#) and introduce additional assumptions to guarantee that an equilibrium exists for our simple electoral competition set-up.⁷

Essentially, we assume that the ideological biases toward party M in district type 1, $\bar{\mu}^M$, and toward party O in district type 3, $\bar{\mu}^O$, are sufficiently large that electoral competition only takes place in district type 2.⁸

Under these additional assumptions the relevant expression for the re-election probability of PM is just the probability that party M wins

⁷We basically assume this simple model set-up to facilitate the analytical derivation of our central results. Please note that alternative approaches exist which derive equilibria for electoral competition in a majoritarian system under less restrictive assumptions (for example, see [Stroemberg \(2005\)](#)). However, the essential results we derive here would not change applying these less restrictive approaches (see [Persson and Tabellini, 2002](#)), therefore we decided to apply this simpler, though certainly more restrictive, approach to increase tractability of our analyses.

⁸Without going into detail at this stage, to understand intuitively under which condition the party leader compete only in district type 2, note that according to our assumptions above, the probability to win a majority in the different districts depends on the common national shock, δ , and thus these probabilities are related. In particular, for any given policy s , there exists a specific threshold value, $\delta^1(s)$, $\delta^2(s)$ and $\delta^3(s)$ for the three different district types, respectively. If the realization of the national shock is below this threshold value, party M wins the majority in this district type and loses otherwise. Obviously, these threshold values depend on the ideological bias and on the policy s . Now, if the urban districts are sufficiently ideologically biased toward the party M and party O, respectively, the threshold value of the rural district is for any given policy $s \in [s^u, s^r]$ always lower when compared to the urban districts biased toward party M (type 1) and always higher when compared to the threshold values of urban districts biased toward party O (type 3). Thus, for any national shock the rural districts are decisive, i.e. whenever a party wins the majority in the rural district type it already wins the majority of districts and vice versa, if a party does not win the rural districts, it does not win the national election.

the election in the district type 2. Thus, under majority voting the PM has the same policy preferences as a legislator re-elected in a rural district.

We have specified the policy preferences of all majority members as well as that of the PM. Thus, we are now able to determine the overall equilibrium of our legislative bargaining game. However, we first analyze the impact of PR and mixed electorate systems on legislators' preferences.

Proportional Representation

Assuming a pure proportional representation system, i.e. $k = N$, $RDS = 1$, implies that all members of the majority are re-elected in one national multi-member district. We assume that the total number of parliamentary seats a party wins is proportional to the party's vote share. The probability that a specific member $g \in M$ will be re-elected depends, on the one hand, on the number of seats won by party M , i.e. on party M 's vote share. On the other hand, as long as the party M does not win all of the votes, not all of the N candidates of party M running for election will get a seat. Thus, the chances of an individual candidate being re-elected depend on the specific organization of the party's candidate list. For simplicity, we assume that no ex ante fixed list order exists, thus, all N candidates have the same probability of getting a parliamentary seat, $1/N$.⁹ Under this assumption, the re-election probability, $\tilde{\pi}_{rg}^N$, of a majority member $g \in M$ under proportional representation conditional on the national shock, δ , is given by:

$$\tilde{\pi}_{rg}^N(\delta) = \frac{1}{N} \Pi_N = \frac{1}{N} \sum_d \pi_d = \sum_J \alpha_N^J \phi^J \omega^J - \chi[\bar{\mu}_N + \delta] + \frac{1}{2} \quad (10)$$

where, it holds

$$\alpha_N^J = \sum_{d \in N} \alpha_d \alpha_d^J \quad \text{and} \quad \bar{\mu}_N = \sum_{d \in N} \alpha_d \bar{\mu}_d = 0$$

The expected re-election probability, π_{rg}^N , depends on the national ideological shock, δ , and thus is uncertain ex ante. However, since the expected national shock is zero, it follows:

$$\pi_{rg}^N = \int_{-\frac{1}{2\psi}}^{\frac{1}{2\psi}} \tilde{\pi}_{rg}^N(\delta) \psi d\delta = \frac{1}{N} \sum_J \alpha_N^J \phi^J \omega^J + \frac{1}{2} \quad (11)$$

⁹ Assuming instead a fixed list would not change the essential part of our analyses, i.e. although under this assumption, legislators' individual re-election probabilities would differ, in equilibrium, legislators' policy preferences would correspond to the same SWF as derived here.

Under PR the re-election probability of the PM corresponds to the probability that party M wins the majority of all votes, i.e. it holds:

$$P_{PM}^{PR} = \text{Prob} \left[\Pi_N > \frac{1}{2} \right] = \psi \left[\sum_J \alpha_N^J \frac{\phi^J}{\chi} \omega^J \right] + \frac{1}{2} \quad (12)$$

Obviously, under PR, maximizing the re-election probability of the party leader corresponds to the same additive and Nash SWF as maximizing the re-election probability of a majority member.¹⁰

Thus, in contrast to a pure majoritarian system under PR, legislators' preferences are perfectly homogenous, i.e. all majority members prefer the same agricultural subsidization level as the PM. Finally, we analyze induced policy preferences under a mixed electorate system.

Mixed Electorate Systems

According to our above definition, mixed electorate systems are characterized by multiple multi-member electorate districts. Denoting k the number of parliamentary members being elected, where it holds: $1 < k < N$. Thus, under a mixed system (Mk) each voting district comprises k generic districts, where the number of electorate districts reduces to N/K . A crucial factor determining policy preferences of legislators being elected is the composition of the voting population. Here, we already assumed that the regional distribution of the total population is characterized by the existence of specific agricultural as well as ideological clusters. Therefore, it follows that analogously to our generic districts $k = 1$, larger electoral districts $k > 1$ also vary systematically regarding the share of agricultural population and average ideological bias. Obviously, the larger the districts, i.e. the closer k to N , the more equal the composition of district population c.p. to the composition of national population. Thus, larger districts are more homogenous than smaller. This fact has clear consequences on the heterogeneity of the policy preferences across majority members. To formalize this point we make the following simplifying assumption.

For a mixed system $N > k > 1$ we define the set of electorate districts as a family of subsets d_k that covers total population. Moreover, every subset d_k contains a voter population of k generic districts.¹¹ Further, we denote α_{dk} the share of agricultural population in the district d_k .

¹⁰Note that the relative additive and Nash-SWF weights corresponding to equations (11) and (12) are identical, although the absolute weights differ. However, the relative weights are relevant for determining the legislators' ideal points in equilibrium.

¹¹Note that we do not necessarily assume that electorate districts d_k include exactly k of the generic districts originally defined under a pure majoritarian system. We only

Furthermore, to keep analyses simple we assume that for any mixed system $N > k > 2$, electorate districts can still be subdivided into three ideological clusters D_1^k , D_2^k and D_3^k .¹² Analogously to our assumptions above, we differentiate only rural and urban districts. Rural districts are ideologically unbiased, i.e. belong to D_2^k , while urban districts are ideologically biased, with the bias split among the two parties. In detail, we define $\alpha_{u_k}^A \leq \alpha_{r_k}^A$ as the share of rural population in urban and rural districts, respectively, and $\bar{\mu}^{d_k} = \bar{\mu}^{O_k} > 0$ for all $d \in D_3^k$ and $\bar{\mu}^d = \bar{\mu}^{M_k} < 0$ for all $d \in D_1^k$. Finally, we assume that $\bar{\mu}^{O_k} + \bar{\mu}^{M_k} = 0$ as well as $\sum_d \alpha_{d_k} \bar{\mu}_{d_k} = 0$, where α_{d_k} denotes the share in total population of district d_k . Again, for simplicity we assume the same population shares, α_{d_k} , for all district. Moreover, we assume that none of the regional clusters D_1^k, D_2^k and D_3^k includes the majority of voter population, while any two clusters together include the majority of voters.

Obviously, given these definitions, it follows analogously to our assumptions above that the ideologically neutral cluster includes all rural districts with the highest share of rural population, $\alpha_{r_k}^A$, while the ideologically biased districts are urban. Finally, we again assume that $\bar{\mu}^{O_k} + \bar{\mu}^{M_k} = 0$ as well as $\sum_d \alpha_{d_k} \bar{\mu}_{D_k} = 0$, where α_{d_k} denotes the share of the population living in the electorate district d_k in total population.

The basic idea behind these assumptions is that both the agricultural and the ideologically biased voter populations are clustered regionally. Empirically, regional rural clusters can be found in most countries. Analogously, in most countries, regional ideological clusters can be found, e.g. left wing working class living areas or upper class right wing living areas. Thus, our assumptions correspond at least approximately to real world societies, although real structures are certainly more heterogeneous. To simplify our analyses, though, we abstract from real world heterogeneity at this point.

Finally, to cover increasing homogeneity of larger electorate districts we assume the following:

$$\alpha_{r_k}^A \leq \alpha_{r_{k-1}}^A \quad \text{and} \quad \alpha_{u_k}^A \geq \alpha_{u_{k-1}}^A \quad \forall k = 1, \dots, N \quad (13)$$

$$(\bar{\mu}^{O_k} - \bar{\mu}^{M_k}) \leq (\bar{\mu}^{O_{k-1}} - \bar{\mu}^{M_{k-1}}) \quad \forall k = 1, \dots, N \quad (14)$$

(footnote continued)

assume that they comprise the same magnitude of voting population as k original generic districts

¹²We assume in the following that the number of electoral districts is higher than or equal to 3. For simplicity, in case that only two districts exist we assume that both districts are perfectly homogenous, i.e. the agricultural population share in both districts equals the national share. Thus, electoral competition in this case corresponds to the competition under PR.

Given these assumptions, it is straightforward to derive policy preferences of the political agents. Assuming a mixed electorate, $1 < k < N$ implies that each member of the majority is re-elected in a multi-member district d_k . Analogously to our expositions regarding re-election probabilities under PR, we assume that all k candidates of party M running for election in the k -member district d_k have the same chances, $1/k$, to get a parliamentary seat won by party M in this district. Accordingly, under this assumption the re-election probability of a majority member $g \in M$ under a mixed system Mk , $\tilde{\pi}_{rg}^k$, conditional on the national shock, δ , is given by

$$\tilde{\pi}_{rg}^k(\delta) = \frac{1}{k} \Pi_{d_k} = \frac{1}{k} \left[\sum_J \alpha_{d_k}^J \phi^J \omega^J - \chi[\bar{\mu}_{d_k} + \delta] + \frac{1}{2} \right] \quad (15)$$

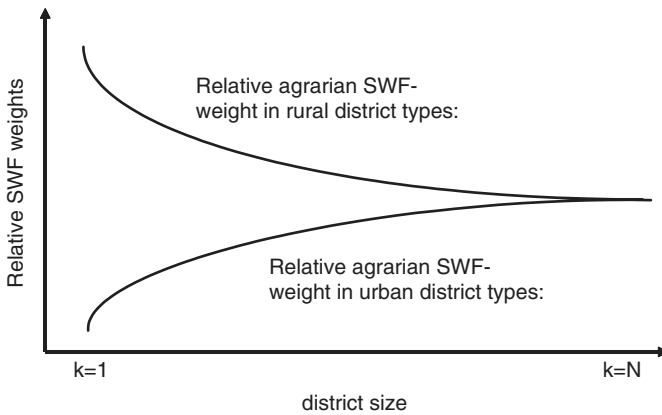
Analogously, the expected re-election probability, π_{rg}^k , results in

$$\pi_{rg}^k = \int_{-\frac{1}{2\psi}}^{\frac{1}{2\psi}} \tilde{\pi}_{rg}^k(\delta) \psi d\delta = \frac{1}{k} \left[\sum_J \alpha_{d_k}^J \phi^J \omega^J - \chi \bar{\mu}_{d_k} + \frac{1}{2} \right] \quad (16)$$

Overall, maximizing the probability of re-election taking the groups' reservation utilities as a given corresponds again to maximizing an additive SWF $_{d_k}$, where compared to the SWFs derived under PR or MS, the relative weight of group J , $\bar{g}_{d_k}^J$ and $\bar{X}_{d_k}^J$, just differs due to a different agricultural population share. Moreover, analogously to MS, it follows under a mixed system (Mk) that legislators have different policy preferences as long as electorate districts are heterogeneous. In particular, we can again define rural and urban policy preferences depending on legislators' re-election in rural (type 2) and urban (type 1 or type 3) districts, respectively. Of course, analogously to a pure MS, rural preferences are characterized by a higher relative SWF-weight for the agricultural population and thus imply a higher preferred subsidization level when compared to urban preferences. However, as we will demonstrate in detail below, the difference of relative weights between rural and urban preferences decreases with the district size k .

Analogously to a pure MS, deriving the probability of re-election for the PM under a mixed system Mk is tentative. Therefore, we again assume that the ideological biases toward party M in the district type 1, $\bar{\mu}_k^M$, and toward party O in district type 2, $\bar{\mu}_k^O$, are sufficiently large that electoral competition only takes place in district type 2.¹³ Thus, analogously to pure MS the

¹³ Of course, the larger the districts the more restrictive this assumption becomes. However, as we already stated, we follow this approach to improve traceability of our analyses, while we could derive essentially the same results following an approach with less restrictive assumption (Stroemberg, 2005). Moreover, note that if

Figure 1: Electorate System and Legislators' Policy Preferences

probability of re-election of the PM under a mixed system, M_k , corresponds simply to the re-election probability of a legislator being reelected in a district of type 2, i.e. a rural district.

Overall, it follows quite plainly from our analyses that electoral competition implies that the PM always has rural policy preferences, while the decisive majority member always has urban policy preferences.¹⁴ However, the difference between rural and urban preferences crucially depends on the electorate system, i.e. the district size k . This relationship is summarized in Figure 1. Under a pure majoritarian system, $k = 1$, policy preferences are most heterogeneous, where legislators who are re-elected in rural districts observe higher relative SWF-weight for the agricultural population when compared to legislators who are re-elected in urban districts. However, with a larger district size, heterogeneity of districts is reduced, i.e. with an increasing district size the relative SWF-weight of the agricultural population decreases for rural preferences, while it increases for urban preferences. In a pure proportional representation system, policy preferences are perfectly homogenous, i.e. all majority members and the PM have the same relative

(footnote continued)

districts are sufficiently large, they are c.p. also sufficiently homogeneous and thus assuming perfect homogeneity is a reasonable approximation, where for perfect homogenous district analysis of PM's re-election probability is again straightforward even for majoritarian systems.

¹⁴Note that as long as a one-dimensional policy space is assumed, the intersection set $\cap A^g$ corresponds to the set $A^g = DM$ of a single majority member. We call this member the decisive majority member, $g = DM$.

SWF-weights. Accordingly, the PM and all rural legislators observe their lowest agricultural SWF-weight under PR and their highest SWF-weight under pure MS. On the other hand, urban legislators observe their highest agricultural SWF-weight under PR and their lowest agricultural SWF-weight under MS.

Policy Outcomes under Different Electorate Systems

Given the impact of the electorate system on legislators' policy preferences, we can now summarize the impact of the electorate system on the equilibrium policy outcome of our legislative bargaining game in Proposition 2. To this end, we let d_1 denote a generic one-member district of a pure MS and let d_N denote the N -member national district under PR (the proof is given in the appendix).

Proposition 2. Let s_k^* and \bar{s}_k denote the equilibrium and default policy outcome, respectively, of the majority bargaining game defined in Proposition 1 assuming a electoral system $k = 1, \dots, N$. Then the following holds:

(i) The equilibrium policy outcome is defined by

$$\begin{aligned} s_k^* = & \underset{t}{\text{Max}} \quad g_{r_k}^A W^A(s) + g_{r_k}^M W^M(s) \\ & \text{s.t. } g_{u_k}^A W^A(s) + g_{u_k}^M W^M(s) + \gamma \geq g_{u_k}^A W^A(\bar{s}) + g_{u_k}^M W^M(\bar{s}) \end{aligned} \quad (17)$$

where $g_{u_k}^J$ and $g_{r_k}^J$ denote the group weights of an additive SWF corresponding to the electorate competition equilibrium in urban and rural districts, respectively, defined by the electorate system k .

(ii) In particular, the equilibrium outcome can be derived from the maximization of an aggregated Nash-SWF, where the relative weight of the agricultural population, $\bar{X}_A^{k^*}$, corresponds to the following linear combination

$$\bar{X}_{k^*}^A = \bar{X}_{r_k}^A + \sigma_k \bar{X}_{u_k}^A \quad (18)$$

where σ_k denotes the Lagrangean-Multiplier of the maximization problem defined under point (i) above.

(iii) There always exists a k^* with $1 \leq k^* \leq N$ and it holds:

$$s_k^* \leq s_{k+1}^* \quad \forall k < k^* \quad \text{and} \quad s_k^* \geq s_{k+1}^* \quad \forall k \geq k^* \quad (19)$$

Two things are worth noting. First, in extreme cases of perfect party discipline, the restriction of the decisive (urban) majority member is never binding, i.e. the equilibrium outcome is solely determined by the preferences of the PM. In this case k^* equals 1. Second, if this restriction is binding, the equilibrium is solely determined by the preferences of the decisive majority member being re-elected in an urban district and the rent γ . Note in particular that under this condition the equilibrium would not change with

changed preferences of the PM as long as the PM prefers a sufficiently high subsidization level, i.e. a level that is higher than the maximum level the decisive (urban) majority member is willing to accept in exchange of the rent, γ .

This last point is crucial regarding the impact of the election system on agricultural policy. This is especially true because preelection politics models explaining special interest politics (see [Persson and Tabellini, 2002](#)) focus on the impact of the election system of the party leader's, i.e. PM's, preferences assuming implicitly perfect party discipline neglecting postelection legislative bargaining.

In our more general approach, the impact of the electorate system on agricultural protection is ambiguous and depends on the heterogeneity of generic districts and on the level of party discipline, γ , that can be exerted by the PM. If this is sufficiently high our model replicates results of existing preelection politics models, i.e. agricultural protection is higher under pure MS when compared with PR and it decreases with district magnitude. However, if party discipline is extremely limited due to extremely heterogeneous policy preferences implied by electoral competition under a majoritarian system, the opposite results can be derived in the framework of our more general model, i.e. in parliamentary systems agricultural protection level is higher under PR when compared to MS and it increases with district magnitude.

In general, holding economic and demographic framework conditions constant, our theory suggests an inverse u-shape relationship between district magnitude and agricultural protection, i.e. c.p. agricultural protection increases with district size up to a specific threshold value $1 < k^* < N$ and decreases with district magnitude if district size is above this threshold value.

3. Empirical Evidence

In the following section, we provide some empirical evidence for our theory from regression analyses. Generally, empirical evidence on our theory can be derived from empirically observed variations of agricultural subsidization levels under different constitutional rules, namely the electorate systems. However, since for a given country political institutions are generally very stable over time, causal effects of political institutions on policy have to be derived from cross-country comparisons. Deriving empirical evidence from cross-country data is often plagued by different statistical problems ([Persson et al., 2003](#)).

On the one hand, these problems correspond to the fact that simple linear regressions explaining observed policy outcomes via taking political institutions and some other socio-economic and demographic variables as explanatory variables might be plagued by different kinds of endogeneity

problems, i.e. selection bias or measurement error problems. On the other, linear regression analysis might be problematic, since observed policy outcomes are often non-linear functions of explanatory variables. In particular, non-linear interaction effects between political institutions and other explanatory variables might exist. While nowadays there are adequate econometric techniques to control for a potential measurement error, e.g. applying a 2SLS instrument variable estimation, as well as to control for nonrandom selection bias, i.e. applying a two-stage Heckman estimation (Persson et al., 2003), non-linearity appears to be a more serious problem, especially in our case.

To see this, note that according to Proposition 2, observed agricultural subsidization levels can be locally derived from the maximization of a Nash-SWF, where the relative weight of the welfare of agricultural population is partly determined by district magnitude. However, for any given Nash-SWF Weight, the final policy choice crucially depends on the economic framework conditions, i.e. marginal deadweight cost, $\Gamma'(s)$ as well as the relative income of rural and urban populations. As we stated in the introduction, several economic factors, e.g. agricultural price elasticities, factor intensities, expenditure shares for food, and the like, determine marginal deadweight costs. Note that assuming different economic framework conditions implies that for the same relative SWF-weights totally different final agricultural policy choices can be observed and vice versa, that the same agricultural protection levels might correspond to totally different relative SWF-weights. Thus, regressing observed agricultural protection levels on political institutions using linear regression techniques might lead to biased or non-significant effects even when we control for relevant economic and demographic variables. Note that a related argument has been made by Rodrik (2005) criticizing the widely used strategy in political economy analyses in macroeconomics to identify the true political technology, i.e. the transformation of policy instruments into economic outcome, from a simple linear regression of economic performance variables on policy variables. Analogously, Persson et al. (2003) discuss the problem of non-linearity in a different context. They suggest propensity score-matching techniques to avoid a potential non-linearity problem and to derive unbiased estimated effects of political institutions.

However, in our case, the non-linearity problem cannot be solved by applying propensity score-matching techniques,¹⁵ thus we suggest a different approach to cope with our specific non-linearity problem.

¹⁵Note in particular that all countries in our CEE country sample are extremely similar regarding most control variables, i.e. they have been subdivided into the same strata by Persson et al. (2003).

3.1 Estimation Strategy

In particular, we apply a two-stage procedure to analyze the impact of the electorate system on observed agricultural protection levels.

At the first stage, we calibrate the following welfare transformation elasticities between agricultural and non-agricultural welfare (WTE) for each year and each country of our database using a simple general equilibrium model (see [Henning et al., 2002](#)).¹⁶

Based on the empirically calibrated WTEs, the relative SWF-weight can be calculated given observed agricultural protection levels according to the equilibrium conditions defined in Proposition 2 (i):

$$X_A^* = \frac{-WTE}{1 - WTE} \quad (20)$$

Thus, in the first step we generated the relative SWF-weights for each year and each country in our data set.

At the second stage, we regress these calculated SWF-weights on district magnitude, controlling for relevant socio-economic and demographic variables (z) as well as other political institutions (o) described in subsection 3.2.

To demonstrate that simple linear regression analysis regressing observed policies on political institutions and relevant socio-economic and demographic variables might indeed be plagued by a non-linearity problem, we additionally present corresponding OLS-estimation results, taking the observed agricultural protection level, s , as an endogenous variable in Table 2.

Furthermore, we run various other regression analyses.

¹⁶The procedure is fully described in [Struve \(2002\)](#). In general it holds

$$WTE = \frac{dU^A/ds}{dU^M/ds} \frac{U^M}{U^A} \quad (21)$$

Taking real net income as a relevant welfare measure, the welfare transformation elasticity (WTE) just corresponds to a policy induced percentage change of the real net income of the non-agrarian and agrarian population, assuming a 1 percent change of the agricultural subsidization level s . It is well known that WTEs can be derived from a linearized form of a general economic equilibrium model (for example, see [DeJanvry et al., 1991](#)). A main advantage of the linearized form is that it can easily be calibrated on the basis of general statistical data from the national economic accounting and an estimation of relevant aggregate price and income elasticities, while a full specification of the corresponding profit and indirect utility function is not necessary.

In particular, we run all regression analyses using the standard absolute measure of district magnitude instead of the RDS measure derived from our theory. Finally, we also run 2SLS regressions to account for potential endogeneity problems. In this regard, [Persson et al. \(2003\)](#) suggested six instrument variables explaining the choice of political institutions, e.g. the electorate system. However, our CEE country sample is extremely homogeneous regarding these possible instrument variables. Therefore, it was impossible to meaningfully replicate this instrument variable estimation.¹⁷

In contrast, we interpret this observed homogeneity within CEE country sample as an empirical justification for the assumption of conditional independence, underlying linear regression analysis. On the other hand, the share of agriculture in employment and GDP as well as the share of rural population is clearly influenced by agricultural protection levels and thus by the political influence of agrarian interest. Therefore, we undertake 2SLS regressions using these variables to account for potential measurement error problems.

In essence, all regression analyses deliver the same results. Therefore, we only present the OLS results here.¹⁸ Before we discuss our main estimation results, we briefly describe our data and discuss the concepts of measurement for our relevant endogenous and explanatory variables.

3.2 Data

To measure the overall agricultural protection level(s) we use the producer subsidy equivalent (PSE) measure in percent published by the OECD ([OECD, 2001](#)). Basically, the PSE measures market price support as well as direct subsidy payments paid to the agrarian sector as the share in total agricultural production valued in domestic market prices. The calibrated WTEs were taken from [Struve \(2002\)](#), who used a simple linearized two-sector general equilibrium model to calibrate WTEs using relevant economic and demographic data available from FAO, EU and World Bank statistics. Based on the calibrated WTEs, we could calculate the corresponding Nash-SWF weights according to equation (20).

¹⁷Note that our CEE country sample is very homogeneous regarding the instrument variables used by [Persson et al. \(2003\)](#) to isolate exogenous variation of electoral rules and forms of government. In particular, eight of the 10 CEE countries are also in the country sample used by [Persson et al. \(2003\)](#) and all of them have been classified into the same propensity score strata.

¹⁸The results of all regression analyses are available from the authors. In addition to the regression analyses mention above, we also run logistic regressions, since the relative SWF weight is bounded to the (0,1)-interval.

Moreover, we included all socio-economic and demographic variables (z) that have been identified by previous studies as relevant factors explaining political influence of the agrarian population. In detail, these are the share of rural population and the share of agriculture in total employment and total GDP (see Table A1).

The data set included data for the 10 CEE-countries that just became new EU members or will become EU members in 2007. In general, our database includes values for the years 1994–2000. We use different concepts of measurement to measure electorate rules. Since the central variable in our theory is relative district magnitude, we basically use our measure of RDS introduced above. Accordingly, a pure majoritarian system corresponds to a minimal RDS value of 0, while a maximal RDS value of 1 corresponds to a pure PR system. RDS values between 0 and 1 indicate mixed electorate systems. However, to check whether our results are robust, we also tested the classical measure of district magnitude defined as the average number of seats per district.

Moreover, we introduce the following additional political control variables (o) to measure further institutional aspects of legislative organization that are not explicitly covered by our theory. In particular, these variables include an index of bicameralism (BCI) suggested by [Lijphart \(1999\)](#).¹⁹ Our theoretical model does not explicitly include bicameralism. However, bicameralism might have an impact on the default policy, \bar{s} and thus might indirectly affect the overall equilibrium outcome as well. Because rural districts are often more strongly represented in a second chamber when compared to the first chamber ([Lijphart, 1999](#)), the second chamber might have a positive impact on the political influence of agrarian interests.

Finally, we also used an effective number of parties ([Sartori, 1976](#)) as an additional political control variable. Of course, due to Duverger's law, the effective party number is highly correlated with our RDS measure. However, beyond this correlation, the effective party number might have an impact on the political weight of the agrarian population, since a large number of political parties might have an impact on the capacity of the PM to discipline her parliamentary majority ([Diermeier and Feddersen, 1998](#)). However, since our simple theoretical model assumes a two-party system, it does not provide any further insights regarding multi-party government.

Finally, please note that all CEE countries in our data set have a pure parliamentary system, i.e. we have no variance regarding the general form of government ([Ismayr, 2002](#)). Therefore, we did not include the usual dummy variable indicating a parliamentary and a presidential system, respectively.

¹⁹ In contrast to [Lijphart \(1999\)](#) we redefine the index over the interval [0–3] instead of [1–4], where 3 represents a system with two equally powerful but incongruent chambers and 0 corresponds to an unicameral system.

The country means of all endogenous and exogenous variables used in the regression analyses are presented in Table A1.

4. Results

4.1 District Magnitude and Political Weight of Agrarian Interests

Table 1 reports on a variety of OLS estimates with the relative political weight of the agrarian interests as dependent variables (X_A^*). We hold constant those socio-economic and demographic variables (z) that have already been identified or suggested as relevant determinants of political influence by previous studies. As discussed above, we consider these variables to be the share of rural population, the share of agriculture in employment, and the share in GDP (GDP share). As can be seen in the first column, these variables already explain more than 90 percent of the observed variance of the political weight of agrarian interests. In particular, the rural population share has a strong and highly significant impact on political representation of agrarian interests. According to the estimated coefficient, an increase of the rural population share by 1 percentage point implies an increase of the

Table 1: Empirical Results of Regression Analysis. Dependent Variable: Agrarian SWF Weight (X_A^*)

	Model 1	Model 2	Model 3	Model 4
Adjusted R-squared	0.907	0.941	0.944	0.942
Dependent variable	X_A^*	X_A^*	X_A^*	X_A^*
(Intercept)	-0.048 (-1.946).	-0.093 (-4.012)***	-0.086 (-3.727)***	-0.085 (-3.45)**
Share of agricultural employment	-1.047 (-12.414)***	-1.015 (-14.596)***	-1.021 (-14.962)***	-1.018 (-11.524)***
GDP share	0.669 (8.959)***	0.629 (10.012)***	0.651 (10.388)***	0.651 (10.302)***
Share of rural population	0.974 (17.897)***	1.087 (22.974)***	1.049 (20.738)***	1.047 (17.139)***
Relative district size		0.166 (2.662)**	0.16 (2.616)*	0.167 (1.045)
Squared relative district size		-0.219 (-3.672)***	-0.204 (-3.464)***	-0.21 (-1.587)
BCI			0.006 (1.898).	0.006 (1.267)
Effective party size				-7.3815E-05 (-0.05)

Note: Significance codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

relative political weight of agrarian interest by roughly 1 percentage point (Figure 2). The agricultural employment share has a similarly strong effect, although this effect is negative (Figure 3). The classical political economy literature has given much consideration to demographic variables at both the theoretical and empirical levels. On the one hand, scholars, e.g. Gardner (1987), follow a pluralistic argument and emphasize that a higher share of the agricultural population increases the vote share of agrarian interests and

Figure 2: Share of Rural Population and Relative Weight

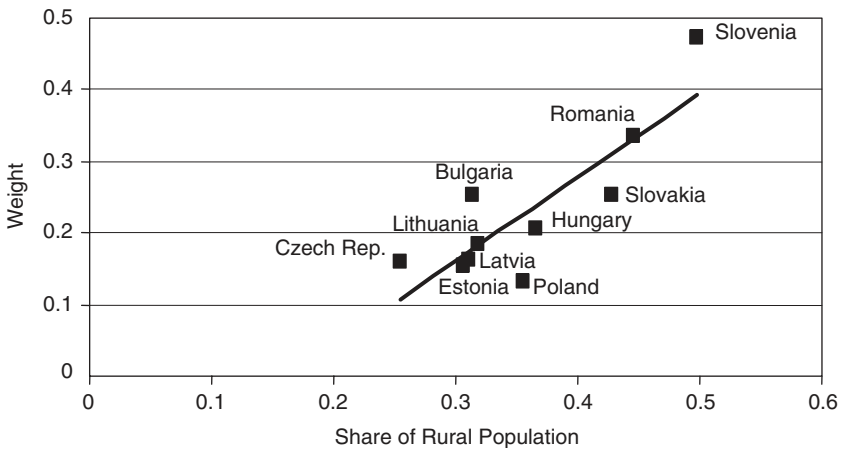
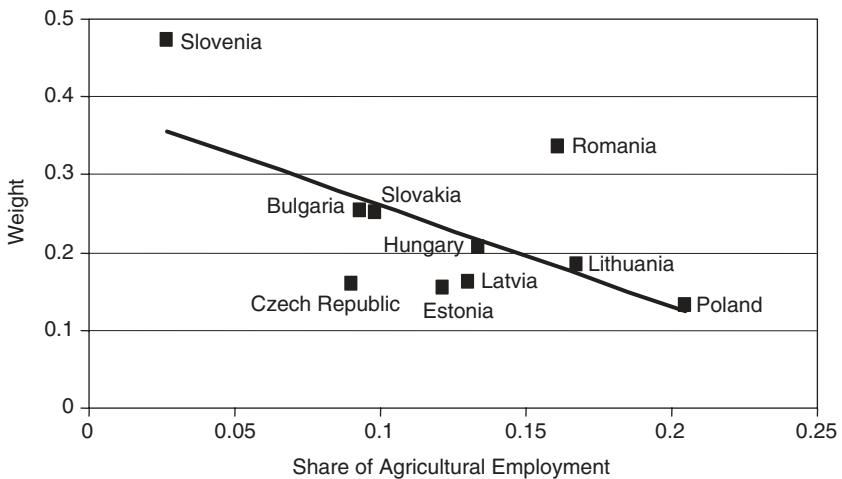


Figure 3: Share of Agricultural Employment and Relative Weight



thus their political influence. On the other, Gardner (1987) also follow Olson's famous theory and argue that the number of farmers significantly increases the cost of organizing agrarian interests due to free-riding and thus, political influence decreases with the number of farmers.

According to our estimation result, we suggest the following interpretation. While the agricultural employment corresponds to organization costs due to free-riding, the rural population share picks up the relative electoral weight of agrarian interests and accordingly, has a positive impact on the political influence of agrarian interests. Note that rural inhabitants feel affiliated with agrarian interests, although they often work in non-agricultural sectors. The latter results from spill-over effects, i.e. high land prices or multiplier effects on the rural economy, implied by agricultural subsidies. These interests are mobilized by farmers' interest groups, which are more efficient in mobilizing the rural population the lower their free-rider problem, i.e. the smaller it is. In the framework of our theory, the first argument follows directly from the fact that the relative SWF weight of agrarian interests increases with the share of the rural population. The second argument, in terms of our model, formally corresponds to an increase in the ideological homogeneity of the rural population induced by more efficient agrarian lobbying groups.

The impact of the agricultural GDP share is positive, although it is lower when compared to the impact of the demographic variables. An explanation for this positive effect can be seen in the fact that relative higher farm income increases c.p. the resources available to agrarian interest groups, and thus again increases their capacity to mobilize rural voters.²⁰

Beyond the significance of those standard variables (z), our regression analyses also indicate a clear significant impact of the electorate system on the political representation of agrarian interests. As can be seen in column 2 in Table 1, a significant impact could be found for both district size as well as squared district size. In particular, the quadratic impact of district size is negative and highly significant, while the linear impact of district size is positive and significant on a 1 percent level. Thus, the estimated parameters of district size clearly confirm our theory that predicts an inverse u-shape relation between relative district magnitude and the political weight of agrarian interests. However, given the parameter values in column 2, the maximal political weight is realized for a mixed electorate system with an average relative district size of 39 percent. This implies a total district number below three, i.e. the estimated cut point is in fact already very close

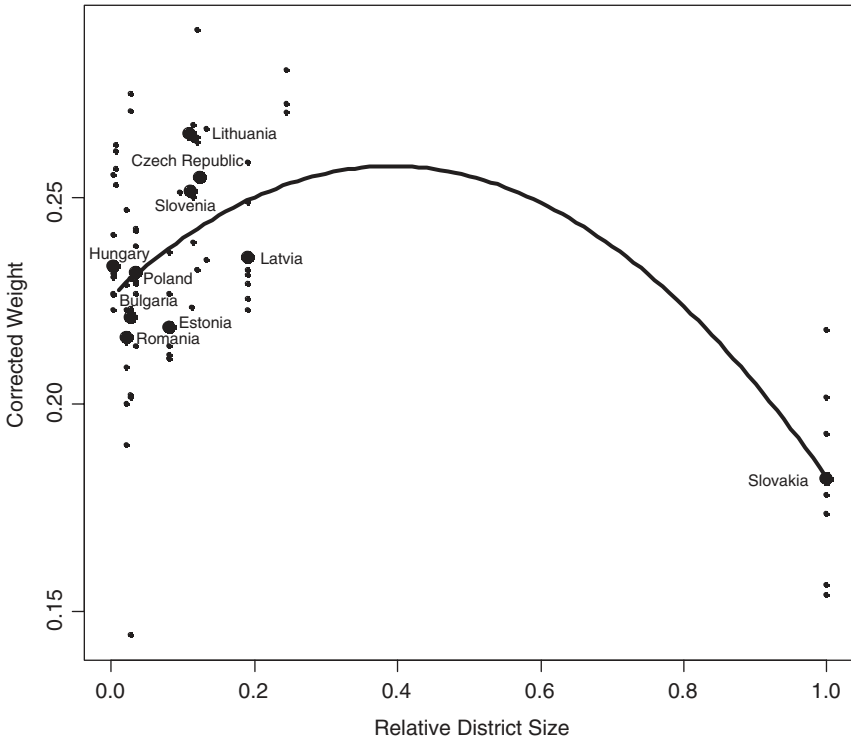
²⁰Note that this argument does not contradict the fact that a higher relative income of rural population c.p. decreases the WTE and thus reduces c.p. agricultural protection for given SWF weights.

to a pure PR system. Further note that RDS values are clustered over the interval ranging from 0 to 0.33. Assuming equally sized districts, only two other values can be observed above 0.33, that is 0.5 corresponding to a mixed system with two multi-member districts and 1 corresponding to a pure PR system with one national district (see Figure 4).

The inverse parable in Figure 4 is calculated as follows: $\tilde{X}^A = \beta_1 \text{RDS} + \beta_2 \text{RDS}^2$. The dots around the parable correspond to the adjusted empirical relative weights X_C^A ; these are calculated as follows: $X_C^A = X_{\text{Emp}}^A - \sum_i [\beta_i \times (z_i - \bar{z}_i)]$, where X_{Emp}^A the empirically observed political weight and \bar{z}_i is the mean of the variable z_i in our sample.

In our sample, only Slovakia has a pure PR system, while all other CEE countries have mixed systems with RDS values ranging from 0.005 to 0.25. The minimal number of districts observed in our sample for mixed systems is four. Therefore, the estimated inverse u-shape crucially depends on Slovakia as an outlier in the sample. In fact, if we delete Slovakia from our data, we get a reverse effect of district magnitude, i.e. the weight of agrarian interests

Figure 4: Relative District Size and Relative Weight



increases monotonically with district size. Moreover, statistical significance is considerably reduced. However, this is exactly what our theory predicts; if we do not include data points observed for district sizes above the cut point (k^*), an increasing impact of district magnitude results. Nevertheless, we have to admit that empirical confirmation of our theory would be more robust if we would include more countries with a pure PR system or a mixed system with less than four districts.

Although our estimation results indicate that political influence is basically determined by demographic and economic factors, in quantitative terms estimation results imply that at least in the 10 CEE countries of our sample electoral rules have some considerable impact on political influence. For example, the estimated maximal impact of the RDS corresponds to a shift of the political weight of agrarian interests by 8 percentage points (shifting RDS from 1 to 0.39) and by 3 percentage points (shifting RDS from 0 to 0.39). Interestingly, in Lithuania, a reform of the electoral system occurred within the estimation period (in 1997), changing the electorate rule from a more PR-like system with only four 35-member districts (RDS = 0.245) to a more majoritarian-like system with 67 two-member districts (RDS = 0.014). According to our estimated parameters (model 2 in Table 1), this implies a decrease of the political weight by 2.5 percent. The empirically calibrated SWF weight decreases in fact by 2.4 percent from 0.194 in 1996 to 0.17 in 2000. We see this as clear additional empirical evidence for our theory. Accordingly, if countries like Rumania or Bulgaria, with almost pure majoritarian systems (RDS = 0.02 and 0.03), would shift their electoral rules to a mixed system like the one of Lithuania before 1997 or the one of Lativa (RDS = 0.2), they would increase the political influence of agrarian interests by a remarkable 2.4 percentage points or 2 percentage points, respectively.

Finally, we introduce further political variables to test for other potential impacts of political institutions not explicitly considered in our theory. In particular, OLS estimations indicate some positive impact of bicameralism (see Table 1 column 3). Although this is only significant at a 10 percent level, in quantitative terms bicameralism has a considerable impact on the political weight of agrarian interests. For example, shifting from unicameralism, e.g. in Bulgaria, to a symmetric two-chamber parliamentary system, e.g. the Czech Republic, implies an increase of the agrarian weight by 1.8 percentage points. Thus, analyzing legislative decision making in bicameral systems more explicitly in the framework of our model seems to be a very interesting topic for future research.²¹

²¹Note that the average political weight of agrarian interests varies between 13 and 48 percent (see Table A1), thus an increase of 1 percentage point corresponds to a relative increase of 2–10 percent.

Table 2: Empirical Results of Regression Analysis. Dependent Variable: PSE

	Model 1	Model 2	Model 3	Model 4
Adjusted <i>R</i> -squared	0.470	0.498	0.513	0.506
Dependent variable	PSE	PSE	PSE	PSE
(Intercept)	-0.138 (-1.465)	-0.147 (-1.355)	-0.117 (-1.075)	-0.096 (-0.8)
Share of agricultural employment	-0.053 (-0.164)	-0.101 (-0.31)	-0.127 (-0.395)	-0.371 (-0.553)
GDP share	-1.57 (-5.471)***	-1.741 (-5.91)***	-1.644 (-5.564)***	-1.407 (-2.186)*
Share of rural population	1.128 (5.392)***	1.263 (5.689)***	1.099 (4.61)***	1.142 (4.372)***
Relative district size		-0.077 (-0.264)	-0.102 (-0.354)	-0.104 (-0.357)
Squared relative district size		-0.05 (-0.178)	0.013 (0.047)	0.003 (0.012)
BCI			0.025 (1.723).	0.025 (1.701).
Relative income				-0.031 (-0.415)

Note: Significance codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Finally, we introduced the effective party number as an additional political variable. As can be seen from the results reported in column 4 of Table 1, introducing the effective party number implies that none of the political variables turns out to be significant. Of course, this basically follows from the strong correlation of effective party size and electoral rules. Please note that by far the lowest *t*-values are observed for effective party size (see column 4 in Table 1).

4.2 District Magnitude and Agricultural Protection

Table 2 presents corresponding OLS estimation results with agricultural protection (PSE) as a dependent variable. As can be seen in column 1, agricultural protection can be explained to a much lesser degree by the standard socio-economic and demographic factors given a R^2 of only 0.47. Moreover, only the rural population share and the GDP share are significant, while the share of agriculture in employment has no significant impact on observed agricultural protection levels. The strongest impact results for the GDP share, for which an overall negative impact on total PSE can be found. Given the fact that the GDP share increases the political weight of

agrarian interests, a negative impact on PSE seems to be a paradox, given the identified positive effect of the GDP share on the political weight. However, the GDP share also has a strong impact on the WTE. Obviously, the larger the agricultural sector in relation to the non-agricultural sector, the lower is c.p. the WTE, i.e. the lower is the relative farm income increase induced by a one percent decrease of the non-agricultural income. Accordingly, for any given political weight of the agrarian interests, the agricultural protection level is c.p. the lower in political economy equilibrium the lower the WTE. Simply speaking, for a large agricultural sector it is economically more difficult to redistribute income from the non-agricultural sector to the agricultural sector. Note that this point corresponds exactly to one of the major theoretical and empirical findings of the classical political economy approaches to agricultural protection (Tyers and Anderson, 1992).

In particular, Tyers and Anderson (1992) explained empirically observed cross-country patterns in agricultural protection levels, i.e. high protection in industrialized and even taxation of the agricultural sector in developing countries, via these well-known ideal-typical economic structures, i.e. low agricultural GDP shares in industrialized countries and a high share in developing countries.

In contrast to the political weight of agrarian interests, agricultural protection levels are not significantly influenced by electorate rules. As can be seen in column 2, neither the linear nor the quadratic parameter of district magnitude turns out to be statistically significant. As we explained above, this result is clearly biased due to non-linearity problems. The non-linearity problems would have become even more clear if we would have used a more heterogeneous country sample including developing countries in which agriculture is taxed. Because electoral rules do not systematically vary across industrialized and developing countries, estimating the impact of these rules on policy outcome for samples including both country types would trivially result in a non-significant effect of electoral rules without explicitly accounting for the non-linearity of the economic transformation surface. We tried to control for non-linear cross-section variations in the economic transformation surface using relative income as an additional control variable. However, as can be seen in column 4, controlling for relative income still does not imply a significant impact of district magnitude.²² This negative result clearly underlines the importance of controlling for non-linearity of the economic transformation surface for a correct empirical estimation of the impact of constitutional rules on policy outcome.

²² Interestingly, the index of bicameralism turns out to be stable and significant, although only at a 10 percent level.

Overall, we conclude that estimation results basically confirm our theory as well as replicate essential results of previous studies. However, to estimate the impact of constitutional rules as well as organizational structures of interest representation, it is crucial to account for the non-linearity of the economic transformation surface. Otherwise, cross-country data lead to biased results, often indicating a non-significant impact of constitutional rules due to disturbances induced by unobserved heterogeneity in relevant economic framework conditions.

5. Conclusion

Agricultural protection certainly is a prominent case of special interest politics. In this framework, the paper analyzes the impact of political institutions on agricultural protection in the parliamentary systems. A political economy model combining a model of postelection bargaining and of retrospective voting behavior is derived at the theoretical level. The main results are: (i) In parliamentary systems, the impact of the electoral system on the political influence of the agrarian population crucially depends on the level of party or coalition discipline and the heterogeneity of policy preferences between the PM and her legislative majority. (ii) If perfect party discipline is assumed, the equilibrium outcome is solely determined by the preferences of the PM. In this case, our model replicates major results of preelection politics models, that is political influence of special agrarian interests increases c.p. the more the electorate system corresponds to a pure majoritarian system. (iii) However, if policy preferences within the majority are sufficiently heterogeneous, imperfect party discipline results and an equilibrium policy outcome is solely determined by policy preferences of the decisive majority member. In this case an opposite result is derived, i.e. agrarian influence increases the more the electorate system corresponds to proportional representation. (iv) In general, legislators' preferences are determined in electoral competition, where legislators represent the interests of their constituencies. In our simple model we distinguish only two different district types, rural and urban, where due to ideological biases electoral competition implies that the PM always represents rural districts, while the decisive majority member represents urban districts. Heterogeneity of rural and urban policy preferences depends on the electorate system, where heterogeneity increases the smaller the district magnitude. Therefore, the overall result is a curve-linear relationship between agricultural protection and district magnitude. Under a pure majoritarian system, strong heterogeneity of the legislators' preferences implies only imperfect party discipline. Accordingly, agrarian interest first increases with district magnitude. However, increasing district magnitude implies increasing homogeneity of the

legislators' preferences. Thus, if homogeneity is sufficiently high, policy outcome is solely determined by the preferences of the PM and the political power of the agrarian population decreases with district magnitude. (v) Empirical analyses basically support our theory. However, applying simple linear regression models without controlling for non-linearity, we found no significant relationship between agricultural protection and the electorate system.

References

- Beck, T., Clarke, G., Groff, A., Keefer, P. and Walsh, P. (2001). New Tools in Comparative Political Economy: The Database of Political Institutions. *World Bank Economic Review*, 15(1), 165–176.
- Becker, G. (1983). A Theory of Competition among Groups for Political Influence. *Quarterly Journal of Economics*, 115, 371–400.
- Beghin, J. and Fafchamps, M. (1995). Constitutions, Institutions and Political Economy of Farm Policies: What Empirical Content?, in Peters, G. and Hedley, D. (eds), *Agricultural Competitiveness: Market Forces and Policy Choice*, Aldershot, Dartmouth.
- Beghin, J., Foster, W. and Kherallah, M. (1996). Institutions and Market Distortions: International Evidence for Tobacco. *Journal of Agricultural Economics*, 47(3), 355–365.
- Beghin, J. and Kherallah, M. (1994). Political Institutions and International Patterns of Agricultural Protection. *The Review of Economics and Statistics*, 76(3), 482–489.
- Binswanger, H. and Deininger, K. (1997). Explaining Agricultural and Agrarian Policies in Developing Countries. *Journal of Economic Literature*, 35, 1958–2005.
- Black, D. (1958). *The Theory of Committees and Elections*, Cambridge University Press, London and New York.
- CIA (1997). *The World Factbook: A Handbook of Economic, Political and Geographic Intelligence/Central Intelligence Agency*, US Government Print. Off, Washington, DC.
- DeGroter, H. and Swinnen, J. (2002). Political Economy of Agricultural Policy, in Rausser, G. and Gardner, B. (eds), *Handbook of Agricultural Economics*, vol. 2B, North-Holland, Amsterdam, The Netherlands.
- DeJanvry, A., Fargeix, A. and Sadoulet, E. (1991). Political Economy of Stabilization Programs: Feasibility, Growth and Welfare. *Journal of Policy Modeling*, 13(3), 317–345.
- Diermeier, D. and Feddersen, T. (1998). Cohesion in Legislatures and the Vote of Confidence Procedure. *American Political Science Review*, 92, 611–621.
- Downs, A. (1957). *An Economic Theory of Democracy*, Harper and Row, New York.
- EU (1998). *Progress Reports from the Commission on Progress Towards Accession by Each of the Candidate Countries*. http://europa.eu.int/comm/enlargement/report_11_98/.
- EU (2001). *Progress Reports from the Commission on Progress Towards Accession by Each of the Candidate Countries*. <http://europa.eu.int/comm/enlargement/report2001/>.

- EU (2002). *Progress Reports from the Commission on Progress Towards Accession by Each of the Candidate Countries*. <http://europa.eu.int/comm/enlargement/report2002/>.
- FAO (2002). *Faostat Data*. <http://faostat.fao.org/>.
- Gardner, B. (1987). Causes of U.S. Farm Commodity Programs. *Journal of Political Economy*, 95(2), 290–310.
- Henning, C. (2004). The Role of Institutions in Agricultural Protectionism, in Huylenbroeck, G.V., Verbeke, W. and Lauwers, L. (eds), *Role of Institutions in Rural Policies and Agricultural Markets*, chap. 9, pp. 137–148, Elsevier, Amsterdam, The Netherlands.
- Henning, C., Krause, K. and Struve, C. (2002). *Institutional Foundation of Agricultural Protection: The Case of EU-Accession and Agricultural Policy in Eastern Europe*. Annual Meeting of the AAEA.
- Hinich, M.J. (1977). Equilibrium in Spatial Voting: The Median Voter Result is an Artifact. *Journal of Economic Theory*, 16, 208–219.
- Hotelling, H. (1929). Stability in Competition. *The Economic Journal: The Journal of Royal Society*, 39, 41–57.
- Huber, J. (1996). The Vote of Confidence in Parliamentary Democracies. *American Political Science Review*, 90, 269–282.
- Ismayr, W. (2002). *Die politischen Systeme Osteuropas*, Leske + Budrich, Opladen.
- Krueger, A., Schiff, M. and Valdes, A. (1988). Agricultural Incentives in Developing Countries: Measuring the Effects of Sectoral and Economy Wide Policies. *World Bank Economic Review*, 2, 255–272.
- Lijphart, A. (1984). *Democracies; Patterns of Majoritarian and Consensus Government in Twenty-One Countries*, Yale University Press, New Haven, CT.
- Lijphart, A. (1999). *Patterns of Democracy. Government Forms and Performance in Thirty-Six Countries*, Yale University Press, New Haven.
- Lohmann, S. (1998). An Information Rationale for the Power of Special Interests. *American Political Science Review*, 92, 809–827.
- Milesi-Ferretti, G.M., Perotti, R. and Rostagno, M. (2002). Electoral Systems and Public Spending. *The Quarterly Journal of Economics*, 117(2), 609–657.
- Miller, G. (1997). The Impact of Economics on Contemporary Political Science. *Journal of Economic Literature*, 35, 1173–1204.
- Miller, T. (1991). Agricultural Price Policies and Political Interest Group Competition. *Journal of Policy Modeling*, 13, 489–513.
- OECD (2001). *Agricultural Policies in Emerging and Transition Economies: Special Focus on Non-tariff Measures*, OECD, Paris.
- Olper, A. (2001). Determinants of Agricultural Protection: The Role of Democracy and Institutional Setting. *Journal of Agricultural Economics*, 52(2), 75–92.
- Peltzman, S. (1976). Toward a More General Theory of Regulation. *Journal of Law and Economic*, 199, 211–240.
- Persson, T. and Tabellini, G. (2002). Do Constitutions Cause Large Governments? Quasi — Experimental Evidence. *European Economic Review*, 46, 908–918.
- Persson, T., Tabellini, G. and Trebbi, F. (2003). Electoral Rules and Corruption. *Journal of the European Economic Association*, 1(4), 958–989.
- Rodrik, D. (2005). *Why We Learn Nothing from Regressing Economic Growth on Policies*. Mimeographed, Harvard University.
- Sartori, G. (1976). *Parties and Party Systems*, Cambridge University Press, London.

- Stroemberg, D. (2005). *How the Electoral College Influences Campaigns and Policy: The Probability of being Florida*. Mimeographed, Stockholm University.
- Struve, C. (2002). *Die Bedeutung politischer Institutionen für Agrarprotektionismus und den EU-Beitritt der MOEL-Staaten*. Master's Thesis, University of Kiel.
- Swinnen, J. (1994). A Positive Theory of Agricultural Protection. *American Journal of Agricultural Economics*, 76, 1–14.
- Swinnen, J.F.M., Banerjee, A.N. and De Gorter, H. (2001). Economic Development, Institutional Change, and the Political Economy of Agricultural Protection: An Econometric Study of Belgium Since the 19th Century. *Agricultural Economics*, 26(1), 25–43.
- Tyers, R. and Anderson, K. (1992). *Disarray in World Food Markets*, Cambridge University Press, Cambridge.
- Weingast, B. and Marshall, W. (1988). The Industrial Organization of Congress; Or Why Legislators, Like Firms, Are Not Organized as Markets. *Journal of Political Economy*, 96, 379–389.
- Weingast, B., Shepsle, K. and Johnsen, C. (1981). The Political Economy of Benefits and Costs: A Neoclassical Approach to Distributive Policies. *Journal of Political Economy*, 89(4), 642–664.
- Zusman, P. (1976). The Incorporation and Measurement of Social Power in Economic Models. *International Economic Review*, 17(2), 432–441.

Appendix

The country means of all endogenous and exogenous variables used in the regression analyses are presented in Table A1.

A: Proofs

A1: Proof of Proposition 2

Part (i) follows directly from the fact that according to our assumptions for any electorate system $k = 1, \dots, N$, only two types of preferences, rural and urban, exist, which correspond to an additive SWF characterized by a specific relative weight of the agricultural population, g_{uk}^J and g_{rk}^J , corresponding to the relative shares of the agricultural population in the rural and urban district α_{rk}^J and α_{uk}^J , respectively. Moreover, electoral competition implies that the PM has rural preferences, while the decisive majority member has urban preferences for any electorate system k . Under these conditions point (i) follows directly from the characterization of the equilibrium policy outcome in Proposition 1.

Part (ii) follows straightforwardly from the first-order condition of the maximization problem defined under point (i).

Table A1: Empirical Economic Data and Variable Values Used in Regression Analysis

Country	Bulgaria	Czech Republic	Estonia	Hungary	Latvia	Lithuania	Poland	Romania	Slovakia	Slovenia
			Economical and structural variables							
GDP-share in % (GDP) ^{a,b}	16.94	4.46	7.79	5.89	6.91	10.37	5.56	17.73	5.01	4.07
Relative income %PSE ^c	1.88	0.49	0.64	0.44	0.52	0.62	0.27	1.09	0.51	1.56
	-16.86	16.29	5.87	22.57	9.86	3.57	17.00	14.43	17.00	38.57
			Demographic data							
Share of agricultural population (%) (AP) ^d	9.28	9.01	12.17	13.39	13.01	16.76	20.46	16.10	9.85	2.67
Share of Rural Population (%) (RP) ^d	31.35	25.41	30.71	36.61	31.04	31.78	35.59	44.61	42.85	49.83
			Political variables							
Weight (W) (%)	25.34	15.90	15.51	20.70	16.12	18.31	13.20	33.48	25.15	47.30

(Continued)

Table A1: (Continued)

Country	Bulgaria	Czech Republic	Estonia	Hungary	Latvia	Lithuania	Poland	Romania	Slovakia	Slovenia
Relative district size (RDS)%	3.21	12.87	9.11	0.51	20.00	11.56	3.63	2.38	100.00	12.13
Index of Bicameralism (BCI) ^c	0	2.14	0	0	0	0	2	2	0	2
Effective number of parties (EP) ^f	2.57	4.08	5.12	3.17	6.00	3.15	3.48	5.43	4.34	5.79
Seats (S) ^f	240	195	101	384	100	138	460	328	150	91

Note: Data are taken from the following sources:

^aEU (1998, 2001, 2002).

^bCIA (1997).

^cOECD (2001).

^dFAO (2002).

^eLijphart (1999).

^fBeck et al. (2001).

Part (iii): Given our assumption regarding the share of the agricultural population in the different rural and urban voting districts, d_k , defined for the electorate systems $k = 1, \dots, N$, it holds

$$\bar{X}_{u_{k+1}}^A \geq \bar{X}_{u_k}^A \quad (\text{A.1})$$

and

$$\bar{X}_{r_{k+1}}^A \leq \bar{X}_{r_k}^A \quad (\text{A.2})$$

Moreover, it holds for any $k = 1, \dots, N$

$$\bar{X}_{r_k}^A \geq \bar{X}_{u_k}^A \quad (\text{A.3})$$

Further, we define

$$\text{SWF}_{r_k} = [W^A]^{\bar{X}_{r_k}^A} [W^M]^{1-\bar{X}_{r_k}^A} \quad (\text{A.4})$$

$$\text{SWF}_{u_k} = [W^A]^{\bar{X}_{u_k}^A} [W^M]^{1-\bar{X}_{u_k}^A} \quad (\text{A.5})$$

Additionally, we define the ideal point of the PM, Y_k^{PM} and the spliss point of the decisive majority member, \tilde{s}_k^{DM} for any electorate system $k = 1, \dots, N$

$$\begin{aligned} Y_k^{\text{PM}} &= \arg \max_s \text{SWF}_{r_k}(s) \\ \tilde{s}_k^{\text{DM}} &= \text{Max}_s \{s \mid \text{SWF}_{u_k}(s) + \gamma \geq \text{SWF}_{u_k}(\tilde{s}_k)\} \end{aligned} \quad (\text{A.6})$$

Now, obviously it holds for the equilibrium outcome s_k^*

$$s_k^* = \text{Min}\{Y_k^{\text{PM}}, \tilde{s}_k^{\text{DM}}\} \quad (\text{A.7})$$

Finally, it obviously holds given our above assumptions

$$\begin{aligned} Y_{k+1}^{\text{PM}} &\leq Y_k^{\text{PM}} \quad \forall k = 1, \dots, N \\ \tilde{s}_{k+1}^{\text{DM}} &\geq \tilde{s}_k^{\text{DM}} \quad \forall k = 1, \dots, N \end{aligned} \quad (\text{A.8})$$

Moreover, it holds

$$\begin{aligned} Y_1^{\text{PM}} &\geq \tilde{s}_1^{\text{DM}} \\ Y_N^{\text{PM}} &\leq \tilde{s}_N^{\text{DM}} \end{aligned} \quad (\text{A.9})$$

Therefore, it follows that if there exists a $k^+ = 1, \dots, N$ such that it holds $Y_{k^+}^{\text{PM}} \leq \tilde{s}_{k^+}^{\text{DM}}$, then it already holds:

$$Y_k^{\text{PM}} \leq \tilde{s}_k^{\text{DM}} \quad \forall k \geq k^+ \quad (\text{A.10})$$

Obviously, there always exists such a k^+ , i.e. equation (A.10) holds for $k^+ = N$. We define k^* as the minimum of all k^+ 's for which equation (A.10) holds. Trivially, k^* always exists and it follows:

$$\begin{aligned} Y_k^{\text{PM}} &\geq \tilde{s}_k^{\text{DM}} & \forall k < k^* \\ Y_k^{\text{PM}} &\leq \tilde{s}_k^{\text{DM}} & \forall k \geq k^* \end{aligned} \quad (\text{A.11})$$

Therefore, it follows that s_k^* equals Y_k^{PM} for all $k < k^*$ and s_k^* equals \tilde{s}_k^{DM} for all $k \geq k^*$.

Thus, part (iii) is proven and therewith Proposition 2 is proven.

Q.E.D.

Chapter 4

The EU Negotiations as a Reform Strategy: Turkey's Problem Ahead

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Abstract

During the negotiation phase of accession to the European Union (EU), Turkey has to carry out a series of reforms. In this context, reforms are taken as production processes to setup new institutions by using available resources of the society. The EU reserves the right of not accepting Turkey as a member state, irrespective of her reform performance. Therefore, in reforming her institutions, Turkey has to consider this uncertainty. It is shown that reforms lead to a welfare loss vis-à-vis status-quo-preserving policies during the negotiations period. It is claimed that even if all political parties consider reforms as desirable, they will commit themselves to a pro-reform strategy only if certain extra conditions are satisfied.

1. Introduction

In the December 2004 meeting of the European Council, the European Union (EU) decided to launch negotiations with Turkey to establish a timetable for accession. The term “negotiation” in this context refers to a phase in which the candidate country adapts and implements the EU legislation, *acquis communautaire*. In other words, the term “negotiation” is slightly misleading. What will actually happen is that the candidate country, i.e. Turkey, will undertake certain reforms to restructure some of her institutions to be compatible with the EU. In this context, the EU-compatible

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institutional structure defined as the one that satisfies the First Copenhagen Economic Criteria, i.e. those institutions that are necessary to create a market-based functioning economy.¹ Obviously, these minimal requirements that the EU imposes on Turkey are not negotiable; however, Turkey has a set of options in terms of sequencing and timing of her reforms. If feasible, Turkey can choose to go beyond satisfying these minimum requirements and lay institutional foundations of an economy that can cope with competitive pressure and market forces within the EU, i.e. the Second Copenhagen Economic Criteria.

In the last two decades, economic reforms, especially in the context of transition economies, have extensively been discussed. These studies analyzed issues such as gradualism as opposed to a big bang strategy under aggregate and individual uncertainty concerning the outcome of reforms, status-quo bias in the presence of individual-specific uncertainty, whether this bias can be overcome by a gradualist approach, and alike.² What makes the Turkish negotiation process an interesting case to analyze is that even in the absence of aggregate and individual uncertainty regarding the outcome of reforms, there is still an important source of uncertainty: the so-called “EU’s absorption capacity”. That is, there are concerns of the EU countries on the Turkey’s membership. At the end of the negotiation process, Turkey may end up as a member of the EU or not. Even the negotiation process can abruptly come to an end due to reasons, irrespective of the performance of Turkey. The natural question then arises is why Turkey should continue with the negotiation process instead of reforming the economy according to

¹The First Copenhagen criteria comprise the following elements:

- (i) Equilibrating supply and demand through market forces, i.e. liberalization of prices and trade,
- (ii) High share of private sector and reallocation of resources according to market principles,
- (iii) Absence of significant barriers to market entry and exit,
- (iv) Effective recognition of the property rights and the existence of a well-established legal system that is capable of enforcing laws and contracts,
- (v) Macroeconomic stability, i.e. price stability coupled with sustainable public finances and external accounts,
- (vi) Strong potential of the economy, i.e. availability of sufficient human and physical capital,
- (vii) Capacity to attract foreign direct investment,
- (viii) Existence of a financial sector capable of allocating savings to productive investments, and
- (ix) Broad consensus about the essentials of economic policy.

²See, for example, [Fernandez and Rodrik \(1991\)](#), [Wyplosz \(1993\)](#), [Dewatripont and Roland \(1995\)](#), and [Wei \(1997\)](#) among others.

its own agenda (domestic reform process). Under which conditions should Turkey follow the second route? Our basic aim is to answer these questions.

The plan of the paper is as follows: in the following section, we consider the EU negotiations as a process, in which the government radically changes the existing institutional structure of the economy, as opposed to an evolutionary change by the market mechanism and the government's secondary and facilitating role in this evolutionary change. The institutional development is not "endogenous"; the government designs new institutions to replace the existing ones. That is, the government does not follow a "policy tinkering strategy" as in [Iyigun and Rodrik \(2004\)](#). Turkey's membership creates controversy not only in the EU countries but also in Turkey. Since the latter affects the domestic politics, and consequently the strategies of the political parties, the major differences between the pro- and anti-EU views are delineated. In the third section, we present a simple framework to compare the welfare effects of different strategies. In this context, a distinction is made between the EU- and domestic reform approaches. We then analyze the welfare implications of government-led institutional reforms financed by extra taxation by making use of this model. We take the uncertainty around the EU membership into consideration in welfare calculations. In the fourth section, politics of reform is discussed. Some concluding remarks are provided in the final section.

2. The EU Negotiation Process: A Reform Agenda to Change the Institutional Structure of the Turkish Economy

Following [North \(1990, p. 3\)](#), institutions can be defined as "*...the rules of the game in a society or more formally, are the humanly devised constraints that shape human interaction*". In most instances, institutional development takes place as a result of a change in interactions among the members of a society. Such a change induces the society to allocate its time, energy and material resources to design new institutions that serve the social needs better. In a sense, such institutional development is akin to the Schumpeterian innovation process where the role of entrepreneur is taken by the society.³ This situation can be labeled as "evolutionary change". In this framework, institutional development is "endogenous", i.e. it is the outcome of the working of the

³For example, in the non-competitive environment of the 1980s in Turkey, where rent seeking was widespread, "informality" was not a major concern for most economic agents. As the economy gradually became more open and competitive, the frequency of complaints concerning "informality" as a source of "unfair competition" increased. The changing mood of the society on this issue encouraged the political decision making body to consider informality as a major cornerstone of the reform process.

market mechanism. In this case, the role that a government can play is to facilitate institutional development in line with the popular demands reflected by market signals. Using the terminology in *Iyigun and Rodrik (2004)*, such a government can be said to follow a “policy tinkering (PT-) strategy”.

In many instances, societies, in order to cope with external shocks, change their institutional structure. In this case, in contrast to the former, designing institutions can be considered as an instrument to introduce a new mode of human interaction to replace the existing one. This situation can be labeled as “reform”. The EU negotiation process aims at transforming a subset of existing institutions into the ones that are externally given. This is a problem of finding the best path to achieve the targeted institutional set-up. In this case, the government is expected to assume more responsibilities, and commit itself to an “institutional reform (IR-) strategy”, again, in the sense used in *Iyigun and Rodrik (2004)*.⁴

The EU and Turkey agreed that the negotiations are open-ended, i.e., even if Turkey satisfies all the necessary conditions for EU membership, the EU may still have an option of not accepting her membership. The concerns of the EU countries on Turkey’s membership are aggregated under the term “EU’s absorption capacity”, which combines factors ranging from psychological ones such as the prejudices against Turkey to more rational ones such as the concerns over the Turkish economy’s development level and its size. In any case, this implies that at the end of the negotiation process, the outcome may be one of the two qualitatively very different states: Turkey may end up as a member of the EU or may not. The social welfare function, then, should incorporate this information in taking into account society’s well-being after the completion of the negotiation phase. This point can be incorporated into the social welfare function in the following way:

$$\begin{aligned}
 W[(y, \delta), \rho, (q^{\text{EU}}, z^{\text{EU}}), T] = & \left[\sum_{t=0}^T (1 + \rho)^{-t} U(y_t, \delta_t) \right] \\
 & + q^{\text{EU}} \left[\sum_{t=T+1}^{\infty} (1 + \rho)^{-t} U(y_t, \delta_t, z^{\text{EU}}) \right] \\
 & + (1 - q^{\text{EU}}) \left[\sum_{t=T+1}^{\infty} (1 + \rho)^{-t} U(y_t, \delta_t) \right] \quad (1)
 \end{aligned}$$

⁴Some institutions, notably those that stem from tradition and moral codes change rather slowly and can hardly be considered in subject to reforms. (Revolutions, in contrast, aim at abruptly changing a subset of such elements.) For the purpose of this paper, we shall confine ourselves with those institutions that can be changed, within a reasonable time period, with some social effort.

where, y is the output level, δ the institutional structure, ρ the social discount rate which is assumed to be given, q^{EU} refers to the probability of Turkey getting EU membership after successfully satisfying the FCEC, z^{EU} the extra benefits that the EU is expected to create for Turkey after her membership (say due to better access to international markets, lower transaction costs and the implied gains from trade), t the time measured in years and T the closest date that is feasible for Turkey to complete the negotiations with the EU.

The first term on the right-hand side of (1) is the intertemporal social welfare function for the negotiation period. The second term refers to the social welfare of the society after the negotiations period if Turkey becomes a member of the EU. The third term, however, refers the social welfare if it is not the case.

Turkey's EU membership is a controversial topic not only in the EU but also in Turkey. At the expense of oversimplifying the issue, various expressed views can be clustered under "pro-" and "anti-EU" labels. A closer inspection of these views reveals that they differ in four major points that can be expressed in terms of the parameters of the framework introduced above. These points and the nature of the differences are summarized in Table 1.

As can be seen from Table 1, for the first three variables the disagreement between two sides is on their relative magnitudes. For the fourth variable, i.e. for the EU-related reforms, the views differ in their desirability in a broader perspective. The arguments put forward on each item by both sides are as follows:

- (1) q^{EU} . According to the anti-EU view, even if Turkey successfully completes the negotiations phase, the EU will not grant membership status to Turkey, i.e. $q^{EU} \cong 0$. The pessimistic stance of the anti-EU view is based on the assumption that rather negative feelings concerning Turkey's membership among the citizens of the EU countries as reflected in the opinion polls, have deep social, historical and political roots and will remain unchanged in the foreseeable future. The pro-EU view, on the other hand, tends to treat the probability of Turkey getting EU

Table 1: Views of Turkish Citizens on EU Membership

	Pro-EU view	Anti-EU view
q^{EU}	$q^{EU} > 0$	$q^{EU} \approx 0$
z^{EU}	$W(z^{EU} \neq 0) > W(z^{EU} = 0)$	$W(z^{EU} \neq 0) \approx W(z^{EU} = 0)$
ρ	ρ can be reduced to a sufficiently low level	ρ is high and will remain so
δ^{EU}	δ^{EU} is a necessary condition for Turkey's integration to global economy	δ^{EU} is necessary only for EU accession

- membership depends on Turkey's performance in reforming the economy and better appreciation of Turkey's contribution to the welfare of the EU. Hence, the defenders of this view place more emphasis on the efficient use of the negotiations period to influence the EU public opinion.
- (2) z^{EU} . The anti-EU view is confident that Turkey has alternative routes to integrate herself to the global economy and to sustain the same welfare level that EU membership can offer. Therefore, in terms of the formulation given above, the expected gain from joining the EU, i.e. z^{EU} , may not be significant, especially after the relaxation of the constraints implied by the targeted institutional structure. The pro-EU view, on the other hand, argues that Turkey will benefit considerably from being a member of the EU, and questions the existence and/or feasibility of the alternative paths that can be compared with EU membership.
 - (3) ρ . According to the anti-EU view, the negotiations are expected to take quite a long time. Consequently, expected benefits of the EU membership lie far ahead. Nonetheless, uncertainties both concerning political developments within the EU and the prospects in the global economy reduce the relevance in taking long-term decisions concerning membership. In the terminology used above, this argument implies that ρ is very high and therefore the present value of the welfare of the society in the post-negotiation period is negligibly small. The pro-EU view, being more optimistic, argues that as Turkey consolidates her economic and political stability during the negotiations period, a significant and steady decline in ρ can be envisaged.
 - (4) δ^{EU} . According to the anti-EU view, the constraints on the institutional structure that the EU is imposing on Turkey are significantly different from those that the country needs to impose on herself if it implements its own restructuring program to integrate herself successfully to the globalizing world economy. In contrast, according to the pro-EU view, most of the reforms that the country has to undertake during the negotiations are not only necessary for Turkey to be eligible for EU membership, but also indispensable if the country wants to be successful in her efforts to integrate herself into the increasingly competitive global economy. To support their view, they point out the similarities between reforms envisaged in the Turkey's own 2001 economic program and those indicated in the EU list.

3. Reform: Which Route?

We first present our benchmark model. Then, we analyze the welfare implications of IR- and PT-strategies. For simplicity, we take PT-strategies as defending the status-quo. In carrying out this exercise, two different

IR-strategies, namely the “EU-compatible” and “domestic” strategies are distinguished.

For simplicity, we abstract from physical capital entirely and assume that the aggregate labor force is constant. Each identical firm has the linear production function,

$$y_t = A\delta_t \quad (2)$$

where y_t is per capita output, A the level of technology, and δ_t the institutional structure prevailing at the beginning of period t . The level of technology is assumed to be constant. The evolution of the institutional structure is determined by government expenditures that are completely financed by tax revenues.

$$\delta_{t+1} = \delta_t + \beta\tau_{t-k}y_{t-k} \quad (3)$$

where τ is the tax rate, β the positive and constant conversion parameter and k ($k = 0, 1, \dots, n$) is one less the number of periods needed in order a reform process to change the institutional structure of the economy. Per capita consumption is given by

$$c_t = (1 - \tau_t)A\delta_t \quad (4)$$

3.1 The Status-quo

Under the status-quo, the government makes no expenditures and the tax rate is zero. Accordingly, the institutional structure remains intact. Hence,

$$\tau_t^{\text{SQ}} = 0, \quad \delta_t^{\text{SQ}} = \delta_0, \quad c_t^{\text{SQ}} = A\delta_0 \quad (5)$$

where the superscript “SQ” denotes the status-quo and δ_0 the initial level of the institutional structure.

3.2 Consequences of Economic Reform

We consider two reform strategies: the EU process and the domestic process. In both of these processes, the government aims at changing the institutional set-up of the country radically. This is accomplished by government expenditures that are fully covered by taxes. The change in the institutional structure increases the productivity level (a higher δ_t in (2)).

At best, $k = 0$ and government expenditures become effective with only one period lag. At the other extreme, $k = T-1$, where T is the end of the reform process. The reform process begins in the first period and $\tau_t > 0$, $t \in [1, T]$. Note that $\tau_0 = 0$ and $\delta_1 = \delta_0$. Under these conditions, for

$t \in [2, T+1+k]$:

$$\delta_t = \delta_0 + \beta \sum_{j=1}^{t-1} \tau_{t-k-j} y_{t-k-j} \quad (6)$$

Since T is the end of the reform process, $\tau_{T+j} = 0$; $j \geq 1$ and accordingly

$$\delta_t = \delta_{T+1+k}, \quad t > T+1+k \quad (7)$$

Let, under both strategies, the targeted institutional structure be δ^* . Hence,

$$\delta_{T+1} = \delta^* = \delta_0 + \beta \sum_{j=1}^T \tau_{T+1-k-j} y_{T+1-k-j} \quad (8)$$

For simplicity, assume that the tax rate is constant throughout the reform process. Using (2) in (8) gives the desired tax rate as

$$\tau = \frac{\delta^* - \delta_0}{\beta A \sum_{j=1}^T \delta_{T+1-k-j}} \quad (9)$$

This equation shows that the desired tax rate increases as δ^* and k increase and decreases as T increases. In order to see the effect of k , let us analyze two extreme cases. First take $k = T-1$. In this case

$$\delta_1 = \delta_2 = \dots = \delta_T = \delta_0; \quad \delta_{T+j} > \delta_0, \quad j \geq 1$$

$$\tau = \frac{(\delta^*/\delta_0) - 1}{\beta A}$$

$$c_1 = c_2 = \dots = c_T < c^{\text{SQ}}; \quad c_{T+j} > c^{\text{SQ}}, \quad j \geq 1$$

When $k = 0$, the situation changes sharply

$$\delta_{t+1} = (1 + \beta A \tau)^t \delta_0, \quad t \in [0, T]; \quad \delta_{T+1+j} = \delta_{T+1}, \quad j \geq 1$$

$$\tau = \frac{(\delta^*/\delta_0)^{\frac{1}{T}} - 1}{\beta A}$$

$$c_1 < c^{\text{SQ}}; \quad c_t > c^{\text{SQ}}, \quad t \in [2, T]; \quad c_{T+j} > c^{\text{SQ}}, \quad j \geq 1$$

Hence, when $k = T-1$, the reform process necessitates a higher tax rate and has a potential to increase dissatisfaction given lower than the status-quo per capita consumption levels throughout the reform process. In

contrast, when $k = 0$, targeted level of institutional structure can be achieved by a much lower tax rate. The first period per capita level of consumption is below than that achieved when the status-quo is kept intact. For remaining periods of the reform process, comparison depends on the parameter values of the model. However, under plausible conditions, consumption levels attained during the reform process will outperform the status-quo consumption levels as time goes by. Finally, for $t \in [T, 2T]$ per capita consumption levels, when $k = 0$, will be higher than those obtained when $k = T-1$.

We now turn to effects of two different types of reform strategies. To simplify the analysis, we take $T = 2$ and $k = 0$ for both of the reform processes. Similarly, the targeted level of institutional structure is same in the EU and domestic processes. Consequently,

$$\delta_1 = \delta_0, \quad \delta_2 = (1 + \beta\tau A)\delta_0 = \delta_T, \quad \delta_3 = (1 + \beta\tau A)^2\delta_0 = \delta_{T+1+j}, \quad j \geq 0 \quad (10)$$

$$\tau = \frac{(\delta^*/\delta_0)^{\frac{1}{2}} - 1}{\beta A} \quad (11)$$

$$c_1 = (1 - \tau)c^{\text{SQ}}, \quad c_2 = (\delta^*/\delta_0)^{\frac{1}{2}}(1 - \tau)c^{\text{SQ}}, \quad c_3 = (\delta^*/\delta_0)c^{\text{SQ}} \quad (12)$$

Note that these consumption levels would be attained if there were no uncertainty regarding the EU and domestic processes.

The EU Reform Process

Completion of the reforms envisaged by the EU negotiations process, although necessary, is not sufficient for securing Turkey's membership to the EU. The EU reserves the right to say "no" to Turkey's membership, for example, by referring to its absorption capacity. Here, it is assumed that even at the end of the first period, there is such a probability $(1 - q_2^{\text{EU}})$. If this sudden stop realizes, there are two possibilities in front of the reformers: either switching to the domestic route and continue with the reform process, or turning back to the status-quo.⁵ Let the probability of choosing the domestic reform alternative be q_2^{D} . If there is not any sudden stop, the reform process continues in the second period. At the end of this period, the EU gives its final decision; the probability of receiving a "yes" from the EU is q_3^{EU} . The timing of events is shown in Table 2.

⁵We assume that turning back to the status-quo is costless.

Table 2: The Timing of Reforms and Events ($T = 2, k = 0$)^a

EU Process					
	$\tau > 0$	q_2^D q_2^{EU}	$\tau > 0$	q_3^{EU}	$\tau = 0$
δ_1	$t=1$	δ_2	$t=2=T$	δ_3	$t=3=T+1$
				δ^*	
Domestic Process					
	$\tau > 0$	q_2^{D1}	$\tau > 0$		$\tau = 0$
δ_1	$t=1$	δ_2	$t=2=T$	δ_3	$t=3=T+1$
				δ^*	

^a T is the length of the reform process; k is one plus the number of periods needed in order a reform process to change the institutional structure of the economy (see the text).

Using these probabilities expected per capita consumption levels as of the beginning of the reform process is as follows:

$$E_0(c_1^{EU}) = (1 - \tau)c^{SQ} \quad (13a)$$

$$E_0(c_2^{EU}) = [q_2^{EU}(1 - \tau)(\delta^*/\delta_0)^{\frac{1}{2}} + (1 - q_2^{EU})q_2^D(1 - \tau)(\delta^*/\delta_0)^{\frac{1}{2}} + (1 - q_2^{EU})(1 - q_2^D)]c^{SQ} \quad (13b)$$

$$E_0(c_3^{EU}) = q_2^{EU}[q_3^{EU}(\delta^*/\delta_0)z^{EU} + (1 - q_3^{EU})(\delta^*/\delta_0)]c^{SQ} + (1 - q_2^{EU})[q_2^D(\delta^*/\delta_0) + (1 - q_2^D)]c^{SQ} \quad (13c)$$

where $E_0(x)$ is the expected value of x as of the end of period 0, and $z^{EU} > 1$ the additional economic benefit obtained having become a full member to the EU.

Domestic Reform Process

Note that, as mentioned above, we assumed that in the domestic reform process, reformers are able to complete reforms at the same duration as in the EU process. Notwithstanding this assumption, some analysts emphasize that one of the basic advantages of choosing the EU process is that completing the reforms in this process needs significantly less time than the

domestic process. The rationale behind this argument is the strong anchoring role of the EU for the reform process.

In our set-up, the first difference between the two reform strategies is the additional benefit stemming from the advantages of full membership to the EU ($z^{\text{EU}} > 1$). The only uncertainty in the domestic process is related with the decision of reformers whether continuing to the reform process or not. This decision is taken at the end of the first reform period ($t = 1$). Let the probability of continuing the domestic reform process be q_2^{D1} . The timing of events is shown in Table 2. Note that in the EU process, conditional on a sudden stop (a “no” from the EU at the end of the first period), the probability of continuing with the domestic reform process is q_2^{D} . As a second difference, we take $q_2^{\text{D1}} \geq q_2^{\text{D}}$. The reason is simply that receiving a negative answer can decrease reform appetite of both reformers and the public. Based on these arguments, using the “D” superscript for the domestic process, one can derive the expected per capita consumption levels as of the beginning of the reform process as follows:

$$E_0(c_1^{\text{D}}) = (1 - \tau)c^{\text{SQ}} \quad (14a)$$

$$E_0(c_2^{\text{D}}) = [q_2^{\text{D1}}(1 - \tau)(\delta^*/\delta_0)^{\frac{1}{2}} + (1 - q_2^{\text{D1}})]c^{\text{SQ}} \quad (14b)$$

$$E_0(c_3^{\text{D}}) = [q_2^{\text{D1}}(\delta^*/\delta_0) + (1 - q_2^{\text{D1}})]c^{\text{SQ}} \quad (14c)$$

Comparison

The implied expected consumption levels are given in Tables 3 and 4. Clearly, in the first period the status-quo (which is taken as the PT-strategy) dominates the IR-strategy. In periods following the second period, that is, after reforms are completed, all members of the society are in all, but two cases, better off compared to the status-quo: Under the EU process, their consumption level reduces to the level under the status-quo when $q_2^{\text{EU}} = 0$, $q_2^{\text{D}} = 0$. Under the domestic reform process, per capita consumption level reduces to the level under the status-quo when $q_2^{\text{D1}} = 0$. Otherwise, the domestic reform process outperforms the status-quo. Per capita consumption comparisons of the second period generally depend on the parameters of the model. For the EU process only when $q_2^{\text{EU}} = 0$, $q_2^{\text{D}} = 0$ and for the domestic process only when $q_2^{\text{D1}} = 0$ consumers’ consumption levels remain unchanged compared to the status-quo. Otherwise, the PT-strategy can dominate or be dominated by the IR-strategy.

When the comparison is made within the IR-strategy, evidence is mixed. If there were not any uncertainty regarding EU membership, the EU would

Table 3: Ex-ante Consumption Comparisons with Respect to the Status-quo ($T = 2$, $k = 0$)^a

		EU-strategy		Domestic strategy	
		Probabilities	Result	Probabilities	Result
$t = 1$	No uncertainty		EU < SQ	No uncertainty	D < SQ
$t = 2$	$q_2^{\text{EU}} = 1$		EU?SQ	$q_2^{\text{D}1} = 1$	D?SQ
	$q_2^{\text{EU}} = 0, q_2^{\text{D}} = 1$		EU?SQ	$q_2^{\text{D}1} = 0$	D = SQ
	$q_2^{\text{EU}} = 0, q_2^{\text{D}} = 0$		EU > SQ		
	$q_2^{\text{EU}} = 0, q_2^{\text{D}} \in (0, 1)$		EU?SQ		
	$q_2^{\text{EU}} \in (0, 1), q_2^{\text{D}} = 1$		EU?SQ	$q_2^{\text{D}1} \in (0, 1)$	D?SQ
	$q_2^{\text{EU}} \in (0, 1), q_2^{\text{D}} = 0$		EU?SQ		
	$q_2^{\text{EU}} \in (0, 1), q_2^{\text{D}} \in (0, 1)$		EU?SQ		
$t = 3$	$q_2^{\text{EU}} = 1, q_3^{\text{EU}} = 1$		EU > SQ	$q_2^{\text{D}1} = 1$	D > SQ
	$q_2^{\text{EU}} = 1, q_3^{\text{EU}} = 0$		EU > SQ		
	$q_2^{\text{EU}} = 1, q_3^{\text{EU}} \in (0, 1)$		EU > SQ		
	$q_2^{\text{EU}} = 0, \therefore q_3^{\text{EU}} = 0, q_2^{\text{D}} = 1$		EU > SQ	$q_2^{\text{D}1} = 0$	D = SQ
	$q_2^{\text{EU}} = 0, \therefore q_3^{\text{EU}} = 0, q_2^{\text{D}} = 0$		EU = SQ		
	$q_2^{\text{EU}} = 0, \therefore q_3^{\text{EU}} = 0, q_2^{\text{D}} \in (0, 1)$		EU > SQ		
	$q_2^{\text{EU}} \in (0, 1)$ and $q_2^{\text{D}} = 1$ (q_3^{EU} is irrelevant)		EU > SQ	$q_2^{\text{D}1} \in (0, 1)$	D > SQ
	$q_2^{\text{D}} = 0, q_3^{\text{EU}} = 1$		EU > SQ		
	$q_2^{\text{D}} = 0, q_3^{\text{EU}} = 0$		EU > SQ		
	$q_2^{\text{D}} = 0, q_3^{\text{EU}} \in (0, 1)$		EU > SQ		
	$q_2^{\text{D}} \in (0, 1), q_3^{\text{EU}} = 1$		EU > SQ		
	$q_2^{\text{D}} \in (0, 1), q_3^{\text{EU}} = 0$		EU > SQ		
	$q_2^{\text{D}} \in (0, 1), q_3^{\text{EU}} \in (0, 1)$		EU > SQ		

Note: EU, the EU process; D, domestic process; SQ, status-quo; probabilities are denoted by q .
^a T is the length of the reform process; k is the one plus the number of periods needed in order a reform process to change the institutional structure of the economy (see the text).

clearly be the dominant strategy. When a sudden stop is almost certain ($q_2^{\text{EU}} \cong 0$), just the opposite is highly likely. Based on a “no” from the EU in the midst of the reform process, if resistance to reform becomes widespread, shifting to the domestic route can be infeasible ($q_2^{\text{D}} \cong 0$). If this is the case then the domestic reform strategy will certainly outperform the EU-strategy. Moreover, taking the first period dominance of the status-quo and the parameter dependence of the second period into consideration, the EU-strategy can prove to be the worst strategy. However, after receiving a “no” from the EU at the end of the second period, the reformers can continue with the domestic route. In this case, regarding per capita consumption, the EU-strategy becomes equivalent to the domestic strategy for $t = 3$ and the following periods. Then the question is whether a sudden stop can increase resistance to the reform process and cease reform appetite of reformers. We will turn to this issue in the following section.

Table 4: Ex-ante Consumption Comparisons within the Reform Strategies ($T = 2$, $k = 0$)^a

	EU probabilities	Domestic probabilities	Result
$t = 1$	No uncertainty	No uncertainty	EU = D
$t = 2$	Some interesting combinations		
	$q_2^{\text{EU}} = 1$	$q_2^{\text{D}1} = 1$	EU = D
	$q_2^{\text{EU}} = 0, q_2^{\text{D}} = 0$	$q_2^{\text{D}1} = 0$	EU = D
	$q_2^{\text{EU}} = 0, q_2^{\text{D}} = 0$	$q_2^{\text{D}1} = 1$	EU?D
$t = 3$	Some interesting combinations		
	$q_2^{\text{EU}} = 1, q_3^{\text{EU}} = 1$	$q_2^{\text{D}1} = 1$	EU > D
	$q_2^{\text{EU}} = 1, q_3^{\text{EU}} = 0$	$q_2^{\text{D}1} = 1$	EU = D
	$q_2^{\text{EU}} = 0, \therefore q_3^{\text{EU}} = 0, q_2^{\text{D}} = 1$	$q_2^{\text{D}1} = 1$	EU = D
	$q_2^{\text{EU}} = 0, \therefore q_3^{\text{EU}} = 0, q_2^{\text{D}} = 0$	$q_2^{\text{D}1} = 1$	EU < D
	$q_2^{\text{EU}} \in (0, 1), q_3^{\text{EU}} \in (0, 1)$	$q_2^{\text{D}1} \in (0, 1)$	EU?D

Note: EU, the EU process; D, domestic process; probabilities are denoted by q .

^a T is the length of the reform process; k is one plus the number of periods needed in order a reform process to change the institutional structure of the economy (see the text).

Two further points deserve emphasis. First, as discussed above, in the EU process, there is a positive probability that the reforms can be completed earlier than the domestic process. In this case, the EU process can dominate the domestic process. In our calculations, we did not take this probability into consideration. Second, the social discount factor is omitted for the sake of simplicity since the main aim is only to make comparisons between the IR-strategies.

4. Political Competition and Reforms

In the previous section, it is demonstrated that governments that implement structural reform programs will, at least in the initial phases of the program, be in a position of asking some sacrifice from the public. In the model of the preceding section, this sacrifice is in the form of a lower per capita consumption. Under certain conditions, for example when there is uncertainty regarding the continuation of the reform process — hence, uncertainty regarding future benefits — as in the presented model future is discounted heavily, such losses can make these programs and the governments that implement them rather unpopular. Such a loss of popularity is a political cost for reformist governments. The magnitude of this cost, to a great degree, depends on the nature of the political process, notably the mode of

political competition. In this section, the political environment of Turkey is simplified into a two-party model and the feasibility of reform in this particular political context is examined.

There are presently two major parties in Turkey: AKP, the party in power and CHP, the main opposition party.⁶ When the coalition possibilities are taken into account, the picture will not drastically change with respect to the EU accession problem even if more political parties are allowed into the scene. After the 2002 elections and during the episode that led to the Turkey's candidacy to EU membership, the major political parties of the Turkish political arena seem to satisfy the following six assumptions:

Assumption 1. Ex ante, both of the political parties are in favor of Turkey's accession to the EU.

Assumption 2. Ex ante, both of the political parties consider all the major economic reforms envisaged in the negotiation period as necessary for Turkey's success in the global economy, irrespective of her membership to the EU.

Assumption 3. Political parties lexicographically order the state they are in power over any state they are not.

Assumption 4. The level of mutual level of trust is too low to make any cooperative effort (including forming a grand coalition) to be feasible.

Assumption 5. Both of the political parties are Wittman-type,⁷ i.e., they are not only interested to be in power but they also have a preference over the actual outcomes of the policies followed.

Assumption 6. The negotiations period is expected to take around a decade, i.e. two election periods. It is highly unlikely that Turkey can squeeze her reforms to a shorter time period.⁸

⁶The paper is finalized in September 2006.

⁷If the political parties are the Wittman-type (Wittman, 1973), i.e. if they have their own preferences over policies, then they can be considered evaluating alternative states according to their utility functions. Such parties then can be considered as taking into account not only the initial phase of the reform but also its aftermath, after suitably discounting it, in devising their strategies. For the discussion of the Downs and Wittman-type political parties and the comparison of the political equilibria they generate under various assumptions, see Roemer (2001).

⁸Under these circumstances the timing of events can be described as the following: the starting time is the 2007 elections. It is assumed that rather technical and passive

Since these assumptions treat both parties symmetrically, let us pick political party A, and examine its behavior. Note that based on the first assumption before the election both of the parties are in favor of EU accession. However, they can change their attitude after having won the election. Now suppose that A wins the election. It can follow the EU-strategy (Strategy 1). Consequently, it may carry Turkey to EU membership (X_{EU+}) or it may fail to do so (X_{EU-}). The second option for the political party A is to follow the PT-strategy (Strategy 2), which makes EU membership infeasible for Turkey. This state is denoted by X_{PT} . The third option is to declare openly a withdrawal from EU membership and launch a domestic reform strategy (Strategy 3), whose outcome is denoted by X_{DR} . Since the political party A is the Wittman-type (Assumption 5), it evaluates these strategies according to its own preference function. Let Y_{ij} is the corresponding outcome of the policies followed when the political party B is in power and ϕ^A and ϕ^B be the preference functions of the political parties A and B, respectively. The outcomes of such evaluations for political party A are given in Table 5 (outcomes for B are similar and not given in the table).⁹

Then the above assumptions imply the following results for the political party A.¹⁰

Since A prefers Turkey's EU membership (Assumption 1), then

$$\phi^A(X_{EU+}) > \phi^A(X_{EU-}) \quad (15)$$

$$\phi^A(X_{EU+}) > \phi^A(X_{PT}) \quad (16)$$

$$\phi^A(X_{EU+}) > \phi^A(X_{DR}) \quad (17)$$

The political party A believes the intrinsic merit of the reforms (Assumption 2).

(footnote continued)

“screening phase” will be completed before the 2007 (first) election. Hence, after the first election, the new government will be in the position of actually starting the negotiations with the EU. At that point the government has to make a policy choice. The EU-reform strategy can only be completed after the second election. That means most of the social costs of implementing such a strategy will be cumulated during the tenure of the existing government, and the social welfare enhancing benefits of the EU, if they can be realized, will be reaped after the second election. Nonetheless, if the ruling government does not follow an EU-endorsed reform program, Turkey will lose its chance to join to the EU.

⁹Since Turkey cannot be a member of the EU without undertaking the EU-strategy, the cells that correspond to these options are left empty.

¹⁰These results are relevant for the political party B as well.

Table 5: Political Party — A's Strategies and Outcomes

	EU-strategy	PT-strategy	Domestic strategy
Turkey \in EU	$\{\varphi^A(X_{EU+}); \varphi^B(Y_{EU+})\}$	—	—
Turkey \notin EU	$\{\varphi^A(X_{EU-}); \varphi^B(Y_{EU-})\}$	$\{\varphi^A(X_{PT}); \varphi^B(Y_{PT})\}$	$\{\varphi^A(X_{DR}); \varphi^B(Y_{DR})\}$

Hence,

$$\varphi^A(X_{EU-}) > \varphi^A(X_{PT}) \quad (18)$$

$$\varphi^A(X_{DR}) > \varphi^A(X_{PT}) \quad (19)$$

The political party A lexicographically prefers a state that it is in power to any state that it is not (Assumption 3):

$$\min_j \{\varphi^A(X_j)\} > \max_j \{\varphi^A(Y_j)\}, \quad j \in \{EU+, EU-, PT, DR\} \quad (20)$$

Therefore, for the sake of simplicity, the following assumption can be made:

$$\varphi^A(Y_j) = \varphi^B(X_j) = 0, \quad j \in \{EU+, EU-, PT, DR\} \quad (21)$$

The political party A's problem in the political competition sphere can be summarized as follows: suppose that A wins the first election and comes to the power. If it launches a reform program, its costs will be borne by those people who will vote in the next (second) election before receiving the benefits of the reform program. As the reform program proceeds, a decrease in the per capita consumption level and uncertainty regarding the attitude of the EU towards Turkey (uncertainty regarding future benefits) in the EU-strategy or uncertainty regarding the continuation of the program in the domestic strategy may lead to a decline in public support to the reform strategy. Such a change in the mood of the people can be incorporated into the above framework as a decrease in q^{EU} and q^D .¹¹ Suppose that voters are rational and base their political choices by looking at their intertemporal welfare. Let the social welfare function introduced in the first section corresponds to the intertemporal welfare of the median voter. The decline in q^{EU} and q^D , at one point, will lead the median voter to support the political party that proposes the PT-strategy. This being

¹¹ On the other hand, reform process increases the uncertainty perceived by the people; consequently, the social time preference being, σ .

the case, under Assumption 3, the challenging political party will not hesitate to launch the PT-strategy to win the (second) election. The ruling political party, on the other hand, under Assumption 4, will expect such a challenge. If this is the case, the ruling political party may refrain from launching reforms, which endangers the chance of radically changing the institutional structure of the economy and increasing future per capita consumption levels. Clearly, such an outcome means an end to the EU journey of Turkey.

This problem can be formulated by a policy choice game between political parties A and B. Suppose that A is in power and implements the EU-strategy and B confines its election campaign on challenging the incumbent within the sphere of IR-policies. Then the political competition will be between two reform programs, none of them offering a higher current welfare.

Let π_{ij}^A (π_{ij}^B) denote the probability that the political party A (B) attributes to its chance of winning the election when it chooses the strategy i whereas the other party prefers the strategy j , ($i, j = 1, 2, 3$). When both parties confine their choices to the EU-endorsed reform programs, the probability that the political party A expects to win the election is $\pi_{11}^A \in (0, 1)$. In this case A expects the following outcome:

$$\pi_{11}^A [q^{\text{EU}} \varphi^A(X_{\text{EU}+}) + (1 - q^{\text{EU}}) \varphi^A(X_{\text{EU}-})] \quad (22)$$

which indicates that with a probability π_{11}^A , A will win the election and continue to implement its reform program. When the program is completed, either Turkey will be a member of the EU with a probability q^{EU} or end up as a non-EU member state that reformed its institutions in line with the EU requirements with a probability $(1 - q^{\text{EU}})$.

Nonetheless, should the political party B choose the PT-strategy, then as shown in the previous section, it will be offering a higher level of current welfare than the alternative IR-strategy. Unless the present value of voters expected future benefits compensates such a difference, the B's program may sound more attractive for the voters and it may win the elections. Let's assume that this is the case. The political party A will evaluate this state by assigning 0.

If A chooses the PT-strategy while the B sticks to the EU-strategy, following the same logic, A will win the elections, and its evaluation of the outcome will be $\varphi^A(X_{\text{PT}})$. Nonetheless, if both parties choose the PT-strategy, the outcome will again be the state X_{PT} . However, in this case, A will evaluate the state considering the probability of winning the elections, i.e. π_{22}^A . The results given above with their counterparts for the political party B are put together in a 3×3 matrix in Table 6.

Table 6: Pay-off Matrix of the Political Competition Game

	B follows EU-endorsed reform strategy	B follows PT-strategy	B follows domestic reform strategy
A follows EU-endorsed reform strategy	$\left\{ \begin{array}{l} \langle \pi_{11}^A [q^{\text{EU}} \varphi^A(X_{\text{EU}+}) + (1 - q^{\text{EU}}) \varphi^A(X_{\text{EU}-})] \rangle; \\ \langle \pi_{11}^B [q^{\text{EU}} \varphi^B(y_{\text{EU}+}) + (1 - q^{\text{EU}}) \varphi^B(y_{\text{EU}-})] \rangle \end{array} \right\}$	$\{(0); \langle \varphi^B(y_{\text{PT}}) \rangle\}$	$\left\{ \begin{array}{l} \langle \pi_{13}^A [q^{\text{EU}} \varphi^A(X_{\text{EU}+}) + (1 - q^{\text{EU}}) \varphi^A(X_{\text{EU}-})] \rangle \\ \langle \pi_{13}^B \varphi^B(y_{\text{DR}}) \rangle \end{array} \right\}$
A follows PT-strategy	$\{\langle \varphi^A(X_{\text{PT}}) \rangle; (0)\}$	$\{\langle \pi_{22}^A \varphi^A(X_{\text{PT}}) \rangle; \langle \pi_{22}^B \varphi^B(y_{\text{PT}}) \rangle\}$	$\{\langle \varphi^A(X_{\text{PT}}) \rangle; (0)\}$
A follows domestic reform strategy	$\left\{ \begin{array}{l} \langle \pi_{31}^A \varphi^A(X_{\text{DR}}) \rangle \\ \langle \pi_{31}^B [q^{\text{EU}} \varphi^B(y_{\text{EU}+}) + (1 - q^{\text{EU}}) \varphi^B(y_{\text{EU}-})] \rangle \end{array} \right\}$	$\{(0); \langle \varphi^B(y_{\text{PT}}) \rangle\}$	$\{\langle \pi_{33}^A \varphi^A(X_{\text{DR}}) \rangle; \langle \pi_{33}^B \varphi^B(y_{\text{DR}}) \rangle\}$

From the assumptions made above it is clear that for the political party A

$$\varphi^A(X_{PT}) > \pi_{22}^A \varphi^A(X_{PT}), \quad \text{since } \pi_{22}^A < 1 \quad (23)$$

On the other hand, the relation between $\pi_{11}^A [q^{EU} \varphi^A(X_{EU+}) + (1 - q^{EU}) \varphi^A(X_{EU-})]$ and $\varphi^A(X_{PT})$ depends on both the election winning probability of the political party A and the difference in its evaluation of the outcomes of the EU- and PT-strategies. If the probability of winning the election for the A, when both parties follow their IR-strategies, is

$$\pi_{11}^A < \frac{\varphi^A(X_{PT})}{[q^{EU} \varphi^A(X_{EU+}) + (1 - q^{EU}) \varphi^A(X_{EU-})]} \quad (24)$$

Equations (21) and (22) together will imply that the political party A will choose the PT-strategy. Notice that this condition is more likely to be satisfied when A does not have a strong preference in favor of following an IR-strategy. Since the same line of reasoning can be applied to B, under these conditions, the above game has a unique Nash equilibrium, at which both parties chose the PT-strategy.

This prisoner's-dilemma type of result draws attention to a political difficulty that Turkey may face in carrying out the necessary reforms for EU accession. Ex ante both people and political parties may be sympathetic to the idea of undertaking reforms. However, as implementation starts, the costs of reforms coupled with the noises that may stem from many sources (e.g. from some EU members) may change electorate's behavior. Under these circumstances, political parties may opt for the PT-strategy, simply by postponing socially costly reforms. This will certainly endanger Turkey's membership to the EU.¹²

What kind of solutions can one seek? Obviously, if the net return of the reforms is incomparably high vis-à-vis keeping the status-quo intact, the relative magnitudes in the above matrix will change and in that case the Nash equilibrium will be the state where both parties choose the EU-strategy. One way of achieving this result is by reducing the social cost of reforms through extensive external support. When the size of the country and the present world order are taken into account, such an outcome is highly unlikely. Second, political parties may change their over-jealous attitude toward each other and seek for a cooperative solution. Such a strategy was

¹²Notice that this problem remains in effect when the EU-endorsed reforms are substituted with the domestic reforms. Using south-east corner of Table 5 as pivot, the above arguments can be repeated.

successfully implemented in Spain during its EU accession. This is certainly not impossible, although unfortunately not very likely in the Turkish context. The last possibility is to reduce the advantage of the PT-strategy. That can be achieved if political parties launch effective threats against each other by launching populist programs if the other one diverges from its own reform program. Notice that such a strategy is effective only if

- (i) The political parties take each others' reform programs seriously and therefore change their ordering of feasible states by attributing higher values to successful reform programs implemented by their competitors over their own PT-strategies. This implies Assumptions 1 and 2 should hold not only *ex ante* but also *ex post*. Continuation of the negotiations with the EU, in this context, is critically important since it enhances the public awareness and makes all the political parties explicitly accountable.
- (ii) None of the political parties has a comfortable and unbreakable majority in the parliament. If that is the case, such a party may ignore the threat and may not hesitate to implement the PT-strategy since whatever the opposition offers is infeasible. The reasoning behind this assertion is as follows: political parties that compete for getting the support of the median voter have to address different interest groups with varying expectations. In that sense, such political parties can be treated as coalitions, which are expected to reflect in the composition of their deputies. On the other hand, an economic program is implemented by taking a sequence of decisions that, eventually, requires the approval of the parliament. Suppose now that the opposition party threatens the ruling party by competing with it by launching a PT-strategy (or even a populist one) if it diverges from following its own IR-strategy. Since the implementation of an economic program requires a long sequence of decisions to be taken, the ruling party is likely to face with such a threat at any moment of time. In other words, the relation between the ruling and opposition parties is akin to a repeated game.

Such a threat, however, can only be effective, if the opposition party is in the position of establishing a winning coalition by recruiting some members of the party in the power. Otherwise, the ruling party may easily ignore the threat and continue with the PT-program, without the fear of being challenged. Therefore, an agreement between the political parties on not challenging ruling party as long as it sticks to the IR program, will be binding only if the coalition that the ruling party represents is not strong.

Although the above discussion sheds some light on the conditions under which political parties will stick to the IR-strategy, it fails to guarantee that they will, indeed, chose the EU-strategy. From [Table 5](#), it can be seen that

when $\pi_{ij}s$ are very close, then the EU-endorsed reforms will be A's dominant reform strategy if

$$q^{\text{EU}} > \frac{\varphi^{\text{A}}(X_{\text{DR}}) - \varphi^{\text{A}}(X_{\text{EU-}})}{\varphi^{\text{A}}(X_{\text{EU+}}) - \varphi^{\text{A}}(X_{\text{DR}})} \quad (25)$$

Notice that, for a given q^{EU} , this condition is more likely to be satisfied, if the political party A does not expect much benefit from pursuing domestic reforms. On the contrary, if the political parties evaluate the outcomes of a domestic reform close to the EU-endorsed ones, the former may indeed become a dominant strategy.

5. Conclusion

The so-called “EU’s absorption capacity” and the accompanying “too big to absorb” arguments for Turkey make the Turkish negotiation process an interesting case to analyze from the perspective of political economy. Concerns of the EU countries on Turkey’s membership masked by the EU’s absorption capacity phrase imply that even after successfully reforming her economy, Turkey may not end up as a member of the EU. Moreover, due to the same reason, the negotiation process can abruptly come to an end. The basic question that we ask in the paper is why Turkey should continue with the EU negotiation process instead of reforming the economy according to its own agenda (domestic reform process).

By making use of a simple model, we compared welfare implications of three strategies: the two reform strategies — the EU-strategy and domestic strategy — and keeping the status-quo. Reform is defined as the tax-financed government expenditures aimed at changing the institutional structure of the economy. Under both strategies, we assumed that the targeted institutional structure is same. Welfare comparisons are sensitive to the length of the reform process and the time lag necessary for the government expenditures to change the institutional structure of the economy.

The important result we obtained is that if there is no uncertainty regarding EU membership, the EU-strategy clearly dominates the other two. However, when it is a widespread expectation that the negotiation process will stop abruptly, just the opposite is likely. Furthermore, if a negative answer from the EU in the midst of the reform process increases resistance to all kinds of reform processes, and ceases reform appetite of reformers, then the EU process becomes the worst one. Under these conditions, one becomes better off by following the domestic process. Even keeping the status-quo intact increases welfare of economic agents relative to the EU process.

Assuming a rather short (two-period) reform process and only one period of efficiency lag, we showed that the status-quo dominates both the reform strategies in the first period. We demonstrated that an increase in the efficiency lag will also increase the number of periods in which the status-quo dominates the reform processes. This means that at least in the initial phases of the reform process governments will be in a position of asking sacrifice from the public. Moreover, given the uncertainty surrounded around the so-called EU's absorption capacity of Turkey, the future reward of this sacrifice is not certain to obtain. We analyzed the feasibility of reform in a two-party policy choice game. Under certain conditions specified in the paper, we showed that the game has a unique Nash equilibrium at which both parties choose not to change the status-quo.

One way of preventing such an outcome is to reduce the social cost of reforms through a significant amount of external support. The second way-out of this prisoner's dilemma is to seek for a cooperative solution as in the Spain's accession to the EU. The third solution to this problem is to reduce the advantage of the PT-strategy. We further showed that if the political parties evaluate the outcomes of the domestic reform process close to the EU process, following the domestic route may become a dominant strategy.

References

- Dewatripont, M. and Roland, G. (1995). The Design of Reform Packages under Uncertainty. *The American Economic Review*, 85, 1207–1223.
- Fernandez, R. and Rodrik, D. (1991). Resistance to Reform: Status Quo Bias in the Presence of Individual-Specific Uncertainty. *The American Economic View*, 81, 1146–1155.
- Iyigun, M. and Rodrik, D. (2004). *On the Efficiency of Reforms-Policy Tinkering, Institutional Change and Entrepreneurship*. Center for Economic Policy Research Discussion Paper Series No. 4399, June.
- North, C.D. (1990). *Institutions, Institutional Change and Economic Performance*, Cambridge University Press, New York.
- Roemer, E.J. (2001). *Political Competition — Theory and Applications*, Harvard University Press, Cambridge, MA.
- Wei, S.-J. (1997). Gradualism Versus Big Bang: Speed and Sustainability of Reforms. *Canadian Journal of Economics*, 30, 1234–1247.
- Wittman, D. (1973). Parties as Utility Maximizers. *American Political Science Review*, 67, 180–189.
- Wyplosz, C. (1993). On the Economics and Politics of Economic Transformation. *European Economic Review*, 37, 379–386.

Chapter 5

A Spatial Theory Approach to the Study of Political Spaces

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Abstract

This paper presents an introduction to the application of a method based on the spatial theory electoral competition to the study of the evolution of ideological positions of candidates and parties in any democracy. The political system defines the scope of the economics system while taking resources from the economy in order to run campaigns and produce the types of compromises that are required of a stable economic and political system. Politics involves group choices as well as individual choices. Emotions are as important in politics as self-interest. Political and social games are so complex that the assumption of common knowledge that all actors know all the states of nature in the games and the conditional joint density of the states is grossly false. Since politics is highly complex, we must simplify our analysis to obtain useful insights about the political space of a country. The spatial theory of electoral competition serves is a useful theory that ties analysis of public opinion data with insights into the dynamics of a democracy.

1. Introduction

This paper presents an introduction to the application of a method based on the spatial theory electoral competition to the study of the evolution of ideological positions of candidates and parties in any democracy. The study of politics is the hardest task in the social sciences. The political system defines the scope of the economics system while taking resources from the economy in order to run campaigns and produce the types of compromises that are required of a stable economic and political system. Politics involves

group choices as well as individual choices. Emotions are as important in politics as self-interest.

Political and social games are so complex that the assumption of common knowledge that all actors know all the states of nature in the games and the conditional joint density of the states is grossly false. The future is unknowable and the fundamental uncertainties in politics are as much a part of political life as they are in economics, sociology, and war. Since politics is highly complex, we must simplify our analysis to obtain useful insights about the political space of a country. The art of research involves creation of simplifications that provide insights based on evidence and observations.

Research about political systems is a remote academic subject for those engaged in domestic and international business and finance. Most corporate executives pay little attention to electoral politics in the countries they do business in other than reading papers such as the *Financial Times* and the *Wall Street Journal* and magazines such as the *Economist*. Firms deal chiefly with state and national politics in the United States by employing lobbyists who lobby trade associations and interest groups that the firm belongs to. The lobbying is aimed at key legislators and staff members of legislative committees who deal with the issues of concern to the firm. In some cases, a firm's representative will present their case on an important issue to officials of a government regulatory agency that impacts the firm's industry. Dealing with politics affecting international business in other democracies can be confusing and difficult for American business leaders, even with the help of US embassy staff in the country of interest.

Some firms will on occasion employ political scientists to analyze the political risk in a country where the firm either has investments or intends to invest. These political risk consultants are mostly academics who know the language(s) of the country and who have spent some time in the country. In some cases, they have high-level contacts in the government, bureaucracy, or military, but usually their contacts are other professors and personal friends with no valuable influence. These academics base their analysis on what they read in the country's papers, on what their friends tell them, and on their reading of the history of the country. Such analysis is rarely based on public opinion data about the country's politicians and parties, on data on public perceptions and attitudes toward issues that link with investment concerns, or even on systematically collected data on opinions of influential citizens of the country. Such unscientific analysis is more often wrong than correct.

Even if analysis is based on public opinion data, the answers to the questions used in the survey may not yield insights to the future outcome of an election. It is easy to make predictions from vote intention questions obtained in a survey taken just before a two-candidate or two-party race. Predicting the output of a multiparty parliamentary election is much harder from vote intention data since some voters may decide to vote strategically

based upon their assessment of the final outcome given poll results presented in the media. In some cases, a survey is either poorly administered or is deliberately biased to influence voter decisions.

There is at least one alternative to journalistic “intelligence” or voting intention polling. This alternative is based upon analysis of public and elite opinion data using statistical methods that are derived from a developed scientific theory of electoral competition. This theory is called *the spatial theory of electoral competition*. A coherent exposition of the basic theory is given by Enelow and Hinich (1984, 1990). A significant expansion of this theory is presented by Hinich and Munger (1994). A simple exposition of the theory is given by Hinich and Munger (1997, 1999). A simplified survey of spatial theory and its implications for shaping national and international technology policies is presented in the following two sections.

2. Spatial Theory of Electoral Competition

Parties and politicians in Western democracies are commonly compared as if they are points on a left — right dimension. We seem to understand one another about the meaning of political labels such as “left”, “right”, “left of center”, “right of center”, and “center”, but a scientific approach to this representation requires a theory that links political outcomes with positions on a latent one- or two-dimensional political space. The term “latent” means that the political spatial representation cannot be observed but can be measured from data. Three related central questions that have to be addressed to make such representations and have a proven ability to make predictions about political outcomes are: (1) what is the meaning of this dimension? (2) what are the connections between positions in this latent space and the positions that parties and candidates take on issues that are of concern to individuals and interest groups? and (3) how do we measure the space and the linkages?

Let me begin my discussion of the meaning of a political space by focusing on the inherent uncertainty in legislative politics for multiparty democracies. Politicians want to be as free as possible to make deals to enact policies. A party is a collection of politicians who want political power. They represent different interests but there is sufficient commonality among the interests to form a party. Politicians have to get elected and they know that they must justify to their potential supporters why they should be elected to rule. Compromising interests is essential to obtaining majorities to enact legislation. Making deals is the essence of politics.

Politicians have to raise money to get elected. In the United States, political money is raised by individual politicians as well as by the Republican

and Democrat parties, but political parties are the major players in European democracies.

In order to get money, the politicians have to make explicit or implicit promises to interest groups about how they will deal with issues that are of importance to the groups. Contributors want commitments from the parties and politicians they support but they understand that the commitments may be forfeited in order to make policies. Deception plays a crucial role in politics and thus the contributors have to find ways to decide which politicians are most likely to fight for their causes.

The same deception problem also holds for voters. Whom should they believe when they know that politicians will lie to them to get their vote?

Most voters process information about politicians via a cognitive mechanism attuned to the pattern they perceive between past party actions and issue outcomes. Since the true relationship between party actions and issue outcomes is noisy and complex, a low-dimensional mental model develops in the society. This model is the political space.

The status quo of present government policies plays a central role in the evolution of the political space. Politicians in the governing coalition are quick to tell their supporting interest groups about how they helped enact the policies that are favorable for these groups. They justify their support for those policies that are unfavorable to their supporters in terms of political "realities".

Parties outside the ruling coalition attack the policies of the status quo that are unfavorable to their supporters. They also attack the leadership of the ruling coalition on various moral and nationalistic issues. Left parties want to move the status quo by advocating new and untried policies that are unsullied with the reality of political deals. The right parties advocate alternatives that are idealized versions of the politics of the "good old days".

Consider the evolution of the left-right political space of the United Kingdom. The three major parties are the Labor Party, the Conservatives, and the Liberal Democrats. The Labor Party is no longer a traditional socialist party. The Conservative Party is no longer the party of the commercial and aristocratic classes, and the Liberal Democrats are a centrist party that has some weak historic connections with old Liberal Party. Various analyses of public opinion data have Labor to be a bit left of center with the Liberal Democrats nearer the center and the Tories to the right of center. The distribution of voter positions has moved to the right over time as the UK economy has deindustrialized.

During most of the 19th century, the political space was dominated by the political conflicts between the Liberal Party, whose main financial supporters were the industrialists, and the Conservatives, whose main supporters were the landed gentry. The Liberals supported free trade and were internationalists. They wanted peace and prosperity through industry and trade.

In the early 1800s, the Industrial Revolution almost died before it got started. It was not from lack of capital or new technology. It was government. It seems that French and German farmers could produce corn and other products at lower cost than the English farm manors. So the English landed gentry got Parliament to pass trade tariffs that protected the higher prices they received for their farm products.

Workers at factories could not make enough to pay for their bread. Their employers could not raise their wages because they could not get enough money for their goods because French and German farmers could not sell their grain and afford to buy English-made clothes. Thus, the new wealthy class of manufacturers and their accountant and lawyers were hurt by these tariffs on imported foodstuffs.

A significant number of the industrial entrepreneurs were Presbyterians or belonged to other non-Church of England Protestant faiths. Up until 1854, unless you were an Anglican it was almost impossible to attend either Cambridge or Oxford, and it was not until 1871 that legislation was passed making all offices, and professorships at Cambridge, Oxford, and Durham (except for certain clerical and theological positions), open to anyone who was not an Anglican. Professors at Cambridge and Oxford had to be ordained ministers of the Established Church. Thus there was a nonviolent religious conflict in the politics of those times.

The Labor Party emerged from the organization of trade unions to improve pay and working conditions in industries of the Industrial Revolution. They adopted the ideology of the Marxists but operated in the political space by forming a party supported by the unions. They appealed to the middle class using moral arguments about fairness and Englishness. The far left members of the English Marxists were internationalists but the political element behind Labor knew that they had to project strong English nationalism.

The Conservatives became less concerned with agrarian issues and absorbed much of the Liberal ideology mixed with an agenda that supported a strong British Empire. Remember that the country was called Great Britain.

This rough take of the historical development of UK politics is meant to provide some intuition about how economic development and international affairs shape the political space of a democracy.

3. Linkages between the Political Space and Issues

The political space is a commonly held simplification of the complex network of government policies and political issues. Most citizens pay little attention to politics since they have next to no influence on what their government does. The vote totals of an election can result in a change of

government that will result in significant policy changes, but usually a change of government has little or no perceived impact on people's lives.

But political interest groups have a vested interest in keeping in close touch with the committees in the legislature that affect the interest group as well as with the executive branch. A political interest group that has a business base also lobbies the bureaucracies that regulate the actions of the businesses that belong to the group. In some cases, these interest groups attempt to influence public opinion by running advertisements in newspapers and on television. The social and economic networks in a democracy help to form a link between the ideological positions of parties in the political space and issues that are relevant for voters.

The mathematical model of this linkage in the spatial theory of electoral politics stipulates that there is a linear relationship between the points in the latent political space and positions in the space of issues that voters have preferences on. There may be several at different levels of complexity for a given individual.

Suppose that all voters have quadratic utility functions whose maximum is at their ideal positions in the issue space. To simplify exposition, suppose that there are only two important issues. Voter v 's quadratic utility for party p 's policy position θ_p in the policy space is of the form

$$U_v(\theta_p, \mathbf{x}_v) = \beta c_{vp} - a_{v11}(\theta_1 - x_{v1})^2 - 2a_{v12}(\theta_1 - x_{v1})(\theta_2 - x_{v2}) - a_{v22}(\theta_2 - x_{v2})^2$$

where $\mathbf{x}_v = (x_{v1}, x_{v2})$ is voter v 's ideal policy preferences and $a_{v11} > 0$, $a_{v22} > 0$, and $a_{v12} < \sqrt{a_{v11}a_{v22}}$ are the parameters of the v 's preference. The term c_{vp} is voter v assessment of the competence and integrity of party p that has the power to attempt to enact policy θ_p . The parameter β is the weighting of the candidate competence term relative to the weighted Euclidean distance term. Voter v prefers party p to party q if and only if $U_v(\theta_p, \mathbf{x}_v) > U_v(\theta_q, \mathbf{x}_v)$.

This quadratic preference model for voter v is shown in Figure 1 for a two-dimensional issue space as a top-down view of an elliptical hill. The point (x_{v1}, x_{v2}) is the maximum of voter v 's utility function for both issues. For expository purposes, the issue on the horizontal axis is the percent duty on imported grain in 19th-century Great Britain before the free trade period. The issue on the vertical axis is the percent of the government budget devoted to the Royal Navy. The ideal position for voter v on the duty issue is x_{v1} and the ideal position for the navy issue is x_{v2} . The ellipse is a level surface of the elliptical hill. In utility theory terms, it is called an indifference contour since voter v is indifferent between any point on the level set. Note that a point is a pair of positions on the two issues.

The orientation of the major axis of the ellipse determines the type of tradeoff voter v makes between the two issues. Since the ellipse's major axis

Figure 1: Negative Complimentary Preference

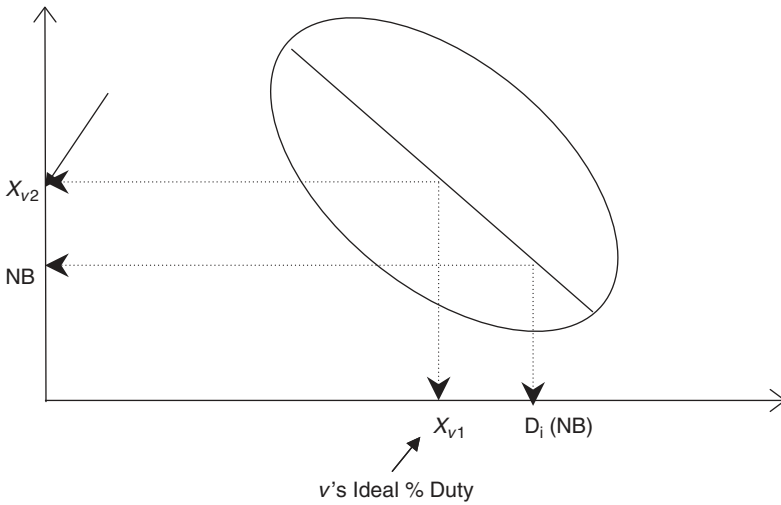
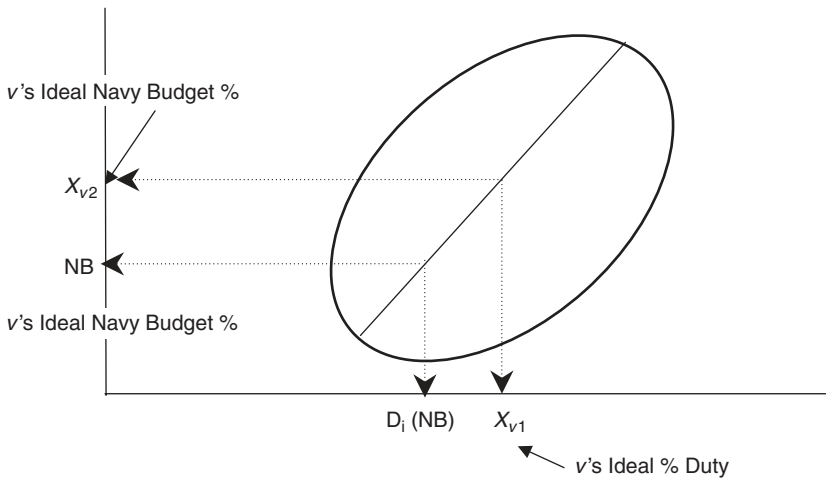
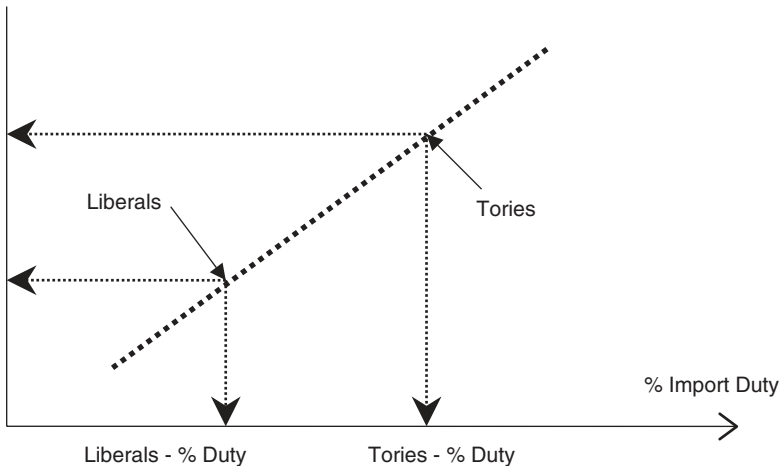


Figure 2: Positive Complimentary Preference



has a Northwest–Southeast orientation if the government sets the navy budget percent at the value NB less than his ideal position x_{v2} then the voter prefers a duty level D_i that is larger than his most ideal percentage x_{v1} .

In Figure 2, the major axis of the voter v 's elliptical indifference contour has a Northeast–Southwest orientation then if the government sets the navy budget at NB . Then voter v prefers a duty percentage that is less than x_{v1} .

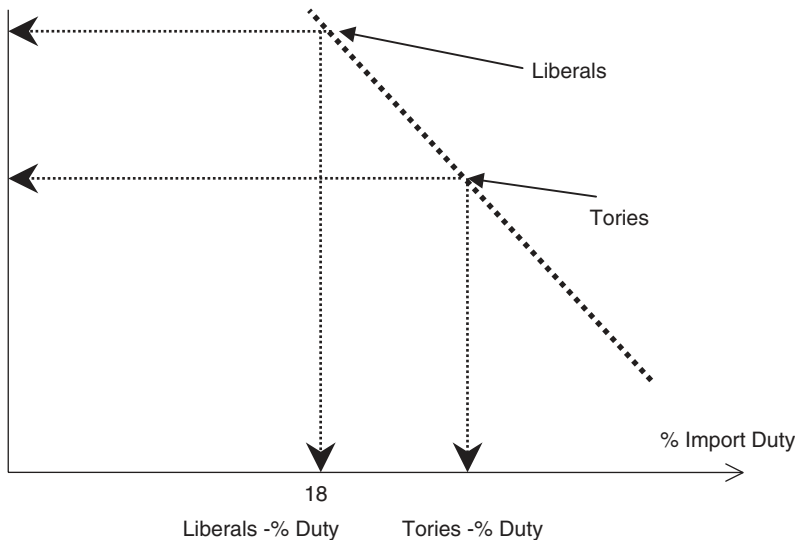
Figure 3: An Example of an Ideological Linkage with the Issues

An example of a linear linkage between a one-dimensional political space and the two-dimensional issue space is shown in Figure 3. The thick line at about a 45-degree angle is the image of the latent political ideology in the two-issue space. The Conservatives want more funds spent on the navy as shown and they want to keep imported grain duties at the present level, whereas the Liberals want to reduce the navy's share of the budget and reduce grain import duties. If the Liberals move to the left on the political dimension then they would want a larger reduction in the navy budget and the elimination of agricultural import duties. This image line is the society's shared perception of how a party's ideological position translates into government policies in the issue space if a party is elected.

If there was a party to the right of the Conservatives, then this party would want to increase the naval budget share above the Tory's level and they would want to increase the agricultural import duties.

The angle of the linkage line in the issue space determines how much a unit shift on the political ideological line translates into increases or decreases in the output levels in the issue space. Figure 4 presents another orientation of the linkage line. These simple examples provide some insight about the theory of the linkage between the latent ideological space and real political issues.

Before proceeding with a presentation of a statistical approach to using opinion questionnaire data to systematically learn about the spaces, recall the perceived party or candidate competency term c_{ip} in the citizen's utility. For many societies, a citizen's evaluation of a party's leadership dominates the policy and ideological preference of that citizen in voting or supporting

Figure 4: Another Example of an Ideological Linkage with the Issues

a party. Thus any empirical method for studying political spaces must be able to incorporate party competence in the choice model. The quadratic plus constant model above does just this. Let us now address the methodology for determining the political space and its linkage with issues using opinion data from both mass publics and major decision makers.

4. Empirical Determination of a Political Space

A linear linkage between policy spaces and the latent political space for quadratic preferences results in an induced quadratic preference for parties located in the political space. This is true for a two-dimensional political space as well as a one-dimensional political space. This important mathematical result makes it possible to determine the political space from public opinion data obtained by using a questionnaire design that is tailored to the spatial theory of electoral competition. The statistical method called *MAP* developed by Cahoon and Hinich (1976) and modified by Hinich (2005). This statistical tool allows a user to learn the nature of the political space and its linkage with critical issues as well as to track changes of the space over time. We now have a theory and a method for studying political risk in a rigorous scientific manner.

The induced preference model in the political space for each voter is also a quadratic model with a party competence term. Chapter 4 of Enelow and

Hinich (1984) presents the algebraic details of the inheritance of quadratic preferences in the low-dimensional space. Assuming that the political space is one-dimensional, voter v 's induced utility for party p 's ideological position π_p in the political space is $U_v(\pi_p, \mathbf{x}_v) = \beta c_{vp} - (\pi_p - y_v)^2$ where y_v is v 's induced ideal position in the policy space. Note that the policy space may have more than one dimension.

The Enelow and Hinich (1984) method for determining the political space uses party score data from a group of respondents who are representative of the politically active citizens in a society. Each respondent is asked to grade a set of parties and their leaders using the grade scale of the country, such as 1–7 for Chile. The respondents do not have to be a random sample of the voters since the purpose of the exercise is to determine the political space and not predict an election, but the party preferences of the respondents must span the political space. For example, if the space is the standard one-dimensional European left-right space then the respondents must range from the extreme left to the extreme right.

The respondents are also asked to score the parties and politicians on issues. The wording of the issue questions is very important since the respondents must recognize the issue in each question. It is all too easy to project the political conceptions of the author of the questionnaire used in the survey.

A spatial analysis of a survey of Turkish voters taken on October before the national election in 2002 provides an example of what insight the spatial methodology can provide. The results are presented in Çarkoğlu and Hinich (2006).

The important results from this study of the survey are as follows: (1) the Turkish electorate has not moved to accept an Islamic state and has remained as centrist as they were in the Çarkoğlu and Hinich study of a 2001 survey, (2) there exists a strong preference among the electorate for joining the EU, and (3) the AK Party won because the centrist parties lost credibility while the AK Party gained credibility for moving Turkey forward into the 21st century. The EU support is obvious from the raw data but the other two results are revealed by the spatial analysis technology and are not at all obvious from the data.

The implications of these findings for firms who are contemplating investments in Turkey are that as long as the AK Party tracks Turkish public opinion, the economic and social reforms pushed through by the previous ruling coalition of centrist parties will remain in place and will probably be strengthened.

Since I distribute MAP to anyone free of charge, any firm can commission their own survey and make their analysis to track the spatial representation of public opinion and the opinions of the major players in any open national political game. The cost of a national survey is relatively inexpensive compared to the political risk cost of a significant investment in a country.

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References

- Cahoon, L. and Hinich, M.J. (1976). A Method for Locating Targets Using Range Only. *IEEE Transactions on Information Theory*, 22(2), 217–225.
- Çarkoğlu, A. and Hinich, M.J. (2006). A Spatial Analysis of Turkish Party Preferences. *Electoral Studies*, 25(2), 369–392.
- Enelow, J. and Hinich, M.J. (1984). *The Spatial Theory of Voting: An Introduction*, Cambridge University Press, New York.
- Enelow, J. and Hinich, M.J. (eds). (1990). *Advances in the Spatial Theory of Voting*, Cambridge University Press, New York.
- Hinich, M.J. (2005). A New Statistical Multidimensional Unfolding Method. *Communication in Statistics*, 34, 2299–2310.
- Hinich, M.J. and Munger, M.C. (1994). *Ideology and the Theory of Political Choice*, University of Michigan Press, Ann Arbor.
- Hinich, M.J. and Munger, M.C. (1997). *Analytical Politics*, Cambridge University Press, New York.
- Hinich, M.J. and Munger, M.C. (1999). *Empirical Studies in Comparative Politics*, Kluwer Academic Publishers, Boston.

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Chapter 6

Proximity versus Directional Models of Voting: Different Concepts but One Theory[☆]

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Abstract

Encouraged by the ongoing dispute among scholars as to whether directional or proximity models provide the better explanation of voting behavior, this paper derives a unified model of voting from incorporating voters' perception of postelection bargaining. In contrast to existing unified voting models, our model offers a theoretical explanation for observed empirical variations of the relative weight of the proximity component based on three factors: (i) formal and informal institutional settings of the political system, e.g. election system and legislative organization; (ii) specific party characteristics, i.e. party size, discipline and extremism; and (iii) the specific social organization of voters in groups and networks. Moreover, our theory contributes to the literature resolving the paradox of not voting via conceptualizing voting as a socially embedded action. Using German election data, we are able to provide promising empirical evidence in support of our theory. However, further research is needed in this area. In particular, a more comprehensive formal

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analysis of voters' perception of postelection legislative bargaining would be desirable.

1. Introduction

An important body of political science research is dedicated to the question of how voters choose between parties or candidates in an election. The most prominent theory of voter behavior is the spatial theory of voting that was first developed by Downs (1957), and more fully formalized by Davis et al. (1970) and Enelow and Hinich (1984). The basic idea of spatial theory is that the choice of a party is driven by the location of the party and the voter in a multidimensional policy issue space. From a rational choice perspective choices are derived from maximization of voters' individual utility functions representing the evaluation of various parties. However, formal spatial models can analogously be derived in the framework of cognitive models used in psychology theory, i.e. voters' choices of parties are determined by voters' emotional responses to symbols like positions taken on specific policy issues. However, within the spatial theory of voting there are two different approaches, namely the proximity and the directional model. Following Downs (1957) or Coombs (1964), the proximity model assumes that voters vote for candidates who have platforms that are close to their own ideal points. In contrast, the directional model suggested by Matthews (1979) or alternatively by Rabinowitz and Macdonald (1989) implies that voters vote for candidates who are most likely to change policy outcomes in a direction they prefer. Although both approaches contributed significantly to our understanding of voting behavior, both have also been heavily criticized on theoretical and empirical grounds. In particular, there is an ongoing dispute among scholars of directional models and proximity models, respectively, where both sides claim that their model fits observed voter behavior better than the other (for example, empirical support for the directional model is provided by Adams and Merrill III (1999), Rabinowitz and Macdonald (1989), while Enelow and Hinich (1989) provide empirical support for the proximity model). Moreover, proximity and directional models result in different implications regarding party behavior. Following the proximity model parties will choose platforms close to the center of their electorate. In particular, corresponding to the well-known Median Voter Theorem parties competing for the same electorate converge to the median voter position. In contrast, assuming a directional model of voter choice parties take different and extreme positions contradicting the Median Voter Theorem. In detail, assuming a two-party competition and a one-dimensional policy space it follows from the directional model that

competing parties tend to take opposite positions of minus and plus infinity. This rather unrealistic implication induced Rabinowitz and Macdonald to revise their directional approach and introduce exogenously a region of acceptability (see Rabinowitz and Macdonald (1989) or Merrill and Grofman (1999)). However, empirically both implications were not fully supported, since parties do neither converge to centrist policy platforms nor diverge to different extreme policy positions (see Merrill and Grofman, 1999). Driven by the empirical finding that both conceptions, the proximity and the directional model, play significant roles in voter choice and hence in the positioning of candidates and parties (Merrill and Grofman, 1999, p. 37), some authors suggest a unified model of voting corresponding to a linear combination of a proximity and directional model (see Merrill and Grofman, 1999; Kedar, 2003; Iversen, 1994). Although the different authors follow slightly different model strategies in essence they all argue that the directional voting corresponds to an instrumental voting, while the proximity component corresponds to an expressive voting. For example, Iversen (1994) introduced a unified model adding a proximity constraint to Rabinowitz and Macdonald's directional model. Based on Iversen, Kedar (2003) nicely developed the idea of expressive and instrumental voting. In particular, Kedar claimed that voters' interest in policy outcomes corresponds to the directional model of voting, while voters' interest in being represented corresponds to the proximity model. Beside Kedar (2003), also other studies hint at the idea that voting is policy-oriented. For example, Lacy and Paolino (1998) put forward a discounting hypothesis in the American case, claiming that in separation of power systems voters differentiate between candidate platforms and policy outcomes. Analogously, Grofman (1985) proposes a discounting model in which voters evaluate potential success of parties in implementing changes from the status quo in their preferred direction. Later, Merrill and Grofman showed that under specific conditions the discounting model corresponds to a unified model comprising a proximity and directional component (Merrill and Grofman, 1999, p. 48, footnote 10). However, Merrill and Grofman only formally proved this identity, while they left teasing out the distinction between these two models as an unanswered puzzle (Merrill and Grofman, 1999, p. 167). In particular, Grofman (1985) did not explicitly relate his discounting model to a model of political decision-making. Moreover, although Kedar provides many additional insights into the theoretical interpretation of proximity, directional and unified models of voting, she still treats proximity and direction as two distinct aspects of voting which she exogenously unifies to a common model. In particular, Kedar's unified model diverges from its own theoretical premises to follow the original work of Downs who on theoretical accounts of voting takes spatial voting to mean voting over

policy outcomes (Kedar, 2003, p. 6).¹ Therefore, although there exists some empirical evidence supporting the unified model as the best model of voter behavior (see Merrill and Grofman, 1999; Kedar, 2003), there still does not exist a comprehensive theory from which the unified model can be derived. In particular, different empirical estimations result in different relative weights of the proximity and directional model (see, for example, Iversen, 1994; Merrill and Grofman, 1999; Kedar, 2003) and it is unclear which factors determine these observed differences. On the other hand, to escape from the criticism of pure curve fitting it is important to derive a theory that provides an explanation for the observed variation of the relative importance of proximity and directional models. For example, to what extent does the organization of mass elections, e.g. electorate system, or the organization of legislative decision-making, e.g. legislative decision-making rule, explain the change in voters' perception of parties. This paper aims to close this gap by providing a theory that allows the derivation of a unified model of voting directly from voters' interest in policy outcomes, i.e. from instrumental voting. In particular, we will show that our approach not only summarizes main findings of existing unified models, but enables a consistent theoretical derivation of the relative weights of the proximity and the directional model that also offers an institutional explanation for observed empirical variations of these weights. In detail, we formally demonstrate that the expected utility gain derived from voting for a specific party can be represented by a unified model corresponding to the weighted sum of a proximity and directional model. The relative weight of the proximity component depends on a voter's belief formation regarding the impact of her vote on policy outcome. It follows from our model that the relative weights of the proximity component depend on specific formal and informal institutions of the political system, e.g. the election system and the organization of legislature, as well as on specific party characteristics like party discipline, size or extremism, and specific social organization of voters in social groups and networks. Beyond this, our theory contributes to the body of literature resolving the paradox of not voting via conceptualizing voting as a socially embedded action. The remainder of the paper is organized as follows. In Section 2, we derive our theoretical model. In Section 3, we provide some empirical evidence for our model derived from empirical

¹ Note that in a two party setup where the winner can implement her preferred policy, the final policy outcome is identical to the policy platform of the elected party. Therefore, voting over policy outcomes results in the same party choices as voting over party platforms. Interestingly, later work generalizing Downs original model to a multiparty, multi-issue setup, e.g. Enelow and Hinich (1984), focuses on voting over platforms neglecting voting over policy outcomes as the original conception of Downs.

estimations provided in the literature as well as from own empirical application to the German elections in 2002. Section 4 summarizes our main conclusions and discusses future research opportunities.

2. Theoretical Model

2.1 Policy-Oriented Voting and the Representation of Voters' Instrumental Preferences

Following Downs (1957), we assume that voters are interested in policy outcomes and hence vote policy-oriented. Let z denote the multidimensional policy outcome a voter observes, then voters' utility $U(z)$ is defined by the following separable weighted Euclidian utility function (see Enelow and Hinich, 1984, p. 18):

$$U_i(z) = - \sum_j \mu_{ij} (Y_{ij} - z_j)^2 \quad (1)$$

The question now is how voters perceive policy outcomes. In contrast to the traditional assumption of Downs, we assume that policies are not solely determined by the elected majority party (government), but collectively by all elected parties or members of parliament according to the following mean voter decision rule (see Hinich, 1978; Caplin and Nelbuff, 1991; Pappi and Henning, 1998; Henning, 2000, 2002):

$$z = \sum_j C_j x_j \quad \text{with} \quad \sum_j C_j = 1 \quad (2)$$

where x_j denotes the ideal position and C_j weight of a political agent j . According to the mean voter decision rule different agents can have different weights, where the relative weight corresponds to the political power of an agent. Intuitively, the mean voter rule assumes that in a democracy the final policy outcome is a compromise between various political agents engaged in political decision-making according to the constitution. Formally, new development in political exchange theory provides a theoretical model of legislative decision-making that derives a mean voter decision rule from a modified noncooperative legislative bargaining model of the Baron/Ferejohn type (Henning, 2002). Of course, the conceptualization of political power is crucial for the assessment of the influence of an individual vote on political power and hence on policy outcomes. We postpone a more detailed discussion of the conceptualization of political power at this stage and assume, in line with Stigler (1972), for the moment that political power of a party is a monotonic function of received votes. One nice implication of this rather simple conception of political power is that any additional single vote for a party has a positive impact on its political power with certainty. Of

course, as has been discussed manifold in the literature, this assumption appears hardly realistic especially for majority systems. However, it simplifies the exposition of our main idea and we will relax this assumption later on. Voters perceive future political outcomes, z^0 , according to the mean voter decision rule. For simplicity we assume the following: An individual voter “i” perceives a specific distribution of political power of political parties (candidates), c_i^0 , as the result of elections without her participation. Regarding the impact of her participation in election an individual voter perceives her vote to shift the political power of the party she votes for by an intensity dC_{ik} , while the relative political power of all other parties remains constant. Hence, under these assumptions a voter perceives the following shift of her utility:

$$\Delta U_i = U_i(z^0 + \lambda dx_k) - U_i(z^0)$$

$$\text{with } dx^k = x^k - z^0; \quad z^0 = \sum_j C_j^0 x^j; \quad \lambda = \frac{dC_{ik}}{1 - C_{ik}^0} \quad (3)$$

Now, according to the ordinary mean value theorem it follows directly (see, for example, Lancaster, 1968, p. 324):²

$$\Delta U_i = \sum_j \frac{\partial U_i}{\partial Z_j} (z^0 + \phi \lambda dx_k) \lambda dX_j \quad 0 \leq \phi \leq 1 \quad (4)$$

Assuming a separable Euclidian utility function as defined in equation (1) it follows:

$$\Delta U_i = \sum_j \mu_{ij} (Y_{ij} - Z_{ij}^0 - \phi \lambda dX_{kj}) \lambda dX_{kj}$$

$$dX_{kj} = (X_{kj} - Z_{ij}^0) \quad (5)$$

Moreover applying some algebra equation (5) can be rearranged:³

$$\lambda \left[-\lambda \sum_j \mu_{ij} [(Y_{ij} - X_{ikj})^2] + \right.$$

$$\left. + (1 - \lambda) \sum_j \mu_{ji} [(Y_{ij} - Z_{ij}^0)(X_{ikj} - Z_{ij}^0)] + K \right] \quad (6)$$

According to equation (6), the utility shift perceived by a voter formally corresponds to a linear transformation of a united voting model as suggested, for example, by Merrill and Grofman (1999), Iversen (1994)

²Note that equation (4) follows from the ordinary mean value theorem interpreting equation (3) as a function of λ .

³ K is a constant in equation (6). A detailed derivation of equation (6) is available from the authors.

or Kedar (2003). Note further that in contrast to former approaches interpreting the weight of the proximity component as voters' exogenously given preferences for expressive voting, in our model the weight is endogenously derived from voters' interests in policy outcomes, i.e. from instrumental voting alone. In particular, it follows directly from the definition of λ in equation (1) that the higher the expected shift of political power for the voted party the higher is c.p. the weight of the proximity model. Although Kedar (2003) intuitively claimed the same result, she did not derive this result formally from her model, since following Iversen (1994) she exogenously assumed that policy-oriented voters also have preferences for expressive voting (Kedar, 2003). So far our derivation of a unified model representing voters' instrumental preferences depends on a rather ad hoc conception of voters' beliefs regarding their individual impact on political power. In particular, it seems unrealistic to assume that political power increases strictly monotonically with received votes. Hence, in the following exposition we will discuss a more elaborated conception of the formation of voters' beliefs as well as the conception of political power. Obviously, the conception of political power depends on the conception of political decision-making. Here we follow Henning (2002) who conceptualized political power within a noncooperative legislative bargaining model of a Baron/Ferejohn type. In particular, political power is defined as the probability that actor's preferred policy proposal will be the final outcome of an informal legislative bargaining process. According to this conception, political power is determined by the share of winning coalitions, in which an agent is a member, in the total number of winning coalitions. Thus, it follows that political power of a party depends on the number of parliamentary seats it holds, although power is not a strictly monotonic function of parliamentary seats. In particular, despite from very specific distributions of votes a single additional vote has generally no impact on political power. Now, let $v \in V$ denote a distribution of votes, i.e. v is a vector of votes received by the parties running for elections and V is the set of all possible distributions of votes. Then for most $v \in V$ it holds: $dC(v) = 0$. However, there always exists some $v \in V$ for which $dC(v) > 0$. Of course, an individual voter does not know ex ante the outcome of the election, i.e. the final vote distribution is uncertain. We assume that voters have commonly held expectations regarding the expected outcome of elections. Formally, these beliefs are encapsulated in a discrete joint probability density function $f(v)$. Under these assumptions the expected utility gain of an individual voter voting for a party k can be calculated as follows:

$$E(\Delta U_i) = \sum_{v \in V} f(v) [U_i(z^0(v) + \lambda(v)dx_k(v)) - U_i(z^0(v))] \\ z^0 = \sum_j C_j^0(v)x^j \text{ and } \lambda(v) = \frac{dC_k(v)}{1 - C_k^0(v)} \quad (7)$$

Further we assume that the expected impact $E(\lambda(v)) = \sum_{v \in V} f(v)\lambda(v)$ of an individual vote is positive, even if extremely small. Under this assumption substituting equation (6) into equation (7) results after some rearrangements:⁴

$$E(\lambda) \left[\begin{array}{l} -\beta_k \sum_j \mu_{ij} [(Y_{ij} - X_{kj})^2] + (1 - \beta_k) \\ \sum_j \mu_{ij} [Y_{ij} - E(Z_{ij}^0 | \lambda - \lambda^2)(X_{ikj} - E(Z_{ij}^0 | \lambda - \lambda^2))] + K_2 \end{array} \right]$$

with $\beta_k = E(\lambda|\lambda) = \frac{E(\lambda^2)}{E(\lambda)}$; $E(Z_{ij}^0 | \lambda - \lambda^2) = \frac{E(Z_{ij}^0(\lambda - \lambda^2))}{E(\lambda - \lambda^2)}$ (8)

where $E(a(v)) = \sum_{v \in V} f(v)a(v)$, for any variable $a(v)$.

Thus, equation (8) corresponds again to a unified model analogously to equation (6). Formally, the relative weight of the proximity model corresponds to the relation of the expected value of the squared impact of a voter on the political power of party k to the expected value of this impact.⁵ However, to enable a more intuitive interpretation of this relationship, consider the following transformation:

$$\frac{E(\lambda^2)}{E(\lambda)} = \frac{\sum_v f(v)\lambda^2(v)}{\sum_v f(v)\lambda(v)}$$

Now define:

$$f^*(v) = f(v) \frac{\lambda(v)}{\sum_v f(v)\lambda(v)} = f(v) \frac{\lambda(v)}{E(\lambda(v))} \quad (9)$$

Then it holds:

$$\frac{E(\lambda^2)}{E(\lambda)} = \sum_v f^*(v)\lambda(v) = E(\lambda|\lambda)$$

From equation (9) it follows that the weight of the proximity model corresponds to the expected value of the impact on the policy outcome assuming the distribution of votes have a probability density function $f^*(v)$. Moreover, it follows directly that the expected value $E(\lambda|\lambda)$ is much greater

⁴ K_2 is a constant in equation (8). A detailed derivation of equation (8) is available from the authors.

⁵ Note that this relation is always less than 1, since λ is always less than 1.

than $E(\lambda)$ since the density $f^*(v)$ is greater than the density $f(v)$ whenever $\lambda(v)$ is greater than the expected value $E(\lambda(v))$. In particular, note that the density is only nonzero for vote distributions (v) for which the voter is decisive, i.e. $dC(v) > 0$. Intuitively, the expected value $E(\lambda|\lambda)$ can be interpreted as a weighted expected policy impact, where the weight corresponds to the policy impact of a voter, $\lambda(v)$, observed for a specific vote distribution, v , in relation to the expected impact over all vote distributions, $E(\lambda(v))$. Analogously, the value $E(Z|\lambda - \lambda^2)$ can be interpreted as a weighted expected policy outcome. However, this time the weight corresponds to the relation of the product of $\lambda(1 - \lambda)$ to the expected value of this product, $E(\lambda(1 - \lambda))$. Accordingly, it follows that policy-oriented voting implies that voters forming their relevant beliefs on their impact on policy outcomes consider only that distribution of votes for which they are decisive, i.e. have a positive policy impact. Moreover, the higher the policy impact expected for a specific vote distribution the higher the weight. Overall, our theoretical analyses so far imply the following: (1) Assuming that policy formulation corresponds to the mean voter decision rule pure instrumental voting implies that voters' individual preferences can be represented by a unified model comprising a linear combination of a directional and proximity model. (2) The relative weight of the proximity component corresponds to voters' weighted expected impact on the final policy outcome, where a voter only takes those vote distributions into account for which she is decisive. (3) In general, given the distribution $f(v)$ the probability that an individual voter is decisive varies over different parties. Therefore, it follows directly that the relative weight of the proximity model varies across parties.⁶ (4) Moreover, as long as we assume that the probability density function $f(v)$ is common knowledge the relative weight of the proximity component when voting for a specific party k is the same for all individual voters. Finally, note that the overall expected utility gain of an individual voter derived from voting depends on the expected impact an individual voter has on the policy, $E(\lambda)$, which is approximately zero, since the probability that a voter is decisive, $Prob(dC(v) > 0)$, is infinitely small in large electorates. Therefore, the paradox of not voting still applies to our model (see Ledyard, 1984; Palfrey and Rosenthal, 1985), that is most voters would abstain once we introduce even a small cost of voting. We will address the problem of abstention and the paradox of not voting in more detail in the following section where we will derive theoretical hypotheses regarding the impact of formal and informal institutions on voting behavior in more detail.

⁶ According to the same argumentation, it follows that the expected policy outcome $E(Z|\lambda - \lambda^2)$ also varies assuming a voter votes for different parties.

3. Formal and Informal Institutions as Determinants of Voting Behavior

3.1 Formal Institutions and Voting Behavior

Given the probability function $f(v)$ a voter's beliefs of her individual impact on political power depend on the function $dC(v)$. Obviously, this function reflects how votes are transformed into political power. Regarding elections of legislature, the transformation of votes into political power can be separated into the transformation of votes into parliamentary seats and the transformation of parliamentary seats into political power. Of course, the translation of votes into seats depends on specific institutions of the election system, while the transformation of seats into power depends on the organization of legislature. Thus, a comprehensive analysis of the impact of formal institutions on voting behavior, i.e. the weight of the proximity component could be undertaken on the basis of an explicit function $dC(v)$ derived for different political institutions. However, the derivation of an explicit function $dC(v)$ is tentative. Therefore, we postpone this for later research and focus on some obvious relationships among institutions and the properties of the function $dC(v)$ and $\lambda(v)$, respectively. Following [Straffin \(1988\)](#), we assume that parties are the relevant actors in parliament and that any party votes for the proposal of any other party with a probability of 0.5. Then, we can apply the classical Banzhaf-Coleman or Shapley-Shubik voting power index to measure the transformation of a seat distribution into political power of parties (see [Henning, 2002](#)). We will relax this assumption below and consider individual legislators instead of parties as the relevant actors. However, assuming for the moment parties are the relevant actors in parliament political power of parties can be measured through the Coleman-Banzhaf index derived from a simple weighted voting game. Moreover, it follows that for a classical majoritarian system with two parties competing in single member districts an individual voter only has an impact on the number of seats received by a party when both parties get exactly the same number of votes without her vote. The majority party forms the government and totally controls legislative and executive power. Under this conception it follows quite plainly that the transformation of seats into political power is a rather simple two-step function. As long as a party holds less than the majority of seats in parliament it has no power and, accordingly, as long as it controls the majority of seats it has total political power. Thus, the impact of an individual vote on political power of a party can only take the value zero or one. It equals one for all vote distributions that imply that in the constituency of the voter the two parties receive exactly the same number of votes and outside the constituency of the voter the parties win exactly the same number of seats. Otherwise it is zero. Moreover, the weighted expected value $E(\lambda|\lambda)$ equals 1, i.e. individual voting behavior corresponds solely to the proximity model.

In contrast, assuming a representative system with a multiparty government, calculation of political power is no longer a simple task of winning the majority of votes. In particular, it depends on the assumption regarding the voting behavior of governmental parties in parliament. For simplicity we assume for the moment that governmental parties cannot agree on any contract, which restricts their voting behavior in parliament. Under this assumption political power of a party simply corresponds to the voting power index derived from parliamentary seat distribution. Under these assumptions it is easy to see that the political power of a party can take different values between 0 and 1 depending on the concrete distributions of parliamentary votes. Moreover, it is obvious that the impact of a single vote on the political power of a party can take other values than 0 or 1. In particular, there always exists vote distributions for which a single additional vote increases the power of a party from zero to a value of below 1. Thus, the corresponding policy impact $\lambda(v)$ is positive but significantly below 1.⁷ Therefore, it follows that the weighted expected value $E(\lambda|\lambda)$ will also be less than 1. Thus, for a representative system the weight of the proximity model will be lower when compared to a majoritarian system. Thus, our model provides a consistent theoretical explanation for Kedar's intuitively derived hypothesis (Kedar, 2003). Applying the same argument to presidential elections in the US system, it follows that the weight of the proximity model is lower when compared to a pure majoritarian system. In particular, this follows from the fact that the presidential system is characterized by a separation of power between government and legislature, i.e. in contrast to the government in a majority system the president does not have total legislative power. For example, the Shapley-Shubik voting power index of the US president is 0.166 (Pappi et al., 1995). However, a comparison of the weight of the proximity model between presidential elections and parliamentary elections in a representative system is generally indeterminate and depends on the specific separation of power, e.g. how many parties exist in the representative system or which specific legislative rights of the president are determined by the constitution.

3.2 Informal Institutions and Socially Embedded Voting Behavior

So far we have assumed that parties are the relevant actors in parliament. Of course, in reality members of parliament vote individually on policies. However, party discipline can be understood as an informal institution

⁷To see this one could use simulations of the Banzhaf-Index in a simple voting game. Assuming that a specific party gets one seat more generally shifts the corresponding normalized Banzhaf-values by an amount that is significantly lower than 1.

coordinating voting behavior of individual party members. Formally, party discipline can be defined as the probability that party members vote for a proposal made by another member of the same party. According to empirical investigations party discipline varies across parties within the same political system. Moreover, average party discipline varies across political systems. Accordingly, the weight of the proximity model should vary across parties within the same political system, and the average weight should vary across political systems, where the weights increase with the degree of party discipline. Note further that as long as no perfect party discipline is assumed even in majority systems the majority party does not exert total political power. Therefore, observed voting behavior, even in purely majoritarian systems, should not correspond fully to the proximity model. This is exactly the result of empirical estimation presented by Kedar (2003, p. 21). Analogously, we can introduce informal agreements among parties forming the coalition government coordinating their voting behavior in legislature via a higher probability to vote for proposals submitted by governmental parties when compared to other party proposals. Moreover, we can introduce ideology into political power via assuming that the probability of voting for a party proposal is c.p. the higher the closer the party's platform to the own ideal point in an ideological space. In particular, introducing ideology implies that political power of extreme parties remains low even if these parties control a significant share of seats in parliament. Overall, our extended conception of political power has the following implication on voter behavior. First, the higher a voter's expectations that a party will participate in forming the government the higher c.p. she perceives her expected political impact of her vote for this party, $E(\lambda|\lambda)$. Secondly, for large parties, i.e. parties for which voters expect a large number of seats, a higher weight of the proximity component can be expected when compared to small parties. Third, for extreme parties a lower weight of the proximity component can be observed when compared to parties with moderate platforms. These results can be derived intuitively with reference to equation (3) or (7). According to equation (3) or (7) the impact $\lambda(v)$ is increasing with a voter's expectation of the political power of party k for a given vote distribution, $C_k^0(v)$. Thus, as long as we assume that the induced power change, $dC(v)$, does at least not extremely vary across parties the results follow directly. Furthermore, according to equation (8) the expected utility gain derived from the participation in election is close to zero implying the so-called paradox of not voting (Downs, 1957; Tullock, 1967; Riker and Ordeshook, 1968). Thus, even if very low costs of voting are assumed, individual participation in elections only appears rational if an extremely (unrealistically) low overall voter turnout is assumed. Otherwise, expected gains from participating in election are negative. Various attempts to solve the paradox of not voting have been made (see, for example, Thurner, 1998,

p. 144). However, a promising solution to the paradox of not voting seems to relax the assumption of atomistic individual actions implicitly inherent in standard rational choice models. The work of Opp (1995), Uhlaner (1989), Dawes et al. (1990), Morton (1991), Chong (1991) and Ostrom (1990, 1991) demonstrates that political participation can be better understood as the outcome of individual, but socially embedded rational actions structured by complex network arrangements in which norms and expectations functioning as implicit contracts coordinate actions among individual members. Assuming that voters are embedded in various social networks with other voters implies a different voting behavior. On the one hand, abstention is no more private information, but can be observed by other actors within the social network. Therefore, it is conceivable that some social groups with homogenous policy preferences can solve the free rider problem inherent in the paradox of not voting. In particular, we suggest that abstention is not costless to the voter, but implies some punishment via the loss of social reputation or exclusion from social interaction within the group. Expected punishment of abstention is the higher the more dense social interaction within the group and the higher the utility gain of a social group derived from collectively coordinated voting, e.g. the more homogenous policy preferences within the group. On the other hand, since the expected policy impact of an individual voter is rather low it often appears individually rational to vote for a party with a more extreme platform when compared to the voter's own ideal point. However, at the group level the political impact of total vote of all members is considerably higher, implying that collectively it would be rational to vote for a party with a platform close to one's ideal point, establishing another free rider problem of voting. It is conceivable that cohesive social groups manage to overcome this kind of free rider problem by implementing group identity in the sense that individual voters do not consider their individual vote but the sum of votes from their affiliated social group when assessing the expected impact of voting. Under this assumption the weight of the proximity component will be systematically higher for voters with a strong affiliation to cohesive social groups, such as members of strong trade unions. Thus, an overall understanding of voting as a socially embedded action requires consideration of the social organization of society, besides formal and informal institutions of the political system and the specific characteristics of the parties.

4. Empirical Evidence

In what follows we provide some empirical evidence for our theory. In detail, our theory implies analogously to existing models in the literature that empirical voting behavior can be best explained by a unified model.

More specifically, it implies that within the unified model the weight of the proximity component is determined by formal and informal institutions of the political system, party characteristics and social organization of voters. Regarding the first hypothesis, Merrill and Grofman (1999) and Kedar (2003) provide convincing empirical evidence. Moreover, Kedar provides empirical evidence for the impact of formal political institutions on the weight of the proximity component. Using election data from Great Britain, Canada, The Netherlands and Norway she finds evidence in support of the hypothesis that voting in majoritarian systems is significantly correlated with a higher weight of the proximity component when compared to representative systems. Moreover, Kedar's results support our conception of political power based on individual voting of party members in parliament, i.e. even in Britain with its purely majoritarian system the share of the proximity component is significantly below 1. However, there have hardly been any empirical tests as to the extent to which specific party characteristics or the organization of voters in social groups and networks impact on voting behavior. Therefore, we will focus our own empirical estimations on these issues.

4.1 Hypotheses and Plan of Empirical Analyses

In the following empirical analyses, we compare the proximity (PM) and directional model of Rabinowitz/Mc Donald (RM) with two unified models based on the theoretical considerations above. In detail, we define the empirical models as follows:

$$\begin{aligned}
 U_{ik}^{\text{RM}} &= \alpha \sum_j \mu_j (Y_{ij} - Z_j^0)(X_{kj} - Z_j^0) + \text{const}_k \\
 U_{ik}^{\text{PM}} &= \alpha \sum_j \mu_j (Y_{ij} - X_{kj})^2 + \text{const}_k \\
 U_{ik}^{\text{UM1}} &= \alpha [2(1 - \beta)U_{ik}^{\text{RM}} - \beta U_{ik}^{\text{PM}}] \\
 U_{ik}^{\text{UM2}} &= \alpha [2(1 - \beta_k)U_{ik}^{\text{RM}} - \beta_k U_{ik}^{\text{PM}}] \tag{10}
 \end{aligned}$$

The difference between the first and the second unified model lies in the β -parameter. In the second model we assume party specific β -parameters. Based upon the above theoretical considerations we formulate the following four hypotheses: (1) The unified model will result in a better empirical fit when compared to both proximity and directional model, respectively. (2) Within the unified model the weight of the proximity component, β , varies significantly across parties, i.e. the best empirical fit will be observed for the unified model type 2. (3) In particular, the β -parameter of a party will be higher for large governmental parties with a high party discipline and moderate policy platforms, while it will be low for nongovernmental parties

Table 1: Calculating the Weights of Parties (C^0)

Party	Forecasting (%)	Expected seat share in the new Bundestag (%)	Banzhaf-Index
SPD	40.0	43.7	1/2
CDU/CSU	37.0	40.4	1/6
FDP	7.5	8.2	1/6
The Greens	7.0	7.7	1/6
PDS	4.5	0.0	0
The other	4.0	0.0	0

with low party discipline and extreme platforms. (4) Estimating the unified models separately for specific voter groups we should observe larger β s for voters who are affiliated to cohesive social groups.

4.2 Data

To test our hypothesis we have estimated the specified models with election data collected in a preelection survey 2002 representative of the German electorate which was part of the project “Politische Einstellungen, politische Partizipation und Wählerverhalten im vereinigten Deutschland”.⁸ In particular, the dataset includes positions of parties and respondents regarding the following four policy issues: nuclear energy, immigration, European integration and left–right ideology. Respondents were asked to put themselves and parties on scales from 1 to 7. To calculate the utilities of the RM and unified models, we have to specify the expected policy outcome (z^0) (see equation (3)). Although our theory implies that expected policy outcome is specific for individual voters due to lacking data we generally compute the expected outcome on the basis of the public forecast of election results published by the “Politbarometer” in the 37th week of 2002 as presented in Table 1.

The PDS and the other parties were not expected to win seats due to a threshold of 5%. We computed the Banzhaf-Index on the basis of this expected seat share for the weights of parties (c^0). Statistically we fit the conditional logit model to the data above. Beside α and β we estimated the vector μ , the relative weight of the four policy issues, where we restrict the sum of μ to equal 1 and assume the same μ for all voters. Regarding the model constant we introduced party specific dummy variable for each party except for the CDU to account for unexplained factors. All parameters were

⁸This survey was conducted by Jürgen Falter, Oscar Gabriel and Hans Rattinger, and funded by the Deutsche Forschungsgemeinschaft.

estimated using a maximum likelihood estimation (see Greene, 1993). We conducted separate estimations for West and East German voters, since we expect significant variances to exist between these two voter groups (see Pappi et al., 2000). Additionally, to test our fourth hypothesis we estimated the four specified models separately for the West-German union members. In general, estimation only includes voter respondents who indicate an own position on each issue and intended to vote for a party finally represented in the parliament. In detail, these were the CDU/CSU, SPD, FDP and the Greens for West Germany (753 out of 1121 total respondents), and the CDU, SPD and PDS for East Germany (277 out of 511 total respondents). Missing values of the perceived position of parties on the issue scale were dealt with by putting in the mean of the respective variable.⁹

4.3 Results

4.3.1 Testing for Party Specific β -Parameters

In Tables 2 and 3, the maximum likelihood estimation of the four different model types are presented for West and East German data, respectively.

As can be seen from Tables 2 and 3, the unified models provided the best empirical fit for both West and East German voters. In particular, the log-likelihood ratio tests (LR-tests)¹⁰ show that for West Germany both unified models deliver a statistically significant better fit when compared to both the RM and proximity models, respectively. For East Germany this holds only true for the second type of the unified model (UM2) assuming party specific β -parameters. Thus, our estimation results clearly support hypothesis 1, which is perfectly in line with the empirical estimations presented by Kedar (2003) or Merrill and Grofman (1999). In detail, the estimate of β is 0.63 for West Germany and 0.75 for East Germany, suggesting a high weight of the proximity model. The estimation of the unified model assuming party specific weights of the proximity component implies significantly different weights for individual parties. Moreover, the LR-tests imply a statistically better fit for the second in comparison to the first unified model, although the results for West Germany are statistically significant at the 5% level only. Thus, so far empirical estimation results support our theory.

⁹CDU/CSU: Christlich Demokratische Union/Christlich Soziale Union; SPD: Sozialdemokratische Partei Deutschlands; FDP: Freie Demokratische Partei; PDS: Partei des Demokratischen Sozialismus.

¹⁰According to the LR-test log-likelihood values must differ by at least 1.92 and 3.32 to be statistically significant at the 5% and 1% level, respectively (see Merrill and Grofman, 1999, p. 87).

Table 2: Result for West German Voters

	RM coefficient	<i>t</i>	PM coefficient	<i>t</i>	UM1 coefficient	<i>t</i>	UM2 coefficient	<i>t</i>
Const. (<i>S</i>)	0.75	6.67	-0.16	-1.59	0.20	1.37	-0.09	-0.48
Const. (<i>F</i>)	-0.98	-6.91	-1.70	-12.30	-1.40	-8.71	-1.44	-6.25
Const. (<i>G</i>)	-0.96	-6.26	-1.26	-8.38	-1.14	-7.26	1.73	-5.22
$\mu_{ideology}$	0.45	9.78	0.48	-9.92	0.48	10.16	0.49	10.76
$\mu_{nuclear}$	0.28	7.64	0.29	7.74	0.28	7.96	0.27	7.90
$\mu_{immigration}$	0.18	5.59	0.20	5.52	0.19	5.64	0.19	5.73
α	0.49	11.84	-0.27	-11.53	0.28	11.81	0.3	11.31
$\beta_{(C)}$					0.63	6.26	0.64	6.55
β_S							0.25	1.24
β_F							0.62	3.90
β_G							0.24	1.29
Log-likelihood	-708.12		-697.92		-691.28		-687.52	

Note: Log-likelihood value of the model only with constant is -893.32; $N = 753$; Constant for the CDU/CSU is fixed on 0; $\mu_{European\ Integration} = 1 - \mu_{ideology} - \mu_{nuclear} - \mu_{immigration}$; $\beta_{(C)}$ is generic to all parties in the first mixed model and specific to CDU/CSU in the second mixed model.

Table 3: Result for East German Voters

	RM coefficient	<i>t</i>	PM coefficient	<i>t</i>	UM1 coefficient	<i>t</i>	UM2 coefficient	<i>t</i>
Const. (<i>S</i>)	0.40	2.35	0.19	-1.18	-0.03	-0.16	-0.35	-1.28
Const. (<i>P</i>)	-0.60	-2.98	-0.47	-2.45	-0.51	-2.61	-1.42	-3.73
$\mu_{ideology}$	0.74	6.30	0.75	6.61	0.76	6.57	0.80	6.80
$\mu_{nuclear}$	0.09	1.11	0.06	0.93	0.07	0.95	0.06	0.90
$\mu_{immigration}$	0.08	1.31	0.12	2.03	0.11	1.82	0.11	1.91
α	0.35	5.56	-0.21	-5.83	0.21	5.76	0.20	5.17
$\beta_{(C)}$					0.75	4.07	1.17	4.88
β_S							0.94	2.30
β_P							0.42	1.76
Log-likelihood	-246.50		-240.51		-239.54		-234.93	

Note: Log-likelihood value of the model only with constant is -299.74; $N = 277$.

However, regarding hypothesis 3, i.e. the impact of party characteristics on voting behavior, empirical estimations deliver ambiguous results. While the weight for the PDS as a small and extreme nongovernmental party is comparatively low, supporting our theory (see Table 3), the estimation for West Germany results in lower weights (SPD = 0.25, Greens = 0.24) for governmental parties when compared to the weights of the opposition parties (FDP = 0.62, CDU = 0.64). Although, we did not control for other theoretically relevant party characteristic, e.g. party discipline, and although the β -coefficients of both governmental parties, SPD and the Greens, are not

Table 4: Result for West German Unionized Workers

	RM	<i>t</i>	Prox.	<i>t</i>	Mixed	<i>t</i>	Mixed	<i>t</i>
	coefficient		Coefficient		coefficient		coefficient	
Const. (<i>S</i>)	1.43	4.65	0.55	1.93	0.64	1.53	-0.10	-0.19
Const. (<i>F</i>)	-1.04	-2.36	-1.75	-4.03	-1.68	-3.30	-1.49	-1.92
Const. (<i>G</i>)	-1.03	-2.39	-1.27	-2.88	-1.25	-2.81	-1.84	-1.76
$\mu_{ideology}$	0.44	3.75	0.37	3.24	0.38	3.18	0.41	3.48
$\mu_{unclear}$	0.24	3.01	0.29	3.26	0.28	3.16	0.27	3.10
$\mu_{immigration}$	0.20	2.26	0.20	2.20	0.20	2.19	0.16	1.63
α	0.51	4.26	-0.30	-4.50	0.30	4.49	0.39	4.51
$\beta_{(C)}$					0.90	2.74	0.86	2.96
β_S							0.16	0.39
β_F							0.98	1.81
β_G							0.57	1.29
Log-likelihood	-94.76		-90.76		-90.72		-87.84	

Note: Log-likelihood value of the model only with constants is -120.44; $N = 118$.

significant, this result seems to contradict our theoretical hypothesis. One possible explanation might be seen in the fact that we have estimated a common model for all voters, although the two groups of voters (West Germans and East Germans) differ significantly in their policy preferences, their expected policy outcome and their affiliation to social groups. It may thus be the case that different effects compensate each other and we might have got better results by carrying out the estimations for the two groups separately. Another explanation of this contradicting result might be seen in the fact that we could not use voter specific expected policy outcome.

4.3.2 Testing for the Impact of Social Organization on Voting Behavior

As can be seen from Table 4, estimating the unified model only for unionized employee in West Germany¹¹ results in a significant β -parameter that is significantly higher than the estimated β -parameter for all West German voters. This finding supports hypothesis 3. However, it also follows from Table 4 that in contrast to our expectation, the estimated party specific β -parameters do again not correspond to our theory. For example, the

¹¹ Beside unionized workers, farmers and members of the catholic church can also be regarded as well-organized voters. However, farmers are not analyzed because of their small size in the sample. While separate estimations for catholics did not support hypothesis 4, we conclude the catholic church in contrast to trade unions cannot be interpreted as a cohesive social group in West Germany. Moreover, we only analyzed West German data because of the small number of catholics in the East German dataset.

weight of the FDP, a small opposition party, is much higher than that of the SPD, a large governmental party.

Moreover, only the weight for the CDU is statistically significant. Nevertheless, estimation results support our hypothesis that weights of the proximity model are party specific, but we must concede that further research regarding the impact of party characteristics on voting behavior is needed. Moreover, the estimation results for the μ -parameters hint to another interesting point regarding the impact of social embeddedness on voting behavior. According to [Table 4](#) the importance of the issue of European integration is much higher for unionized workers than for all West German voters (with values of 0.14 and 0.05, respectively), while the left–right ideology is comparatively less important (0.41 to 0.49; see [Tables 3 and 4](#)). Obviously, the unionized workers base their voting decision not only on broad ideological issues but also increasingly include more specific issues such as European integration into their evaluation of parties. This seems plausible since organized social groups overcome not only freerider problems regarding voting, but also regarding collection and processing of information (see [Lohmann, 1998](#)).

5. Summary

The writing of this paper was encouraged by the ongoing dispute among scholars as to whether directional or proximity models provide the better explanation of voting behavior. Driven by the empirical finding that both models play significant roles in explaining voter choice and hence in the positioning of candidates and parties we follow Grofman/Merill and Iversen and Kedar suggesting a unified model of voting corresponding to a linear combination of a proximity and directional model. However, in contrast to existing theory of unified voting models the paper provides a theory that enables a consistent derivation of a unified model of voting directly from voters' interest in policy outcomes. In particular, we showed that our approach not only summarizes main findings of existing unified models, but enables a consistent theoretical derivation of the relative weights of the proximity and the directional model which also offers an explanation for observed empirical variations of these weights. In detail, it follows from our model that the relative weights of the proximity component depend on: (1) institutional settings of the political system, i.e. election system and legislative organization; (2) specific party characteristics, i.e. size, discipline and extremism and (3) the specific social organization of voters in groups and networks. Beyond these findings, our theory contributes to the literature resolving the paradox of not voting via conceptualizing voting as a socially embedded action. Using German election data we were able to provide

promising empirical evidence in support of our theory. However, regarding the impact of party characteristics empirical findings were ambiguous. Further research is needed in this area. In particular, a more comprehensive formal analysis of voters' perception of postelection bargaining, especially the role of parties in this process, would be helpful. Moreover, our approach is still limited in as much as we do not provide a rigorous game-theoretical approach, where voter and party behavior is simultaneously derived from rational beliefs in equilibrium. Thus, we still consider our model as a decision-theoretic approach, i.e. voters' behavior is derived from utility maximization under exogenously given beliefs regarding the behavior of other voters and parties. A more general game-theoretic approach would include both voters' belief formation and party behavior as endogenous equilibrium strategies. However, we think our approach is a further step toward such a general theory of voting.

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References

- Adams, J. and Merrill, S.III (1999). Modeling Party Strategies and Policy Representation in Multiparty Elections: Why Are Strategies so Extreme? *American Journal of Political Science*, 43, 765–791.
- Caplin, A. and Nlbuuff, B. (1991). Aggregation and Social Choice: A Mean Voter Theorem. *Econometrica*, 43(1), 1–23.
- Chong, D. (1991). *Collective Action and the Civil Rights Movement*, University of Chicago Press, Chicago.
- Coombs, C.H. (1964). *A Theory of Data*, Wiley, New York.
- Davis, O., Melvin, H.J. and Ordeshook, P.C. (1970). An Expository Development of a Mathematical Model of the Electoral Process. *American Political Science Review*, 64, 426–448.
- Dawes, R., van de Kragt, J. and Orbell, J. (1990). Cooperation for the Benefit of US – Not Me, or My Conscience, in Mansbridge, J. (ed), *Beyond Self-Interest*, University of Chicago Press, Chicago.
- Downs, A. (1957). *An Economic Theory of Democracy*, Harper and Row, New York.
- Enelow, J.M. and Hinich, M.J. (1984). *The Spatial Theory of Voting: An Introduction*, Cambridge University Press, New York.

- Enelow, J.M. and Hinich, M.J. (1989). A General Probabilistic Spatial Theory of Elections. *Public Choice*, 61, 101–113.
- Greene, W.H. (1993). *Econometric Analysis*, Macmillan, New York.
- Grofman, B. (1985). The Neglected Role of the Status Quo in Models of Issue Voting. *Journal of Politics*, 47, 230–237.
- Henning, C.H.C.A. (2000). *Macht und Tausch in der Europäischen Agrarpolitik: Eine positive politische Entscheidungstheorie*, Campus, Frankfurt, New York.
- Henning, C.H.C.A. (2002). Power in Legislative Bargaining. Annual Meeting of the Public Choice Society and Economic Science Association.
- Hinich, M.J. (1978). The Mean Versus the Median in Spatial Voting Games, in Ordeshook, P. (ed), *Game Theory and Political Science*, New York University Press, New York, pp. 357–374.
- Iversen, T. (1994). Political Leadership and Representation in West European Democracies: A Test of Three Models of Voting. *American Journal of Political Science*, 38, 45–74.
- Kedar, O. (2003). *Policy Balancing in Comparative Context: Institutional Mediation of Voter Behavior*. Prepared for delivery at the European Consortium for Political Research Joint Sessions.
- Lacy, D. and Paolino, P. (1998). Downsian Voting and Separation of Powers. *American Journal of Political Science*, 42, 1180–1199.
- Lancaster, K. (1968). *Mathematical Economics*, Dover, New York.
- Ledyard, J. (1984). The Pure Theory of Large Two Candidate Elections. *Public Choice*, 44, 7–41.
- Lohmann, S. (1998). An Information Rationale for the Power of Special Interests. *American Political Science Review*, 92, 809–827.
- Matthews, S.A. (1979). A Simple Direction Model of Electoral Competition. *Public Choice*, 34, 141–156.
- Merrill, S. and Grofman, B. (1999). *A Unified Theory of Voting: Directional and Proximity Spatial Models*, Cambridge University Press, Cambridge.
- Morton, R.B. (1991). Groups in Rational Turnout Models. *American Journal of Political Science*, 35, 758–776.
- Opp, K.-D. (1995). Social Networks can Resolve Actor Paradoxes in Economics and in Psychology. *Comment. Journal of Institutional and Theoretical Economics*, 151, 75–79.
- Ostrom, E. (1990). *Governing the Commons*, Cambridge University Press, New York.
- Ostrom, E. (1991). Rational-Choice Theory and Institutional Analysis: Towards Complementarity. *American Political Science Review*, 85, 237–250.
- Palfrey, T.R. and Rosenthal, H. (1985). Voter Participation and Strategic Uncertainty. *American Political Science Review*, 79, 62–78.
- Pappi, F.U. and Henning, C.H.C.A. (1998). Policy Networks: More than a Metaphor? *Journal of Theoretical Politics*, 10, 553–575.
- Pappi, F.U., Hinich, M.J. and Shikano, S. (2000). Ideologie und Wählerverhalten am Beispiel der Bundestagswahl 1998, in Keynes, E. (ed), *Willensbildungsprozesse und Demokratie – in memoriam Werner Kaltefleiter*, Peter Lang, Frankfurt, pp. 27–59.
- Pappi, F.U., König, T. and Knoke, D. (1995). *Entscheidungsprozesse in der Arbeits- und Sozialpolitik. Der Zugang der Interessengruppen zum Regierungssystem über Politikfeldnetze. Ein deutsch-amerikanischer Vergleich*, Campus, Frankfurt, New York.

- Rabinowitz, G. and Macdonald, S.E. (1989). A Directional Theory of Issue Voting. *American Political Science Review*, 83, 93–121.
- Riker, W.H. and Ordeshook, P.C. (1968). A Theory of the Calculus of Voting. *American Political Science Review*, 62, 25–42.
- Stigler, G.J. (1972). Economic Competition and Political Competition. *Public Choice*, 62, 91–106.
- Straffin, P.D. (1988). The Shapley-Shubik and Banzhaf Power Indices as Probabilities, in Roth, A. (ed), *The Shapley Value*, Cambridge University Press, New York, pp. 71–82.
- Thurner, P.W. (1998). *Wählen als rationale Entscheidung. Die Modellierung von Politikreaktionen im Mehrparteiensystem*, Oldenbourg Scientia Nova, München.
- Tullock, G. (1967). *Toward a Mathematics of Politics*, University of Michigan Press, Ann Arbor.
- Uhlaner, C.J. (1989). Rational Turnout: The Neglected Role of Groups. *American Journal of Political Science*, 33, 390–422.

Chapter 7

Markets and Politics: The 2000 Taiwanese Presidential Election

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Abstract

Economic issues loomed large in the March 2000 presidential election in Taiwan. These issues ranged from high-minded concerns about the future of bilateral trade relations with China to charges of economic manipulation leveled at the incumbent government. This paper seeks to lay bare crucial features of the redistributive consequences of this election and, in particular, tests the importance of China in explaining the sensitivity of the Taiwanese economy to the outcome of the election. Evidence from Taiwanese financial markets is offered to show a strong China factor in the economic consequences of the election.

1. Introduction

On March 18, 2000, Chen Shui-bian was elected president of Taiwan, marking the ascendancy, to the surprise of many, of the first non-Kuomintang (KMT) leader in modern, post-WWII, Taiwanese political history. The dethroning of the KMT was not the only remarkable feature of this election. The election exposed a number of curious institutional features of the Taiwanese electoral system that may have had a direct bearing on the outcome of the election. Among these is the use of plurality rule — Chen won with 39.3% of the popular vote — and the prohibition of published opinion polls in the 10 days prior to the election.¹

¹Achen (2001) and Niou and Paolino (2003) consider whether these institutional features were directly responsible for the election outcome, with particular emphasis on whether strategic voting did or could have played a role in the election.

The omnipresent issue of China relations further colored the election, with the major presidential candidates staking out different positions on the issues of Taiwan independence and bilateral trade. The economic consequences of the election was a significant theme in much of the campaign rhetoric leading up to the election on March 18th, much of it tied, in one way or another, to the immediate future of relations with China. There were also, in the best tradition of the political business cycle literature, accusations of economic manipulation leveled against the incumbent KMT government.

Taiwanese financial markets were quite volatile over the course of the campaign, reflecting the uncertainty of the outcome and the disparate economic consequences thought to be associated with the potential feasible outcomes. This paper seeks to measure and explain the firm-level sensitivity of Taiwanese financial markets to the outcome of the election. Following a brief overview of the election — candidates, issues, and outcome — we explain our strategy for measuring and explaining market sensitivity to the election. Central to this endeavor is an effort to exploit data gathered by the Iowa Electronic Markets, which established and maintained a political futures market tied to the outcome of the March 2000 election.² An empirical model and results suggesting a strong China connection to observed political sensitivity are presented.

2. The 2000 Taiwanese Presidential Election

Chen Shui-bian's victory in the 2000 Taiwanese presidential election was a watershed event in the history of the Republic of China and a critical test of the institutional resilience of this emerging democracy. Although Chen's party, the Democratic Progressive Party (DPP), had made steady inroads at the local and parliamentary level since its inception in 1986, it was never considered a serious threat to win the presidency. This feat was considered beyond reach for any party other than the KMT, which reigned supreme since the relocation of the Nationalist government to Taiwan in 1949.

2.1 Candidates and Outcome

The 2000 election was only the second presidential election in Taiwan to be determined by universal suffrage. In 1996, Lee Teng-hui of the KMT won the first such election decisively with just under 54% of the vote, thereby transitioning the KMT to a true political party and, arguably, Taiwan to a

² See <http://www.biz.uiowa.edu/iem> for general information about the Iowa Electronic Markets and see <http://www.biz.uiowa.edu/iem/closed/Taiwan00.html> for details about the IEM 2000 Taiwan Election Market.

democracy. In many ways, however, the 1996 election was a harbinger of the events in 2000. Not only did the DPP make a legitimate showing in 1996 — slightly over 21% of the vote — but KMT defectors — Lin Yang-kang and Chen Lu-an — also made respectable showings, together capturing almost 25% of the vote.

A key feature of the 2000 election was the prominent defection from the KMT of James Soong (Soong Chu-yu), former governor of Taiwan and high-ranking member of the KMT. Scholars have debated over whether Chen's victory was due to the sharing of the KMT voter base by Soong and Lien Chan, Lee's vice-president and KMT heir apparent (Achen, 2001; Niou and Paolino, 2003).

In the end, Chen Shui-bian, the DPP candidate and former mayor of Taipei, won under the plurality system governing the election with 39.3% of the vote, followed closely by James Soong (36.8%) and, more distantly, Lien Chan with 23.1%.³

2.2 The China Factor

A prominent backdrop to the 2000 presidential election, as it generally is in Taiwan, was the future of relations with Beijing. Ever since the Nationalist government (KMT) settled on Taiwan in 1949 there has been a struggle over political and economic relationships across the Taiwan Strait. A complex mix of history, ethnicity, politics and economics complicates China policy in Taiwan, and it is far beyond the scope or ambition of this paper to explore or explain it in any detail.⁴ Nonetheless, some account of these tensions is necessary to gauge the political and economic calculations hinging on the 2000 election.

Beijing took an active and public interest in the 2000 Taiwanese presidential election, much as it had in 1996. Most of the rhetoric centered on the question of independence — Taiwanese sovereignty — and the length to which Beijing was prepared to go to stop any such movement. Fresh off its integration of Hong Kong and Macao, Beijing was casting its eyes at Taiwan with renewed eagerness and clearly perceived daylight between the positions on independence espoused by the three leading candidates heading into the March 2000 election.

³The New Party also fielded its candidate — Li Ao — in the 2000 election but despite last minute appeals to rally behind James Soong, Li did not play a discernable role in either the expected or actual election outcome. Hsu Hsin-liang, a former chairman of the DPP, ran as an independent.

⁴See Lin et al. (1996) and Higley et al. (1998) for a discussion of political cleavages in Taiwan's electoral and elite politics.

James Soong was China's preferred candidate. Soong's position hewed closest to the original KMT policy of unification of Taiwan with the Mainland. Of course the unification originally envisioned by the KMT was one under their rule, as had been the case prior to their defeat at the hands of the Communists in 1949. Soong's policy was somewhat updated, recognizing the widespread support across Taiwan for the status quo of de facto independence, and called for a protracted — 50 year — decision-making process with a long term goal of unification. Of more immediate interest, Soong appeared the most willing of the major candidates to open discussion with Beijing over the lifting of formal trade restrictions, many of which were imposed and maintained by Lee Teng-hui, the incumbent president.⁵

President Lee and, by association, Lien Chan, his vice president and the 2000 KMT presidential candidate, were perceived by Beijing as having advanced the independence movement in recent years, most publicly in 1999, when Lee announced Taiwan's intentions to seek "special state-to-state" relations with China. Although stopping short of announcing a true independence policy, Lee's announcement was considered a serious escalation in the independence rhetoric. As Lee's handpicked successor to the KMT throne, Lien Chan was closely associated with these rhetorical challenges and thus not well received by Beijing.⁶

The DPP was considered the most aggressively and publicly pro-independence of the major political parties in Taiwan. Tied closely to the large — roughly 85% — ethnic (native) Taiwanese, the DPP had historically championed outright independence — no unification, short or long term — and, even though the DPP and Chen Shui-bian toned down the pro-independence rhetoric in advance of the election, thus found themselves along with Lien in the crosshairs of Beijing's blunt assaults on the 2000 electoral process.⁷

⁵ One of the principal reasons that James Soong broke with the KMT was Lee's successful effort in 1997 to abolish the provincial government of Taiwan, a largely redundant set of government institutions symbolizing, however, the aspiration of eventual unification with the Mainland. James Soong had been the governor of Taiwan, head of the provisional government eliminated through Lee's political engineering.

⁶ Lien made some, mostly futile, effort to distance himself from Lee, refusing, for instance, to repeat Lee's provocative call for "state-to-state" relations between Beijing and Taipei.

⁷ Chen sought to play down the DPP's well-known pro-independence stance by saying that there would be no calls for formal independence or a national referendum on the issue unless China used force to resolve the issue.

It is not clear when or if Beijing, or anyone else for that matter, perceived Chen as the likely winner of the election. The belief that the KMT (Lien) would prevail was widely held in Taiwan and abroad and was sufficient cause for Beijing to raise public concern about the consequences of the election outcome. Beijing's rhetoric was not restrained. It was enlivened in 11,000-word white paper issued on February 21st, in which Beijing, among other things, threatened use of force if Taiwanese officials refused to negotiate unification. This was perceived as an escalation of Beijing's former policy of threatening force only in the advent of a declaration of independence.⁸

Chinese rhetoric continued unabated as the election approached, culminating in a blunt warning three days before the election by Chinese premier Zhu Rongji that a victory by Chen Shui-bian could lead to war. Zhu's comments rocked Asian financial markets, which had already been hit hard following strong indications of Chen's rising prospects over the weekend preceding the election.

A number of trade issues were also present in the cross-Strait pre-election dialogue. In addition to bilateral issues — mostly tied to trade restrictions introduced by President Lee — the prospects for World Trade Organization participation by both Beijing and Taipei were at stake. Trade with the mainland has long been a mainstay of cross-Strait relations even though Taiwanese law forbade firms from investing directly in China until the early 1990s. Prior to that mainland investment took place indirectly (illegally), mostly through Hong Kong. The investment released through the floodgates of the new policy — \$6 Billion from 1990–1995 — took Lee by surprise and in 1996 he sought to slow the capital flow through a policy of Jieji Yongren — “do not hurry, have patience” — that required government evaluation and approval of significant investments in certain industrial sectors (*South China Morning Post*, 3/12/2000, p. 11). This apparent policy reversal did not sit well with many Taiwanese business leaders and its effects spilled over to presidential politics in 2000.⁹

Of the three leading presidential candidates, both Soong and Chen spoke openly of abandoning the cross-Strait trade restrictions imposed by Lee. Lien Chan also sought to distance himself from Lee's policies but, once again, shaking the close ties to Lee proved very difficult.

⁸ In the face of harsh reactions, including financial, to the white paper, Beijing insisted that the policy it advanced was nothing but a restatement of existing policy.

⁹ According to a survey issued by the Ministry of Economic Affairs in March 2000, the mainland accounted officially for 40% — \$14.4 Billion — of all Taiwanese foreign investment, clearly a number designed to capture the attention of voters and politicians alike (<http://www.trade.gov.tw/>).

3. Markets, Opinion, and Expectations

The Taiwanese stock market went on a wild ride as the March 18th election approached, suffering its greatest single day point loss to date — 617 (6.5%) — on March 13th (Figure 1).¹⁰ Given the potential consequences of the election this volatility was to be expected. The uncertainty of the election outcome and its economic consequences were coupled with active market intervention by the Taiwanese government and accusations of more nefarious private market manipulation to create a chaotic investment environment.^{11,12}

To exacerbate farther the uncertainty faced by investors over this period, Taiwanese law forbade the *publication* of any public opinion poll information over the 10 days preceding the election. Not only did this deny investors critical information as they sought to predict the outcome, some argue that this law may actually have been responsible for Chen's unexpected victory (Achen, 2001).¹³ Whether this claim is true or not, there is no doubt that the poll blackout masked significant changes in voter preferences and election expectations. Going into this homestretch the three candidates were in a three-way statistical dead heat but it was during the blackout that some of the more significant election events took place.

3.1 Blackout

The tenor of the 2000 presidential election clearly changed during the public opinion moratorium preceding the balloting as the possibility of a Chen Shui-bian victory became very real. Two events over the weekend of March 11–12 were particularly significant (for a more comprehensive list of

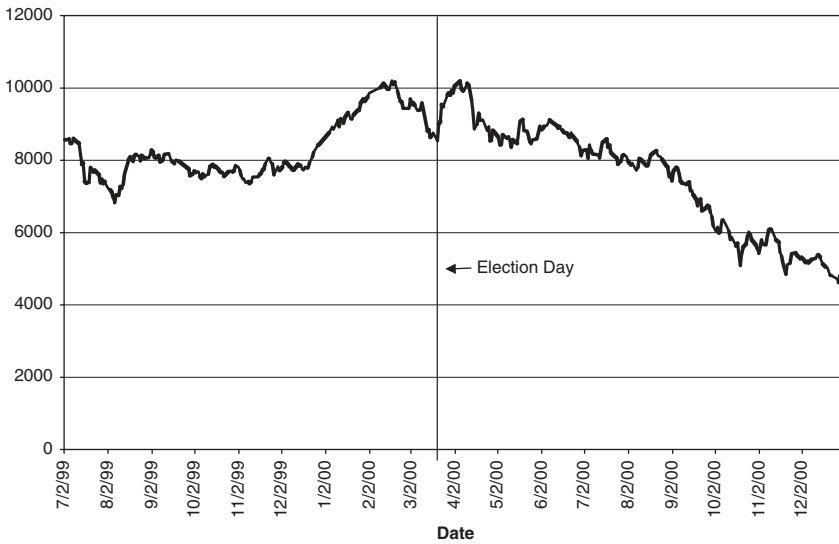
¹⁰ Taiwan Stock Exchange rules limiting one day price drops for individual securities to 7% were fully engaged on March 13th and significantly limited the overall market drop.

¹¹ The Taiwanese Stock Exchange has a history of volatility, with annual stock crashes averaging 44% between 1990 and 1998 (Kuo, 2000). This volatility is traditionally blamed on the rampant speculation — short term trading — by TSE investors; the uncertainty of the 2000 election outcome added an entirely new dimension to the trading calculus.

¹² It is important to note that Taiwanese financial markets were not the only ones affected significantly by the 2000 election. In light of Taiwan's strong Southeast Asian trading relations it should come as no surprise that many Asian markets, Hong Kong in particular, exhibited notable sensitivity to the election. This study, however, only examines the reactions of firms on the Taiwanese Stock Exchange.

¹³ Niou and Paolino (2003) take issue with Achen's claim that the absence of polling information led to Chen's victory by diminishing the opportunity for KMT voters to engage in strategic voting that might have elected James Soong.

Figure 1: TSE Weighted Index, July 1999–December 2000



campaign events see Appendix 1). The first was an embarrassing disparity in the turnout for campaign rallies held by Chen and Lien, especially those held in the southern port city of Kaohsiung, Taiwan’s second largest city. Conservative estimates had Chen outdrawing Lien two to one at their respective head to head rallies (*Japan Economic Newswire*, 3/13/00). These numbers, along with reports of similarly unexpected support for Chen at weekend campaign events in Taipei, the capital, and Taichung (central Taiwan) appear to have taken most Taiwanese by complete surprise. The same weekend saw the very influential Lee Yuan-tseh, Nobel Prize laureate (1986 Chemistry) and president of Taiwan’s leading think tank — Academia Sinica — surprise many with an endorsement of Chen. Lee Yuan-tseh was joined by several other well-known Taiwanese academics in signing on as advisors to Chen.

These weekend events were almost certainly responsible for the unprecedented drop in the Taiwan Stock Exchange (TSE) on March 13th, the first day of trading following the weekend. The same events were almost certainly further responsible for the bluntly threatening comments of Chinese Premier Zhu Rongji on Wednesday, March 15th, which sent the TSE down by another 2.2%.

With financial markets in such an unsettled state the week preceding the election, the Taiwanese government and, in the eyes of many, large private interests as well engaged in active market intervention.

3.2 Intervention

Through the use of large, government-controlled funds — pension, insurance, retirement, and postal — the Taiwanese government was in a position to exert considerable influence on the TSE. Heightened concern over market volatility associated with the election and all that it might portend led to strong pressure on Lee's government to create a special stabilization fund that would effectively double the funds available to the government for market intervention.¹⁴ Lee agreed to the creation of such a fund but initially said that it could not be established until well after the election and thus would not be available to counter any election jitters. Lee was harshly criticized, mostly by the business community, for this delay and in the wake of adverse market reactions to election events — specifically Mr. Zhu's bellicosity — Lee relented and brought the National Financial Stabilization Fund online two days before the election.¹⁵

Chen Shui-bian's DPP opposed the hasty (pre-election) creation of a new stabilization fund for fear it would serve the ruling KMT and permit market manipulation beyond that which it already perceived occurring.¹⁶ In addition to concerns that the existing government-controlled funds were being used in the waning days of the campaign to heighten concerns over the prospects of a Chen victory, some stock analysts saw evidence of separate manipulation by KMT interests of certain high tech firms with known KMT ties.¹⁷

The combination of a close election, limited information, and market intervention resulted in a highly volatile market. It is to markets, however, that we turn in search of systematic behavior that may shed light on the

¹⁴The four original funds provided the government with access to NT\$ 220 billion and an additional NT\$ 200 billion was sought for the new National Financial Stabilization Fund (*Business Times* — Singapore, 3/15/00, p. 21).

¹⁵The 2.2% drop in the value of the main Taipei index attributed to Zhu Rongji's threat of war spurred Lee to engage the new stabilization fund the day before the election. This intervention was credited with stopping a further market slide (*Financial Times* [London], 3/17/00, p. 11).

¹⁶Chen articulated these concerns during a large political rally on March 12th, saying, in reference to a perceived under-commitment of government funds to bolster the market, "Don't turn investors into paupers for political power."

¹⁷The Asian financial press was full of such speculation. The March 14th edition of the *Business Times* (Singapore), for example, carried an article (p. 14) describing analysts' concerns that the trading activity in the shares of United Microelectronic Corporation, Hon Hai Precision, and Asustek Computer were linked to their close ties to the KMT. The analysts' specific concern was that shares of these firms were being dumped in advance of the election to further support expectations of dire economic consequences should Chen win.

breadth and depth of the (anticipated) economic consequences of the 2000 Taiwanese presidential election.

4. Markets and Politics

Although the 2000 Taiwanese presidential election attracted wide coverage in the financial press, most of this was done with a broad brush, centering on aggregate regional, national, or sector-wide consequences. Such an approach is valuable in its own right but cannot help but mask firm-level variation in election sensitivity that might give rise to a more insightful understanding of the Taiwanese political economy.

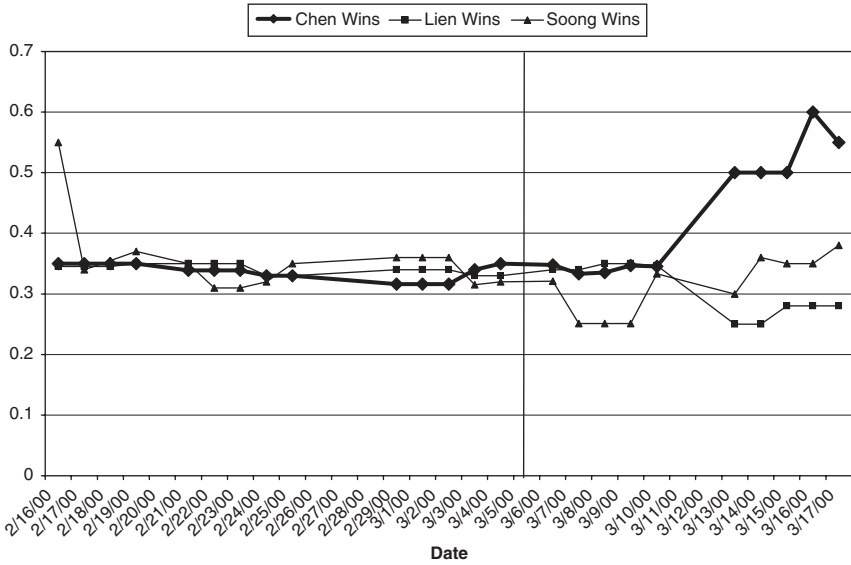
Financial market participants daily make finely-tuned, firm-specific investment decisions by drawing on a wide range of information, including relevant changes in the political environment. As part of this investment calculus, market participants must judge for any firm the relevance of any given political event to the firm's prospective fortunes. That market participants have a keen appreciation for politics and its economic consequences has long been assumed in the study of U.S. financial markets (Schwert, 1981) and there is every reason to believe it holds true among participants in one of Asia's most sophisticated financial markets, the TSE.

The intersection of elections and financial markets has been the object of recent quantitative research (Roberts, 1990; Herron et al., 1999; Herron, 2000; Leblang and Bernhard, 2000).¹⁸ Interest in identifying and explaining the disaggregated market effects of (U.S.) elections traces back to two conference papers written in 1994 (Cram et al., 1994 [revised and published as Herron et al., 1999]; Roberts, 1994), which examined the across-the-board industry-level financial market consequences of the 1992 U.S. presidential election. These two papers were also related by their use of data generated by the Iowa Electronic Markets (IEM), known then as the Iowa Political Stock Market. This paper follows in this tradition, both in its use of IEM data and the desire to identify and explain the disaggregated economic consequences of a presidential election.

The IEM created two continuous futures markets tied to the outcome of the 2000 Taiwanese presidential election (see Footnote 2 for links to information about the IEM in general and the Taiwan markets in particular). The first, established in December 1999, was a "vote share" market in which value of traded contracts were tied to the popular vote shared garnered by individual presidential candidates. The second market, opened on February 15, 2000, was a "winner" market in which each contract tied to the plurality

¹⁸ Niederhoffer et al. (1970) represents some of the early quantitative work on elections and markets.

Figure 2: IEM Taiwan 2000 Presidential Election Winner Market



winner of the presidential election would receive \$1.00, all others \$0.00 (Figure 2). Prior to the election, at any given time the market price of an individual contract in the winner market should have reflected market participants' collective (equilibrium) assessment of the probability of a candidate winning.¹⁹ For the purpose of this paper these market prices provide not only a theoretically attractive measure of the expected outcome of the election but also the *only* source of such information for the 10 days preceding the election during which public opinion information was embargoed.²⁰

The use of market data — TSE and IEM — is central to this paper and, as such, begs concern about their reliability and usefulness for the research at hand. Such questions are particularly valid in this case due to the apparent vulnerability of the TSE to manipulation and speculative binges and, in the case of the IEM Taiwan election market, concerns over erratic trading

¹⁹ For more complete discussions of the logic and mechanics of the IEM political markets see Herron et al. (1999) and Shaw and Roberts (2000).

²⁰ The absence of polling information for IEM investors to draw on is of some concern as these investors are essentially trying to predict mass (electorate) behavior. Studies of US presidential elections suggest, however, that daily changes in IEM prices are not significantly correlated with changes in public opinion (Forsythe et al., 1992; Shaw and Roberts, 2000).

volume. The larger issue of market participants' attentiveness to the election and its economic implications is of much less concern. We move forward, therefore, with concern about data quality but with enough faith in market forces to seek systematic explanations for market reactions to the election.

5. Measurement, Models, and Methods

The object of this paper is to measure and explain empirically firm-level financial market sensitivity to the 2000 Taiwanese presidential election. Measurement and explanation proceed in separate steps, using different data, models, and estimators.

5.1 Measurement

Following the lead of Herron et al. (1999) and Roberts (1994), political sensitivity is measured by observing the degree to which financial market rates of return over time can be explained by changes in the expected outcome of the March 2000 Taiwanese presidential election. Election expectations — the lone independent variable — are derived from the daily closing prices in the IEM of the Chen Shui-bian contract.²¹ Daily rates of return for each of 204 firms trading on the TSE during the election campaign are used separately as dependent variables in firm-specific regressions. The 204 firms were selected on the basis of the availability of firm-specific data used in the second stage of the analysis.

For any firm i the estimated model is

$$R_{it} = \alpha_i + \beta_i CHEN_t + u_{it}, \quad i = 1, \dots, 204, \quad t = 1, \dots, 10 \quad (1)$$

where R_{it} is the daily rate of return for firm i and $CHEN_t$ the daily IEM closing price of the WTA Chen contract, transformed to reflect a rate of return $((P_t/P_{t-1}) - 1)$.

Owing to both the thinness of trading and the lack of price variation in the IEM up until the last two weeks of the campaign — see Figure 2 — *the firm-specific regressions use only ten observations*. Although not by initial intent, the market data used in this analysis thus closely correspond to the period during which the Taiwanese electorate was denied access to public

²¹Owing to the time differential between Iowa and Taiwan the IEM prices were lagged a day. This still creates a small mismatch between price recording times in the two markets but is as close as we can get. The choice of the Chen contract was made both because he was the ultimate winner but also because of the peculiar dynamics of the KMT electorate associated with potential strategic voting. See Footnote 3 for links to the IEM Taiwan market.

opinion information. The lack of price variation in the IEM market until the last two weeks tracked closely with public opinion polls.²² Once the ban was enforced, traders without private access to polls could only rely on personal observations or media reports of campaign events. During the second-half of this period, the price of Chen contract started to rise, reflecting the endorsement of Lee Yuan-tseh and the huge mass rallies Chen's campaign pulled off in central and southern Taiwan. Because it reflects the probabilities of winning, the Winner market tends to exaggerate a clear winner's lead, but the upward movement in Chen's price is more consistent with election outcomes than are some then-unreleased polls. For example, two surveys conducted by the Election Study Center at National Chengchi University show no significant shifts in candidate support during the blackout period; what they do show is but a dramatic increase in undecided voters.²³ Thus, even though the paucity of observations presents an obvious challenge in securing useful results, the IEM was keen in detecting the political dynamics in the last days of the election campaign.

Equation (1) deviates from the more common "market model"-derived specification found in financial market event studies, which typically include a market index variable to account for a firm's systematic risk (Campbell et al., 1997, Chapter 4; Herron et al., 1999). Without controlling for the TSE weighted index to represent market forces, our measure of political sensitivity captures not only the direct effect of *CHEN* on R_i but also the indirect effects that *CHEN* exerts upon R_i through other components of the index, i.e., R_j with $j \neq i$. Thus, ours is a comprehensive measure of the *gross effect* of politics on market.²⁴ While it is true that the market in general has its own

²² A TVBS telephone survey conducted on March 6 shows that Chen, Soong, and Lien were virtually tied with 26, 24, and 25% support among all respondents ($N = 2,092$), which translates to 33.8, 31.2, and 32.5% after excluding the 23% undecided respondents. See <http://www.tvbs.com.tw/code/tvbsnews/poll/200003/0305.asp>.

²³ The first survey, conducted during March 7–11, shows support for Chen, Soong, and Lien to be, respectively, 34.6, 31.7, and 30.9% among decided and probable respondents. The corresponding numbers of the second survey, conducted during March 12–16, are 34.2, 31.3, and 29.4%. (The election outcome was 39.3, 36.8, and 23.1%.) However, the second survey has 34.6% ($N = 1,582$) undecided respondents while the first survey has only 15.0% ($N = 1,144$.)

²⁴ Consider the model $Y_t = \beta_1 + \beta_2 X_{2t} + \beta_3 X_{3t} + u_t$. If we omit X_3 and run the simple regression $Y_t = b_1 + b_{12} X_{2t} + e_t$, it can be shown that $b_{12} = \hat{\beta}_2 + \hat{\beta}_3 b_{32}$ and $E(b_{12}) = \beta_2 + \beta_3 b_{32}$, where b_{32} is the slope coefficient in the regression of X_3 on X_2 . Thus, although b_{12} is biased against β_2 , it is an unbiased measure of the *gross effect* of X_2 on Y , which includes both the *direct effect* ($= \beta_2$) and the *indirect effect* through X_3 ($= \beta_3 b_{32}$). See Gujarati (1995, pp. 204–207) for a detailed discussion.

dynamics that can affect political outcomes, a chronology of the interaction between politics and market strongly suggests that, during the short period of our estimation sample, politics was the dominant forces that moved Taiwan's financial market, not the other ways around (see Appendix 1).

The Prais–Winsten estimator was used in these regressions to account for first-order autocorrelation. The estimator is preferred both for its theoretical properties and particularly in our case because, unlike Cochrane–Orcutt, it preserves the first observation in the series (Kobayashi, 1985). Since both R_t and $CHEN$ are daily rates of return rather than price levels, stationarity is not a particular concern.²⁵ Our measure of cross-sectional political sensitivity comes from the 204 estimated coefficients for the $CHEN$ variable (β_i) in equation (1). For each firm, the sign, magnitude, and significance of this estimated coefficient provide us with useful information about the expected economic consequences of the election. Explaining the cross-sectional variation in these expected consequences is the objective of the second stage in the analysis.

5.2 Explanation

A systematic explanation for the variation in political sensitivity of individual firms would provide unique insights to the Taiwanese political economy. Elections in democratic countries often have large redistributive consequences associated with (potential) change in party control yet very few studies of this phenomenon look beyond changes in broad, macroeconomic indicators (Hibbs, 1977; Beck, 1982; Alesina and Rosenthal, 1989, 1995; Alesina et al., 1993; Midtbo, 1999). Evidence from financial markets has also been highly aggregated (Niederhoffer et al., 1970; Riley and Luksetich, 1980; Yantek and Cowart, 1986; Roberts, 1990; Hensel and Ziemba, 1995; Herron, 2000). Two studies of U.S. elections looking to explain disaggregated (industry-level) market reactions, Roberts (1994, 2000), met with very limited success.

Although there have been few studies of disaggregated political sensitivity there is a related literature on U.S. corporate political behavior that may offer clues in the search for systematic explanations of political sensitivity. Efforts, for instance, to explain corporate PAC contribution patterns have found explanatory purchase in a range of firm, industry, and market

²⁵ Because of the short sample period, conducting stationarity tests such as the Dickey–Fuller unit root test would be over-stretching the data. The 204 estimated autocorrelation coefficients are distributed symmetrically with a mean of -0.023 and a standard deviation of 0.386 ; only 6 or 3% of them have an absolute value exceeding 0.75 .

characteristics (Grier et al., 1994; Mitchell et al., 1997). If variation in the level of overt political acts such as contributing to political campaigns is indicative of the relative importance (sensitivity) of political outcomes to future economic performance then a search for common explanatory variables carries some logic.

For this study, we include firm-specific measures of size (total capital) and profitability (net income per share) in the belief that both of these characteristics may speak to the support — regulatory or otherwise — that firms received under long-standing relationships maintained over 50 years of KMT rule (see Appendix 2 for data sources). The link between such relationships and political sensitivity is theoretically ambiguous. On the one hand, the viability of large and profitable firms may have been perceived as crucially dependent on the continued reign of the KMT. On the other, perhaps large and profitable firms were thought to have matured beyond the need of care and feeding by the KMT, leaving their futures unfazed by the election outcome.

In the case of Taiwan there are additional, somewhat unique candidates for sources of relative political sensitivity. Two in particular seem to stand out. These are firm-specific ties to China and to the KMT. With respect to the latter, a small group of firms was identified that were explicitly under the control of the business wing of the KMT. A priori we assumed such firms would exhibit unusual sensitivity to the potential, and ultimately realized, loss of KMT control.

Direct investment on the Chinese mainland was used account for the impact of cross-Strait relations on corporate political sensitivity. It is hypothesized that the greater a firm's direct investment in China the more sensitive the firm to changes in the likelihood of a Chen victory.

In addition to firm level data, industry dummy variables were created both to search for any gross industry effects and to see if the explanatory power of any firm-level variables could be sustained.

Two models — with and without industry dummies — were estimated using a maximum likelihood heteroscedastic regression model. This estimator was used to account for the unusual nature of the dependent variable, which is the vector of estimated coefficients from the 204 regressions discussed previously. Each observation of the dependent variable is accompanied by a standard error which can be considered as measurement error:

$$Y_i = \hat{\beta}_i = \beta_i + \varepsilon_i \quad \text{with } \varepsilon_i \sim N(0, se(\hat{\beta}_i)^2)$$

Our explanatory model essentially re-parameterizes β_i as a stochastic linear function of a vector of covariates, X_i :

$$\beta_i = \gamma_i' X_i + v_i \quad \text{with } v_i \sim N(0, \sigma^2) \quad \text{and } \text{cov}(v_i, \varepsilon_i) = 0$$

Thus, the overall cross-sectional model is

$$Y_i = \gamma'_i X_i + u_i \quad \text{with } u_i = v_i + \varepsilon_i \sim N(0, \sigma^2 + se(\hat{\beta}_i)^2) \quad (2)$$

$$i = 1, \dots, 204$$

This regression is *theoretically* heteroscedastic because the disturbance term, u_i , has a non-constant variance, $\sigma^2 + se(\hat{\beta}_i)^2$, that is specific to firm i . To account for this additional information we estimate equation (2) with the variance of the disturbance term in the two MLE models specified as $s_i^2 = \text{constant} + \hat{s}(\hat{\beta}_i)^2$ where $\hat{s}(\hat{\beta}_i)$, the estimated standard error of $\hat{\beta}_i$, is the variance of measurement error in the dependent variable.

6. Results

6.1 Measurement

The results of the measurement exercise are summarized in Figures 3–5, which show, respectively, the point estimates and confidence intervals for the *CHEN* coefficients, the distribution of the political sensitivity point estimates from the 200 firm-specific regressions, and a summary of average estimated sensitivity across 19 industries.

Figure. 3: Estimates of Chen Sensitivity and 95% Confidence Intervals ($N = 204$)

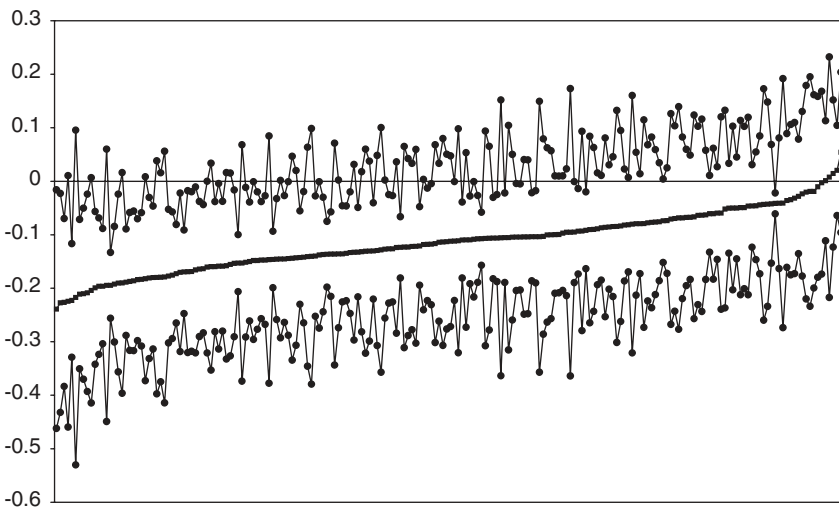


Figure 4: Histogram of Chen Sensitivity

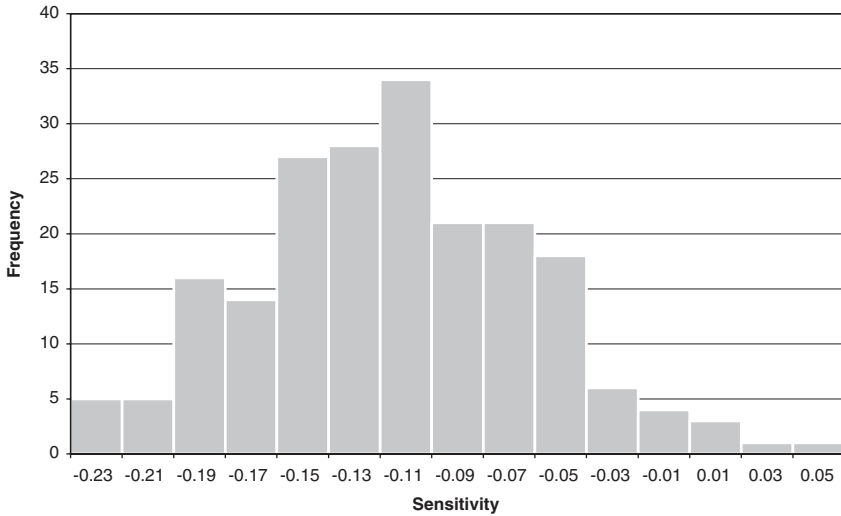
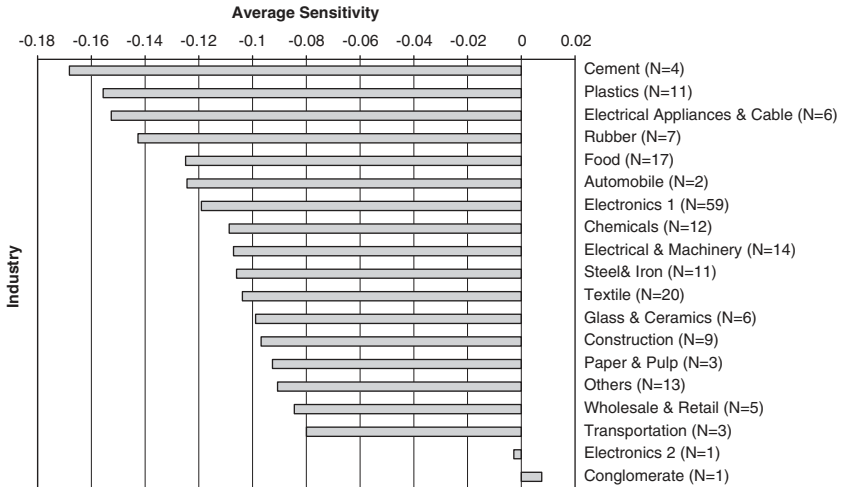


Figure 5: Average Chen Sensitivity by Industry



The figures reveal a nicely distributed but almost universally negative reaction to the prospect of a Chen victory. It seems clear that a combination of concern over Chen’s leadership ability, Chinese relations, and the possible dismantling of longstanding relationships between the central government and Taiwanese industry was of broad concern. At the same time, the effect

was clearly not uniform; the prospect of a Chen victory affected some firms far more than others.

6.2 Explanation

Table 1 presents the results of the cross-sectional model in which we seek to explain firm-level variation in sensitivity to a Chen victory. The results are heartening. Two firm-specific variables — net income per share and logged China investment — are statistically significant in both models (with and without industry dummies). The coefficients for both variables in both models are negative. Thus, firms with higher net income per share or higher China investment tended to have stronger negative sensitivity to Chen's IEM standing. Conversely, firms with lower income per share or lower China investment tended to have weaker negative sensitivity or even insignificant sensitivity. The negative coefficient on mainland investment comes as little surprise given strong anti-Chen rhetoric coming out of Beijing in ever more strident terms as the election approached. The heightened prospect of open hostilities clearly won out in the expectations of investors. Figure 6 shows an industry-level comparison of investment in China. The negative coefficient on net income per share can likewise be interpreted as high income firms' negative reaction to the uncertainty that Chen's rise might have cast upon them.

Interestingly, the measures of size and profitability behaved quite differently. The measure of firm size — logged total capital — was hopelessly insignificant; suggesting that large firms may have indeed established a sphere of domestic political insulation. The profitability measure, on the other hand, was clearly in play by investors. The source of investors' concerns could be many. Generically, the prospect for change in regulatory environments is rarely welcome for the uncertainty it creates.

The inclusion of industry dummies in the second model had minimal effects. The model fit improved marginally but only one industry — plastics — had a statistically significant (negative) coefficient. Perhaps most notable, the inclusion of the industry variables had no meaningful effect on the firm-specific variables; both the magnitude and significance of the China Investment coefficient dropped slightly. This result further strengthens the argument that disaggregated effects not only exist but also need to be pursued to gain insight to the political economy.

Missing from the models presented in Table 1 is any effort to account for explicit firm-specific ties to the KMT. Curiously, when included in the models no effect on sensitivity could be found and the variable was dropped in the final specification. As with the insignificance of the total capital variable, the absence of a KMT effect is revealing of a mature and sophisticated political independence among these firms.

Table 1: Maximum Likelihood Estimates of Heteroscedastic Regression Models of Political Sensitivity (Dependent Variable: Sensitivity with Respect to Chen)

Independent variable	MLE coefficient (s.e.)	MLE coefficient (s.e.)
China investment (log)	-.0085(.0030)**	-.0069(.0033)*
Total capital (log)	.0039(.0047)	.0041(.0052)
Income per share	-.0059(.0018)**	-.0056(.0019)**
Constant	-.0639(.0691)	-.0729(.0737)
Cement industry		-.0600(.0355) [†]
Food industry		-.0276(.0192)
Plastics industry		-.0571(.0204)**
Textile industry		.0071(.0187)
Elec. and Mach. industry		-.0201(.0193)
Electrical appliance and cable industry		-.0341(.0312)
Chemicals industry		-.0070(.0187)
Glass and ceramics industry		.0245(.0258)
Paper and pulp industry		.0103(.0466)
Steel and iron industry		-.0297(.0247)
Rubber industry		-.0351(.0213) [†]
Automobile industry		-.0165(.0373)
Electronics industry (1)		-.0133(.0163)
Electronics industry (2)		.1013(.0770)
Construction industry		-.0002(.0243)
Transportation industry		-.0207(.0364)
Wholesale and retail industry		.0037(.0251)
Conglomerate industry		.0852(.1002)
Variance model ^a		
Constant	.0004 (.0002)*	.0002(.0001)
Variance of measurement error in Y	1	1
N	200	200
Wald χ^2 (df)	18.31(3)***	48.94(21)***
Log likelihood	299.44	312.13

Note: Standard errors are in parentheses.

^aThe variance of the regression disturbance is specified as $s_i^2 = \text{constant} + \hat{s}(\hat{\beta}_i)^2$ where $\hat{s}(\hat{\beta}_i)$ the standard error of $\hat{\beta}_i$ estimated from equation (1), is the variance of measurement error in the dependent variable. The heteroscedastic regression model was estimated by a constrained maximum likelihood procedure.

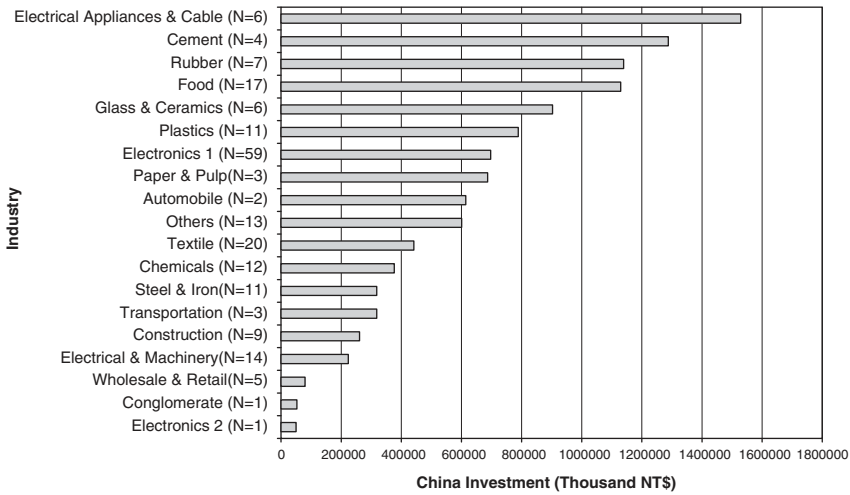
* $p < .05$.

** $p < .01$.

*** $p < .001$.

[†] $p < .10$; two-tailed tests.

Figure 6: Average China Investment by Industry



6.3 Aftermath

The analysis to this point has been based on expectations: Who would win and what would be the consequences. One is always tempted to ask whether any of the pre-election prognostication by investors was on the mark. This is a dangerous exercise, particularly when basing such assessments on subsequent market performance, which is driven by inherently prospective assessments and theoretically reflects only to new information. It is possible however to remain (somewhat) true to the efficient markets hypothesis and still gain some insight.

Returning to Figure 1 it is clear that the TSE suffered, but for an initial bout of optimism, a fairly steady decline over the months following the election. The efficient market hypothesis attributes all such behavior to new information and not any breakdown in pre-election forecasting. Rather than focus on the price trends it is possible to fashion a hypothesis tied to Chen Shui-bian’s fast deteriorating presidency and ask whether pre-election sensitivity to Chen’s victory spelled greater or lesser decline for these firms’ stock prices in the election’s aftermath. The idea is that firms that were more (negatively) sensitive to Chen’s chance of winning during the critical pre-election period were more nervous about a DPP control. So when President Chen was losing his grip in the months after the election, these firms should have had reason to be relatively optimistic about their prospect and suffered less price decline amidst the market’s general pessimism.

To that end, Table 2 presents the results of a simple Tobit regression of Chen Sensitivity on the decline, in proportion, from a firm’s post-election

Table 2: Post-Election Price Decline, Tobit Estimates (Dependent Variable: Post-Election Price Decline)^a

Independent variable	MLE coefficient (s.e.)
Chen sensitivity	.456(.248)*
Constant	.763(.032)***
<i>N</i>	204
Log likelihood	19.082

Note: Standard errors are in parentheses.

^aThe dependent variable is defined as $Y = (P_{max} - P_{min}) / P_{max}$ where P_{max} and P_{min} are the maximum and minimum, respectively, of a firm's daily stock prices from March 20, 2000 to December 30, 2000. Of the 204 observations, 20 are right-censored at $Y = 1$.

* $p < .05$; one-tailed tests.

*** $p < .001$.

maximum price to its minimum, which generally took place at or near the end of 2000 — the end of our data period. As the results suggest, price decline of individual firms following the election can be explained, in part, by their pre-election sensitivity to a Chen victory. The more (negatively) sensitive the firms were, the less price decline they suffered after the election. Firms that were insensitive suffered more.

7. Conclusion

The anticipated redistributive consequences of the March 2000 Taiwanese presidential election were closely tied to the burgeoning economic ties between Taiwan and China. Given the pre-election rhetoric, particularly that emanating from Beijing, this could hardly be surprising. Nor could one consider surprising the prospects for diminished profitability that were likely to follow from the domestic policy volatility likely to accompany a Chen administration grappling for the first time in modern Taiwanese history with a change in partisan control of the central government.

If there are surprises in the preceding analysis it rests with the insignificance of the KMT, firm size, and industry variables; sensitivity to the election was independent of either firm size, overt ties to the KMT, or sector.

The information environment of the election was the poorer for not having access to public opinion polls. It is clear, however, that neither voters nor investors were faced with an information vacuum. Traders in both the IEM and Taiwanese financial markets responded to a sequence of events that were well reported in the local and regional press. The IEM traders' payoffs were tied to their forecasts of mass behavior, not their own preferences, and thus the movement in Chen's contract prices reflected belief that voters were rethinking or refining their intentions significantly over the days preceding

the election. What is striking is that well-reported negative financial markets reactions to the prospects of a Chen victory did not, in the eyes of IEM traders, scare off voters, who were clearly prepared to pay a price for a change in government.

References

- Achen, C.H. (2001). Polls, Pluralities, and Insurgent Party Victories: The 2000 Taiwan and Mexico Presidential Elections. Prepared for Presentation at the Duke University Conference on The Rise of DPP and PAN in Taiwan and Mexico, January 2001.
- Alesina, A., Londregan, J. and Rosenthal, H. (1993). A Model of the Political-Economy of the United States. *American Political Science Review*, 87(1), 12–33.
- Alesina, A. and Rosenthal, H. (1989). Partisan Cycles in Congressional Elections and the Macroeconomy. *American Political Science Review*, 83(2), 373–398.
- Alesina, A. and Rosenthal, H. (1995). *Partisan Politics, Divided Government, and the Economy*. Cambridge University Press, Cambridge.
- Beck, N. (1982). Parties, Administrations, and American Macroeconomic Outcomes. *American Political Science Review*, 76, 83–93.
- Campbell, J.Y., Lo, A.W. and MacKinlay, A.C. (1997). *The Econometrics of Financial Markets*, Princeton University Press, Princeton, NJ.
- Cram, D.P., Heron, M.C., Lavin, J. and Silver, J. (1994). Measurement of Political Effects in the Stock Market: A Study of the 1992 United States Presidential Election. Working Paper. Graduate School of Business, Stanford University.
- Forsythe, R., Nelson, F., Neumann, G.R. and Wright, J. (1992). Anatomy of an Experimental Stock Market. *American Economic Review*, 82(5), 1142–1161.
- Grier, K., Munger, M. and Roberts, B. (1994). The Determinants of Industry Political Activity, 1978–1986. *American Political Science Review*, 88, 911–926.
- Gujarati, D.N. (1995). *Basic Econometrics*, McGraw-Hill, New York.
- Hensel, C.R. and Ziemba, W.T. (1995). United States Investment Returns During Democratic and Republican Administrations, 1928–1993. *Financial Analysts Journal*, 51(2), 61–69.
- Herron, M.C. (2000). Estimating the Economic Impact of Political Party Competition in the 1992 British Election. *American Journal of Political Science*, 44(2), 326–337.
- Herron, M.C., Lavin, J., Cram, D. and Silver, J. (1999). Measurement of Political Effects in the Stock Market: A Study of the 1992 Presidential Election. *Economics and Politics*, 11(1), 51–82.
- Hibbs, D.A. (1977). Political Parties and Macroeconomic Policy. *American Political Science Review*, 71, 1467–1487.
- Higley, J., Huang, T.-yi. and Lin, T. (1998). Elite Settlements in Taiwan. *Journal of Democracy*, 9(2), 148–163.
- Kobayashi, M. (1985). Comparison of Efficiencies of Several Estimators for Linear Regressions With Autocorrelated Errors. *Journal of the American Statistical Association*, 80(392), 951–953.
- Kuo, C. (2000). New Financial Politics in Taiwan, Thailand, and Malaysia. Working Paper. Department of Political Science. National Chengchi University.

- Leblang, D. and Bernhard, W.T. (2000). The Politics of Speculative Attacks in Industrial Democracies. *International Organization*, 54(2), 291.
- Lin, T., Chu, Y. and Hinich, M.J. (1996). Conflict Displacement and Regime Transition in Taiwan: A Spatial Analysis. *World Politics*, 48, 453–481.
- Midtbo, T. (1999). The Impact of Parties, Economic Growth, and Public Sector Expansion: A Comparison of Long-Term Dynamics in the Scandinavian and Anglo-American Democracies. *European Journal of Political Research*, 35(2), 199–223.
- Mitchell, N.J., Hansen, W.L. and Jepsen, E.M. (1997). The Determinants of Domestic and Foreign Corporate Political Activity. *Journal of Politics*, 59(4), 1096–1113.
- Niederhoffer, V., Gibbs, M. and Bulloch, H. (1970). Presidential Elections and the Stock Market. *Financial Analyst's Journal*, 26, 111–113.
- Niou, E. and Paolino, P. (2003). The Rise of the Opposition Party in Taiwan: Explaining Chen Shui-bian's Victory in the 2000 Presidential Election. *Electoral Studies*, 22(4), 721–740.
- Riley, W. and Luksetich, W. (1980). The Market Prefers Republicans: Myth or Reality. *Journal of Financial and Quantitative Analysis*, 15, 541–560.
- Roberts, B.E. (1990). Political Institutions, Policy Expectations, and the 1980 Election: A Financial Market Perspective. *American Journal of Political Science*, 34(2), 289–310.
- Roberts, B.E. (1994). The Industrial Organization of the 1992 US Presidential Election. Presented at the 1994 Annual Meetings of the Midwest Political Science Association, Chicago, IL.
- Roberts, B.E. (2000). The Redistributive Consequences of Changing Majority Control in the US House of Representatives. Presented at the 2000 Annual Meetings of the Midwest Political Science Association, Chicago, IL.
- Schwert, G.W. (1981). Using Financial Data to Measure Effects of Regulation. *Journal of Law and Economics*, 24, 121–158.
- Shaw, D.R. and Roberts, B.E. (2000). Campaign Events, the Media and the Prospects of Victory: The 1992 and 1996 US Presidential Elections. *British Journal of Political Science*, 30(April), 259–289.
- Yantek, T. and Cowart, A.T. (1986). Elections and Wall Street: Taking Stock of Parties and Presidents. *Western Political Quarterly*, 39, 390–412.

Appendix 1: Campaign Events, March 6–18, 2000

- March 6 The PRC's *Liberation Army Daily* publishes an article declaring that, "Taiwan independence implies war." TSE weighted index: 9367.91
- March 7 Echoing the *Liberation Army Daily's* article, Li Peng, the former Chinese premier and current parliamentary chairman, and Qian Qichen, the Chinese vice premier, reiterate that Taiwan independence means war. TSE weighted index: 9380.07

- March 8 Ban on reporting results of opinion polls takes effect.
TSE weighted index: 9389.49
- March 9 TSE weighted index: 9587.27
- March 10 Yan Ching-piao, a local politician known for his connection with the Mafia or “Black Society,” endorses James Soong.
TSE weighted index: 9429.60
- March 11 Citing his dismay with the Black Society’s meddling with the election, Lee Yuan-tseh meets with Chen Shui-bian and agrees to serve as an “advisor” for national affairs if Chen is elected.
The final presidential candidate television debate is held.
A campaign rally held by Chen Shui-bian in Taichung draws hundreds of thousands of supporters.
- March 12 Lee Ao says, “voting for James Soong is the right choice now.”
A campaign rally held by Chen Shui-bian in Kaohsiung draws hundreds of thousands of supporters, overwhelming a rival rally held by Lien Chan in the same city.
- March 13 Lee Yuan-tseh declares his resignation as president of Academia Sinica.
TSE weighted index: 8811.95
- March 14 Madam Chiang Kai-shek endorses Lien Chan in an open letter.
TSE weighted index: 8835.58
- March 15 Lee Yuan-tseh says he will not accept the post of the premier if Chen Shui-bian is elected.
Zhu Rongji, the Chinese premier, warns the people of Taiwan not to vote for “candidates who support Taiwan independence.”
TSE weighted index: 8640.03
- March 16 U.S. Secretary of State Madeleine Albright says China’s threat against Taiwan is unacceptable.
Admiral Dennis Blair, the Commander in Chief of the U.S. Pacific Command, says the U.S. military forces will be able to protect Taiwan if they are ordered to do so.
Government funds intervene in the stock market.
TSE weighted index: 8682.76

- March 17 In a joint press conference with Lee Ao, Lee Ching-hua, a leader of the New Party, endorses James Soong. Government funds intervene in the stock market. TSE weighted index: 8763.27
- March 18 Chen Shui-bian is elected as Taiwan's president.
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Appendix 2: Data Sources

Daily Taiwan Stock Exchange weighted index, daily closing prices for individual stocks, 1999 total capital and net income per share of listed companies: Taiwan Stock Exchange Corporation web site (<http://www.mops.tse.com.tw/>).

China investment: *Biznews Weekly* (Taipei), November 9–16, 2000, p. 58–67.

Daily closing prices for presidential candidates, winner market: IEM 2000 Taiwan Election Markets web site (<http://www.biz.uiowa.edu/iem/closed/Taiwan00.html>).

Data for surveys conducted by the Election Study Center (ESC) at National Chengchi University were provided by Dr. Lu-huei Chen of the ESC. We thank Dr. Chen for his assistance.

Chapter 8

Endogenous Time Preferences, Social Networks and Complexity

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Abstract

Virtually all of economic theory assumes that individual time preferences are exogenously determined. Here we explore a computer model that allows for endogenous time preference change consistent with an evolutionary game theoretic perspective. However, allowing individual interactions to occur within an endogenously determined network reveals a degree of complexity in network structure and individual behavior (consumption and investment patterns) that is unlikely to be captured by an analysis that limits itself to closed form analytic results. Hence, in addition to offering a perspective on the modeling of networks and how individuals come to value the future, this essay also brings into question the adequacy of traditional modes of formal theoretical inquiry — the adequacy of modes that eschew computer simulation and instead give value only to results that can be stated in terms of theorems, propositions and lemmas.

A search for origins and for trends is ... bedeviled by the tendency to treat in linear, cause-and-effect terms a relationship which is circular and elusive. At whatever point the circle is entered appear the dangers of assumptions too hastily made and generalizations too easily arrived at (David B. Truman, 1967, p. 81)

1. Introduction

It might seem strange to begin this essay by asking about the connection between the introduction of interchangeable parts in manufacture and enforcement of the First Amendment to the US Constitution. But there is a link relevant to our subject. We can begin by noting that despite popular belief, much of the technology behind the advent of mass manufacturing in the United States was known in England. However, it was in the United States that its development became the focus of manufacture, largely because of labor's mobility — free, or nearly free land to the West made it difficult to keep labor in place. Hence, technology shifted from manufacturing by artisans to those who could more easily be trained to maintain the machines that mass produced things. But a mobile population was itself encouraged by land speculators (and later by the railroads) who sought consumers for their 'goods' — land was valuable only if there was someone to sell it to. Indeed, more often than not, people were encouraged to move to 'towns' that barely existed. To prove that they did exist and to encourage migration to them, those towns established, among other things, newspapers, often as a mechanism for civic boosterism. The United States thereby saw an unprecedented proliferation of a locally controlled and hence wholly decentralized printed media. Of course, as in governments elsewhere, politicians found such a thing discomfiting — witness the ill-fated Alien and Sedition Acts. But controlling a media wholly decentralized across continents was an impossibility, thereby rendering the First Amendment's guarantee of an unfettered press a practical necessity.

This brief historical accounting illustrates the complexity of social processes — in this instance, the interaction of a number of seemingly unrelated social conditions so as to facilitate the development of liberal democracy. And it is this complexity to which Truman refers in the quotation that introduces this essay. Unfortunately, that admonition and the proper treatment of social complexity commonly fall by the wayside in the academic development of disciplines. Specifically, much of the published research in economics, sociology and political science that is explicitly mathematical or has a formal flavor is valued *only* to the extent that it yields closed form results. Assumptions then are often imposed to ensure analytic tractability as opposed to being guided by a desire to explain social processes. Thus, preference functions are concave and upper-semicontinuous, information is complete or decisions makers are perfect Bayesian updaters, common knowledge pervades, event sequences are sufficiently long to allow limit points to be reached, and everyone — consumers, firms, investors, voters, election candidates, political elites, criminals and heads of households — operates with perfect foresight up to some well-defined statistical specification of uncertainty. To illustrate, consider a recent issue of *Review of Economic Design* (April 2005 vol. 9, no. 2). Here we have six mathematically

rigorous essays, where, in setting forth the analytic domain of each, we find the following (quotes are in abbreviated form to bypass notation):¹

1. Buyer i 's preferences ... are characterized by two parameters (v_i, θ_i) ... For each i , θ_i takes the value ... with probability 1/2 and ... with probability 1/2. Also, v_i is the realization of a random variable. All random variables are independent. All this is common knowledge.
2. The economy involves two types of agents indexed by i ... Both types are infinitely lived ... there are two commodities at each time: a factor of production ... and a nonstorable consumption good ...
3. The economy e is described by the list $e = \{ \dots [\text{every consumer's consumption set, initial endowment, share of the production sector, preferences over consumption}], [\text{the aggregate production set}] \}$... e is assumed to be common knowledge ... [individual preference] is complete, reflexive, transitive, continuous, strictly convex and strictly monotonic ...
4. A risk neutral seller wants to maximize her revenue from the sale of an indivisible good for which her valuation is known ... there are n risk neutral potential buyers each with private information on his own valuation ... valuations ... are independently drawn from a continuously differentiable distribution ... each bidder's virtual valuation function is monotone increasing.
5. Every individual ... has a preference ordering ... monotonic ... and continuous.
6. Preferences are assumed to be linear order relations ... This entails that there is a strict preference between any two objects ... An allocation ... is a distribution of a subset of the objects ... such that an individual receives at most one object.

The product of these assumptions across the 6 essays is 7 lemmas, 15 propositions and 9 theorems. Of course, the imposition of restrictive assumptions by itself does not depreciate the value of the resulting research, although one wonders about the publishability of an essay here absent

¹The authors and titles of the essays are as follows: R. Burquet, "The Condominium Problem: Auctions for Substitutes"; E. Basci and I. Saglam, "Optimal Money Growth in a Limited Participation Model with Heterogeneous Agents"; L. Kranich, "Manipulation of the Walrasian Mechanism in Production Economies with Unbounded Short-Selling"; B. Caillaud and J. Robert, "Implementation of the Revenue-Maximizing Auction by an Ignorant Seller"; M. Fleurbaey, "The Pazner-Schmeidler Social Ordering: A Defense" and L-G. Svensson and B. Larsson, "Strategy-Proofness, Core, and Sequential Trade".

its own list of propositions and theorems. However, it is reasonable to question the extent to which such analyses contribute to an understanding of real-world processes. If a single issue of a journal can yield nine theorems, one suspects that these theorems are anything but fundamental laws of social process. The specificity of assumptions, moreover, governed as they are by analytic necessity rather than empirical fact (or even hypothesis), are not likely to yield a model of anything substantively specific. Indeed, one can argue that the premium placed on analytic tractability renders it nearly impossible for the resulting analysis to model much of anything real.

We understand that this is a contentious and controversial view — one that we overstate somewhat for the sake of argument. But as a component of that argument, we offer here a simple dynamic model whose component parts are linear and analytically trivial, but which nevertheless yields complex patterns of social action that are unlikely to be captured by analytically closed form results. We do not say that this model is any closer to reality than those we cite above, but from it we draw the implication that even fundamental social processes — here, the evolution of individual time preferences — are likely to exhibit the properties of non-linear systems. Although such systems may operate in accordance with ‘simple laws’ (e.g., the laws of thermodynamics in the physical sciences), they need not manifest themselves ‘simply’ (e.g., the thermal properties of ocean currents or fluid flow in your automobile’s radiator) in which case attaching the label ‘theorem’ to some result derived from a specialized, analytically tractable model is done more to ensure publication than it is a signal about the general importance of the result.

The model we offer concerns individual time preferences and the dynamics of their change in a social context. Time preference, of course, is a critical parameter of individual choice since with it we can manipulate the likelihood of cooperation (Taylor, 1976; Axelrod, 1984), the value of various punishment strategies (Friedman, 1977), the emergence and sustainability of norms (Bendor and Swistak, 2001) and agreement points in bargaining (Rubinstein, 1979). For the most part, models based on the economist’s paradigm take this parameter as predetermined and unchanging despite empirical evidence that time preferences are impacted by, among other things, drug dependence, age, income and peer group associations (Becker and Mulligan, 1977; Becker and Murphy, 1988; Klochko, 2005, 2006). Instead, research focuses on whether time discounting is best represented by exponential or hyperbolic functions and whether the nature of discounting depends on the outcomes under consideration.

But consider this scenario: with a normal planning horizon of, say, 5–6 years, you are a foreign investor in an ‘emerging market economy’ (e.g., Ukraine). However, those with whom you must deal are products of the previous regime and operate with planning horizons measured in weeks

owing to the pervasiveness of corruption, regime instability and a general unfamiliarity with property rights. In this instance it would seem that you would be a fool to not discount the future like everyone else lest you proceed under the assumption that agreements and contracts will be adhered to while all others assume the opposite. We see here, then, how time preference can be determined by those around you. But let us extend this scenario a step further. Suppose that economy is ‘flooded’ by investors such as yourself so that on average you are more likely to interact with someone who discounts the future as you do. In this instance, your expectations about the viability of agreements and contracts are likely to be revised upwards and your initial time discount less likely to change. Indeed, it may be that it is the time preferences of those who previously operated with short horizons who find it advantageous to change — especially if those like you can identify types and refrain from engaging in otherwise potentially mutually profitable negotiations with those who act on the basis of a truncated time horizon. It is the formulation and analysis of a model consistent with such scenarios that provide the focus of this essay.

2. A Model of Endogenous Time Preferences

2.1 Investment and Consumption

The preceding scenario hints at a model in which time preferences are somehow ‘learned’. Without fully dissecting the meaning of the notion of learning, suppose we conceptualize a person as consisting of two alternative time preference parameters — one that discounts the future heavily and one that does not. Which of these two parameter values applies will depend on things to be specified shortly, but suppose for the moment that each person must make an investment decision in which they allocate their current resources between investment and immediate consumption. Suppose investment yields a one period return of r . Let C_0 and I_0 be a person’s consumption and investment in the initial period ($t = 0$), so that for $t = 1$ they must divide $(1 + r)I_0$ between period 1 consumption and investment. Let that decision be C_1 and I_1 , respectively. For $t = 2$, the person must then allocate $(1 + r)I_1$ in a similar fashion between C_2 and I_2 and so on. Since we will be concerned with steady states, we make the simplifying assumption that this state is reached at $t = 1$. Thus, $C_1^* = C_2^* = C_3^* = \dots$, etc. In period 0, then, a person foresees (perhaps incorrectly) the present value of the consumption stream as

$$C_0^* + dC_1^* + d^2C_1^* + d^3C_1^* + \dots = \frac{C_0^* + dC_1^*}{1 - d} \tag{1}$$

where d is the discount applied to the future. If utility is linear, expression (1) describes what a person maximizes when making an initial investment-consumption decision. This is not necessarily what she experiences since her assumptions may be erroneous (e.g., private time discounts may change), but, *ceteris paribus*, we can solve for the pattern of investment by observing that at steady state, if $K_0 - C_0$ is invested in period 0, the period 1 ‘budget’ is $K_1 = (1 + r)(K_0 - C_0)$. Thus, if C_1 is consumed at $t = 1$, the amount $(1 + r)(K_0 - C_0) - C_1$ is invested, which yields $(1 + r)[(1 + r)(K_0 - C_0) - C_1]$ to be allocated at $t = 2$. But since we are describing a steady state, $C_2 = C_1$ and the amount $(1 + r)[(1 + r)(K_0 - C_0) - C_1] - C_1$ will be invested. Also this quantity, the amount invested in period 2, must equal the amount invested in period 1. Thus,

$$(1 + r)(K_0 - C_0) - C_1 = (1 + r)[(1 + r)(K_0 - C_0) - C_1] - C_1$$

Simple algebra reduces this equation to $C_1 = R(K_0 - C_0)$. Substituting this identity into (1) gives

$$C_0(1 - d - dr) + drK \tag{2}$$

as the thing a person maximizes by an appropriate selection of C_0 (and of C_1 , etc.). Hence,

- if $(1 - d - dr) > 0$ (i.e., $d < 1/(1 - r)$), a person’s utility stream, as perceived at $t = 0$, is maximized by setting C_0 at the maximum, K_0 , in which case the anticipated stream of consumption takes the form $(K_0, 0, 0, \dots)$, whereas
- if $(1 - d - dr) \leq 0$ (i.e., $d \geq 1/(1 - r)$), the stream of utility is maximized by setting C_0 at the minimum, 0, so that in accordance with expression (2) and the anticipated stream takes the form $(0, rK_0, rK_0, \dots)$.

Given this ‘decision rule’ a person’s pattern of investment and consumption will be determined solely by whether they have a ‘high’ or ‘low’ d , denoted d_{high} and d_{low} .²

2.2 A Modest Evolutionary Perspective

We have chosen only the simplest investment–consumption model, and one might consider using a more traditional capital stock model in which investments sustain the stock of capital goods that otherwise depreciate at an

²In the model we consider here we also allow for a small supplemental income to be added to each node in each period, which serves the purpose of ensuring that no node wholly disappears from the analysis because it consumes all of its resources in a period.

exponential rate, the product of which is consumed. Our focus, however, is not on how much complexity we can build into the model's substructure but instead to illustrate the complexity that emerges from even a simple structure. We turn then to the model's next component wherein we embed individuals in a network. Letting $i \in N = \{1, 2, \dots, n\}$ denote network nodes, we let $c_{ij} \in [0, 1]$ be the 'strength of connection' between i and j and $C = [c_{ij}]$ the $n \times n$ matrix of connections (note that our notation does not suppose that c_{ij} equals c_{ji} — connections can be asymmetric). However, before defining connection and strength, we need to specify what we mean by a node. Briefly, a node here can be viewed either as a single individual or as a collection of individuals who are themselves completely connected. In either case, a node's critical characteristic is that it is composed of a collection of both high and low ds , where \hat{p}_j denotes the current proportion of low d types at node j . This proportion, though, will depend on a starting point, a parameter p_j which denotes node j 's Evolutionary Stable proportion of low ds , the rate at which \hat{p}_j converges to p_j , and whether p_j itself is subject to change. In fact, in the model that follows, p_j is a function of $C = [c_{ij}]$ as well as of $P = (p_1, p_2, \dots, p_n)$, while c_{ij} is a function of \hat{p}_i and \hat{p}_j . Finally, if we let K_j^{low} and K_j^{high} denote the proportion of consumption in a period that can be attributed to low and high ds , respectively at node j , then our model can be summarized or at least denoted by the following functions:

$$\begin{aligned} \hat{p}_j &= g(P) \\ p_j &= h(P, C) \\ c_{ij} &= f(k_i^{\text{low}}, k_j^{\text{low}}) \end{aligned}$$

As employed in our model the functions f , g and h incorporate a number of additional parameters that are set exogenously, including the rate of return on investments and the rate at which \hat{p}_i adjusts in the direction of p_i .

The purpose of the preceding equation set is to emphasize that our model constitutes a system of simultaneously adjusting variables and that its overall character depends on several specific functional relationships. To begin, the functions g and h employed here are admittedly simple as compared to the universe of possibilities. To see some of the alternatives for g , we again let k_j^{low} and k_j^{high} denote the proportion of consumption in a period that can be attributed to low and high ds , respectively at node j and let $K_j^{\text{low}}(S)$ and $K_j^{\text{high}}(S)$ denote the proportion of consumption attributable to low and high ds , respectively among all those nodes to which j is connected (including itself) with a strength of connection greater than or equal to S , $0 \leq S < 1$. Using this notation, there are now several possibilities that we might consider. The first simply allows g to move \hat{p}_j incrementally in the direction of p_j . Alternatively, we might suppose that g takes k_j^{low} as compared to p_j to indicate whether there are too many or too few low ds at node j and

increases or decreases \hat{p}_j accordingly. In other words, rates of consumption are taken as the measure of the relative proportion of high versus low ds . The idea here is that the greater the rate of consumption by one type versus the other, the more visible and seemingly successful that type is and the more likely it is to be mimicked. The third possibility is that g compares $K_j^{\text{low}}(S)$ to p_j to indicate whether there are too many or too few low ds at node j and increases or decreases \hat{p}_j accordingly. However, regardless of which assumption is used, we need to introduce an additional parameter — the rate, r_a , at which \hat{p}_j is allowed to change from one period to the next. Specifically, we can use any one of the following transition rules:

$$\begin{aligned}\hat{p}_j &= (1 - r_a)\hat{p}_j + r_a p_j \\ \hat{p}_j &= \frac{(1 - r_a)\hat{p}_j + r_a k_j^{\text{low}}}{k_j^{\text{low}} + k_j^{\text{high}}} \\ \hat{p}_j &= \frac{(1 - r_a)\hat{p}_j + r_a K_j^{\text{low}}(S)}{K_j^{\text{low}}(S) + K_j^{\text{high}}(S)}\end{aligned}$$

In the simulation results reported here employ the third option.

The function h , in turn, which in effect subsumes the parameters and evolutionary stable strategies of some unspecified evolutionary game (see Klochko and Ordeshook, 2005 and our conclusion), can also take several forms, but here we consider the following: suppose a node looks at all others to which it is connected (at strength greater than S) and identifies the node recording the greatest per capita consumption — the node that appears to be performing best (which might be itself). Suppose the node in question, j , adjusts p_j in the direction of that best performing node, again at some incremental rate denoted r_b . That is, define $K^{\text{percap}}(i)$ as the per capita consumption of node i for the period in question. Then letting

$$k(j) = \arg \max \{K^{\text{percap}}(i) : c_{ij} \geq S\}$$

we let p_j in the next period be given by $p_j = (1 - r_b)p_j + r_b p_{k(j)}$.

There are, of course, any number of alternative functional relationships, including those in which r_b is a function of the similarity of p_j and $p_{k(j)}$ or where, instead of a simple triggering parameter S , we allow for calculations of $p_{k(j)}$ to depend on some probabilistic sampling function. But even with this simple ad hoc form, our model establishes a system in which the following parameters are initial inputs: the rate or return, r , on investments, the vector $P = (p_1, p_2, \dots, p_n)$ of initial ES p values, the vector $\hat{p} = (\hat{p}_1, \hat{p}_2, \dots, \hat{p}_n)$ of initial low d proportions at each node, the rates of adjustment r_a and r_b , and an initial $n \times n$ matrix, C , of connections with $0 < c_{ij} < 1$.

What remains is to define the function f , which dictates the dynamics of the network itself. And again we employ an especially simple functional form, namely

$$c_{ij}^{\text{new}} = \frac{c_{ij}^{\text{old}} + t2}{t1 |k_i^{\text{low}} - k_j^{\text{low}}|}$$

where c_{ij} is truncated to remain in the interval $[0,1]$. This expression introduces two parameters, $t1$ and $t2$ whose values must be set somewhat arbitrarily. The role of $t2$ is to allow connections to form between nodes where previously they did not exist, whereas $t1$ establishes the sensitivity of the strength of connection to the absolute difference in the ‘apparent’ or observed patterns of consumption between nodes, $|k_i^{\text{low}} - k_j^{\text{low}}|$. However, we can define at least two alternative forms. The first substitutes p_i and p_j for k_i^{low} and k_j^{low} , respectively so as to make connection strength a function of the similarity of current and true ES p values. Alternatively, we can let connection strengths be a function of the similarity of nodes in terms of per capita consumption. Needless to say, we are uncertain as to which assumption is most appropriate, so for the sake of brevity we consider here only the implications of the first. Nevertheless, regardless of which assumption is used, the substantively important feature of this functional form is that it assumes, as does most of the literature on networks, that connection strength (however measured or conceptualized) is monotonic and increasing with the similarity of nodes, however that similarity might be defined.

Our model’s dynamic from one period to the next, then, entails three things: adjusting the strength of connections, the proportion of types at each node and the ES p value of each node. It is the analysis of that adjustment process to which we now turn.

3. Analysis

We appreciate that the model outlined in the previous section is replete with ad hoc assumptions and formulations, including the need to specify initial and fixed parameter values for which we have no empirical referent. What, for example, is an appropriate rate of return on investments? Are we, for example, modeling financial things, wherein the market rate of return is appropriate, or are we modeling other forms of investment such as the time and effort people put into exercise and other activities ostensibly intended to facilitate one’s long-term health? Do network nodes correspond to groups of individuals or to single individuals who sometimes act as if they have a high

d and at other times a low d , with frequencies given by \hat{p}_j ?³ And what is a reasonable rate at which the proportion of types within a node adjust to the current ES p value at that node? As we show shortly, moreover, the relative rate of adjustment of ES p itself as well as the parameters $t1$ and $t2$ critically impact the dynamics of our model. But again, we are afforded little guidance by any empirical literature as to what might be appropriate ranges for such variables.

Our intent, though, is not necessarily to provide a model of any specific real-world process of endogenous time discounts and networks, but rather to show the complexity that emerges from even a simple system — an admittedly ‘mechanical’ system with a fixed number of nodes, no uncertainty, and individual relationships that, with the exception of the discrete difference in consumption patterns between high and low d types and the thermostat-like role of the parameter S , is linear in its component parts. It is not our intent, then, to explore in any comprehensive way the character of this model, looking across wide ranges of values for each and every parameter in it. Instead, we focus on the impact of a few specific parameters, arbitrarily fixing the rest.⁴ Specifically, we fix the rate of return on investments, r , at 0.05, the threshold S at 0.6, the within-node rate of convergence of low versus high d proportions to p_j at 0.025, the ratio of each node’s initial endowment to its supplemental income at 5 for each node, and the initial proportion of low d s at each node at 0.05. Finally, we report here only those results that pertain to letting the number of nodes, n , equal 16. The critical parameters those remain, then, are the rate of ES p change; the initial input connections matrix C ; the initial vector of ES p values; and the parameters $t1$ and $t2$. Even here we consider only a few possibilities by way of illustration, and note that insofar as initial conditions are concerned, nodes differ only by their initial ES p values and, in the case of hierarchical networks, the nodes to which they are initially connected.

3.1 An Initially Complete Network

We begin by assuming that every node is initially connected to every other node at strength 1.0 (in which case we set $t2 = 0$ since connection strength

³Note that if we assume that each node is a person, then our model is compatible with the assumption that people consist of memes as defined by Dawkins (1976) — some that discount the future heavily and others that do not — that survive or flourish within a person’s head in accordance with some evolutionary game (for a description of such games that require a consideration of time preferences see Klochko and Ordeshook, 2005).

⁴For the BASIC code used in this analysis see Klochko and Ordeshook (2005).

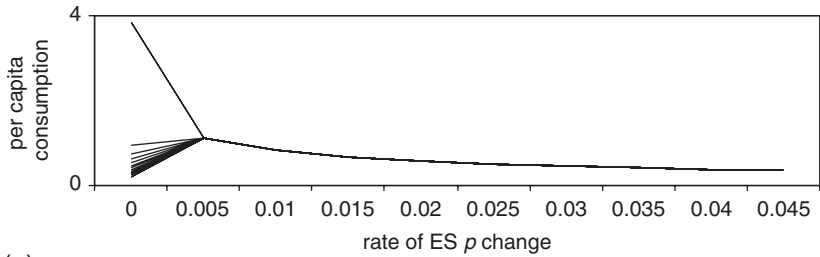
can erode, but never to 0). And here we note simply that if one pattern holds throughout our simulations it is that subnetworks tend to be defined by ‘gaps’ in the initial vector of ES p values. For example, with $n = 16$, if p increases in increments of, say, 0.05 as we go from node 1 to 8 and from 9 to 16, but by say 0.10 between nodes 8 and 9, then barring a wholly complete 16-node network or a wholly atomistic system in which no node is connected to any other, there is a strong tendency for nodes 1 through 8 and 9 through 16 to form distinct subnetworks. Here, then, we limit our discussion to a vector of initial ES p s that eliminates such gaps with a uniform difference across numerically adjacent nodes. Specifically, we let

$$P = (0.05, 0.11, 0.17, 0.23, 0.29, 0.35, 0.41, 0.47, 0.53, 0.59, 0.65, 0.71, 0.77, 0.83, 0.89, 0.95)$$

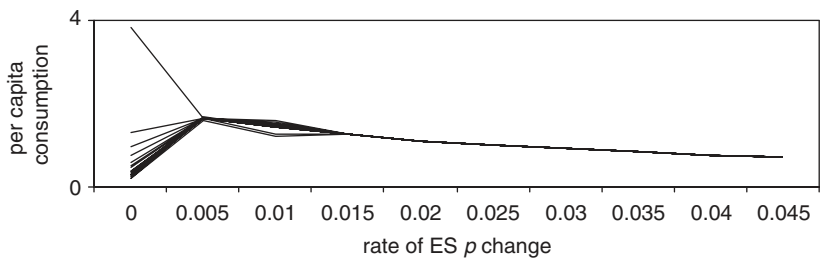
Figure 1, which graph per capita consumption for each of 16 nodes, portray the results of simulations for a range of values of $t1$ (2–14) and reveal a number of emergent patterns. First, even if we make it relatively difficult to sustain connections (e.g., $t1 = 14$), the absence of gaps yields a single subnetwork for all but the lowest rates of change in ES p . This is not to say, however, that $t1$ is irrelevant. When $t1 = 2$, the network is complete — all 256 connections exist at strength 1. When $t1 = 7$, completeness declines to 130; at $t1 = 9$ it becomes 104 and at $t1 = 14$, it declines to 74. Indeed, at $t1 = 14$, no node is connected to more than four other nodes, and the ‘boundary’ nodes of 1 and 16 are connected to only two others. Thus, and wholly unsurprisingly, as it becomes more difficult to sustain connections among dissimilar nodes, a ‘chain’ pattern emerges in the overall structure of the network. Of course, if we increase $t1$ further to say 17, this chain is broken and the system becomes nearly wholly atomistic: nodes 1 through 13 are not connected to anyone, whereas nodes 14 through 16 form a unique subnetwork (and for still greater values of $t1$ even this subnetwork disappears).

However, Figure 1 do not exhaust the patterns that emerge with P . Consider Figure 2, which graph per capita consumption for four values of $t1$ all slightly less than 17. Here, we see a process whereby a 16-node system becomes increasingly atomistic as $t1$ increases. For $t1 = 16.7$, Figure 2 looks much like what we observe when $t1 = 14$ (Figure 1). However, for $t1 = 16.8$, a number of groups ‘fell away’ significantly to form several distinct subgroups at the lowest rate of ES p change (specifically: $\{1, 2, 3, 4\}$, $\{5\}$, $\{6, 7, 8, 9, 10, 11\}$, $\{12\}$ and $\{13, 14, 15, 16\}$). This ‘falling away’ accelerates when $t1$ increases to 16.9 (Figure 2) so that distinct subnetworks are observed even when the rate of ES p adjustment equals 0.01 (specifically: $\{1, 2, 3\}$, $\{4, 5\}$, $\{6, 7, 8, 9, 10, 11\}$ and $\{12, 13, 14, 15, 16\}$). Finally, in for $t1 = 17$, the

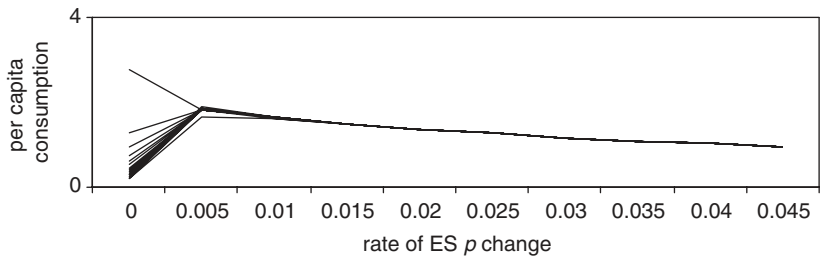
Figure 1: Graph Showing Per Capita Consumption for Each of 16 Nodes Showing a Range of Values of $t1$ (a) $t1 = 2$; (b) $t1 = 7$; (c) $t1 = 9$; (d) $t1 = 14$.



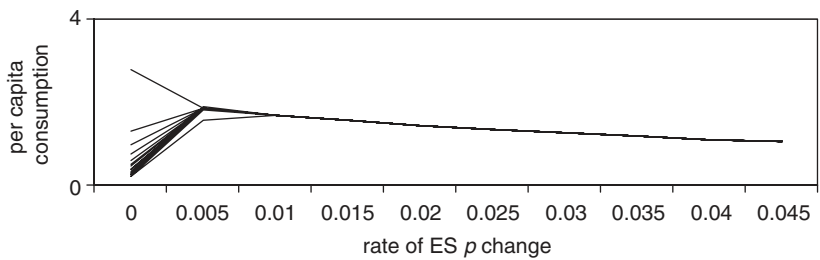
(a)



(b)

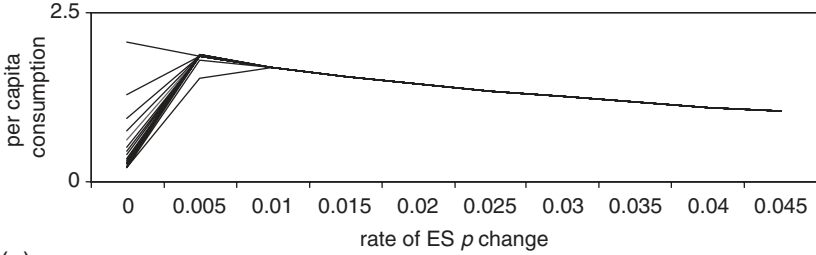


(c)

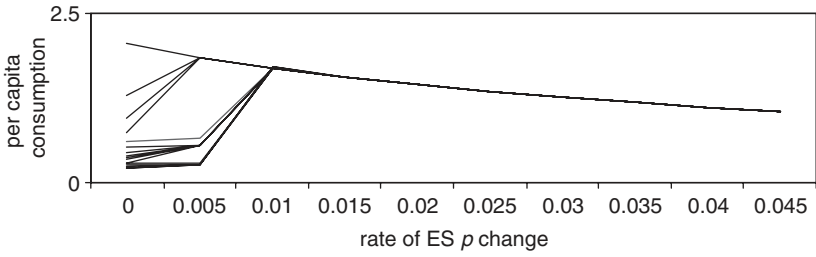


(d)

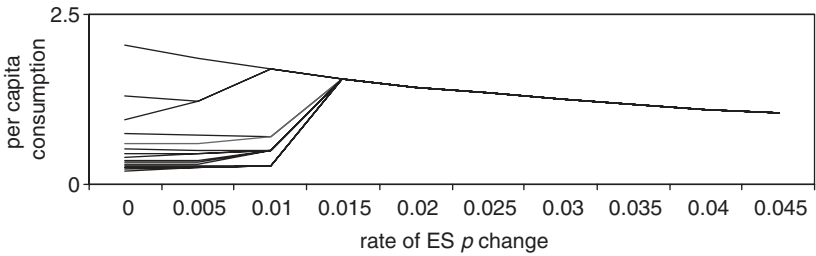
Figure 2: Graph Depicting Per Capita Consumption for Four Values of $t1$. (a) $t1 = 16.7$; (b) $t1 = 16.8$; (c) $t1 = 16.9$; (d) $t1 = 17$.



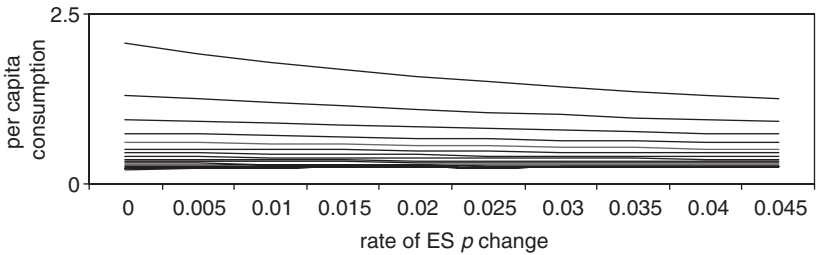
(a)



(b)



(c)



(d)

Table 1: Subnetworks and Number of Connections for Values of $t1$

	16.80	16.90	16.91	16.92	16.93	16.94	16.95	17.00
1	2	2	0	0	0	0	0	0
2	3	2	0	0	0	0	0	0
3	4	2	0	0	0	0	0	0
4	4	1	1	0	0	0	0	0
5	4	1	1	0	0	0	0	0
6	4	2	2	2	0	0	0	0
7	4	3	3	3	2	0	0	0
8	4	4	3	4	3	2	0	0
9	4	4	3	3	3	2	0	0
10	4	3	2	2	2	2	0	0
11	4	2	0	2	2	2	2	0
12	4	2	2	3	3	3	3	0
13	4	3	3	4	4	4	4	0
14	4	4	4	4	4	4	4	2
15	4	3	3	3	3	3	3	2
16	2	2	2	2	2	2	2	2

process of atomization is nearly complete for all values of ES p rates of change considered.

There is an additional feature of subgroup formation that Figure 2 fail to reveal. Consider Table 1, which, for a rate of ES p adjustment equal to 0.01, shows the subnetworks that exist for several values of $t1$ in the range 16.8–17.0 (subnetwork boundaries are given by the dark solid lines while cells report the number of nodes to which the node in question is connected other than itself). Note that with but one exception, once a boundary between subnetworks forms, it persists for all higher values of $t1$. The exception to this rule of ‘subnetwork continuity’ occurs for values of $t1$ around 16.91. In this instance, node 11 is a member of subnetwork {6, 7, 8, 9, 10, 11} when $t1 = 16.9$, is a member of {11, 12, 13, 14, 15, 16} when $t1$ is 16.92 or greater, but is wholly disconnected from every other node for the intermediate value of $t1 = 16.91$. One can reasonably assume that similar instances of ‘transitional isolation’ would be discovered with an even finer grid of $t1$ values. But one example is sufficient to establish a degree of complexity in the relationship between subnetwork structures and the ease or difficult of sustaining connections. That is, if we can imagine a circumstance in which the maintenance of network connections becomes incrementally more difficult, we cannot preclude the possibility of observing instances in which a node, initially a part of some subnetwork, transitions to standing alone in isolation until either it remains isolated thereafter as the difficulty of

maintaining connections increases further or joins some other subnetwork. Admittedly, instances of temporary isolation are not common in our simulations. But their occurrence suggests a social phenomenon wherein the isolation of a group or individual from society is an otherwise unstable equilibrium in which the likelihood that it will join a subnetwork is determined by small, even imperceptible changes in parameters. At a minimum, these instances of temporary isolation reveal that the process of subnetwork formation or dissolution need not be continuous or monotonic.

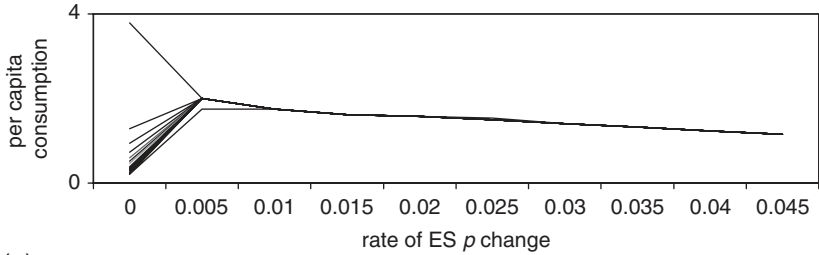
3.2 An Intermediate Case

As a prelude to considering the opposite extreme of an initially wholly disconnected system, we next consider the intermediate case where the initial connections matrix, now denoted C^o , connects all odd (even)-numbered nodes but where no odd node is connected to any even one. In this instance, setting $t2 = 0$ precludes the possibility of odd-numbered nodes impacting any even-numbered one and vice versa. The more substantively reasonable case is when connections can develop even if they are initially nonexistent. Hence, to explore the issues that arise when $t2 > 0$, we proceed with P as the input vector of initial ES p s, and setting $t1$ not altogether arbitrarily equal to 16.7, Figure 3 graph per capita spending for four values of $t2$: 0.5, 0.01, 0.00125 and 0.001.

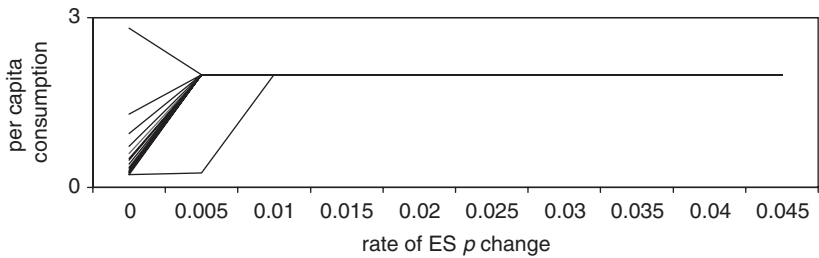
These figures reveal the obvious: as $t2$ decreases — as it becomes more difficult to establish a connection where initially there is none — atomization increases (as measured by the number of subnetworks). At $t2 = 0.5$, only one subnetwork prevails for any positive rate of ES p adjustment; when $t2 = 0.01$, the rate of ES p adjustment needs to equal 0.01 or greater before the subnetwork {15, 16} joins the remaining nodes; when $t2 = 0.00125$, the system converges to three wholly connected subnetworks ({1, 2, 3, 4, 5}, {6, 7, 8, 9}, {10, 11, 12, 13, 14, 15, 16}), and when $t2$ is reduced still further to 0.001, the system becomes wholly atomistic.

It might seem that this is the end of the story: the easier it is to establish a connection (or, as in the discussion of $t1$, to maintain one), the more likely we are to see that connection in equilibrium. However, network structures can change as a function of $t1$ and $t2$ in more complex ways. First, although a single subnetwork prevails when $t2$ equals either 0.5 or 0.01, the character of these subnetworks differ. Whereas with $t2 = 0.5$ per capita consumption continues to decline as the rate of ES p change increases, consumption rates are a constant when $t2 = 0.01$ (or greater). The suggestion here, then, is that if connections are relatively easy to establish, the influence of nodes that discount the future greatly and save little increases as the rate of change in ES p increases; but if connections are more difficult to establish but not so much so as to preclude them altogether, nodes that value the future more

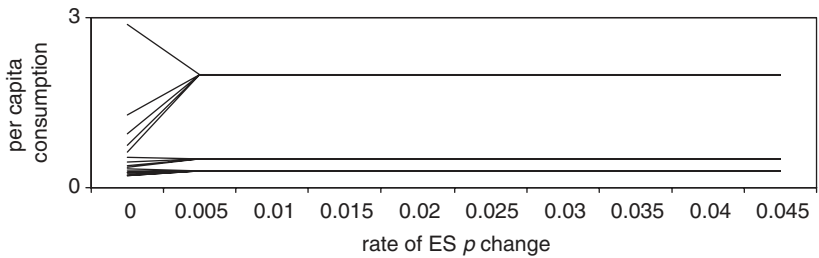
Figure 3: Graph Showing Per Capita Spending for Four Values of t_2 (a) C^o , $t_1 = 16.7$, $t_2 = 0.50$; (b) C^o , $t_1 = 16.7$, $t_2 = 0.01$; (c) C^o , $t_1 = 16.7$, $t_2 = 0.00125$; (d) C^o , $t_1 = 16.7$, $t_2 = 0.001$.



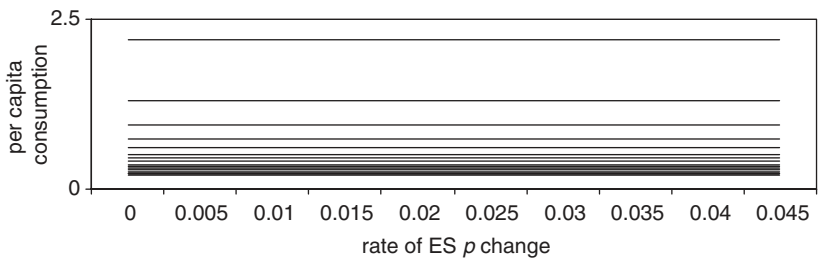
(a)



(b)



(c)



(d)

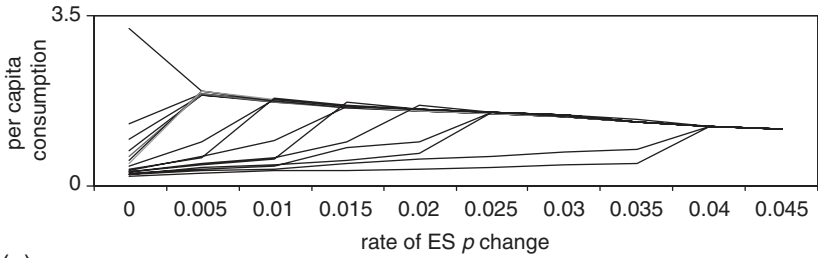
highly succeed in bringing all other nodes up to a higher level of consumption that is invariant with the rate of ES p adjustment. This result might seem counter-intuitive. Although we might otherwise suppose that social welfare is maximized when network connections are relatively easy to form, here we see the opposite. The reason is straightforward: if high investment nodes are isolated for a time, they can achieve a relatively high level of consumption. If at the same time the difficulty of forming connections is not so great as to exclude them altogether, then ultimately the nodes that achieve a high level of per capita consumption through investment will impact those that initially saved little. Hence, overall social welfare and homogeneity are maximized for intermediate values of $t2$. That is, at least for the range of parameter values considered, it is as if there is an intermediate socially optimal value for the ease with which new connections can be formed on the basis of the similarity of nodes.

Other patterns emerge for $t2 > 0$. For example, the move from $t2 = 0.50$ to 0.01 in Figure 3 disguise the sometimes complex nature of $t2$'s influence. Figure 4, then, consider the intermediate values in the range $[0.10, 0.0125]$. What we see here is a process whereby low investment nodes require increasingly higher rates of ES p adjustment in order to join and influence (negatively) their high investment counterparts; but once some critical value of $t2$ is passed (0.0125), high investment nodes become, in a sense, dominant.

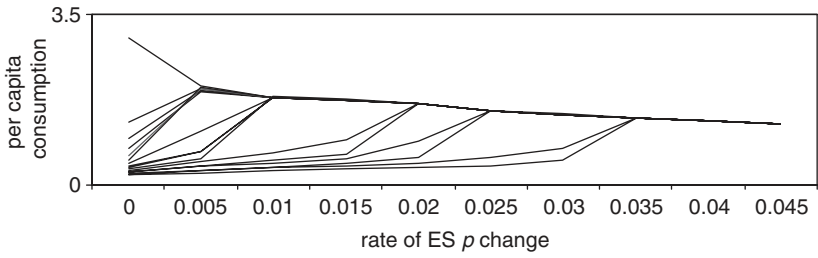
At this point it is worth noting that our analysis considers only rates of ES p adjustment over a small range and ignores the threshold S at which a node takes cognizance of the actions of others. Figure 5, then, consider four alternative values of $t2$ when, instead of looking at rates of ES p change between 0 and 0.045 , we consider rates between 0 and 0.45 . And what we see is a great deal more regularity in the character of subnetworks. Absent are any transitional processes and instead we observe immediate convergence to subnetworks that follow a predictable pattern: with higher rates of ES p change, the more difficult it is to form a new connection (the lower the value of $t2$), the greater is the number of subnetworks in equilibrium (with respect to Figure 5, the progression is $1, 4, 14$ and 16 subnetworks).

More interesting is the impact of S . To this point we let $S = 0.6$. However, in the preceding figures the boundary between subnetworks is precisely 0.6 when $t2 = 0.0012$. Figure 6, then, compare simulations when S equals $0.60, 0.59, 0.55$ and 0.50 (hence, Figure 6 reproduces Figure 5). The pattern is again as expected: As S decreases, the number of subnetworks declines as well. Of course, when we lower S it is logical that new and stronger connections will form in equilibrium between adjacent subnetworks. For example, when $S = 0.6$, the strength of connection between nodes 1 and 2 equals precisely 0.6 , and when the threshold S is lowered to 0.59 , that strength becomes 1.0 in equilibrium. But lest we assume that any 'nearly

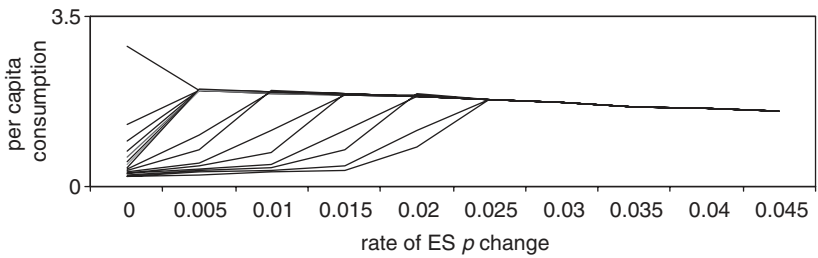
Figure 4: Graph Showing Intermediate Values of t_2 . (a) C^o , $t_1 = 16.7$, $t_2 = 0.1$; (b) C^o , $t_1 = 16.7$, $t_2 = 0.05$; (c) C^o , $t_1 = 16.7$, $t_2 = 0.025$; (d) C^o , $t_1 = 16.7$, $t_2 = 0.0125$.



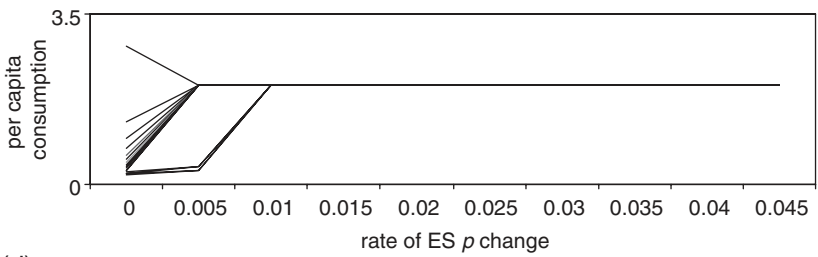
(a)



(b)



(c)



(d)

Figure 5: Graph Showing Four Alternative Values of t_2 . (a) C^o , $t_1 = 16.7$, $t_2 = 0.002$; (b) C^o , $t_1 = 16.7$, $t_2 = 0.00121$; (c) C^o , $t_1 = 16.7$, $t_2 = 0.0012$; (d) C^o , $t_1 = 16.7$, $t_2 = 0.001$.

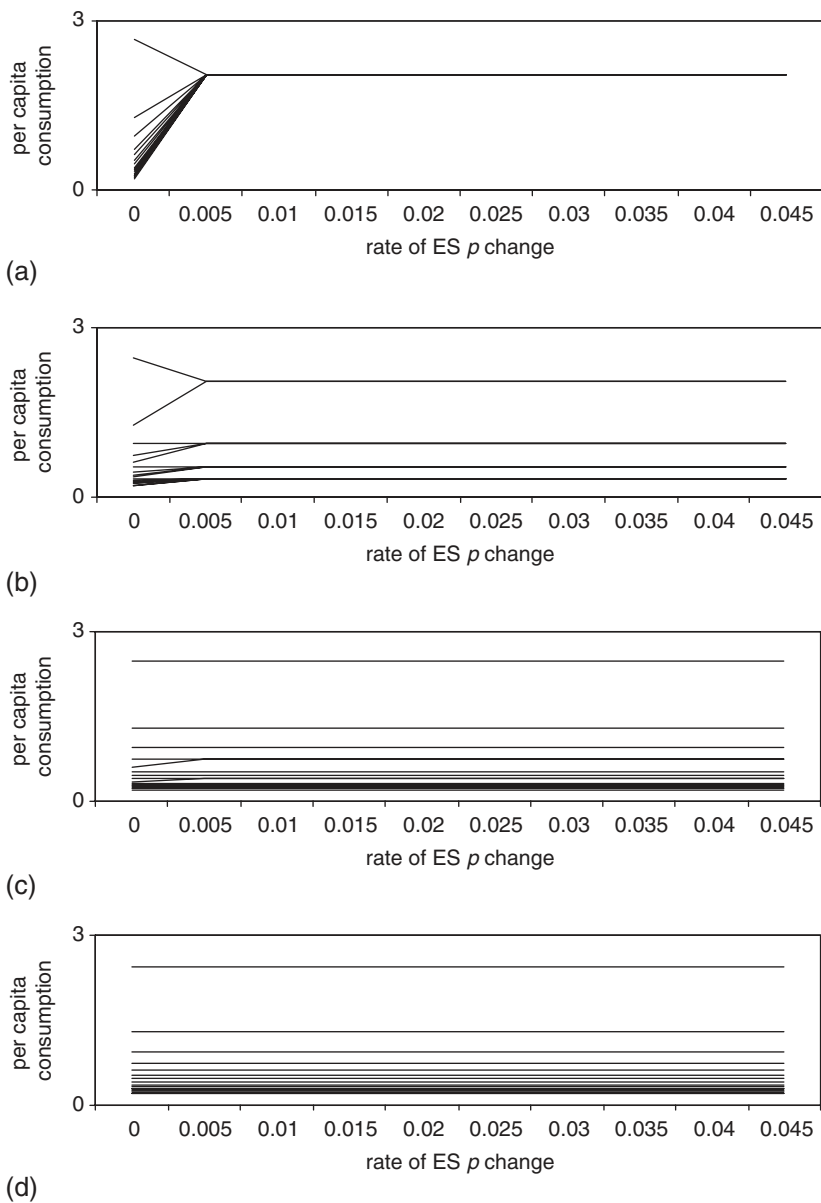
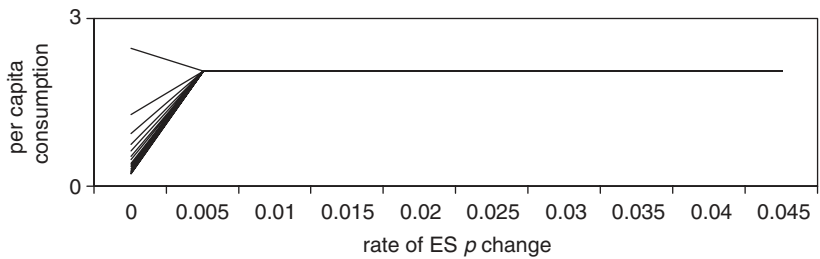
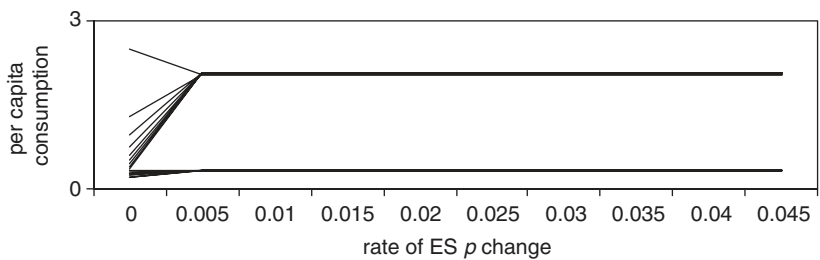
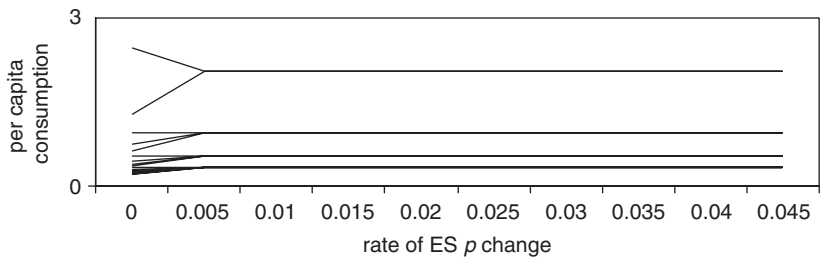
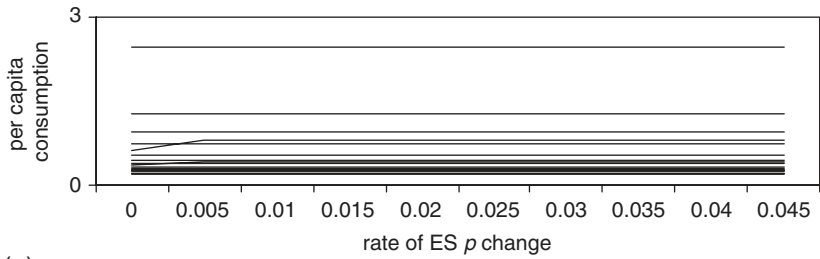


Figure 6: Graph Showing Simulations Compared when S equals 0.6, 0.59, 0.55 and 0.50. (a) C^o , $t_1 = 16.7$, $t_2 = 0.0012$, $S = 0.60$; (b) C^o , $t_1 = 16.7$, $t_2 = 0.0012$, $S = 0.59$; (c) C^o , $t_1 = 16.7$, $t_2 = 0.0012$, $S = 0.55$; (d) C^o , $t_1 = 16.7$, $t_2 = 0.0012$, $S = 0.50$.



sufficient' connection will become sufficient to fully connect two nodes when S is lowered, we note that 2's strength of connection to node 3 is also 0.6 with $t2 = 0.0012$ and $S = 0.6$. However, rather than join 3 when S is reduced to 0.59, 2 joins 1 while 3 forms a subnetwork with nodes 4 and 5. And lest we think that subnetworks will join only if the strength of connection between them is sufficiently high, we note with $S = 0.59$, the strengths of connection between any two subnetworks does not exceed 0.001. However, as we lower S further to 0.55, subnetworks continue to consolidate (to two), and they consolidate further still when S is lowered to 0.50.

This somewhat counter-intuitive result has a logical explanation that bears on the emergent complexity of our model. We need to bear in mind that this discussion here concerns outcomes in equilibrium. However, suppose two nodes have some connection at or near the beginning of an equilibration process — say 0.56. With $S = 0.60$ those two nodes do not take into account each others rates of consumption in adjusting their respective ES *ps* and proportions of types, in which case, *ceteris paribus*, they are likely to 'drift apart' and form distinct subgroups. On the other hand, if $S = 0.55$, they each pay full heed to the other and are thereby more likely to join in the same subnetwork and arrive at equivalent levels of consumption, which nevertheless can have the effect of drawing them away from other nodes. The eventual equilibrium will then depend on the interactions of various rates of adjustment in what might seem at times like a 'race for influence'. Of course, the impact of S here is determined by the functional forms within our model and we appreciate that the discrete 'triggering' character of our model is unlikely to match reality. The model, though, does alert us to the possibility that the 'technologies of visibility' whereby nodes 'pay attention' to others can have profound effects. A node, for example, that bears the strength of connection X to adjacent groups might move in the direction of one set of nodes to form a subnetwork whereas if that initial strength is $X + \epsilon$, it might move in a wholly different direction so as to yield a distinctly different subnetwork structure.

3.3 An Atomistic Initial State

Our analysis began at one extreme, where nodes are initially connected at maximum strength, and then moved to a somewhat arbitrary intermediate case. We now consider the opposite extreme where no node is connected initially to any other node (i.e., where the 16×16 input matrix of connection strengths, C , is simply the identity matrix \mathbf{I}). However, before proceeding, a bit of algebra is in order. Note that if $c_{old} = 0$ is our initial condition, we can write $c_{new} = t2/t1 \delta p$ where $\delta p = |p_i - p_j|$. Moreover, if $\delta p = 0.06$ initially (as is the case with the vector P) and $S = 0.6$, then the initial condition for two

nodes to develop a connection is

$$\frac{t2}{t1\delta p > 0.6} \Rightarrow \frac{t2}{t1 > 0.036}$$

This unexceptional condition requires only that $t2$ be ‘large enough’ and $t1$ ‘small enough’. On the other hand, we cannot assume that a connection will not develop if this inequality is reversed. Our assumption about the functional relationship between c_{new} and c_{old} defines a recursive equation across periods, so letting $c(j)$ denote the strength of connection in iteration or period j , if this strength is 0 for $j = 0$, then for $j = 1$ it equals $c(1) = t2/t1\delta p$. Letting $K = t1\delta p$, then for $j = 2$, if δp is unchanged because of the disconnect between nodes, we have

$$c(2) = \frac{t2 + t2/K}{K} = \frac{Kt2 + t2}{K^2}$$

for $j = 3$,

$$c(3) = \frac{t2 + (Kt2 + t2)/K^2}{K} = \frac{K^2t2 + Kt2 + t2^2}{K^3}$$

and for $j = n$,

$$c(n) = \frac{t2(K^{n-1} + K^{n-2} + \dots + K + 1)}{K^n} = \frac{t2}{K} + \frac{t2}{K^2} + \frac{t2}{K^3} + \dots + \frac{t2}{K^n}$$

Note that if $K < 1$, the most relevant term is the last, whereas if $K > 1$, the most relevant is the first. Hence, if $K > 1$, $t2$ is critical for determining whether a connection will develop that exceeds S ($= 0.6$ here). But if $K < 1$, we need only consider a sufficiently large number of iterations before $c(n)$ achieves this threshold. And if, as with P , $\delta p = 0.06$, then $K = 1$ if $t1 = 16.667$. Thus, it is no accident that in describing the sensitivity of such things as per capita consumption and subnetwork structures to variations in $t2$, it is when $t1 = 16.7$ that we are likely to find the eventual equilibrium most sensitive to other parameter values. However, none of this implies that disjoint subnetworks cannot develop for values of $K < 1$. Even if $t1\delta p < 1$ initially, it is possible that ES ps evolve so that δp grows to reverse this inequality (which establishes that if $t1 < 1$, a single wholly connected subnetwork prevails ultimately in our model since in this case K can never equal or exceed 1). But clearly, such an occurrence is more difficult than when $K > 1$.

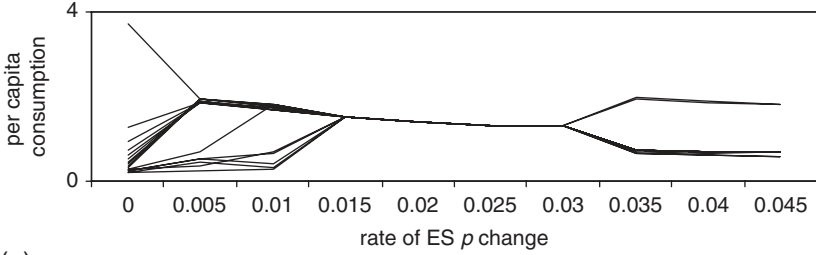
With these considerations in mind, if we again let P be our initial vector of ES p values and set $t1 = 16.7$, then graphs of per capita consumption various values of $t2$ look much like what we see when we let $C = C^o$. Thus, the initial disconnect between odd and even number nodes in the previous section seems of little if any consequence, at least when compared to the case

where all nodes are initially disconnected. However, a word of caution is in order here before we infer that it matters little whether we begin with $C = C^\circ$ or $C = \mathbf{I}$. There are, in fact, subtle differences in per capita consumption rates that simply are not large enough to impact subnetwork structures for the parameter values considered. There is, moreover, no formal reason for concluding that C° and \mathbf{I} are equivalent starting points. We can, in fact, find subtle differences in both subnetwork structures (e.g., instances in which the subnetworks $\{1, \dots, 12\}$, $\{13, \dots, 16\}$ prevail with C° and $\{1, \dots, 13\}$, $\{14, \dots, 16\}$ with \mathbf{I}). The differences in per capita consumption also follow a consistent pattern; namely, consumption is higher with \mathbf{I} than with C° . The reason for this difference is that the initial isolation of nodes that invest affords them greater consumption in the long run, and induces nodes that initially save little to raise their ES p values when mimicking others so that they too, in the long run, enjoy a higher level of consumption. This explanation reveals, though, that eventual equilibria will be sensitive in complex ways to relative rates of change, initial parameter values (including the rate of return on investments), and functional forms.

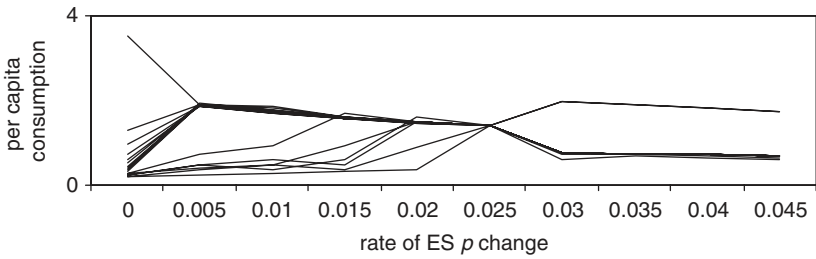
Finally, let us consider a set of simulations that pertain to letting t_1 take a more extreme value, 20, so that K , initially, exceeds 1 and t_2 becomes especially critical. Briefly, with $t_1 = 20$, if $t_2 \geq 0.45$ (again with $S = 0.6$), the system converges to a single wholly connected subnetwork regardless of the rate of change of ES p , whereas with $t_2 \leq 0.11$, we sustain the initial atomistic structure of \mathbf{I} . But now, consider [Figure 7](#), where per capita consumption fails to abide by any monotonic relationship with rates of ES p adjustment and nodes seem to shift almost randomly among subgroups. It would seem, then, that our model generates more than mere complexity – it generates incoherence. There is, though, somewhat more of a pattern here than initially meets the eye. First, a good share of the apparent incoherence in [Figure 6](#) is a product of the fact that even in equilibrium, nodes that are members of the same subgroup need not enjoy the same level of per capita consumption. For example, although it might seem in [Figure 7](#) that there are at least three and possibly four subnetworks if the rate of ES p change equals or exceeds 0.02, there are only two — ($\{1, \dots, 13\}, \{14, \dots, 16\}$ and then $\{1, 2\}, \{3, \dots, 16\}$). Nevertheless, there is an additional source of apparent incoherence here; namely, subnetwork structures are not a monotonic function of either the rate of ES p adjustment or of t_2 .

[Table 2](#) describes subnetworks for each rate of ES p change between 0.005 and 0.045 versus nine values of t_2 (e.g., with $t_2 = 0.18$ and a rate of ES p change equal to 0.010, we have four subnetworks: $\{1, \dots, 9\}, \{10, 11\}, \{12, 13\}, \{14, \dots, 16\}$). The first thing to note is that although there is a tendency for the number of subnetworks to increase as the rate of ES p change increases, that tendency is not a universal rule: it is violated in several instance when $t_2 = 0.30, 0.25, 0.20$ and 0.125 . The same is true with respect to

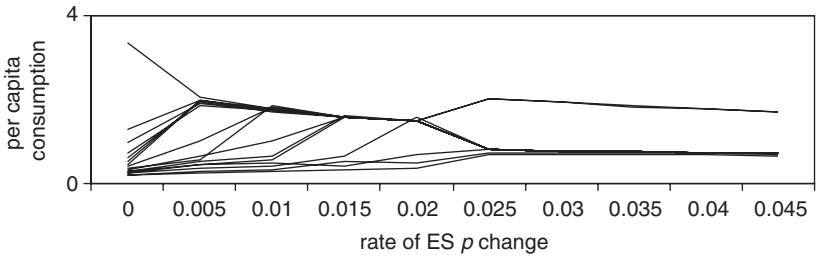
Figure 7: Graph Showing that Per Capita Consumption Abides by Monotonic Relationship with Rates of ES_P Adjustment. (a) $C = I$, $t1 = 20$, $t2 = 0.25$; (b) $C = I$, $t1 = 20$, $t2 = 0.20$; (c) $C = I$, $t1 = 20$, $t2 = 0.175$; (d) $C = I$, $t1 = 20$, $t2 = 0.125$.



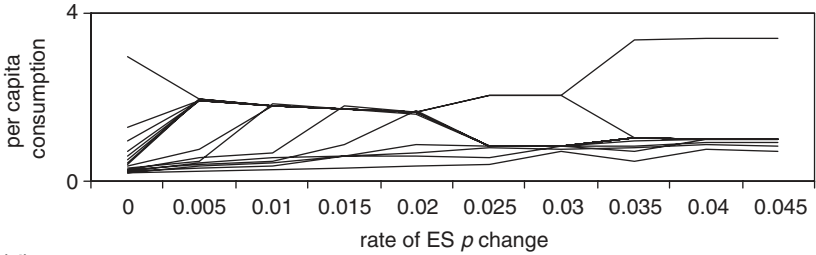
(a)



(b)



(c)



(d)

Table 2: Subnetworks Versus t_2 and Rates of ES p Change, P_3 , $C = I$, $t_1 = 20$

	.30	.25	.20	.19	.18	.175	.15	.125
.005	1-11	1-10	1-10	1-9	1-7	1-7	1-7	1-8
	12-16	11-12	11-12	10-11	8-9	8-9	8-9	9-10
.010		13-16	13-16	12-13	10-11	10-11	10-11	11-12
				14-16	12-16	12-13	12-13	13-14
						14-16	14-16	15-16
	1-16	1-11	1-10	1-11	1-9	1-9	1-9	1-10
		12-13	11-12	12-13	10-11	10-11	10-11	11-12
.015		14-16	13-14	14-16	12-13	12-13	12-13	13-14
			15-16		14-16	14-16	14-16	15-16
	1-16	1-16	1-11	1-11	1-13	1-12	1-12	1-11
.020			12-13	12-13	14-16	13-14	13-14	12-13
			14-16	14-16		15-16	15-16	14-16
	1-16	1-16	1-14	1-13	1-13	1-13	1-12	1-11
.025			15-16	14-16	14-16	14-16	13-14	12-13
							15-16	14-16
	1-16	1-16	1-16	1-14	1-2	1-2	1-2	1-2
.030				15-16	3-16	3-16	3-14	3-14
							15-16	15-16
.035	1-16	1-16	1-2	1-2	1-2	1-2	1-2	1-2
			3-16	3-16	3-16	3-16	3-16	3-16
.040			1-2	1-2	1-2	1-2	1-2	1
	1-16	1-2	3-16	3-16	3-16	3-16	3-16	2-14
.045								15-16
	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1
.045								1
	3-16	3-16	3-16	3-16	3-16	3-16	3-16	2-16

the relationship between the number of subnetworks and t_2 : although there is a tendency for that number to increase as t_2 increases, there are at least two instances where monotonicity does not hold (when $t_2 = 0.19$ and the rate of change is 0.010 and when $t_2 = 0.18$ and that rate equals 0.015). The shaded cells in Table 2 denote points of ‘subnetwork structure’ discontinuity (e.g., when the rate of adjustment equals 0.010 and we decrease t_2 from 0.20 to 0.19, the boundaries between $\{1, \dots, 10\}$ and $\{11, 12\}$, between $\{11, 12\}$ and $\{13, 14\}$ and between $\{13, 14\}$ and $\{15, 16\}$ disappear since node 11 splits off from $\{11, 12\}$ to join $\{1, \dots, 10\}$, 12 joins 13, and 14 splits off from $\{13, 14\}$ to join $\{15, 16\}$). Recall in Table 1 the single instance of what we labeled a discontinuity — of where a boundary between subnetworks disappeared and a new one appeared as t_1 increased. The discontinuities to

which we refer in Table 2 are of a similar sort, except that now we are considering changes in $t2$.

4. Summary and Conclusions

We should note that the preceding seemingly peculiar ‘patterns’ arise in part because we consider rates of adjustment that allow for the complex interplay of the variety of endogenously determined parameters (i.e., strengths of connection, the nodes that each node considers when making any adjustment in its ES p , the ES p s themselves, consumption and investment rates, and the proportion of high and low d types), and that if we consider higher rates of change, then more coherent patterns prevail. Nevertheless, the patterns we describe here reveal some of the complexity that, it is safe to assume, can arise in real world environments. We should also emphasize that we cannot assume that the rates adjustment considered here are in fact ‘low’ and that higher rates are more substantively relevant. We have no empirical guidance as to what constitutes an appropriate rate. And, as we note earlier, the same is true of the other parameter values considered here. Finally, we need to emphasize that we consider here only a small fraction of potentially interesting initial conditions. We could, for instance, consider larger populations, or initial connection matrices that allow for hierarchies. Almost certainly other unanticipated complex patterns will emerge that are no less complex than the ones portrayed here.

Can a more concerted effort at formulating a model that allows for closed form results eliminate some or all of this apparent incoherence? Naturally it is dangerous to say ‘no’, but we suspect that that is indeed the answer. This is not to say that there do not exist functional forms for some of the relationships modeled here that might yield closed form results. But absent any substantive basis for choosing one set of functional forms over another, we cannot also preclude the possibility that the ‘incoherence’ established by our model does not in fact mirror reality and that an analysis which establishes more coherent and more easily describable patterns is in fact a model of nothing.

There are, in fact, reasons for believing that reality gives rise to even more complexity than we describe here. Consider the function h which determines the ES p value of a node. Rather than assume as h does that p is dictated by simple mimicking, suppose we dig deeper into the evolutionary game theoretic underpinnings and choose instead to derive the value of p from some evolutionary game that seeks to model a specific substantive scenario. The simplest and most commonly cited such scenario, of course, is the familiar ‘Hawk-Dove’ game occasioned by the following 2×2 payoff matrix (see for example, Samuelson 1997, Weibull, 1995; Dixit and Skeath, 1999), which we instead label as the interaction of high and low d types:

The payoffs u and v can model a variety of situations. If $u > 1$ and $v > 0$, the game is a Prisoners' Dilemma; if $u > 1$ $v < 0$, the situation corresponds to the game of Chicken; if $u > 1$ and $v < -1$, the situation is a Battle of the Sexes; and if $v > 1$ and $0 < u < 1$, the situation is an Assurance game. However, if instead of treating this matrix as a two-person game, we use it as a model of an evolutionary process in which cell payoffs correspond to 'fitness', we can assess whether a population consisting exclusively of one type or the other, or some mixture of both, confers an advantage on one type or the other. That is, for a particular distribution across types, will one type or the other replicate itself at a greater rate than the alternative? Evolutionary stability, then, corresponds to a 'strategy' or distribution $p = (p, 1-p)$ across the two types such that genetic 'defects' of one type or the other cannot 'invade' a population that corresponds to that distribution. And here, for brevity, we note simply that if $u > 1$ and $v < 0$, the population will be polymorphic with $p = -v/(u-1-v)$. However, in the current context, we should follow Shapiro's (2002) suggestion for adaptive neural networks by supposing that Table 3 merely describes the possible payoffs experienced in a single event or interaction. Instead, we let fitness be determined by whatever payoff accrues in that interaction under the assumption that this payoff is but one realization of an indefinite sequence of equivalent payoffs. Thus, the generalization of Table 3 is shown in Table 4, in which case the value of ES p for a polymorphic population becomes,

$$p = \frac{-v}{u(1 - d_{\text{high}}) - (1 - d_{\text{low}}) - v}$$

Note that if both discount rates equal 0, then this expression is equivalent to the ES value of p when we equate fitness with immediate payoffs from a

Table 3: Generic Evolutionary Game

	high d	low d
high d	1, 1	$-v, u$
low d	$u, -v$	0, 0

Table 4: Fitness Discounted

	high d	low d
high d	$1/(1-d_{\text{high}}), 1/(1-d_{\text{high}})$	$-v/(1-d_{\text{high}}), u/(1-d_{\text{low}})$
low d	$u/(1-d_{\text{low}}), -v/(1-d_{\text{high}})$	0, 0

single interaction. Note also the equivalence here between this formulation and one in which fitness is measured by the discounted value of past experiences as opposed to a projection of future experience. Specifically, if experience in period $t = (0, -1, -2, -3, \dots)$ is weighted by the discount d^{-t} (so that recent events are given more weight than less recent ones), we achieve an analytically identical formulation. More importantly, what the preceding expression for p reveals is a new interaction function for the parameters of our model; namely between ES p and the cardinal value of d (as opposed to merely whether d is ‘high’ or ‘low’). Hence, a more complete model that seeks to accommodate the implicit evolutionary game that underlies the analysis offered here will most likely yield even more complex patterns than those we describe here. And this complexity can only increase further if, at the same time, we assume that what is being learned from interactions in a network is not p directly, but the parameters of an evolutionary game such as u and v .

It is also important to note that it is not simply the mechanism of adaptive time preferences within a single individual (or node of a network) that is the source and manifestation of complexity in the analysis we offer here. Indeed, our adaptation mechanism and its consequences for consumption versus investment within a node is quite simple and easily describable in analytic form. Rather, it is the combination of interactions across a network, when otherwise easily described components of a system interact and adjust to each other, that occasions the patterns we describe here that are unlikely to be subject to closed form summary. Emphasizing this conclusion is the fact that the seemingly ‘irregular’ consumption patterns summarized by [Figure 7](#) are largely the consequence of ‘irregular’ changes in subnetwork structure as parameters change (see [Table 2](#)).

This is not to say, of course, that some patterns cannot be generalized in closed form. Surely the patterns of consumption (and correspondingly, of investment) illustrated by [Figure 1 through 6](#) are anything but incoherent. On the other hand, we wonder what closed form system can summarize the ‘patterns’ [Figures 7](#) show or the discontinuities in subnetwork structure that [Tables 1 and 2](#) reveal. Moreover, it needs to be kept in mind that we have hardly begun to explore here the interaction of the majority of our model’s parameters — and exploration that almost certainly will uncover other complex patterns. The general lesson learned here, then, is that although we should hardly suspend the quest for analytic tractability, we should not establish it as an objective whereby we judge the quality of research by its ability to yield results that can be portrayed as general ‘theorems’ or ‘propositions’. Research in the social sciences, whether it is economics, political science or sociology, needs to be prepared for models and analysis of real world phenomena that are too complex to be summarized in any simple analytic way.

References

- Axelrod, R.M. (1984). *The Evolution of Cooperation*, Basic Books, New York.
- Becker, G.S. and Mulligan, C.B. (1977). The Endogenous determination of Time Preference. *Quarterly Journal of Economics*, 112(August), 729–758.
- Becker, G.S. and Murphy, K.M. (1988). A Theory of Rational Addiction. *Journal of Political Economy*, 96(4), 675–700.
- Bendor, J. and Swistak, P. (2001). The Evolution of Norms. *American Journal of Sociology*, 106(6), 1493–1545.
- Dawkins, R. (1976). *The Selfish Gene*, Oxford University Press, Oxford.
- Dixit, A. and Skeath, S. (1999). *Games of Strategy*, Norton, New York.
- Friedman, J. (1977). *Oligopoly and the Theory of Games*, North-Holland, Amsterdam.
- Klochko, M.A. (2005). *A Note on Time Discounting and Sobriety: Evidence of the Endogenous Determination of Discount Rates*. Mimeo, Ohio State University, Marion, OH
- Klochko, M.A. (2006). Time Preferences and Selection vs. Learning: A Case Study of Ukrainian Students. *Rationality and Society*, 18(3 August) forthcoming.
- Klochko, M.A. and Ordeshook, P.C. (2005). *Endogenous Time Preferences in Social Networks*, E. Elger, Cheltenham, UK.
- Rubinstein, A. (1979). Equilibrium in Supergames with the Overtaking Criterion. *Journal of Economic Theory*, 21, 1–9.
- Samuelson, L. (1997). *Evolutionary Games and Equilibrium Selection*, MIT Press, Cambridge, MA.
- Shapiro, J. (2002). *Notes on the Presentation for Complex Systems Summer School*, Santa Fe, New Mexico.
- Taylor, M. (1976). *Anarchy and Cooperation*, Wiley, New York.
- Truman, D.B. (1967). Federalism and the Party System, in Wildavsky, A. (ed), *American Federalism in Perspective*, Little Brown, Boston.
- Weibull, J.W. (1995). *Evolutionary Game Theory*, MIT Press, Cambridge, MA.

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Chapter 9

A Formal Analysis of Patronage Politics

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Clientelism as a political strategy has been used in a wide variety of societies across time. The last democratization wave brought high expectations for the new democracies. Economic development, efficient governments and the decline of corrupt political behavior were some of the expected results in the new democratic regimes. Unfortunately, in many cases these promises have panned out. What we have learned from these experiences is that these outcomes are not necessarily inherent of political systems where individual rights of free speech and association are constitutionally enshrined and open and free competitions for elected offices takes place regularly. One characteristic that has prevailed in the new democracies is political competition based on patron–client relations. However, this result should not be surprising since political clientelism has been a practice in many developed democracies as well as in authoritarian regimes.

This phenomenon has been extensively studied from different theoretical perspectives and in particular from culturalist and developmentalist approaches. However, there is still a lack of an approach capable to explain the resilience and existence of this strategy in so many different contexts as well as the theoretical and empirical contradictions that this implies.

The classical literature on clientelism characterizes the patron–client relation in a way that is usually attached to *traditional* groups and societies. There is no doubt that in such *traditional* societies, and also authoritarian regimes and dictatorships, patronage and clientelism have been used to gain support within the citizenry. However, this practice can also be found in some developed democracies and prosperous economies (see Kristinsson, 1996, 2001; Warner, 1997, 1998; Blakeley, 2001 for an analysis of some European countries; for the United States and Canada, see Clark, 1994; Alesina et al., 1998; Fletcher, 1994). These approaches also argue that dyadicity, personalism and inequality of power and resources, are important determinants of clientelist relations (Graziano, 1976; Schmidt et al., 1977; Silverman, 1977; Einsesand and Lemarchand, 1981; Einsesand and

Roniger, 1984; Robinson and Verdier, 2002; Brusco et al., 2002; Medina and Stokes, 2002). This perspective underlies analyses that consider clientelism a coercive and exploitative practice (Graziano, 1976; Li Causi, 1981; Mouzelis, 1985). Nonetheless, in contemporary clientelism, the monopolistic position of the patron over the means of livelihood of her clients is less common; therefore, clients can enter the relation voluntarily and in many cases they are able to abandon it without jeopardizing their survival. Moreover, although in many cases a personal relationship between the patron and the client does exist, clientelism has evolved into a massive and anonymous strategy, involving groups like unions or corporations (Silverman, 1977; Collier and Collier, 1991; Heredia, 1994; Mavrogordatos, 1997), where personalism and, to some degree, the coercive power are diluted.

The idea of *traditional* societies is always linked with developing economies, which tend to have unequal wealth distributions and significant poverty problems. Thus, clientelism has been positively related with inequality and poverty and it has been considered an endemic problem of developing countries as Robinson and Verdier (2002) observed. Political clientelism, however, is not an uncommon practice in developed economies; moreover, it is not also uncommon to find wealthy and powerful clients or brokers such as entrepreneurs and union leaders (Roniger, 1990; Verdier, 1995; Lowery and Brasher, 2004). Clientelism is neither absent in low inequality economies like Iceland or Canada (see Fletcher, 1994 and Kristinsson, 2001). There is an important literature that examines and reports the use of patronage and clientelism in developed economies and the existence of clients within wealthy social groups, however there is no analytical framework that can consistently solve this contradiction.

Clientelism is also associated with corruption and inefficiencies within a democratic political system since it threatens the freedom of choice, including the free formation and expression of political preferences. Therefore it is considered a typical problem of less-developed democracies. Rational choice analyses of democracy and political competition argue that, even if the political market is not perfect, the rise of party competition will weaken this and other nonoptimal and inefficient political behaviors (Stigler, 1971, 1972; Becker, 1983, 1985; Wittman, 1989). Some scholars argue that under a more competitive party system, the median voter acquires significant importance and encourages the use of programmatic policies as a mean of gaining political support (Verdier, 1995). However, clientelism has survived the development of competitive party systems, and is used as a political strategy in some developed democracies. Furthermore, in some cases the use of patronage increased when the party system becomes more competitive (Villareal, 2002; Moreno, 2005).

Within this literature there is no consensus about a single definition of clientelism and patronage. These two concepts are sometimes used

indistinctly while other times they are considered different phenomena (see [Medina and Stokes, 2002](#) and [Piattoni, 2001](#)). In this essay both concepts are considered the same type of political strategy based on their general features. An increasing number of scholars acknowledge that a general characteristic of the patron–client relationship is the logic of exchange ([Roniger, 1994](#); [Piattoni, 2001](#)). Following this idea, I consider that clientelism is an exchange relation where political rulers seek to increase and maintain their power by trading public decisions that produce private benefits in exchange of citizens' support. In this relation, the means used to buy political support are called patronage. The formal analysis presented in this essay is based on these concepts.

This essay presents a formal theory that seeks to clarify these contradictions. It tries to advance in the search of the conditions for the existence of patron–client relations; in analyzing the effects of structural issues such as income distribution, poverty, social cleavages and ideological preferences of the citizens on patronage as well as in explaining how patronage and clientelism are affected by institutional variables like the internal organization and composition of parties and the level of freedom and fairness to compete within the political arena.

In the next section, I present a simple probabilistic spatial model where an incumbent party and an opposition party compete to gain political support within a set of citizens in which ideological and programmatic policy preferences are private information. I analyze how a given amount of public resources is allocated in the provision of patronage and public goods. Parties compete programmatically by assuming an ideological position observed by the citizens and, in the case of the incumbent, by making public decisions about the allocation of the public expenditure. Patronage would only be used to co-opt citizens who programmatically oppose the incumbent, but since the ideological and programmatic policy preferences of the citizens are not observed by the parties, the incumbent faces an agency problem. Citizens, however, have other observable characteristics that can signal their preferences. Thus, the incumbent can separate the population into different clusters according to these characteristics and link them with their possible ideological positions by a set of subjective probability functions. Both parties then choose their political platforms according to their competitive strengths, and the party in office decides how to allocate the public resources. The different political-economic equilibria are characterized by a set of party decisions, containing the programmatic positions of the parties, the amount of public resources used to provide public goods and the level of patronage invested in each group within the economy.

In this setting, patronage and the way it is allocated within the citizenry is not just driven by the cost of co-optation determined by the political preferences of the citizens, their private consumption utility function, and their

capacity to generate wealth. Patronage is instead determined by the programmatic competitiveness of the parties and the relative political relevance that each group of citizens has as a support provider in the political competition process.

1. An Economy with Clientelism and Political Competition

Consider an economy with the following characteristics. There are two political parties that compete to gain as much support as possible within the citizenry, which consists in a large number I of agents. Both parties are predators in the sense that their main objective is to maximize the political revenue given their resources and institutional constraints. In contrast with other models, this is not a case of electoral competition where parties seek to win an election. Instead, parties seek to gain the support of each citizen which is considered a political asset that can be used in different ways within the political arena.

One of the two parties is an incumbent and the other one is an opposition party denoted by A and B , respectively. Both parties compete programmatically by assuming a political platform, which is publicly known. The incumbent party, however, has some fixed amount of public resources, G , that can be used either to provide public goods or to create clientelist relations by patronage. Incumbent parties have the advantage of using public resources to favor individuals and buy their political support with a threat of withdrawing the favor if the support is not given to them. Thus, the model assumes that the incumbent has a fixed amount of public resources G that can be invested to produce and provide a public good or to establish a clientel-patron relationship. The budget constraint for the incumbent is

$$g + p \leq G \tag{1}$$

where g is the amount of public resources invested in public goods and p are those resources utilized for patronage.

To simplify the analysis, I will assume that the opposition does not have any resources to use them as patronage. Thus the incumbent does not just compete by presenting a political platform but also by distributing the available public resources as public goods and patronage.

Following [Hinich and Munger \(1994\)](#) and [Enelow and Hinich \(1990\)](#), the model assumes ideology is used by agents as a mechanism to link the perception they have on political competitors and the way their rule may affect them. Preferences over the policy and political program space have a correspondence over the one-dimensional ideological space.

Even though parties are assumed to be predators, they have preferences over the political program space, and therefore over the ideological single

space. Then, parties *A* and *B* have different ideal ideological positions upon which their members agree. To simplify and without lose of generality in our results, the model assumes that these ideal positions are located on the extreme points of the ideological line, which is normalized around the incumbent position. Thus, the incumbent ideal position is located on 0 and the rival is situated on some point *L*, with $L > 0$. These positions are common knowledge for both parties. When the parties compete programmatically they may embrace a political program other than their ideal one. Let *a* and *b* denote the position of these programs over the ideological line. Any deviation from its ideal point implies a cost for the party. It is assumed that deviating costs may be different for each party and respond both to the characteristics of the party itself and to the structure of the political system. Costs for parties *A* and *B* are represented by functions $C_A(\cdot)$ and $C_B(\cdot)$, respectively with the following characteristics:

$$C'_A(\cdot) > 0, \quad C''_A(\cdot) \geq 0 \quad C'_A(0) \geq 0 \tag{2}$$

$$C'_B(\cdot) > 0, \quad C''_B(\cdot) \geq 0 \quad C'_B(0) > 0 \tag{3}$$

Each citizen *i* has symmetric single-peaked preferences over the ideological line and is indexed according to the location of her ideal position over this space. These preferences are private and they reflect different individual characteristics; it is assumed that political platforms cannot credibly modify these preferences; therefore, they are fixed parameters in the model. Citizens, however, have other observable characteristics that can be probabilistically liked with ideological preferences.

Citizenry can be divided in a finite number *J* of disjoint groups. The size of group *j* is given by $I\alpha^j$ with $\sum_{j=1}^J \alpha^j = 1$. The members of each group share the same observable individual characteristics given by a vector with $q^j \in \mathbb{R}^n$ for $j = 1, 2, \dots, J$. The parties can observe these vectors and use them to infer the ideological preferences within the different social groups. The incumbent party uses this information to conform efficient client–patron relations within the citizenry.

One element in every vector q^j is the individual income level for the members of the social group *j*. To simplify, assume that there are *J* different income levels and y^j is an element of vector q^j .

It is assumed that there is a unique consumption good in the economy whose price is equal to one. Citizen *i* has an exogenous income $y_i \in \{y^1, y^2, \dots, y^J\}$ which is totally expended in the consumption good. When any citizen becomes a client, she is paid a patronage transfer t_i . Then consumption level for citizen *i* is $y_i + t_i$ if *i* is a client and y^i if not. Thus, the allocation of public resources in patronage can be used to gain the political support of groups of citizens. Public resources, however, can be used to

provide a pure public good and the provision of this public good favors the position of the incumbent relative to the opposition party within the citizenry.

Citizens select the party that they support in view of the parties' political platforms, their provision of public goods and the clientelist relations established by the incumbent. The preferences of citizen i over the two parties are represented by the comparison of the following utility functions:

$$V(A|i) = -(a - i)^2 + g + [u(y_i + t_i) - u(y_i)] \quad (4)$$

$$V(B|i) = -(b - i)^2 \quad (5)$$

Then, functions $V(A|i)$ and $V(B|i)$ represent the level of citizen i 's "empathy" for the government party and the opposition, respectively.

The difference $u(y_i + t_i) - u(y_i)$ is the utility gain of becoming a client. Function $u(\cdot)$ is assumed to be the same for every citizen, to be continuous, differentiable and strictly concave:

$$u(0) = 0, \quad u'(\cdot) > 0 \quad u''(\cdot) < 0, \quad u'(0) \rightarrow \infty \quad (6)$$

Each citizen gives her support just to one party. Thus, citizen i supports the incumbent party if $V(A|i) > V(B|i)$; if $V(A|i) < V(B|i)$, she gives her support to the opposition and if she is indifferent between both parties, she supports each of them with a probability of 0.5.

2. Political Competition

Both parties compete programmatically to maximize the number of supporters within the polity taking into account the costs of embracing an ideological position other than their ideal one. The incumbent can also use public resources in patronage to gain the support of programmatic opponents. However, the incumbent faces an agency problem when she allocates public resources in the supply of public goods and patronage since ideological preferences are not publicly observed and citizens act strategically to increase their private consumption. Thus, the allocation of patronage is based on the possibility of separating the society in ideologically oriented groups, according to some observable characteristics, including income.

In order to maximize the support within the citizenry, the political parties need to infer the ideological distribution of the citizens. They consider a set of group-specific probability functions $\{F^j(x)\}_{j=1}^J$, which are assumed to be continuous, with probability density function $f^j(x)$ over $[\psi^j - (1/2\phi^j), \psi^j + (1/2\phi^j)]$, where $\phi^j \in (0, \infty)$, and which are common knowledge for the political parties. To simplify, every $f^j(x)$ is assumed to be single peaked with a unique maximum at $m^j \in [\psi^j - (1/2\phi^j), \psi^j + (1/2\phi^j)]$.

The members of each group have some inherently ideological bias given by ψ^j and the ideological volatility of the group is represented by the parameter ϕ^j . The single-picked assumption can be interpreted as if there exists some predominant ideological position in any group and that predominance is unique.

Thus, $F^j(x) = \text{prob}\{i \leq x | q_i = q^j\}$ and it is a mapping function that goes from the space of observable characteristics to a segment of the ideological line. Since individual ideological positions are not observable, political parties decide their strategies considering an ideological space given by the union of the supports of the group-specific density functions. Then the ideological space is given by $\cup_{j=1}^J [\psi^j - (1/2\phi^j) + (1/2\phi^j)]$ which is assumed to be continuous. The space is normalized around the incumbent position located on 0 and the rival is situated on point L .

Each party tries to obtain as many supporters as possible by considering the cost of embracing a particular ideological platform. The incumbent also allocates the public resources to maximize her revenue by investing in public goods and in patronage.

In this setting, the incumbent party will allocate a patronage transfer $t^j \geq 0$ for each member of group j . Then the total amount of patronage is distributed in individual transfers and $\sum_{j=1}^J t^j \alpha^j I = P$ with $0 \leq t^j \leq P$ for every j .

Then, given platforms a and b , the investment in public goods g and the set of patronage transfers $\{t^j\}_{j=1}^J$, the expected share of the population that supports the incumbent, is

$$S = \sum_{j=1}^J \alpha^j F^j \left(\frac{u(y^j + t^j) - u(y^j)}{2(b - a)} + \frac{g + b^2 - a^2}{2(b - a)} \right)$$

Note that if the probability of supporting the incumbent for any member of group j is one, then there is no patron-client relation between this group and the incumbent. That is, if $\theta > \psi^j + (1/2\phi^j)$, then $F^j(\theta) = 1$ and $t^j = 0$, with $\theta \equiv (g + b^2 - a^2)/2(b - a)$. For the rest of the paper I will call θ as the *pivotal point*.

Thus, the goal for the parties is to maximize their expected revenue in a one-shot game by setting their platforms, the investment in public goods and the allocation of patronage, which is define by the following two problems:

$$\begin{aligned} & \max_{a, g, \{t^j\}_{j=1}^J} IS - C_A(a) & (7) \\ \text{s.t. } & IS - C_A(a) \geq 0 \\ & I \sum_{j=1}^J \alpha^j t^j + g \leq G \end{aligned}$$

$$g \geq 0$$

$$t^j \geq 0$$

$$L \geq a \geq 0$$

and

$$\max_b I(1 - S) - C_B(L - b) \quad (8)$$

$$\text{s.t. } I(1 - S) - C_B(L - b) \geq 0$$

$$L \geq b \geq 0$$

In any equilibrium with positive patronage, some groups become clientelist and the incumbent party offers an individual patronage transfer to the members of these groups. Each member of a clientelist group collects the same amount of patronage, but individual transfers may differ along the different clientelist groups. Thus, not all the members of a clientelist group would necessarily support the incumbent. Within each clientelist group exists a point over the ideological line that determines the expected share of its members that support the incumbent; to differentiate this from the pivotal location, I will call it the *j swing member point*.

In this context, political competition may drive to the creation of patron–client relations; however, this is not a necessary result.

When for any combination of ideological platforms, it is not possible to find a clientelist structure where the marginal effect of patronage would be greater than the effect of the provision of public goods over the expected political support, no clientelism occurs. This type of political-economic equilibrium is given by a set $\{a^*, b^*, \{t^{j*}\}_1^J\}$, such that $t^{j*} = 0$ and

$$f^j \left(\frac{G + b^{*2} - a^{*2}}{2(b^* - a^*)} \right) [u'(y^j) - I\alpha^j] \leq I \sum_{-j} \alpha^h f^h \left(\frac{G + b^{*2} - a^{*2}}{2(b^* - a^*)} \right) \quad (9)$$

for every j . the left-hand side of (9) is the net marginal political revenue that the incumbent obtains from group j . For any group j to be prone of becoming a client this net marginal revenue must be positive. In that case, the gain of patronage investment in group j would be greater than the marginal benefit obtained in that same group of providing public goods. This implies that if any of the following:

- (i) the individual income level for group j given the size of the group and the incumbent's efficiency, is such that $u'(y^j) \leq I\alpha^j$;

(ii) if

$$y^j \geq u'^{-1} \left(\frac{TK \sum_{h=1}^J \alpha^h f^h(x_m)}{f^j(m^j)} \right) \tag{10}$$

where $x_m = \arg \min_x \sum_{h=1}^J \alpha^h f^h(x)$

(iii) the population share I is such that

$$\alpha^j \geq \frac{u'(y^j)}{I} - \frac{\sum_{-j} f^h(\hat{x}_m)}{f^j(m^j)}$$

where $\hat{x}_m = \arg \min_x \sum_{-j} \alpha^h f^h(x)$

(iv) the population size is such that

$$I \geq \frac{u'(y^j) f^j(m^j)}{\sum_{h=1}^J f^h(x_m)}$$

(v) or the relative density is such that

$$\frac{\sum_{h=1}^J f^h(x_m)}{f^j(m^j)} \geq \frac{u'(y^j)}{I}$$

then group j is never targeted as a clientelist one.

This is consistent with the intuitive idea that high-income agents are difficult to co-opt. However, the possibility of co-opting high-income clients is not ruled out. If the members of some group have high income, but the number of members is small, it may be considered a possible client since the total amount of patronage would be not so high even though it is more costly to obtain the support of these citizens. Moreover, if a high-income group has a low ideological dispersion it may be an important source of clientelistal political support in comparison with other groups. When a group is less identified with an ideological or programmatic position, its variance will be high and therefore the density in every point would be low. Then, the expected support given some level of patronage will be low

compared to what would be expected from other group with less ideological volatility. Patronage is therefore allocated within the groups with greater ideological identification.

When political competition results in an equilibrium with patronage and provision of public goods, the marginal political revenue of patronage in each clientelist group is equal to the marginal political revenue of the public good provision. It may happen that some number of groups could be completely co-opted, in which case the marginal revenue of patronage within that group would be greater than the marginal revenue of the public good. To simplify the exposition I withdraw this last case.

Thus, from the Kuhn–Tucker conditions of the problem, the characterization of an equilibrium with patronage and public goods is given by a set $\{a^*, b^*, \{t^{j*}\}_1^J\}$ such that $G > T \sum_{j=1}^J \alpha^j t^{j*}$, where for every clientelist group $k \in \{1, 2, \dots, J\}$,

$$\begin{aligned} & f^k \left(\frac{u(y^k + t^{k*}) - u(y^k) + g^* + b^{*2} - a^{*2}}{2(b^* - a^*)} \right) u'(y^k + t^{k*}) \\ &= I \sum_{j=1}^J \alpha^j f^h \left(\frac{u(y^j + t^{j*}) - u(y^j) + g^* + b^{*2} - a^{*2}}{2(b^* - a^*)} \right) \end{aligned} \quad (11)$$

and for every nonclientelist group h it is the case that

$$\begin{aligned} & f^h \left(\frac{g^* + b^{*2} - a^{*2}}{2(b^* - a^*)} \right) u'(y^h) \\ & \leq I \sum_{j=1}^J \alpha^j f^j \left(\frac{u(y^j + t^{j*}) - u(y^j) + g^* + b^{*2} - a^{*2}}{2(b^* - a^*)} \right) \end{aligned}$$

where $g^* = G - T \sum_{j=1}^J \alpha^j t^{j*}$, $t^k > 0$ and $t^h = 0$.

Neither the left- nor the right-hand side of condition (11) is linear on t^* and an equilibrium of this type may arise or not. Moreover, if an equilibrium of this type exists condition (11) may have multiple solutions, however, not all of them are equilibria points. The next lemma shows this.

Lemma 1. If in an equilibrium $\{a^*, b^*, \{t^{j*}\}_1^J\}$ condition (11) holds with equality for any clientelist group k then the following must hold:

$$\begin{aligned} & \left(\frac{u'(y^k + t^{k*}) - I\alpha^k}{2(b^* - a^*)} \right) (u'(y^k + t^{k*}) - I\alpha^k) \\ & f^{k'} \left(\frac{u(y^k + t^{k*}) - u(y^k) + g^* + b^{*2} - a^{*2}}{2(b^* - a^*)} \right) \\ & + u''(y^k + t^{k*}) f^k \left(\frac{u(y^k + t^{k*}) - u(y^k) + g^* + b^{*2} - a^{*2}}{2(b^* - a^*)} \right) < 0 \end{aligned}$$

otherwise group k is totally co-opted and condition (11) holds with inequality.

Proof. See Appendix A1.

This lemma implies that the expected marginal revenue in every not totally co-opted clientelist group is decreasing on patronage. Otherwise, since there are available public resources, it would be possible to either increase or reduce the investment in patronage within that group and gain greater political revenue.

Thus if an equilibrium of this type exists, the patronage each member of the clientelist group k receives is given by

$$t^{k*} = u'^{-1} \left(I\alpha^k + \frac{I}{\Phi^k} \right) - y^k \tag{12}$$

$$\text{where } \Phi^k = \frac{f^k(u(y^k + t^{k*}) - u(y^k) + g^* + b^{*2} - a^{*2}/2(b^* - a^*))}{\sum_{-k} \alpha^j f^j(u(y^j + t^{j*}) - u(y^j) + g^* + b^{*2} - a^{*2}/2(b^* - a^*))}$$

which is the relative density of group j with respect to the weighted average density of all the clientelist groups and the nonclientelist groups containing a pivotal point member.

3. Determinants of Patronage: A Partial Equilibrium Analysis

In this section, I analyze the effect that the parameters in the model have over patronage considering as given the ideological positions of both parties. This partial equilibrium analysis provides us with important insights and will be useful for the general equilibrium analysis presented in the next section. The final effect that different variables and parameters have over patronage depends on how the relative average density is affected. According to equation (12), the patronage transfers for any clientelist group depend on its relative average density. The greater the relative density of group j , the greater is its political relevance as a source of clientelist support; therefore, patronage within this group is higher. The clearest result is that from the ideological dispersion of the clientelist groups. However, the effects of other parameters depend on the specific forms of the density functions; therefore in this section, I will introduce some assumptions about the density functions to clarify the causal mechanisms in the model.

3.1 Ideological Dispersion

If some group has a low ideological dispersion it would be easier to co-opt some of its members. The political return of patronage and the expected political revenue of group j increase when the ideological dispersion decreases. Therefore, when the swinger member density of some clientelist group increases, it is always the case that optimal patronage also increases.

3.2 Income Effect

As in the case where all the public resources are used in patronage, it is expected that richer groups would be more expensive to co-opt than the poor. That implies that the marginal revenue of patronage is greater within poor groups and therefore the incumbent would target these groups as clients in the first place. But the negative relationship between income and patronage is less clear when there is private information and members are not distributed uniformly within some group. This is due to the effects on the expected support within each group which depends on the change of the swinger members' densities. If income grows for the members of some clientelist group, given the amount of the patronage transfers, fewer members can be co-opted. This implies that the swinger member shifts toward the incumbent location. When this shift affects the density of the swinger member, the relative marginal revenue of patronage changes but not necessarily decreases and then it is possible for a relocation of resources with greater patronage transfers. Obviously if the relative density is constant, then the transfers are always decreasing on income level and therefore patronage and clientelism within a group always decline when its members' income level grows. That is, for example, the case in which every group has a uniform distribution. Then equation (12) becomes

$$t^{k*} = u'^{-1} \left(\frac{I \sum_{j=1}^J \alpha^j \phi^j}{\phi^k} \right) - y^k \quad (13)$$

where the relative density just depends on constant parameters and then the transfer decreases if income grows. But if the relative density is affected by changes in income level, the story can be different.

If an increase on income reduces the marginal revenue of patronage within a particular group, its relative density declines and the individual transfer for that group decreases just as in the uniform distribution case. An increase on income within some group always shifts the swinger member

reducing the expected support within that group. However, the marginal change of the swinger member's density may be high enough to be more than to compensate the loss of individual marginal utility of the transfer caused by the rise of income. If when public resources are reallocated the final relative average density is greater than the initial one, then even though the members become more expensive to co-opt, the group is relatively more profitable than the others and therefore the incumbent allocates more patronage within that group (see Appendix A2 for the general formal statement).

To clarify this mechanism, consider the following simple case.

Assumption 1. Every group has a uniform distribution except group k which is a clientelist group with a continuously differentiable p.d.f., $f^k(\cdot)$ and $[a^*, b^*] \subset [\psi^j - 1/2\phi^j, \psi^j + 1/2\phi^j]$ for $j = 1, 2, \dots, J$.

This assumption implies that any change on the relative density of any group is due to movements of group k 's density. Thus, if the swinger member's density within group k is steep enough it will have an important change if income within that group grows. If this change is sufficiently high, it would imply a loss of support within the group but the marginal revenue of patronage would increase and therefore more resources would be allocated to maintain the existing client-patron relations. The next result shows this.

Result 1. Under Assumption 1,

- (i) If $f'^k(\chi) = 0$, then $\partial t^{k*} / \partial y^k < 0$,
- (ii) If $y^k \rightarrow u'^{-1}(I\alpha^k) - t^{k*}$, then $\partial t^{k*} / \partial y^k < 0$,
- (iii) When $f'^k(\chi) < 0$, then $\partial t^{k*} / \partial y^k < (>) 0$ if

$$-\frac{f'^k(\chi)}{f^k(\chi)} < (>) \frac{2(b^* - a^*)u''(y^k + t^{k*})}{(u'(y^k + t^{k*}) - u'(y^k))(u'(y^k + t^{k*}) - I\alpha^k)}$$

- (iv) When $f'^k(\chi) \geq 0$, then $\partial t^{k*} / \partial y^k < 0$,

$$\text{where } \chi = \frac{u(y^k + t^{k*}) - u(y^k) + g^* + b^{*2} - a^{*2}}{2(b^* - a^*)}$$

Proof. See Appendix A3.

The result characterizes the profitability of the clientelist groups. A change of the members income can lead to lower or higher amount of patronage invested in that group. What determines this is the net expected rate of return of public resources when they are invested in patronage instead of public goods. Intuitively when the expected political rate of return of patronage of some clientelist group is greater than the one obtained by

investment of public goods within whole polity, that group would be such an important source of revenue that the incumbent will always try to co-opt it. Then, even if an increase of income within the group rises the co-optation cost of each member, more resources are allocated in patronage to maintain the client–patron relation. Thus, patronage transfers not necessarily have a negative relation with individual income levels in every case.

The second part of the result implies, however, that if income rises enough, patronage always decreases until the group becomes nonclientelist.

3.3 Ideological Distance and Ideological Bias

When the political parties assume similar ideological platforms, the use of policies and strategies to differentiate themselves from their rivals become more important. It is also the case that the relative position of both platforms over the ideological line, changes the effectiveness of the parties' strategies. This means that given the ideological distance of the platforms, if the population preferences increase their ideological bias toward some party the political return of the strategies change. Assumption 1 is once more a useful setup to show this.

Changes in both the ideological bias and the ideological distance of the programs affect the relative average density of every group around the pivotal point. For example, under Assumption 1 the relative average density of the clientelist group k becomes

$$\frac{1}{\Phi^{k*}} = \alpha^k + \frac{\sum_{-k} \alpha^j \phi^j}{f^k \left(\frac{u(y^k + t^{k*}) - u(y^k) + g^*}{2(b^* - a^*)} + \frac{b^* + a^*}{2} \right)}$$

If the ideological distance $b^* - a^*$ is constant but the midpoint $(b + a)/2$ between the political platforms increases, the swinger members deviate toward the opposition. This means that, given the investment on patronage, the expected support within each group increases. The effect on patronage depends once more on the change of the swinger density.

A similar effect occurs when the ideological distance changes. Given the ideological bias, if the distance is reduced the political parties become more alike and therefore the utility differences of supporting one or the other are reduced. This implies that the marginal revenue of both, patronage and public goods, increases. The final result depends on the magnitude of both marginal effects. This is shown in the next result.

Result 2. Under Assumption 1

- (i) if $f^{kl}(\chi) > 0$, then the political bias to the incumbent, $(b^* + a^*)/2$, has a positive effect on patronage transfers and the ideological distance, $b^* - a^*$, has a negative effect on patronage transfers for the clientelist group.
- (ii) if $f^{kl}(\chi) < 0$, then the political bias to the incumbent, $(b^* + a^*)/2$, has a negative effect on patronage transfers and the ideological distance, $b^* - a^*$, has a positive effect on patronage transfers for the clientelist group.

Proof. See Appendix A4.

4. Competitiveness and Patronage: A General Equilibrium Approach

In this section, the essay analyzes the effect of an increase in the competitiveness within the political system over the allocation of patronage. In contrast with the idea that competitiveness drives to more efficient outcomes, the model shows how this relation can be reversed.

In the previous section, I show the circumstances where a stronger opposition, which can modify the swinger point by changing the ideological distance or the mid point between the competitors, leads to an increase in patronage investment. That analysis, whichever, does not consider the secondary effects of the patronage investment over the ideological positions of the parties. An increase in patronage discourages the opposition to compete and can reverse the initial effect. As equation (12) suggests, the final effect depends on the sensitivity of the relative density of each clientelist group. To clarify this mechanism here, I will focus on a simple case where every group has a uniform distribution except group j which is the only clientelist group with a continuously differentiable p.d.f., $f^j(\cdot)$, over $[0, L]$.

The competitiveness issue in the model is reflected by the cost structure of programmatic competition. When the costs for both parties are similar, competitiveness within the political arena is higher. To simplify the discussion, assume that the costs for the parties are such that $C'_A(a) = C$ for any a , and $C'_B(L - b) = \gamma C$ for any b , where C is the positive constant and γ the positive parameter which determines the competitive advantage of the incumbent. When parameter γ is close to one, competitiveness is high. On the contrary, the greater is γ , the lesser competitive is the party system.

Note that these assumptions do not place further restrictions either on the clientelist group's density function or on the rest of the agents' characteristics. Thus, any adjustment of the relative density does just depend on the changes of the clientelist group's density.

I will depart from an interior equilibrium where political parties compete by signaling a pair of political platforms other than their ideal positions and where the incumbent invests in both patronage and public goods. Then, according to our assumptions, the Kuhn–Tucker conditions for an interior solution are

$$C = \pi T \sum_h^{-j} \alpha^h \phi^h \left(\frac{1}{2} + \frac{Kg}{2(b-a)^2} \right) + \pi T \alpha^j f^j(\chi) \left(\frac{1}{2} + \frac{u(y^j + t^j) - u(y^j) + Kg}{2(b-a)^2} \right) \quad (14)$$

$$-\gamma C = \pi T \sum_h^{-j} \alpha^h \phi^h \left(\frac{1}{2} - \frac{Kg}{2(b-a)^2} \right) + \pi T \alpha^j f^j(\chi) \left(\frac{1}{2} - \frac{u(y^j + t^j) - u(y^j) + Kg}{2(b-a)^2} \right) \quad (15)$$

$$f^j(\chi)(u'(y^j + t^j) - KT\alpha^j) = KT \sum_h^{-j} \alpha^h \phi^h \quad (16)$$

where

$$\chi \equiv \frac{u(y^j + t^{j*}) - u(y^j)}{(b^* - a^*)} + \theta^* \quad (17)$$

Since with the exception of group j the rest of the groups have a uniform distribution, the right-hand sides of conditions (14) and (15) are not necessarily continuous nor monotone on a and b , respectively. Then it is convenient then to make a last assumption.

Assume that

$$\left[\psi^i - \frac{1}{2\phi^i}, \psi^i + \frac{1}{2\phi^i} \right] \cap \left[\psi^h - \frac{1}{2\phi^h}, \psi^h + \frac{1}{2\phi^h} \right] = \emptyset$$

for any two groups $h, i \in \{1, 2, \dots, J\}$, $[\psi^j - (1/2\phi^j), \psi^j + (1/2\phi^j)] \subset [o, L]$ and $[0, L] \subset [\underline{\xi}, \bar{\xi}]$ where $\underline{\xi}$ is the maximum element of the sequence $\{\psi^h - (1/2\phi^h)\}_1^j$ and $\bar{\xi}$ the minimum element of the sequence $\{\psi^h + (1/2\phi^h)\}_1^j$.

This assumption implies that $\sum_{-j} \alpha^h \phi^h$ is constant over the interval $[0, L]$ then there are no jumps of this weighted average density when the swinger point change and the marginal revenue of political competition for each party is continuously differentiable on the ideological position of its platform. Moreover, the assumptions guarantee that the changes in the relative density are smooth; this simplifies the static comparative analysis.

In this case, then it is the case that an interior equilibria implies (14)–(16), and

$$\frac{f^j(\chi)}{f^j(\chi)} < - \frac{4\alpha^j(b^* - a^*)(u'(y^j + t^{j*})(1 + (g^*/\alpha^j T)) - u(y^j))}{((b^* - a^*)^2 - u(y^j + t^{j*}) + u(y^j) - Kg^*)^2} \tag{18}$$

where χ is defined by (17).

Our assumptions guarantee continuity and differentiability of the marginal revenue, but it does not imply monotonicity. Thus, and since marginal cost is constant, there exist multiple solutions for conditions (14) and (15), but not all of them can be sustained as an equilibrium. This implies that there can be different ideological platform combinations that equalize the marginal revenue of political competition and the marginal cost, but not all of them are profitable for the parties and will not be sustained as equilibria.

This is consistent with the partial equilibrium results which show that if the clientelist group is an important supporter for the incumbent, this last would try to maintain its support when the system becomes more competitive by increasing patronage.

For our simple case, the following result holds.

Result 3. When the political system becomes more competitive patronage increases if in the equilibrium the clientelist group’s density, $f^j(\chi)$, is such that $f^j(\chi) < \rho_1$. Patronage decreases when the political system becomes more competitive if $f^j(\chi) \in (\rho_1, \rho_2)$, where ρ_1 and ρ_2 are defined by the following:

$$\rho_1 = \frac{-\left(\frac{\Gamma(u(y^j - t^{j*}) - \alpha^j KT)^2}{2(b^* - a^*)}\right) - \sqrt{\left(\frac{\Gamma^2(u(y^j - t^{j*}) - \alpha^j KT)^4}{4(b^* - a^*)^2}\right) - 4\alpha^j \Psi f^j(\chi) u''(y^j - t^{j*})}}{2\alpha^j \Psi}$$

$$\rho_2 = -\frac{\Gamma}{2\alpha^j} \left(\frac{1}{2} - \frac{u(y^j + t^{j*}) - u(y^j) + Kg^*}{2(b^* - a^*)^2}\right)^{-2}$$

$$\text{where } \Gamma \equiv \frac{\alpha^j(u(y^j - t^{j*}) - u(y^j) + kg^*)f^j(\chi) + Kg^* \sum_{-j} \alpha^h \phi^h}{(b^* - a^*)^3}$$

and

$$\Psi \equiv \left(\frac{1}{2} + \frac{u(y^j + t^{j*}) - u(y^j) + kg^*}{(b^* - a^*)^2}\right)^2 \left(\frac{1}{2} - \frac{u(y^j + t^{j*}) - u(y^j) + kg^*}{(b^* - a^*)^2}\right)^2$$

Proof. See Appendix A5.

Note that $\rho_1 < \rho_2 < 0$. What this formal statement says is that when the swinger member of the clientelist group is around the mode or on a broader interval of the decreasing part of the density function near the mode, an increase on the competitiveness of the system leads to a greater investment in clientelism. In an equilibrium where the swinger member is in such location, the incumbent invest in patronage in such a way because the group is an important revenue source and therefore the incumbent will try to keep the support of this group.

5. Concluding Remarks

Summarizing, this essay presents a formal model of political competition and clientelism where leading idea is that patronage is determined by the relative political relevance that different social groups have. This contrast with other analytical theories that focus on the plain co-optation cost driven by the private consumption utility function of the citizens, their productivity or wealth and their political preferences (Estevez et al., 2002; Medina and Stokes, 2002; Robinson and Verdier, 2002).

The argument is similar to Shefter's (1994) since it is based on a supply–demand relation; however, the mechanisms of the two theories are different. Since this model considers that personalism and dyadicity are not necessary characteristics of patron–client relations, it suggests that political parties recognize potential clients within the whole set of citizens who demand patronage. I argue then that the supply of patronage match the potential demand depending on three main issues: the ideological bias of the group, its ideological volatility and the relative value citizens give to private consumption and public goods which depends on their income level.

The model assumes that any citizen would be better off if her income rises independently of her initial wealth, therefore any citizen is prone to sell her political support at some price. This price depends not just on a demand of consumption goods but also on a subjective valuation of the political activity. Ideology is then an important issue in the dynamics of patronage. The more bias toward the opposition, the greater will be the cost of co-optation. Therefore, clientelism would be less costly within groups around the pivotal position. However, it is not uncommon that parties try to use patronage to co-opt opposition groups even though this could be more expensive than co-opting those groups around the pivotal point. The model shows that if opposition groups are considered relatively important supporters, the incumbent will target them as clients. Many opposition groups are organizations of citizens that have an active political life, they are easily monitored and their ideological dispersion is low. These groups are generally an

important source of political revenue since they can be organized and can act as activists. Other opposition groups are not necessarily organized but can be monitored, like intellectuals and artists, and they have a relevant role within the public opinion. Thus, these groups are in many cases strategically more relevant than other groups within the political arena and therefore they are targeted as clients even though their co-optation can be expensive because of their ideological bias.

Ideological dispersion also has an important role. The lesser the ideological dispersion within a social group the greater is its clientelist relevance. Thus, organized ideological groups become attractive clientelist targets. The model argues that the possibility of dividing the society in ideological groups is one of the most important sources of clientelism. If society cannot be divided in ideological groups the cost of patron–client relations will be too high unless they are established in a personal way with the possibility of monitor the client’s behavior. Under this logic, it is expected that political parties and governments take advantage of social cleavages or implement strategies to divide the citizenry in groups minimizing the ideological variance. This provides an explanation to the positive relationship between clientelism and ethnic cleavages and corporative states that has been observed (see Fearon, 2002).

Contrary to most theories and analysis of clientelist relations that associate it with poverty and therefore with developing economies, I argue that low income is neither a necessary nor a sufficient condition for clientelism. The model is consistent with the intuitive idea that less-wealthy groups are easier to co-opt. However, the model suggests that there is not necessarily a unidirectional causal relation between wealth and clientelism. The fact is that low-income groups are not necessarily clients even when their valuation of private consumption would be high, and it is also common to find wealthy clients. This is possible since an individual or group with low income is not necessarily a potential client and it will not be considered strategically relevant. On the contrary, since the relative relevance depends not just on income level, wealthy groups may be considered important sources of clientelist revenue. Moreover, when the incumbent sets her strategy, she also takes into account the negative externalities that patronage produces within the citizenry and other clientelist groups; a greater amount of patronage within some group may imply less provision of public goods and less patronage for other groups. Owing to these effects there is not necessarily an income level or a distributional pattern that explain clientelism. The comparative static results also show that an increase on income levels does not necessarily reduces the investment in patronage since an incumbent will find important to maintain the control over strategically groups. Thus, the model is consistent with the fact that clientelism is neither a general practice in less economically developed societies nor an absent practice in

rich economies. It also contrasts with the culturalist approaches and may contribute to the explanation of the presence of clientelist practices in a broad number of different cultural groups and countries.

Finally, an important feature of the model is that it can address some insights about the relation between the level of competitiveness within the parties and the use of patronage. Despite the expected social and political benefits of democratization, and the idea that patronage and clientelism will diminish under the competitive political market that liberal democracy implies, these strategies are present in modern democracies and have survived even after different democratization processes. More over, some analyses suggest that the use of patronage may increase when the political arena becomes more competitive (Moreno, 2005). This behavior is explained by the model when clientelist groups are an important source of political support and therefore the incumbent will prefer to maintain their control instead of trying to compete programmatically and by supplying public goods.

In conclusion, the model developed in this essay formalizes the main characteristics that the informal literature attaches to the patron–client relation providing explanations not just for developing and poor democracies, but also for developed ones. It can help to explain a number of paradoxes that other theories have failed to clarify, particularly for developed democracies, by analyzing clientelism and patronage as a pure relation of exchange of political support for public excludable decisions. It also helps to understand why democratization as a purely process of development of a competitive political market, does not necessarily provide the incentives to diminish the use of clientelism as a political strategy.

References

- Alesina, A., Baquir, R. and Easterly, W. (1998). *Redistributive Public Employment*. NBER Working Paper 7387.
- Becker, G. (1983). A Theory of Competition among Pressure Groups for Political Influence. *Quarterly Journal of Economics*, 98, 371–400.
- Becker, G. (1985). Public Policies, Pressure Groups and Dead Weight Costs. *Journal of Public Economics*, 28, 330–347.
- Blakeley, G. (2001). Clientelism in the Building of the State and Civil Society in Spain, in Piattoni, S. (ed), *Clientelism Interests, and Democratic Representation*, Cambridge University Press, Cambridge, UK, pp. 77–100.
- Brusco, V., Nazareno, M. and Stokes, S. (2002). *Clientelism and Democracy: Evidence from Argentina*. Paper Presented at the Conference on Political Parties and Legislative Organizations in Parliamentary and Presidential Regimens in Yale University, March.
- Clark, T.N. (1994). Clientelism, U.S.A.: The Dynamics of Change, in Roniger, L. and Güneş-Ayata, G. (eds), *Democracy, Clientelism, and Civil Society*, Lynne Rienner Publishers, Boulder, pp. 121–144.

- Collier, R.B. and Collier, D. (1991). *Shaping the Political Arena*, Princeton University Press, Princeton.
- Einsieband, S. and Lemarchand, R. (1981). *Political Clientelism, Patronage and Development*, Sage, California.
- Einsieband, S. and Roniger, L. (1984). *Patrons, Clients and Friends*, Cambridge University Press, Cambridge.
- Enelow, J. and Hinich, M.J. (eds). (1990). *The Theory of Predictive Mappings, Advances of the Spatial Theory of Voting*, Cambridge University Press, New York.
- Estevez, F., Beatriz Magaloni, B. and Diaz Cayeros, A. (2002). *The Erosion of One Party Rule: Clientelism, Portfolio Diversification and Electoral Strategy*. Paper Prepared for Delivery at the 2002 Annual Meeting of the American Political Science Association, Boston.
- Fearon, J. (2002). *Why Ethnic Politics and Pork Tend to go Together*. In Conference on Clientelism in Latin America: Theoretical and Comparative Perspectives, Stanford University.
- Fletcher, M. (1994). Clientelism and Political Culture in the Provincial Politics of Canada, in Roniger, L. and Güneş-Ayata, A. (eds), *Democracy, Clientelism, and Civil Society*, Lynne Rienner Publishers, Boulder, pp. 145–166.
- Graziano, L. (1976). A Conceptual Framework for the Study of Clientelistic Behavior. *European Journal of Political Research*, 4, 149–174.
- Heredia, B. (1994). Making Economic Reform Political Viable: The Mexican Experience, in Smith, W.C., Acuña, C.H. and Gamarra, E.A. (eds), *Democracy, Markets and Structural Reform in Latin America*, North-South Center Press, University of Miami, Boulder, pp. 297–324.
- Hinich, M.J. and Munger, M. (1994). *Ideology and the Theory of Political Choice*, University of Michigan Press, Ann Arbor.
- Kristinsson, G.H. (1996). Parties, States and Patronage. *West European Politics*, 19(3), 433–457.
- Kristinsson, G.H. (2001). Clientelism in a Cold Climate: The Case of Iceland, in Piattoni, S. (ed), *Clientelism Interests, and Democratic Representation*, Cambridge University Press, Cambridge, UK, pp. 172–192.
- Li Causi, L.L. (1981). Traditional Anthropology, Marxist Anthropology and Patronage: A Reply to Littlewood. *Critique of Anthropology*, 4, 68–71.
- Lowery, D. and Brasher, H. (2004). *Organized Interests and America Government*, McGraw-Hill, New York.
- Mavrogordatos, G.T. (1997). From Traditional Clientelism to Machine Politics: The Impact of PASOK Populism in Greece. *South European Society & Politics*, 2(3), 1–26.
- Medina, L.F. and Stokes, S. (2002). *Clientelism as Political Monopoly*, Department of Political Science, University of Chicago.
- Moreno, C.L. (2005). *Decentralization, Electoral Competition and Local Government Performance in Mexico*, Ph.D. Dissertation, University of Texas, Austin
- Mouzelis, N. (1985). On the Concept of Populism: Populist and Clientelist Models of Incorporation in Semiperipheral Politics. *Politics and Society*, 14(3), 329–348.
- Piattoni, S. (ed.), (2001). Clientelism in Historical and Comparative Perspective, *Clientelism Interests, and Democratic Representation*. Cambridge, UK: Cambridge University Press, pp. 1–30.

- Robinson, J.A. and Verdier, T. (2002). *The Political Economy of Clientelism*. Discussion Paper No. 3205, Center of Economic Policy Research.
- Roniger, L. (1990). *Hierarchy and Trust in Modern Mexico and Brazil*, Praeger, New York.
- Roniger, L. (1994). The Comparative Study of Clientelism and the Changing Nature of Civil Society in the Contemporary, in Roniger, L. and Güneş-Ayata, A. (eds), *Democracy, Clientelism, and Civil Society*, Lynne Rienner Publishers, Boulder, pp. 121–144.
- Schmidt, S.W., Guasti, L., Landé, C.H. and Scott, J.C. (1977). *Friends, Followers and Factions: A Reader in Political Clientelism*, University of California Press, Berkeley.
- Shefter, M. (1994). *Political Parties and the State: The American Historical Experience*, Princeton University Press, Princeton.
- Silverman, S. (1977). Clientelism as Myth, in Geller, E. and Waterbury, J. (eds), *Patrons and Clients in Mediterranean Societies*, Duckworth, London, pp. 7–20.
- Stigler, G.J. (1971). The Theory of Economic Regulation. *Bell Journal of Economics and Management Science*, 2, 3–21.
- Stigler, G.J. (1972). Economic Competition and Political Competition. *Public Choice*, 13, 91–106.
- Verdier, D. (1995). The Politics of Public Aid to Private Industry: The Role of Policy Networks. *Comparative Political Studies*, 28(1), 2–42.
- Villareal, A. (2002). Political Competition and Violence in Mexico: Hierarchical Social Control in Local Patronage Structures. *American Sociological Review*, 67(4), 477–498.
- Warner, C.M. (1997). Political Parties and the Opportunity Cost of Patronage. *Party Politics*, 3(October), 533–548.
- Warner, C.M. (1998). Getting Out the Vote with Patronage and Threat: Constructing the French and Italian Christian Democratic Parties, 1944–1958. *Journal of Interdisciplinary History*, 28(4), 533–582.
- Wittman, D. (1989). Why Democracies Produce Efficient Results. *Journal of Political Economy*, 97, 1395–1424.

Appendix

A1 : Proof of Lemma 1

Suppose $\{a^*, b^*, \{t^{j*}\}_1^j\}$ is an equilibrium where

$$\begin{aligned} & \left(\frac{u'(y^k + t^{k*}) - \alpha^k}{2(b^* - a^*)} \right) (u'(y^k + t^{k*}) - I\alpha^k) f^{k'} \\ & \left(\frac{u(y^k + t^{k*}) - u(y^k) + g^* + b^{*2} - a^{*2}}{2(b^* - a^*)} \right) + u''(y^k + t^{k*}) f^k \\ & \left(\frac{u(y^k + t^{k*}) - u(y^k) + g^* + b^{*2} - a^{*2}}{2(b^* - a^*)} \right) \geq 0 \end{aligned} \quad (19)$$

If (19) holds with inequality, then there exist some $x, t^{k*} > x \geq 0$, such that for any $t' \in (x, t^{k*})$,

$$f^k \left(\frac{u(y^k + t') - u(y^k) + g^* + b^{*2} - a^{*2}}{2(b^* - a^*)} \right) [u'(y^k + t') - I\alpha^k] < I \sum_{-k} \alpha^j f^j \left(\frac{u(y^j + t^{j*}) - u(y^j) + g^* + b^{*2} - a^{*2}}{2(b^* - a^*)} \right)$$

and therefore total political revenue is greater with t' than with t^{j*} , therefore it can not be an equilibrium. If equation (19) holds with strict equality, then

$$f^j \left(\frac{u(y^k + t') - u(y^k) + g^* + b^{*2} - a^{*2}}{2(b^* - a^*)} \right) (u'(y^k + t') - I\alpha^k)$$

is either a maximum or a minimum. If it is a maximum then the previous part of the proof applies. If it is a minimum then there exist some $x > t^{j*}$ such that for any $t' \in (t^{j*}, x)$

$$f^k \left(\frac{u(y^k + t') - u(y^k) + g^* + b^{*2} - a^{*2}}{2(b^* - a^*)} \right) [u'(y^j + t') - I\alpha^k] > I \sum_{-k} \alpha^j f^j \left(\frac{u(y^j + t^{j*}) - u(y^j) + g^* + b^{*2} - a^{*2}}{2(b^* - a^*)} \right)$$

and therefore total political revenue is greater with t than with t^{j*} , therefore it can not be an equilibrium.

A2 : Income Effect over Patronage Transfers

Differentiating equation (12) we get

$$\frac{dt^{j*}}{dy^j} = - \frac{\Phi_{y^j} + \Phi^2 u''(u'^{-1}(1/\Phi))}{\Phi_{t^j} + \Phi^2 u''(u'^{-1}(1/\Phi))}$$

where $\Phi_x \equiv \partial\Phi/\partial x$. If $-\Phi^2 u''(y^j + t^{j*}) \in (\min\{\Phi_{y^j}, \Phi_{t^j}\}, \max\{\Phi_{y^j}, \Phi_{t^j}\})$, then income has positive effect over the individual transfer. This is possible just if at least one of Φ_{y^j} and Φ_{t^j} is positive and high enough, where as the other effect over the relative density is low enough. In all other cases income and individual transfers have a negative relationship.

A3 : Proof of Result 1

According to Assumption 1 and differentiating (12) the following is obtained:

$$\frac{\partial t^{k*}}{\partial y^k} = - \frac{\left(\frac{(u'(y^k + t^{k*}) - I\alpha^k)^2}{2(b^* - a^*)} \right) f'^k(\Theta) + u''(y^k + t^{k*}) f^k(\Theta)}{\left(\frac{(u'(y^k + t^{k*}) - u'(y^k))}{2(b^* - a^*)} \right) (u'(y^k + t^{k*}) - I\alpha^k) f'^k(\Theta) + u''(y^k + t^{k*}) f^k(\Theta)}$$

with

$$\chi = \frac{u(y^k + t^{k*}) - u(y^k) + g^* + b^{*2} - a^{*2}}{2(b^* - a^*)}$$

From (6) and Lemma 1 the result follows straightforward.

A4 : Proof of Result 2

Let $\omega \equiv (b^* + a^*/2)$, then under Assumption 1, from (12),

$$\frac{dt^{k*}}{d\omega^*} = - \frac{(u'(y^k + t^{k*}) - I\alpha^k) f'^k(\Theta)}{f'^k(\Theta) \left(\frac{(u'(y^k + t^{k*}) - I\alpha^k)}{2(b^* - a^*)} \right) + f^k(\Theta) u''(y^k + t^{k*})}$$

According to Lemma 1, the denominator is always negative for any clientelist group, therefore if $f'^k(\Theta) > (<) 0$, then $dt^{k*}/d\omega^* > (<) 0$.

In the same way,

$$\frac{dt^{k*}}{d(b^* - a^*)} = \frac{\left(\frac{(u(y^k + t^{k*}) - u(y^k) + g^*)}{(b^* - a^*)^2} \right) f'^k(\chi)}{f'^k(\chi) \left(\frac{(u'(y^k + t^{k*}) - I\alpha^k)^2}{2(b^* - a^*)} \right) + f^k(\chi) u''(y^k + t^{k*})}$$

therefore

if $f'^k(\chi) > (<) 0$, then $dt^{k*}/d(b^* - a^*) < (>) 0$.

A5 : Proof of Result 3

Differentiating the equation system (14)–(16), and after some algebra it follows

$$\frac{\partial j^i}{\partial \gamma} = \frac{-(u'(y^j - t^{j*}) - \alpha^j KT) \Gamma \left(\frac{C}{\pi T} \right)}{\alpha^j \left[\left(u''(y^j - t^{j*}) f^j(\chi) + \left(\frac{(u'(y^j - t^{j*}) - \alpha^j KT)^2}{2(b^* - a^*)} \right) f'^j(\chi) \right) \Gamma + \alpha^j \Psi \left(f^j(\chi) \right)^2 \right]} \tag{20}$$

where:

$$\Gamma \equiv \frac{\alpha^j (u(y^j - t^{j*}) - u(y^j) + kg^*) f^j(\chi) + Kg^* \sum_{-j} \alpha^h \phi^h}{(b^* - a^*)^3}$$

$$\Psi \equiv \left(\frac{1}{2} + \frac{u(y^j + t^{j*}) - u(y^j) + kg^*}{(b^* - a^*)^2} \right)^2 \left(\frac{1}{2} - \frac{u(y^j + t^{j*}) - u(y^j) + kg^*}{(b^* - a^*)^2} \right)^2$$

$$\chi \equiv \frac{u(y^j + t^{j*}) - u(y^j)}{(b^* - a^*)} + \theta^*$$

Thus it follows that if:

$$\left(u''(y^j - t^{j*}) f^j(\chi) + \frac{(u'(y^j - t^{j*}) - \alpha^j KT)^2}{2(b^* - a^*)} f^{j'}(\chi) \right) \Gamma + \alpha^j \Psi (f^{j'}(\chi))^2 < (>) 0 \tag{21}$$

then $\partial t^* / \partial \gamma > (<) 0$

Note that given the characteristics of the utility function (6), the right-hand side of equation (21), is a strictly convex function on $f^{j'}(\chi)$ with two real roots:

$$r_1 = \frac{-\left(\frac{\Gamma (u'(y^j - t^{j*}) - \alpha^j KT)^2}{2(b^* - a^*)} \right) - \sqrt{\left(\frac{\Gamma^2 (u'(y^j - t^{j*}) - \alpha^j KT)^4}{4(b^* - a^*)^2} \right) - 4\alpha^j \Psi f^j(\chi) u''(y^j - t^{j*})}}{2\alpha^j \Psi} < 0$$

and

$$r_2 = \frac{-\left(\frac{\Gamma (u'(y^j - t^{j*}) - \alpha^j KT)^2}{2(b^* - a^*)} \right) + \sqrt{\left(\frac{\Gamma^2 (u'(y^j - t^{j*}) - \alpha^j KT)^4}{4(b^* - a^*)^2} \right) - 4\alpha^j \Psi f^j(\chi) u''(y^j - t^{j*})}}{2\alpha^j \Psi} > 0$$

with $r_2 < -r_1$ and with a minimum at

$$-\Gamma (u'(y^j - t^{j*}) - \alpha^j TK)^2 / 4(b^* - a^*) \alpha^j \Psi$$

Therefore, if $f^{j'}(\chi) \in (r_1, r_2)$, then $\partial t^* / \partial \gamma > 0$. Nevertheless Lemma 2 states that in any equilibrium

$$f^{j'}(\chi) < -\frac{\Gamma}{\alpha^j} \left(\frac{1}{2} - \frac{u(y^j + t^{j*}) - u(y^j) + Kg^*}{2(b^* - a^*)^2} \right)^{-2}$$

Therefore, since

$$r_1 < -\frac{\Gamma}{\alpha^j} \left(\frac{1}{2} - \frac{u(y^j + t^{j*}) - u(y^j) + Kg^*}{2(b^* - a^*)^2} \right)^{-2} < 0$$

in an equilibrium $\partial t^*/\partial \gamma < 0$ if $f^j(\chi) < r_1$ and $\partial t^*/\partial \gamma > 0$ if $f^j(\chi) \in (r_1, \rho)$, where

$$\rho \equiv -\frac{\Gamma}{\alpha^j} \left(\frac{1}{2} - \frac{u(y^j + t^{j*}) - u(y^j) + Kg^*}{2(b^* - a^*)^2} \right)^{-2}$$