Politically Induced Abnormal Returns:
How and Why Politics Move Financial Markets

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We argue that political science theory can provide insight into the information available to market actors about the partisan and policy consequences of political events and, in turn, how markets process this information. In the absence of a predictable political equilibrium (i.e., where no equilibria exist or where there are multiple equilibrium), economic actors may be less able to forecast the consequences of a political event, creating increased market volatility as they update their expectations in response to news and developments. We test the argument by examining market responses to cabinet formations in parliamentary democracies. First, we demonstrate that the predictability of cabinet bargaining affects stock and bond market returns. In situations when a "strong" party does not exist, market returns are depressed during the coalition formation period. Second, we show that periods of potential political change can alter the comovement between stock returns and bond market returns. Finally, we investigate the market for Austrian government debt during the bargaining process after the 1999 Austrian elections. Although the formation of the OVP-FPO coalition precipitated a sharp political reaction, bond markets remained relatively calm. Using content analysis of major Austrian newspapers, we show that market actors recognized the likelihood of an OVP-FPO coalition early in the process and made adjustments at that point rather than after the collapse of SPO-OVP negotiations in late January.

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A small interdisciplinary literature explicitly examines how democratic political events—elections, cabinet negotiations, etc.—affect financial markets.[1] These studies reveal considerable variation in how markets respond to political events. In some instances, markets react calmly to political changes. In others, political events touch off frenetic market activity. Attempts to explain this variation have not enjoyed compelling support. Hypotheses based on incumbent partisanship, partisan change, electoral institutions, and exchange rate commitments receive only weak corroboration. The failure of these simple hypotheses underscores the need for more theoretical development about the conditions under which democratic politics affect market behavior.

To examine the impact of politics on market behavior requires a sophisticated understanding of 1) the type of political information that is available to market actors and 2) how that information is processed. We contend that political science theories can provide insight into the political information available to market actors about the partisan and policy consequences of political events. Political scientists have developed models about equilibrium behavior in electoral competition, cabinet formation, and policy choice. Where a predictable equilibrium exists, markets should be able anticipate that outcome and adjust accordingly. In the absence of a predictable equilibrium, however, economic actors may be less able to forecast the consequences of a political event, creating increased market volatility or abnormal returns. We employ models of cabinet formation in parliamentary democracies to estimate the information available to asset holders. Using these more nuanced models of the political process helps determine the political information actually available to markets. Our results show that political events with predictable outcomes do not induce market actors to shift their assets. Cabinet negotiations where the outcome is less certain, however, do contribute to increased market volatility and asset shifts.

Second, we consider how political information is processed. Prior beliefs condition how the arrival of information affects the expectations of market actors. In some instances, information may simply reinforce the market's prior beliefs about the likely result of a political process. In contrast, unexpected political developments may force market actors to update their beliefs about the eventual outcome. Without an understanding of how markets update and process political information, we cannot accurately measure market reaction to a political event. In order to

[1] See, among others, Blomberg and Hess 1996; Lobo and Tufte 1998; Freeman, Hays, and Stix 2000; Leblang and Bernhard 2001; Leblang and Bernhard 2000; Eichengreen, Rose, and Wyplosz 1995; Bachman 1992; Christodoulakis and Kalyvitis 1997; Bernhard and Leblang 2002; Leblang and Mukherjee 2004.

capture the political information available to market actors, we analyze the formation of the surprising OVP-FPO coalition in Austria (1999-2000).

Our concern with developing a more sophisticated understanding of the information available to markets also implies an empirical strategy. We employ the capital asset pricing model (CAPM) and asset pricing theory (APT) to trace the impact of political events on the behavior of various asset prices. These models provide a clear analytic benchmark against which to measure market responses to political events.

Further, the size and integration of financial markets dictates that we work at the lowest level of temporal aggregation possible. Often, studies of asset price behavior use monthly, quarterly, or even annual data to gauge how politics affects markets. But financial markets have become so integrated and responsive that any evidence of a political influence on the behavior of asset prices is likely to dissipate rapidly. This necessitates that we work with highly disaggregated data. For the most part we employ daily or weekly political and financial data series.

Overall, the results of our analysis suggest that asset owners prefer political predictability. With the growth of capital markets over the past twenty years, political uncertainty carries greater economic costs. Consequently, owners of assets are likely to demand political institutions that will produce predictable outcomes. The interests of asset owners, therefore, may help explain the pattern of institutional reforms in the advanced democracies, including electoral reform.

Political Change in Parliamentary Systems

Democratic political processes may make it difficult for economic actors to predict future economic policies. During elections, cabinet negotiations, and cabinet dissolutions, economic actors are bombarded with information about potential policy choices. Competing parties announce their policy objectives and programs. Opposition parties may win election or new individuals may be selected to occupy leadership positions, changing the composition of the government.

During periods of potential political change, therefore, economic actors must process a large amount of information about the government's future economic policy—information about the policy priorities of different parties, potential election results, and possible cabinets. The contingent nature of democratic political processes exacerbates this problem. Opinion polls may not accurately predict election winners. Politicians may renege on policy promises. Policymakers may surprise economic agents with their policy choices.

As a result, democratic political events can increase the variation of expectations about the government's future economic policy. Some asset owners may anticipate a change in the policy priorities. Other economic actors may guess that the policies of the new government will not

change significantly. The variation in expectations associated with political events may increase asset market volatility or contribute to abnormal returns.

Where periods of political change have more predictable outcomes, however, asset owners can better forecast future economic policy. In these situations, political processes will not induce market shifts. To measure the predictability of political processes, we focus on coalition formation in parliamentary systems.

Periods of Potential Political Change in Parliamentary Systems

In parliamentary systems, elections determine the distribution of legislative seats, which shapes the composition of the cabinet and, in turn, the policy priorities of the new government. We identify two distinct event-periods when political news is likely to affect asset markets: campaigns and post-election negotiations surrounding the cabinet.

For each election, we define the campaign period as the day when an election was called until the day prior to the election. During the campaign, parties may choose candidates or announce new policies to appeal to voters. Opinion polls will chart which parties stand to gain or lose and the likely distribution of legislative seats. The campaign immediately prior to the election, therefore, represents an important period for economic agents to assess the government's future economic policies.

Post-election negotiations begin immediately after the election and last until the new government assumes office. If no party wins a majority of legislative seats in a parliamentary system, post-election bargaining among the represented parties determines the composition of the government, the distribution of cabinet portfolios, and the cabinet's policy objectives. As a result, economic actors must pay attention to these negotiations to gauge how the election will affect future policies. Even in majoritarian systems where a single party forms the government, the time immediately following the election can be a source of uncertainty if party leaders must still determine the identity of key cabinet ministers. Information about negotiation and bargaining in the cabinet formation process, therefore, shapes market expectations about the government's policy program.

Measuring the Predictability of Coalition Formation

Political scientists have developed increasingly sophisticated models to predict the results of a cabinet formation process (Laver and Schofield 1998 and Lijphart 1999 provide reviews). Laver and Shepsle (1996) present one of the most complete theories of cabinet formation. They assume that parties are bargain over the distribution of cabinet portfolios, rather than over the

cabinet's policy priorities.[2] From this assumption, they develop a spatial model that predicts the outcomes of cabinet negotiations based on the distribution of legislative seats among the parties, the policy positions of the parties, and the salience of different issue dimensions. Laver and Shepsle show that, under certain conditions, a specific party will enjoy privileged positions in the negotiation process—what they call a "strong" party. Specifically, a strong party participates in every potential cabinet preferred by a majority of legislators to a cabinet in which the strong party assumes all of the portfolios (that is, a minority government controlled by the strong party.) These strong parties, therefore, have veto power over the partisan identity of the cabinet government.

Laver and Shepsle demonstrate that there can be at most one strong party for a particular configuration of party ideal points and legislative seats. Further, Laver and Shepsle show theoretically and empirically that strong parties are likely to participate in a governing coalition and, as such, structure the cabinet negotiations. Where a strong party does not exist, however, the outcome of cabinet negotiations is less predictable.

We employ their conception of a "strong" party to provide a measure of the predictability of cabinet negotiations.[3] When a strong party exists, coalition negotiations should be fairly predictable and, as a result, we expect markets to adjust easily. When a strong party does not exist, the outcome of coalition bargaining is less predictable and, in turn, we expect stock markets returns to be depressed during the negotiation period.

Because of the complexity of the strong party concept, Laver and Shepsle develop a computer program that calculates the existence of a strong party. The "winset" program requires information about the distribution of seats and party positions to compute whether a strong party exists—i.e., one party that is in advantageous negotiation position. We calculate the existence of a strong party in 25 post-election cabinet formations in the 1980s and 1990s in 8 parliamentary democracies with proportional representation electoral systems: Austria, Belgium, Denmark, Italy, Germany, Netherlands, Norway, and Sweden.

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[2] In contrast, Schofield (1992) assumes that parties bargain over policy. Instead of dividing the policy space into a single dimensions or "jurisdictions," he views the bargaining space between parties as continuous. Relying on the game-theoretic concept of the core, he classifies parties as strong core parties, weak core parties, anti-core parties, and peripheral parties. He then argues that the existence of these different party types will determine the outcome of coalition bargaining.

[3] Laver and Shepsle distinguish between a very strong party and a merely strong party. We collapse the two categories since we found no systematic differences between our results.

While the distribution of legislative seats for each post-election bargaining period is trivial to obtain, each party's policy position needs to be calculated. Although political scientists have developed a number of scales to indicate relative policy positions of parties (e.g., Castles and Mair 1984; Laver and Budge 1991; Laver 2001; Huber and Gabel 2000), these scales tend to be unidimensional and static. Laver and Shepsle's sophisticated model of cabinet formation, however, demands multidimensional measures of party positions. Additionally, we want to capture changes in party positions from election to election.

To do so, we use data from the party manifesto project (Budge et al 2001). At each election, parties issue manifestos that outline policy priorities and set the tone for the campaign. (In the United States, these are referred to as party platforms.) The Manifestos data project performs content analysis on party programmes for over twenty democracies from 1945-1998. For each manifesto, the data set codes the proportion of sentences (or quasi-sentences) devoted to a particular issue in six sets of policy domains: external relations, freedom and democracy, political system, economy, welfare and quality of life, fabric of society, and social groups. Within these policy domains, the manifestos are coded for more specific topics. For example, within the freedom and democracy domain, there are variables for mentions of freedom and human rights, democracy, constitutionalism: positive, and constitutionalism: negative. A party receiving a score of 5 on the issue of "constitutionalism: negative" devoted 5 per cent of their manifesto to negative mentions of constitutionalism.

To convert the Manifestos data to party positions on an economic dimension and a social dimension, we first chose variables related to each dimension. Following Budge and Klingemann 2001, we selected a number of relevant questions for each dimension and then subtracted the number of negative mentions from the number of positive mentions. Table 1 shows the exact questions used to construct the indices.

Laver and Shepsle's winset program requires that party positions fall between 0 and 1. Therefore, we normalized the party position data on country-by-country basis. For each dimension, we calculated the largest difference in party scores between all parties running for election at any time during the post-war period. We then divided each party's score by this maximum value to standardize the party scores.

With this map of party positions and the distribution of legislative seats, we then calculated the existence of a strong party using the winset program.[4] The existence of a strong party

[4] For all simulations, we assumed that each dimension has equal salience. We also did not exclude any parties from consideration as potential coalition partners.

provides a measure of the predictability of coalition formation processes. We use these variables to evaluate how markets react—we expect that the less predictable the cabinet formation, the lower stock market returns will be during the negotiation period.

A Brief Introduction to Portfolio Allocation[5]

We examine how political information influences the allocation of resources by market participants across assets. We concentrate on two asset markets: equity or stock markets and bond markets.[6] Both stocks and bonds can be interpreted as a promise by the issuer to pay a return at some point in the future. The prices that rational investors are willing to pay for these assets, therefore, depend on prospective evaluations of future economic performance and government policy. As with most work in finance, we assume that economic actors have rational expectations; that investors form their expectations of future prices and returns with an awareness of the factors generating those values.[7]

Following the literature in finance and economics, we assume that market participants invest their capital in a variety of instruments and choose their portfolios with the goal of balancing risk and return.[8] Each individual investor chooses a portfolio (not to exceed total initial wealth) that maximizes

$$M = M(\mu_M, \sigma_M^2)$$

where μ_M is the mean (or expected) return on the portfolio and σ_M^2 is the variance (or a proxy for the overall riskiness) of the portfolio. According to the framework, an investor's portfolio

[5] Useful expositions include Alexander (2001); Campbell, Lo and MacKinlay (1997); Cochrane (2001); Duffie (2001); Elton, Gruber, Brown and Goetzmann (2003); and Solnik (2000). A helpful critique based on experimental evidence is Bossaerts (2002). See also Shleifer (2000).

[6] Both stocks and bonds are traded on primary and secondary markets. We focus on secondary markets where the prices of both assets are driven by supply and demand and where trading is predominantly among investors without a significant involvement by the issuer.

[7] A growing literature argues that traders deviate from pure rational behavior. The literature in behavioral finance traces deviations from rational expectations equilibria to fads, herding behavior, the existence of noise traders, sunspots, etc. See Barberis and Thaler (2002) for a survey.

[8] The fundamental idea motivating the tradeoff between risk and return imposes some structure on the investor's (von Neumann-Morgenstern) utility function. If we assume that utility is quadratic in wealth then expected utility can be expressed as a function of the expected value (mean) and variance (or standard deviation) of the return on an asset. The "mean-variance" approach to finance is due to Markovitz (1959). Sharpe (1970) developed the basics of portfolio theory.

choices occur in two parts. The investor first constructs the portfolio frontier – the set of portfolios for which σ_M^2 is minimized and μ_M is maximized. From this set, the investor selects a portfolio that maximizes the objective function M based on his/her preferences. The mean-variance framework, therefore, provides a theory of individual decision making regardless of whether the market is in equilibrium.

The capital asset pricing model (CAPM) extends the mean-variance approach to portfolio selection to the economy as a whole: "If all investors behave according to a mean-variance objective and if they all have the same beliefs (expressed by the means and variances of asset returns), then [the CAPM determines] what can be inferred about the pattern of asset returns when asset markets are in equilibrium" (Bailey 2003, p.107). As originally developed by Sharpe (1964) and Lintner (1965), the CAPM represents a model of market equilibrium that links the return on an asset to the performance of comparable assets within the economy. If there are no arbitrage opportunities available, the difference between the return on a specific asset and the return for the market as a whole should be a function of only risk.

A (linear) representation of the CAPM can be expressed as:

$$R_t = \alpha + \beta X_t + \varepsilon_t \tag{1}$$

where R_t represents the return to an asset, X_t represents the return to a market index, and ε_t the asset specific return all measured at time t.[9] In this specification, as in ordinary least squares regression, the estimated value of β ($\hat{\beta}$) can be interpreted as the relationship between the return on the market index and the return on the particular asset. If $\hat{\beta}$=0 then there is no systematic relationship between the market index and R; a value of $\hat{\beta}$ equal to one indicates that R follows the market return. Values of $\hat{\beta}$ greater (lower) than one mean that, in relation to the market return, R is riskier (safer). The error term (ε_t**)** is assumed to be distributed normally with constant variance and can be interpreted as the asset specific return. We discuss other interpretations of the error term in more detail later in this section.

Although the CAPM has proven to be useful in both theory and practice, it has significant limitations. First, as is apparent from equation (1), values of $\hat{\beta}$ are sensitive to the selection of the market index (X). If, for example, one is interested in pricing the return on shares of IBM,

[9] The original version of the CAPM based on mean-variance analysis derived R and X as deviations from a risk free rate. Black (1972) modified the model to allow R and X to be interpreted as real returns.

values for $\hat{\beta}$ may vary significantly if the Dow Jones Industrial Average or the S&P 500 index are used as the market index. Second, critics have noted that the CAPM requires an exact identification of the market portfolio which must include all possible investable assets (Roll 1977).[10]

To combat these problems, arbitrage pricing theory (APT) extends the CAPM to a more general linear setting (Ross 1976). In APT, the return on an asset is determined by a number of "risk" factors that are common to all assets (within a class) plus a term specific to the asset. Factor models of asset prices state that the return on an asset can be expressed as a function of a (relatively) small number of factors. The simplest case, that of a single factor model, can be written as:

$$R_t = \alpha + \beta_1 X_{1t} + \varepsilon_t \tag{2}$$

where R_t is the rate of return on an asset (or portfolio), X_1 is the factor used to describe R_t, and ε_t is the asset specific return. In this model, β captures the sensitivity of X to R and is often referred to as a "factor loading." Further it is assumed that the conditional expectation of the error given the factor is zero ($E[\varepsilon_t \mid X_t] = 0$).

The single factor APT model is easily extended to multiple factors where the rate of return on an asset (R) depends on a number of risk factors:

$$R_t = \alpha + \beta_1 X_{1t} + \beta_2 X_{2t} + ... + \beta_k X_{kt} + \varepsilon_t \tag{2'}$$

where α is again the intercept and ε is the random asset specific term and is independent of the Xs. The Xs are a set of factors common to all assets and the betas represent the sensitivity or "risk exposure" of the asset to each factor.

The APT model in equation (2) is identical in form to the CAPM model in (1). The theoretical underpinnings and empirical implementation of these two models, however, differ considerably.[11] Theoretically, APT provides a more general description of equilibria than the CAPM since prices can be determined by more than expected means and variances. Since investors attempt to exploit arbitrage opportunities, subsequent returns on an asset (and its relationship to various market indices) are constrained by the law of one price. Because no

[10] Roll argues that "(a) no correct and unambiguous test of the [CAPM] theory has appeared in the literature and (b) there is practically no possibility that such a test can be accomplished in the future" (1977, 129-30).

[11] See Campbell, Lo and MacKinlay (1997) and Elton, Gruber, Brown and Goetzmann (2003) for a detailed discussion.

arbitrage opportunities remain unexploited (and thus no arbitrage opportunities exist in equilibrium), it is easier to implement an empirical APT model--it is not necessary to identify "all" risky assets or the "true" market portfolio. This generality of the APT, however, comes at a price: it is difficult to identify the "appropriate" factors to include in an empirical model.

The identification of the appropriate factors represents one of the major issues in working with APT models. An enormous literature describes, analyzes, and evaluates the relative contribution of various factors in explaining stock and bond market returns.[12] One set of papers points to the growing importance of international factors in shaping local returns. Given (relatively) integrated markets, the expected return on a domestic stock or bond may be correlated with the world market (Karolyi and Stulz 2002 provide a review). A sizable literature on cross-economy "synchronization" examines comovement in business cycles and correlations between real variables (e.g., Kose et al. 2003).

A second set of arguments emphasizes the role of local factors in asset pricing. Roll (1992), Heston and Rouwenhorst (1994), and Cavaglia et al. (2000) contend that differences in industrial structures drive stock market returns.[13]

While much less work has been published on the factors appropriate for pricing bonds, Barr and Priestley (2002), Ilmanen (1996), and Harvey, Solnik and Zhou (1994) find that the factors driving equity returns also play a role in generating bond market returns.[14]

We examine returns of both stocks and ten-year government bonds. The generic form of our APT model for stocks (bonds) is:

$$R_{it}^{S} = \alpha + \beta_1 RUS_t^{S} + \beta_2 \Delta Gold_t + \beta_3 \Delta Oil_t + \beta_3 \Delta Sec_t + \beta_4 R_{it}^{B} + \varepsilon_t \qquad (3)$$

According to (3), the return R_{it}^{S} on country i's stock (bond) market is a function of the rate of return on the stock (bond) market in the United States, the change in the price of gold, the change in the price of oil, the underlying performance of 13 industrial sectors, the return on country i's

[12] Chen, Roll, and Ross (1986), Chen (1991), and Fama and French (1993) are but a few papers that employ a multi-factor approach to asset pricing.

[13] Brooks and Del Negro (2002) and Griffin and Karolyi (1998) provide a dissenting point of view.

[14] Bond markets are more segmented than equity markets due to cross-national differences in legal restrictions, tax regulations, as well as the persistent problems of home bias and asymmetric information. Jorian (1992) provides a valuable discussion.

bond (stock) market, and a random error.[15] To be clear: when stock returns in country i are the dependent variable, we control for country i's bond market return as well as for the return in the US stock market. When country i's bond returns are the dependent variable, we control for country i's stock market and the US bond market.

Equation (3) is the fundamental model for our empirical analysis. If the model in (3) is correct, then ε_t represents the asset specific return; that is, the return on the asset that is not predicted by the factors in equation (3). We make the standard assumption (and check it empirically) that ε_t is distributed normally with mean zero and constant variance.

Sample and Economic Data

To evaluate the impact of democratic political events on asset market behavior, we employ the factor model in equation (3) on up to ten industrial democracies: Austria, Belgium, France, Germany, Ireland, Italy, Norway, Netherlands, Sweden, and the United Kingdom. Our focus on "normal" politics in established democracies should bias our tests against finding evidence that politics influences markets. In these countries, extraordinary political events such as a coup d'etat or a major default are rare. Asset owners, therefore, can have confidence that political events will not cause a major disruption to markets. By looking at countries where property rights are secure, we are able to isolate the role of political uncertainty in shaping market behavior.

Given that political information is likely to possess a short half-life, we need to work at the lowest level of temporal aggregation possible. Daily data for asset returns is available beginning in 1985. Working at the daily level, however, does limit the type and availability of control variables.

Most of the data come from two sources: Morgan Stanley Capital International (MSCI) and DataStream. MSCI compiles both national stock market indices and industrial sector indices. MSCI's national stock market indices are weighted to be representative of all major markets in the country. MSCI also calculates 36 indices corresponding to different industrial sectors. Following Forbes and Chinn (2003), we run a factor analysis on 14 of these sectoral factors to determine a single underlying factor to capture sectoral performance.

[15] This specification is similar to Forbes and Chinn (2002) with three important modifications. First, we control for the US rather than a world or European index because the latter two indices are heavily influenced by the indices from countries in our sample. Second, we use principle components analysis to generate a specific factor common to the thirteen industrial sectors available from MSCI. Third, and most importantly, when modeling the return on one asset we control for the other domestic asset.

We employ the annualized interest rate on ten-year government bonds from DataStream. DataStream is also the source for two additional global variables: oil prices (measured as the current dollar price per barrel for Brent oil) and gold prices (measured as the price of gold bullion in $/oz in the London market).

Abnormal Returns During Periods of Potential Political Change

Our first set of tests examines whether stock and bond returns differ during periods of potential political change. We expect that stock and bond returns will be lower during these periods than in the absence of political events. When political outcomes are predictable, however, we expect stock and bond returns to be relatively unaffected.

In this section, we present three tests. First, we compare the median abnormal return of national stock and bond markets during periods of potential political change with periods when the government's position in office is secure. The second test evaluates the impact of political predictability on average abnormal returns in both stock and bond markets. Finally, we calculate the amount of abnormal returns during periods of potential political change due to political risk. We explain the configuration of political institutions and economic policy commitments that contribute to these politically-induced abnormal returns.

Median Abnormal Returns in Political and Non-Political Periods

Financial economists commonly use a "market model" to forecast returns (Brown and Warner 1980, 1985). A market model argues that, given efficient markets, the best predictor of an individual asset's performance is the performance of the market as a whole. This argument is based on the idea that anomalous events—macroeconomic announcements, expectations of war, etc—may influence the market as a whole. Controlling for these "market" influences allows the analyst to observe changes in the behavior of an asset that are not caused by factors outside of the event in question. We use the market model in (3) as our baseline for both stock and bond market returns. The residuals (ε_t) represent abnormal returns.

To determine whether returns differ during periods of potential political change, we compare the median abnormal return during a political event to a distribution of medians generated during non-political periods. For each country and asset, we first select a random sequence of ninety consecutive non-political days—that is, a period when there is no campaign, election, or cabinet negotiations. For each of these randomly-selected periods, we estimate the market model (equation 3) for the respective asset and calculate the abnormal returns ($\hat{\varepsilon}_t$), and then identify the median abnormal return. We repeat this process 1,000 times and generate an empirical distribution of median abnormal returns. We then calculate a 90 per cent confidence interval

around the average median abnormal return for these non-political periods for both the equity and bond markets.

In the second step, we calculate the median abnormal return for each political period. That is, we estimate equation (3) for each campaign or coalition formation period in the sample and calculate the median abnormal return. We then compare the median abnormal return for each period of potential political change with the empirical distribution of median abnormal returns.

This research design deals with two potential problems in evaluating the impact of politics on financial markets. First, distributions of returns on financial assets are notoriously fat tailed: large observations occur more frequently than expected under a normal distribution. Since some of the political event periods are relatively short (they range between 4 and 141 days), a single outlier or short series of unusually large abnormal returns during any of these periods could distort the average abnormal return for the entire period. If the sample of financial returns contains a larger number of extreme values, then the median will be a more reliable indicator of central tendency.

A second concern reflects the possibility that the any differences in abnormal returns between political and non-political periods might be driven by selection issues. It is possible that large abnormal returns occur randomly and that, by focusing only on periods of potential political change, we happen to select these periods. Any differences, therefore, might represent a function of the time periods selected, rather than the occurrence of political processes. By generating a distribution of median abnormal returns, we are able to demonstrate that these selection issues do not drive the results.

Results

Table 2 presents the results. The first set of columns contains the empirical 90% confidence interval for equity and bond median abnormal returns for all the countries in our sample. In Austria, for example, ninety per cent of the median abnormal stock returns fall between -0.0019328 and 0.001988. The column labeled year indicates the year of the political event. The Stock (Bond) Market columns indicate the median abnormal stock (bond) return for each campaign and coalition formation period. Entries marked in bold differ from the average median return at the 90 per cent confidence level. Again turning to Austria as an example, the 1994 campaign period had a median abnormal stock return that differed from the sample distribution of median returns. The median abnormal stock return during the 1994 coalition formation period, however, does not differ from the sample distribution.

The results strongly support the idea that returns differ during periods of potential political change. For the stock returns, the median abnormal return in campaign periods differs

significantly from the empirical distribution in 20 of 42 political events, a proportion well above what we would expect if these returns occurred by chance. For stock returns during the government formation period, the median return differs 21 times.

In bond markets, the median abnormal return also differs from the empirical distribution more than would occur by chance, although the proportions are not as striking as in the stock market returns. During the campaign and coalition formation periods, the median abnormal bond return differed 15 times and 17 times, respectively.

Overall, the results confirm that stock and bond returns during periods of potential political change regularly differ from the empirical distribution of abnormal returns. But in many cases, these political events do not appear to affect market behavior. What explains this variation? We turn to this question in the next test. In particular, we evaluate whether political predictability affects market behavior during periods of potential political change by focusing on the coalition formation process in parliamentary democracies.

Average Abnormal Returns and Political Predictability

To examine how political information affects market returns, our second test uses an event study approach.[16] Event studies examine the effect of some event (or set of events) on the value of an asset (or set of assets) during a particular period of time. For example, event studies in finance examine whether the return on a particular stock differs after a stock split, an earnings announcement, a merger or takeover announcement, and/or a regulatory change. The idea is to compare the performance of an asset during a period of relative stability prior to the event (the estimation window) to a period after the event (the event window). If asset returns are different after the event—if the returns are higher or lower than expected based on the estimation window—then the event is said to have an effect on the asset in question.

We want to estimate whether campaigns, elections, and cabinet negotiations affect stock and bond market performance in a systematic fashion. Our first step is to identify the event window. For each election, we define the campaign period as the day when an election was called until the day prior to the election.[17] Once the election has occurred, parties that have won seats in parliament engage in a period of negotiation during which cabinet offices are distributed. This period provides market participants with information about which party—and politician—will

[16] Campbell, Lo and MacKinlay (1997) contain a particularly lucid treatment of event studies.

[17] We relied on Keesing's Contemporary Archive for this information. In the rare cases when we could not find the date when an election was called we coded the election period as sixty days prior to the election date.

control specific areas of the policymaking process. The negotiation period extends from the day after the election until the day the new cabinet is installed. These two periods combined—the campaign and election/negotiation period—are the event window: the period of time when we expect market behavior to be influenced by the (un)predictability of cabinet formation.

In order to demonstrate whether market performance is unusual due to political events, we next need to identify a baseline—a period when no political (or other unusual) event is taking place. For this baseline estimation window, we employ a sample of 150 trading days prior to the beginning of the campaign period.

Having identified the event and estimation windows, the next task is to develop a statistical model that can be used to predict market returns during the event window. We again use the market model in (3) as our baseline for both stock and bond market returns. Equation (3) is estimated for the estimation window; the residuals (ε_t), or abnormal returns, are then generated for the event window.

A standard event study would then calculate the cumulative abnormal returns (CAR) by summing the residuals during the event window and would test the null hypothesis that the CAR is no different from zero. Our approach differs slightly. Because we compare the behavior of abnormal returns across political periods where the event window is of differing lengths we calculate the average abnormal return (AAR) rather than the cumulative abnormal return.

We use ordinary least squares regression to test whether the predictability of cabinet formation influences the returns on stock and bond markets. As a proxy for the predictability of cabinet negotiations, we employ a dummy variable for the presence of a strong party. Since the existence of a strong party will generate clearer expectations about the identity of policymakers, we expect that average abnormal returns during the coalition formation period will be larger in the presence of a strong party than if a strong party does not exist.

We regress the average abnormal returns during the coalition formation period on a dummy variable representing the presence of a strong party. We also include a variable measuring the average abnormal returns during the campaign periods. Inclusion of this variable not only controls for possible unmeasured factors that influence a market during a period of potential political change, but also acts as an independent test of whether a structural break in returns between the campaign and negotiation periods exists. Because the data represent repeated observations within countries, we calculate robust standard errors with clustering across countries.

Results

Column 1 of table 3 reports the results from our regression on average abnormal returns in stock markets during the political negotiation period. The parameter estimate on the dummy variable representing the existence of a strong party is positive and statistically significant at conventional levels. Strong parties increase average abnormal returns. Note that the parameter estimate for strong party is opposite in sign and almost identical in magnitude to the intercept. Holding constant the AARs from the campaign period, the absence of a strong period causes leads to negative abnormal returns during coalition formation periods. Moreover, we cannot reject the null hypothesis that the combination of the intercept and slope coefficient on strong party are equal to zero. That is, when a strong party exists, abnormal returns are zero. Strong parties negate the political risk surrounding periods of potential political change.

To check the robustness of these results, we re-estimate the model in column 1 using robust regression. This regression technique does an initial screening based on Cook's distance and iteratively (re)-weights each observation based on the size of its standardized residual. Parameter estimates from this technique are robust to the influence of outliers and from deviations from normality. As is apparent from column 2, no overly influential observations in the AAR regression for stock markets exist.

Columns 3 report the results of the same exercise for abnormal returns in government bond markets. Here, the parameter estimate for strong party fails to attain conventional levels of statistical significance, although it is in the expected direction. This estimate, however, appears to be the consequence of a single influential observation: the 1994 Swedish election. For this observation, the average abnormal returns are more than three times the next largest average abnormal return. Column 4 reports the results from using the robust regression technique, which places almost no weight on this observation (0.00001). With this adjustment, the results are similar to the results from the stock market: the presence of a strong party increases average abnormal returns during the coalition formation process. In column 5, we drop Sweden 1994 from the analysis to show that the results are similar.

The results indicate that political predictability helps reduce negative abnormal returns during periods of coalition negotiation. In the absence of a strong party, returns are lower during these periods than what would have been predicted. The political uncertainty causes a shifting of assets. When a party enjoyed a privileged position in the process of cabinet bargaining, however, asset owners have clearer expectations about the political outcome and, as a result, markets are unaffected.

Politically Induced Abnormal Returns in Stock and Bond Markets

The results from the two previous tests indicate that abnormal returns during periods of potential political change differ from those during periods when the government's position in office is secure. In particular, when the outcomes of democratic political processes are unclear, returns tend to be lower than when outcomes are predictable. In this section, we take an alternative approach to estimating the impact of political events on abnormal returns. We calculate the component of abnormal returns is unique to politics. We call this component politically induced abnormal returns (PIAR). We then model variation in PIAR across periods of potential political change, showing how the configuration of political and economic institutions affects the size of the abnormal returns created during political events.

Calculating Politically Induced Abnormal Returns (PIAR)

We are interested in extracting the component of abnormal returns that is unique to politics. To do so, we again draw on the factor model in equation (3):

$$R_{it} = \alpha + \beta_1 RUS_t + \beta_2 \Delta Gold_t + \beta_3 \Delta Oil_t + \beta_3 \Delta Sec_t + \varepsilon_t^M \qquad (4)$$

where R refers to the return on the asset (either stocks or bonds). The residual, ε, is the asset specific return and is interpreted as the abnormal return given the market model. We superscript ε with M to indicate that these abnormal returns are based on factors identified in the market model alone.

In order to isolate the impact of political periods on abnormal returns, we next modify (4) to include dummy variables for each political period (i.e., campaign and coalition formation):

$$R_{it} = \alpha + \beta_1 RUS_t + \beta_2 \Delta Gold_t + \beta_3 \Delta Oil_t + \beta_3 \Delta Sec_t + \beta_4 PolitcalPeriod_t + \varepsilon_t^P \qquad (5)$$

Here, we superscript ε with P to indicate that these abnormal returns are based on factors identified in the market model and with dummy variables for political periods.

For each asset market in each country, we then recursively estimate equations (4) and (5) using daily data from January 2, 1985 – December 31, 2002. Recursive estimation allows us to generate parameter estimates and residuals for time t that are not influenced by factors occurring at time t+j.

We measure the component of abnormal returns due solely to political factors as $\varepsilon_t^M - \varepsilon_t^P$ and use this quantity as our indicator of PIAR. One of the advantages of this formulation is that, with the exception of the potential omission of a systematically important economic factor, PIAR is not influenced by specification or measurement error. The only difference between ε_t^M and ε_t^P is the influence that political events plays in generating stock or bond market returns. A

positive PIAR indicates that the political period causes market returns to be lower. A negative value of PIAR indicates that politics causes market returns to be higher.

Finally, we want to explain variations in PIAR across countries and over time. Since our specification includes only dummy variables for each political period, the PIAR measure systematically differs from zero only during each political event. Therefore, we model PIAR during each political event as the dependent variable.

Explaining the Variation in PIAR

We argue that the impact of periods of potential political change on asset markets reflects the degree of policy stability in a particular country. If political institutions and economic commitments allow asset owners to anticipate and forecast government policy, then periods of potential change in the partisan identity of the government will have less impact on market returns. Where policy is less stable, however, asset owners will be less able to predict future policies. In these systems, periods of potential political change are likely to be associated with the possibility of political shocks to economic policy.

Policy stability is a function of both political institutions and economic policy commitments. Institutions and commitments that enhance policy stability will decrease the impact of political events on abnormal returns since economic actors can be confident that policies will remain in place despite potential shifts in the identity of government ministers.

Political Institutions

We include two variables to capture the influence of the political system.

Electoral System

The decisiveness of the electoral system will affect the impact of politics on abnormal returns. Majoritarian electoral systems tend to "manufacture" single party majority governments (Lijphart 1984). In these systems, changes in a relatively small number of votes can actually lead to large swings in the distribution of legislative seats between the leading parties and, potentially, a change in the governing party. Therefore, periods of potential political change are likely to be associated with the possibility of sharp shifts in economic policy.

In proportional electoral systems, elections are less likely to lead to dramatic policy shifts. In these systems, policy often represents bargaining between different parties. Consequently, policy change is more likely to be incremental (e.g., Rogowski 1987) and not concentrated around periods of potential political change.

We include a dummy variable, coded 1, for countries with *Proportional Representation* system. (In the sample, only Britain and France are majoritarian.) As a robustness check, we alternatively employ a measure of median district magnitude--the number of representatives

returned per district (Farrell 200?). Higher district magnitudes indicate a more proportional electoral system. We expect both of these variables to have a negative impact on the size of PIAR.

Strong Party

We also include the *Strong Party* dummy variable. As before, we expect the presence of a strong party to reduce PIAR. (We code strong parties for proportional electoral systems only. Since majoritarian electoral systems usually produce one party with a legislative majority, these parties are technically strong parties. But since it is trivial for majoritarian systems, we do not code them as having strong parties).

Economic Policy Commitments

Economic policy commitments can also enhance the predictability of government policy. These institutional commitments can help asset owners predict economic policy and performance, mitigating the potential shock of a change in the government's partisan identity.

Central Bank Independence

An independent central bank enhances monetary policy stability, insulated policy from short-term political pressures. With a dependent central bank, government ministers have more influence over interest rates. A shift in the partisan identity of the government, therefore, may alter monetary policy. Consequently, asset owners may be less able to predict economic policy.

We include a measure of *central bank independence* from Cukierman, Webb, and Neyapti (1992). We update this measure to reflect central bank reform in Belgium, France, and Italy during the sample period.[18] If central bank independence insulates markets from periods of potential political change, the variable should have a negative effect on PIAR.

Exchange Rate Commitments

An exchange rate commitment can also help insulate monetary policy from the potential effects of a change in the partisan identity of the government. With a floating exchange rate, however, governments have the autonomy to pursue domestically-oriented objectives—objectives that can change easily with the arrival of a new government.

We include three variables to account for exchange rate commitments. The first dummy variable, *Fixed Exchange Rate,* is coded one when a country had a pegged exchange rate outside

[18] The rankings of central bank independence for reformed central banks are based on Tavelli, Tullio, and Spinelli (1998), who used the Grilli, Masciandaro and Tabellini (1991) criteria. We used the same criteria to compute the value for the reformed New Zealand central bank. We then used these updated rankings to impute the new values in the Cukierman, Webb, and Neyapti (1992) index.

the European Monetary System. The second dummy variable, *European Monetary System*, is coded one when a country participated in the E.M.S. between 1985 and 1999.[19] The third dummy variable, *Euro*, is coded one for countries participating in the single currency after 1999. Data are from Cobham (1994); Gros and Thygesen (1998), and the I.M.F.'s "Exchange Arrangements and Exchange Restrictions Annual Report" (various years). We expect all three variables to have a negative parameter estimate.

Capital Controls

The impact of capital controls on how markets respond to periods of potential political change is less clear. Without capital controls, asset owners can easily shift their assets easily out of the country, perhaps contributing to market shifts during these periods. If controls are in place, however, asset owners have fewer exit options in the face of a political event.

On the other hand, capital mobility may act as a disciplining device on economic policy. With controls in place, governments have more domestic policy autonomy—autonomy they could use to pursue alternative partisan objectives.

We measure include a dummy variable, *Capital Controls*, coded one when controls are in place. Data are from the I.M.F.

Control Variables

We include two variables to capture potential temporal issues surrounding the calculation of abnormal returns. First, since periods of potential political change are of varying length, we include a variable, *Counter*, that counts the duration of the event.

Second, we include a time trend variable, *Year*, designed to account for any temporal dependence in the dependent variable. This variable may also capture increasing capital mobility over time.

Finally, we estimate all models with a full set of country dummy variables.

Method

We estimate the impact of institutions and policy commitments on politically induced abnormal returns in both stock and bond markets using Zellner's Seemingly Unrelated Regression (SUR) model. The SUR model estimates the models iteratively, taking into account that the errors between models are not orthogonal—which is likely since stock and markets are not independent of one another.

[19] This includes Denmark and, after 1995, Sweden—countries that participated in the E.M.S. until 1999, but then opted out of the single currency. For Austria and Sweden, countries that joined the E.U. in 1995-96, we code them as participating in the E.M.S. beginning in 1996.

Results

Most of the estimated parameters square with expectations. Proportional representation electoral institutions are associated with lower levels of politically induced abnormal returns in both stack and bond markets--this translates to higher returns. For stock markets, coalition formation periods with a strong party also lead to lower PIAR. This effect, however, is not significant for bond returns. The statistical significance of these two parameter estimates is especially compelling as we have also included a set of nine country dummy variables (Sweden is the omitted country) in the analysis. This means that the configuration of electoral institutions and the existence of strong parties have consequences across countries above and beyond that associated with other institutional characteristics that do not change over time.

Monetary commitment technologies are associated with lower PIAR in stock markets. The parameter estimates for both membership in the European Monetary System and the degree of central bank independence are negatively signed and statistically significant at conventional levels in the stock market equation. Monetary commitments appear to insulate stock markets from political uncertainty. Assuming that monetary commitments and low inflation are correlated, investors do not fear that high inflation will wash away their anticipated profits from equity investment, even in the face of uncertain future government policies.

The important role played by monetary institutions also helps explain the positive coefficient on the central bank independence variable in the bond market equation. If monetary tools are not available to policymakers they may turn to fiscal policy as a means of providing private goods to their constituents. If investors anticipate future fiscal deficits then they may sell their holdings of government bonds during periods of potential political change, decreasing the return on bonds.

The coefficient on capital controls also differs across assets. Controls are associated with lower PIAR in stock markets and higher PIAR in bond markets.

The time-trend variable, year, was positive in the stock equation, but negative in the bond model reflecting the global stock market bubble and the convergence in government bond rates in the late 1990s.

As a robustness check, we re-estimated both equations using a random effects estimator and did not find evidence of serial correlation. The random effects specification also confirmed the importance of including country dummy variables.

Discussion

The results indicate that politically-induced abnormal stock market returns are minimized in countries with proportional representation electoral systems, strong parties, an independent central bank, and an exchange rate commitment.

Interestingly, these institutions are consistent with the pattern of institutional reforms we observe in the industrial democracies over the past 20 years (see Bernhard and Leblang 2002). For instance, most industrial democracies have adopted central bank institutions to make central bankers more independent of direct political control (Bernhard 2002). In European Union, member states have adopted a single market and a single currency.

Several industrial democracies have also experimented with electoral reform. Italy, New Zealand, and Japan, for instance, recently adopted new, mixed-member electoral systems. These relatively-disproportionate P.R. systems are likely to produce large centrist parties—the type of parties that enjoy a "strong" position in the process of coalition formation. These reforms are designed to make political competition in these countries more predictable and stable while still allowing for meaningful partisan choice. By making politics more predictable, these reforms should reduce the level of abnormal returns caused by political competition.

While the occurrence of these institutional reforms is far too contingent to be attributed solely to the impact of larger and more volatile capital markets, it is worth noting that our results indicate that these reforms are remarkably *consistent* with the interests of asset owners. As asset ownership has spread in the industrial democracies, the lower returns generated by political uncertainty impose greater and more widespread costs. While reforms have been precipitated by a variety of shocks, the interests of asset owners constitute one of the important background conditions influencing patterns of reform.

Linking Stock and Bond Markets

The analyses of abnormal returns indicate that political events with unclear outcomes can depress both stock returns and bond returns. Where political processes have a more predictable outcome, stock and bond markets are unaffected by these political events.

But the analysis leaves an important question unanswered: where does investment go during periods of political uncertainty? That is, the previous results suggest that investors reallocate their portfolios during periods of political uncertainty. But by analyzing stock and bond markets in isolation, we still have an incomplete understanding of how investors respond to political information.

In this section, we investigate how political information affects portfolio allocation by investigating the inter-relationship between national equity markets and government bond market returns. Because bonds issued by the government have little (if any) default risk they are often viewed as a safe-haven by investors. Consequently government issued securities often have provide a lower return when compared to equities issued within the same national market.

Empirical evidence confirms that, in general, there is a negative correlation between stock and bond market returns (see Li 2002 for a review).

We contend that the predictability of political outcomes will affect the relationship between stock and bond markets during periods of potential political change. In situations of political predictability (e.g., where a strong party exists), investors have no reason to shift their holding from one asset to another, conditional on the market model.

We could evaluate the question of portfolio reallocation during periods of potential political change in several ways. The most direct test, of course, would be to gather individual-level panel data on political expectations and portfolio holdings. Unfortunately, such data are not readily available. Alternatively, we could investigate whether political risk generates requires issuers of stocks (or bonds) to pay a premium in order to convince investors to hold these assets. In general, however, models of the equity premia have enjoyed only limited success in explaining the empirical patterns observed across industrial countries (Mehra and Prescott 1985; Campbell 2002). Further, an empirical implementation of an equity premia approach would require the use of variables that are not available at a daily (or even weekly) frequency.

Instead, we evaluate the linkage between stock and bond markets during periods of potential political change by examining the comovement of stock and bond markets over time—that is, we assess the degree to which the returns on these assets move together.

The Comovement of Stock and Bond Markets During Periods of Potential Political Change

The comovement of asset returns affects the diversification decisions of investors. Consider the correlation between the returns on two assets.[20] The correlation coefficient can range between -1 and +1, where -1 means that the two assets move in exactly opposite directions and +1 means that the two assets move perfectly in unison. If the returns are perfectly positively correlated (r = 1.0), then investors have no opportunities to reduce their risk through diversification. Nothing is gained by investing in both assets. If returns are perfectly negatively correlated (-1), then the risk on the portfolio as a whole decreases--an increase in risk by one asset is offset by a decrease in risk by the other asset. But the expected return of the portfolio is not affected since an increase in the return of one asset is offset by a decrease in the return of the other. If the correlation between the return of two assets is zero, then the portfolio has "minimum risk" since there is no systematic relationship between either the riskiness or the return of the assets.

[20] See chapter 5 of Elton, Gruber, Brown, and Goetzmann (2003) for a detailed discussion of these issues.

We analyze the comovement between returns on domestic equity and government bond markets by calculating a 120 day rolling correlation between the returns on these two assets.[21] A positive correlation means that returns move together, but does not indicate whether this comovement is in a positive or negative direction. If the correlation is negative then investors can gain through diversification. Finally, if the correlation is not statistically different from zero the implication is that there is no systematic relationship between the returns.[22]

We then model the comovement between stock and bond returns for each country. To do this, we modify the market model in equation (3) in three ways. First, rather than controlling for the return on US stock or bond markets, we calculate a 120-day rolling correlation between these two US assets and employ that as a control variable. The other global market and sectoral variables remain the same.

The second modification is econometric. The use of rolling or moving averages creates serial correlation. Therefore, we calculate Newey-West standard errors that are robust to an unknown form of heteroscedasticity and serial correlation of an unknown length and report t-statistics based on these standard errors. We set the truncation length at 120 days, the same as the length of time used to create the dependent variable. Alternating the truncation lengths (+/- 10 days) do not alter the substantive findings reported below.

Third, we incorporate dummy variables representing the campaign period, the coalition formation (negotiation) period, and the presence of a strong party:

$$\begin{aligned} Rho_t = \alpha + X\beta + \lambda USRho_t + \phi_1 Campaign_t + \phi_2 Strong * Campaign_t \\ + \varphi_1 Negotiation_t + \varphi_2 Strong * Negotiation_t + \varepsilon_t \end{aligned} \tag{5}$$

where Rho_t is the correlation between stock and bond returns for country i; X is a vector containing the changes in gold prices, oil prices, and the sectoral index. Campaign and Negotiation are dummy variables coded 1 during the electoral campaigns and cabinet formation

[21] The selection of 120 days for the rolling correlation window was made arbitrarily; results using 90 or 150 day windows do not lead to substantively different results.

[22] Critics charge that the use of (unconditional) correlation coefficients to measure comovement among assets suffers from "conditioning bias" (Boyer, Gibson and Loretan 1997; Longin and Solnik 2001; Forbes and Rigobon 2002). Correlation coefficients, when calculated for periods of extreme volatility, are biased upwards relative to the true value of comovement. We are not overly concerned about this possibility for two reasons. First, both Corsetti, Pericoli and Sbracia (2001) and Li (2002) point out that the aforementioned papers overestimate conditioning bias by focusing on a very restrictive setting: the 1997 Asian financial crisis. Since we examine the comovement of assets over a 17 year period (1985-2002), it is unlikely that these extreme conditions are observed very frequently. Second, in the factor model of comovement, extreme conditions will affect other control variables as well.

periods respectively; Strong indicates the presence of a strong party during that particular political event.

Results

Table 5 contains the results of estimating equation (4) for our sample of ten countries. For ease of presentation, the coefficients for the global and sectoral factors are not reported. Consistent with the separate stock and bond return regressions, the correlation of returns in the US market significantly influences local correlations for all countries, although the magnitude of coefficient differs.

In general the results indicate that campaigns and coalition formation periods are associated with higher correlations between stock and bond returns. The coefficients for the campaign and coalition formation periods are, for the most part, positive and individually statistically significant. In the absence of a strong party, the political risk associated with these periods reduces opportunities for portfolio diversification in terms of both risk and return. (The exceptions for these findings are the campaign period in Belgium and both political periods in Italy.)

Does political predictability during alter the possibility for diversification? That is, does the existence of strong parties during the political election season enhance or diminish the possibility of diversification? The coefficients on Strong*Campaign and Strong*Negotiation generally indicate that the presence of a strong party decreases the correlation of returns between the stock and bond market, leading to the expansion of diversification opportunities. (Italy is again an exception.)

Bargaining Processes and Bond Markets.

The previous experiment shows that cabinet negotiations affect stock market returns. Where the outcome of cabinet negotiations is less predictable, stick market returns are lower than in situations where the identity of the cabinet is clear.

But the previous experiment does not tap into the *process* of cabinet negotiations. Parties posture for influence; they make offers and counter-offers. The media covers the bargaining closely, reporting on which parties are negotiating, what portfolios and policies are on the table, and what the likely outcome will be. The information contained in these news reports conditions the expectations of market actors. We expect that the impact of news items on markets will vary according to the prior expectations of market actors about which cabinet is likely to form. In situations where market actors have a clear idea of what cabinet will form—for instance, where there is a predictable equilibrium cabinet—we anticipate that these news items will have little effect on currency markets (unless the politicians pursue some off-the-path equilibrium behavior).

Currency traders recognize where the negotiations will lead and have built that information into asset prices. In situations where the eventual outcome is less predictable, however, we anticipate that these news items will affect market behavior. Here, market actors will be updating their expectations based on information about party bargaining. As a result, we expect more volatility in reaction to these events.

In order to evaluate how the process of cabinet negotiation affects markets, we use the case of Austria after the October 1999 elections to examine how political information affects the market for government bonds. The next subsections detail the process of cabinet formation in Austria and how we reconstruct the ebb and flow of cabinet bargaining. The following sections discuss how we assess the impact of cabinet bargaining on the bond market.

Cabinet Negotiations after the 1999 Austrian Elections

The October 3, 1999 election stunned the Austrian political establishment. The success of the far-right Freedom Party, under the leadership of Haider, signaled voters' disapproval of the long-running coalition between the Social Democrats, the SPO, and the People's Party, the OVP. The two parties had cooperated in government throughout the post-war period, institutionalizing a norm of proportionality for the government, economy, and society. Although the SPO remained the largest party, it lost six seats in the election. The FPO and the OVP were in a dead heat for second place. Once the postal ballots had been counted, the FPO outpolled the OVP by slightly more than 400 votes, giving them both 52 seats in the parliament.

SPO Chancellor Klima reacted initially by encouraging a continuation of the traditional SPO-OVP coalition. He signaled an unwillingness to deal with Haider and the FPO. The FPO, buoyed by its electoral triumph, welcomed offers from all parties to form a government. Haider boldly claimed that the FPO would be "strong player in the political game."

The OVP's incentives, however, were less clear. In one sense, the OVP enjoyed an enviable position in possible negotiations. As the second largest party in parliament, its seats were required to form a majority coalition. From a policy perspective, it was positioned between the SPO and the FPO on many issues. In short, any coalition was likely to involve the OVP. Indeed, Laver and Sheple's winset program indicates that the OVP was a strong party (in two dimensions). Political and market actors seemed to recognize the OVP's good bargaining position. In personal interviews with central bank officials, they recalled a strong belief throughout the bargaining process that the OVP was likely to emerge as a governing party.

On the other hand, the OVP had lost the election, dropping 12 seats in the process. The OVP leader, Schuessel, had pledged not to participate in government if the OVP received fewer votes than the FPO. On October 13, he stated, "I concluded from the results of the election that voters

do not want a resumption of the governing coalition in the old style." Additionally, it was whispered that Schuessel and Klima did not get along well personally. Clearly, the OVP was not eager to form another coalition with the SPO.

In the Austrian system, the president plays a role in the coalition process. He selects the party to form a government and, in turn, must approve any coalition agreement. Immediately after the election, Austrian President Klestil signaled his desire for a continuation of the SPO-OVP coalition. On October 14, Klestil asked the SPO to begin exploratory talks with all other parties, including the FPO. Even though Klima had ruled out a coalition with the FPO, the two parties scheduled a meeting for November 15. In the meantime, the Green party indicated that it would not join any government and the OVP continued to reiterate its refusal to deal with Klima (even up until December 2). On the weekend of December 4-5, however, OVP leader Schuessel indicated that he would be willing to negotiate with the SPO, although he attached some strict conditions to his announcement. On December 9, President Klestil formally requested that the SPO form a new government. Negotations commenced on December 17, a few days after the OVP's party leadership formally endorsed the negotiations with the SPO on December 13.

Talks between the two parties dragged through mid-January. Nevertheless, on January 17, the outlines of an agreement appeared to on the horizon. An OVP spokesperson said, "The chances are very good that we will find a solution in the next few days." And by January 19, it appeared that a coalition agreement had been struck. Party leaders from both parties approved the agreement in principle, although the distribution of portfolios had not been determined—and this proved to be the undoing of the coalition. In particular, the OVP insisted on the finance portfolio, a demand the SPO was unwilling to meet. By January 21, the deal was dead. In response, SPO leader Klima announced his intention to explore the formation of a minority government. President Kestil authorized him to examine the possibility and report back in one week.

The political wrangling between the SPO and the OVP increased public support for the FPO. Opinion polls indicated that in a new election, the public would support the far right party over the two established major parties. As Klima explored a minority government, the OVP and the FPO opened discussions—even though they had not been authorized by the president. On January 22, Schuessel declared that he would "explore the possibility" of a coalition with the FPO. In turn, the FPO voted unanimously on the 24th to support talks with the OVP. As those talks began the following day, Klima abandoned his efforts to form a minority government. President Kestil, reluctant to accept the FPO into government, declined to ask the leaders of either the OVP or the FPO to form a government. Instead, he opted to wait for the "outcome of these talks before taking the next step in forming a government."

On February 1, the OVP and the FPO announced a new coalition agreement, with Schuessel as prime minister. The two parties presented the proposed cabinet to President Kestil the following day. After delaying for two days and asking the FPO to drop two of its more controversial nominees for cabinet positions, Kestil accepted the coalition late on February 3. The new coalition was sworn in on February 4, touching off protests within Austria and formal complaints from the European Union.

Measuring the Negotiation Process

Measuring a dynamic process like coalition bargaining can be difficult. A simple timeline of meetings between parties may provide little information about the tone, details, and context of cabinet negotiations—information that is likely to influence the perceptions of market actors. Instead, we rely on media accounts of the negotiation process to provide details about cabinet bargaining. National media cover the cabinet formation process closely, reporting on which parties are negotiating, what portfolios and policies are on the table, and what the likely outcome will be.

A team of research assistants performed a content analysis of news stories covering the party negotiations, systematically recording the information contained in the articles of *der Standard*, one of the major Viennese dailies. We collected over 750 articles for the period October 1999 to February 2000.[23] The research assistants coded each paragraph of each article for the following information:

1) Source of the activity—which party or institution is discussing the potential coalition;

2) The activity—whether the party participated in a meeting, made a formal offer, or made a public statement about a potential coalition;

3) The target of the activity--the coalition being discussed by the source;

4) An evaluation of whether the coalition is likely to form;

5) An evaluation of whether the coalition is positive or negative for Austria.

Appendix 1 shows the coding instructions. Appendix 2 indicates the coding scheme. Tests of inter-coder reliability among the research team revealed high levels of agreement—the kappa coefficients for each category were above 0.9 (Brennan and Prediger 1981).

The content analysis provides us with an overwhelming amount of information about the bargaining process. We have a data set of daily frequency showing party activities, parties'

[23] We performed a similar content analysis for the party negotiations following the 1996 New Zealand elections, although we have not had an opportunity to analyze it.

evaluations of the negotiation process, and parties' evaluations of potential coalitions. Using that information, we can reconstruct the evolution of bargaining in the cabinet formation process.

As a first step, we tallied the number of mentions for the OVP-FPO, SPO-OVP, and SPO-FPO coalitions that indicated each coalition was likely or unlikely, regardless of the source. We then subtracted the number of "unlikely" mentions from the number of "likely" mentions to generate a daily indicator of the net number of "likely" mentions.

Figure 1 indicates the number of net likely mentions for each of these coalitions. Shortly after the election, much of the press coverage of a potential SPO-OVP coalition views that outcome as unlikely. As negotiations continue, however, there is an uptick in the number of articles that see the traditional governing coalition as the likely result, reflecting renewed efforts at bargaining between the two parties in December and January. The collapse of the meetings between of the SPO and the OVP, however, sends this measure sharply downward in mid January. The coverage for a potential OVP-FPO coalition is more mixed—a few days of positive coverage is followed by coverage that dismisses the possibility. It is not really until the very end of the period when the number of net "likely" mentions becomes consistently greater than zero. Finally, the content analysis indicates that an SPO-FPO coalition is unlikely, particularly early in the negotiation process. Indeed, after December, the coalition is rarely even mentioned. The content analysis, therefore, captures the ebb and flow of party negotiation: tremendous uncertainty just after the election, replaced by a sense that the SPO and OVP would patch up their differences, followed by a bargaining collapse that left Austria with the OVP-FPO coalition.

Beliefs about Which Coalition Will Form

The raw data on the net number of "likely" mentions suggest that the OVP-FPO coalition came as a surprise in the wake of the sudden collapse of SPO-OVP bargain. But how unexpected was the collapse of the SPO-OVP negotiations? Market actors had prior beliefs about the probability of different coalition outcomes. The distribution of seats, party statements, and the negotiation process informed market actors about the likelihood of different outcomes. These prior beliefs, in turn, condition how the arrival of information affected the assessment of different coalition possibilities. Unexpected information may have caused market actors to update their beliefs about the eventual outcome. In other cases, information may have simply reinforced the market's prior beliefs. Without an understanding of how markets update and process political information, however, we may not be able to accurately measure market reaction to a political event.

As a first cut on measuring the market's beliefs about the formation of different coalitions, we employ the data on the net number of likely mentions. For each coalition possibility, market

actors must estimate the probability that the net number of likely mentions will be greater than zero—i.e., whether there will be more "likely" mentions than "unlikely" mentions of that coalition. While this is an imperfect measure of the probability of different coalitions, it does provide a way to estimate changes in the perceptions of market actors.[24]

The prior beliefs of market actors condition the affect of each day's news stories about coalition formation. We assume that the parameters that constitute the prior density function are normally distributed and informative. The posterior also follows a normal distribution. Market actors are going to update beliefs about the probability of a net "likely" mention using the data from news stories each day. We follow a standard Bayesian formula to calculate this probability (Granato 1996):

$$\theta_t = P(\theta_{t-1} \mid \text{Net Likely Mentions}) = L(\theta_t \mid \text{Net Likely Mentions}) * P(\theta_t)$$

Appendix 3 indicates the exact formulae used to calculate the posteriors.

Figure 2 indicates the evolution of the posterior beliefs concerning the probability of a positive number of likely mentions for the SPO-OVP and OVP-FPO coalitions. First, the probabilities of a likely mention are always higher for an OVP-FPO coalition. Our measure seems to capture the uncertainties about an SPO-OVP coalition, particularly just after the election. Indeed, the initial negativity about a potential SPO-OVP coalition depresses the subsequent probabilities throughout much of the negotiation period. Second, the posterior beliefs about the potential OVP-FPO coalition suggest that market actors anticipated the eventual partnership *much earlier* in the negotiation process than indicated by the narrative overview or the raw data. The probability of a positive mention for the OVP-FPO increases throughout the early part of the negotiation process, crossing the 0.5 threshold on November 29 and hovering there for the rest of the process. This analysis suggests that market actors were not surprised by the formation an OVP-FPO coalition. Instead, they anticipated the result long before the collapse of the SPO-FPO negotiations.

Figure 3 shows the evolution of the probability that an OVP-FPO coalition and an OVP-SPO coalition would receive a net likely mention and the overnight interest rate on Austrian government debt during the negotiation period. Throughout the early part of the negotiations,

[24] In particular, this measure does not account for the compositional nature of the coalition formation problem. That is, our measured probabilities for each coalition are independent of one another—an increase in one probability is not necessarily accompanied by a decrease in the other probabilities. A second issue concerns the proper treatment of days on which a coalitional possibility is not mentioned. Right now, these days are coded zero, the same as days when the number of "likely" and "unlikely" mentions cancel themselves out.

both the probability for the OVP-FPO coalition and the short-term interest rates increase. Short term rates fall sharply at the end of December, shortly after the resumption of SPO-OVP negotiations. But they jump right back up once an OVP-FPO coalition becomes a reality. One explanation of this pattern may stem from the unprecedented nature of an OVP-FPO coalition. Although market actors could foresee this coalition, they did not know what its policy program would entail. Short-term interest rate increases, therefore, might reflect this uncertainty about the coalition's policy priorities. A second interpretation rests on the disjuncture between market beliefs about which coalition would form and actual events. Interest rates peak just as the probability of a net positive likely mention for the OVP-FPO peaks—but it is also around this time that the OVP reverses field and begins negotiations with the SPO. Market actors could have responded to this unanticipated event by pushing up interest rates.

The Experiment: Predicting Short-term Interest Rates

To assess the influence of cabinet bargaining on markets, we examine the behavior of market determined interest rates on Austrian government bonds from October 11, 1999- February 4, 2000, the negotiation period. Market data are the daily closing prices of government bonds issued at various maturities.[25] We test whether information about the bargaining process affects interest rates on government bonds. We anticipate that news about bargaining will affect interest rates only when it affects beliefs of market actors about the relative likelihood of different coalition possibilities.

An enormous literature from economics and finance models the level and change in interest rates. The dominant model of the term structure of interest rates—a model that links short-term to long-term interest rates—is the expectations theory. Derived from rational expectations and the efficient markets hypothesis, the expectations theory argues that the behavior of long-term interest rates is determined entirely by expected changes in short-term interest rates.[26] While there are a large number of different implementations of the expectations theory for the term

[25] We are grateful to Helmut Stix of the National Bank of Austria for generously providing these data.

[26] While a large empirical literature rejects the implications of the expectations hypothesis, it is a valuable and essential tool in understanding how interest rates evolve. As King and Kurmann note: "While this [the expectations theory of the term structure] has strong implications that have been rejected in many studies, it nonetheless seems to contain important elements of truth. Therefore, many central bankers and other practitioners of monetary policy continue to apply it as an admittedly imperfect yet useful benchmark" (2002:49).

structure (see Shiller 1990 and Cuthbertson 1996 for reviews), we use the model developed by Shiller (1979) and implemented by Campbell and Shiller (1987) among others.[27]

Shiller's version of the expectations theory is based on the assumption that the yield expected by speculators holding long-term bonds is equal to a constant term premium plus a weighted average of current and expected future short rates.[28] Let R_t^L be the long-term rate of return and let r_t denote the one-period (or short-term) interest rate. According to Shiller (1979) the expectations theory of the term structure is a relationship between the long and short rate that satisfies:

$$R_t^L = k + \sum_{j=0}^{\infty} w_j E_t r_{t+j} \tag{6}$$

where k is a constant term premia, E_t is the expectations operator given time t information, and w_j are weights whose value are determined by the duration between the long and the short rate.[29]

The Campbell-Shiller (1987) approach to testing the expectations theory of the term structure relies upon the calculation of the theoretical spread between long and short-term interest rates. Following Campbell and Shiller, equation (6) is equivalent to

$$S_t^e = k + \sum_{j=1}^{\infty} \omega_j E_t \Delta r_{t+j}$$

where S_t^e is the theoretical spread ($R_t^L - r_t$), $\omega_j = w_j + w_{j+1} + ... + w_{n-1}$, and Δ denotes the first difference operator. This equation implies that the spread between the long and short rate is equal to a constant plus a linear combination of expected changes in the short term interest rate. Campbell and Shiller test the expectations theory through a comparison of actual and theoretical spreads where the theoretical spreads are calculated from forecasts of the actual spread calculated from a bivariate VAR. The VAR models the actual spread (S_t) and changes in the short rate (Δr_t) as functions of their own and each other's past values.

Implicit—and important—in the Campbell-Shiller approach is the underlying assumption that forecasts of short rate changes generated from a bivariate VAR accurately (or at the very least

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[27] One major advantage of choosing these models is that this version of the model uses a linear formula for long-term yields.

[28] This holding period return is not an integral part of the model; some models argue that it reflects a risk premia while others suggest that it reflects a liquidity premia.

[29] The weights satisfy $w_j = h^j(1-h)/(1-h^n)$ where $h \equiv 1/(1+\overline{R})$ and $\overline{R}$ is the average long-term yield over the sample period.

adequately) reflect the behavior of market participants. Since expectations theory implies that the spread is an optimal forecast of a weighted average of future short rates, Campbell and Shiller argue that it is a good proxy for the wide array of information available to economic agents at time t.

In the experiment, we do not exploit the distinction between the theoretical and actual spread; rather, we take the expectations theory based VAR as our analytical anchor and add political variables to this very simple specification.[30] If all the information necessary for predicting future changes in interest rates is contained in the present (and lagged) values of the actual spread, then our variables of interest should not be statistically significant. If, on the other hand, political information matters, then it should have a statistically significant influence on changes in the short rate.

Results

Our implementation of the Campbell-Shiller methodology uses the overnight interest rate as the short-term rate and the interest rate on the 10-year bond as the long-term rate; the actual spread is the difference between these two rates. The substance of the results we report below do not change if we use either the 20-year or the 30-year bond as the long-term rate. We estimate a bivariate VAR where the dependent variables are, as suggested by the expectations theory, the change in the short rate and the long-short spread. Included in the VAR, and determined by likelihood ratio tests, are three lags of each dependent variable. In preliminary analyses we included variables from the market model (US interest rates, gold and oil prices and the sectoral indicator) as strictly exogenous variables. These variables were not statistically significant individually or jointly; as a result we do not include them in the models reported below.

To assess the influence of news about cabinet bargaining on interest rates, we proceed in three steps. First, we include in our VAR model dates of events that are considered—ex post—to be politically important during the 1999 cabinet negotiation. In a second specification, we measure political information using the net likely mentions for each pair of potential coalition partners. The third specification includes our measure of market beliefs about the probability that the OVP-FPO and the SPO-OVP coalitions would get a net number of likely mentions.

Our first specification of the VAR model includes dummy variables for important events in the bargaining process (results not presented). In neither the short-rate or in the spread equations

[30] One additional experiment would be to regress the theoretical spread, the actual spread, and our political variables of interest. If the political variables are statistically significant, we can conclude that they contain information useful in explaining the term structure.

are any of these variables statistically significant.[31] These events did not appear to have any affect on the market for government bonds.

Table 6 contains the results of the other two VAR models. For ease of presentation, we show only the coefficients and standard errors for the variables measuring political information and suppress the coefficients for the lagged endogenous variables. Columns 1 and 2 include the number of net likely mentions for potential coalition partners for the model of changes in the short-term interest rate and the spread, respectively. Surprisingly, none of the three political variables is statistically significant in either equation. We checked to see if this result was due, at least in part, to collinearity by examining the correlations between the measures (never greater than 0.3) and, in alternative specifications, by dropping one of the measures from the model. No test revealed collinearity as a culprit; raw measures of information arrival into the market do not cause traders to bid up short-term interest rates.

If information arrival does alter the behavior of market participants—information above and beyond that captured in the actual spread—that information will be conditioned by their prior expectations. We examine this idea by including the measures of market beliefs about the OVP-FPO and SPO-OVP coalitions (results in columns 3 and 4). In the short-rate model, both these measures are statistically significant, indicating that they provide information about interest rate movements. The OVP-FPO measure is positive, as suggested by Figure 3—as markets came to believe a potential OVP-FPO would get more favorable media coverage, short term interest rates increase. In contrast, the estimate for the SPO-OVP measure is negative—as their assessment of this coalition improved, short-term interest rates declined. (The OVP-FPO measure and the SPO-OVP measure are essentially uncorrelated (r=0.06)). In alternative specifications, we included the dummy variables for important dates (not reported). The inclusion of these variables did not affect the significance of the belief measures. None of the dummy variables was ever significant with one exception: December 9, the day President Kestil formally asked the SPO to form a coalition. The estimate of the December 9 dummy variable was negative. These results suggest that markets bid up interest rates in response to the policy uncertainty of an OVP-FPO coalition. When the traditional SPO-OVP coalition—with a more predictable policy outcome--appeared more likely, interest rates dropped.

[31] If these dummy variables are lagged then the variables for December 5 and December 9 are statistically significant and are positive for the short-rate equation and negative for the spread equation. Lagging these variables, however, does not seem appropriate in that the news stories appear in the morning paper and the interest rates—being closing prices—reflect the behavior of speculators during the trading day.

Conclusion

In attempting to assess the impact of democratic political events on financial markets, it is important not only to consider the information available to market actors, but also how they process that information. We contribute to this literature by employing political science models that more accurately reflect the information available to market actors. Further, the impact of new information will be conditioned upon the prior beliefs of market actors. While we concentrate on one type of political process—coalition government formation—and two different financial markets—European equity and debt markets—our findings point to the importance of theoretically identifying and empirically modeling the relationship between political information and market performance.

Our concern with developing a more sophisticated understanding of the information available to markets also implies a particular research strategy. In order to capture the political information available to market actors, we must analyze specific events. Only by investigating the arrival of political information at specific times can we assess the relationship between political processes and market behavior. Therefore, we complement our aggregate analysis of politics and asset markets across space and time with the study of a specific political event: the 1999-2000 coalition formation in Austria.

These results suggest a link between the coincidence of monetary and political reforms in the industrial democracies over the past twenty years. In particular, the reforms may be designed to break the linkages between asset market volatility and domestic political outcomes. Increased economic openness and more widespread asset ownership may have increased the economic costs of political competition, making high levels of democratic political uncertainty may simply too costly to sustain. Indeed, several industrial democracies have implemented political reforms that reduce the level of political uncertainty or insulated markets from the consequences of partisan change.

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Appendix 1: Coding Instructions

General Instructions

Instructions for filling in each category in the coding sheet are outlined below. The articles need to be coded by paragraph. For each source, code each coalition discussed in the paragraph.

Every paragraph mentioning a potential coalition should be coded.

Quotes from the past or about the past should be coded as if mentioned or discussing the present. It doesn't matter if the statements are about what happened last week, that day, or tomorrow as long as it is about the current government building process.

Don't use the later contextual clues to code earlier parts of the article. Code only by information in that particular sentence or what has come before. If something is a quotation, however, then later information identifying the speaker of the quotation can be used.

Finally, if you can't decide if a statement has something to be coded, then code as 999 if it takes more than 30 seconds to make the choice.

Note that the process of downloading the documents corrupted all special characters, including all letters with umlauts and ß. For example, Ö is ... and Ÿ is ü.

Line by Line Instructions

Line 1. Fill in date of article, following model on sheet.

Line 2. Newspaper title (already filled in for reliability sample).

Line 3. Article number: red number in upper right or left corner of article.

Line 4. Paragraph number (Sent on coding sheet). For each article, number each paragraph.

Line 5. Source (Source on coding sheet). This category captures all sources who discuss the various possible coalitions among the political parties. The source is the organizational affiliation of the person discussing the potential coalition rather than the person/organization conducting the action. For example, a sentence that reads "OVP and SPO are meeting today" should be coded as media, because the source here is the journalist explaining what is happening, not the OVP or SPO; they are participants, not sources in this case. But indirect quotations should be coded according to attribution. For example, "OVP and SPO are meeting today" should be coded 170. But "An OVP spokesperson announced that OVP and SPO are meeting today" should be coded as 111.

Line 6. Action (Action on coding sheet). This category captures the action discussed by the source.The source could give conditional statements about coalitions, definitive statements about coalitions, or could participate in informal or formal meetings or make actual formal offers to join a coalition. The key difference between conditional and definitive statements is that conditional statements assert that the action will take place only if some conditions are met. The key is to distinguish between signals of what might or might not happen and clear statements of what will happen. Definitive statements are like lines in the sand, whereas conditional statements suggest that there are multiple possible options in the future. If the statement is just the opinion of the

source, code it as 210. If the source is discussing what happened in a meeting, code it 230 or 240 as appropriate. Finally, if a source suggests that one party would like to make a formal offer to another, code it as 250, even if the offer hasn't happened yet. The suggestion that a formal offer might be on the table is a serious claim, and should be coded as an actual offer.

Examples:
Conditional: "OPV would like to rejoin the SPO coalition, but there are issues that need to be resolved" or "OPV and FPO could still work out an agreement"

Definitive: "OPV will decide next week whether to withdraw its promise to go into the opposition" or "SPO cannot accept Haider as a participant in the government."

Line 7. Coalition (Coal on coding sheet). The category codes the coalition being discussed by the source. When the party of the potential Prime Minister (Kanzler) is given, use the more specific codes, otherwise just use the general code. If the story talks about a party choosing to go into opposition, rather than entering a coalition, code it as the party in opposition code. But the choice under discussion must be about the party itself choosing to go into opposition, not ending up in opposition because two other parties decide to form a coalition. E.g, "OVP is thinking about whether to go into opposition after the election results" would be coded as 311. But "SPO may end up in opposition because OVP and FPO are close to agreement" should be coded as 330. There is also a general code for any coalition. Use this code for statements that discuss either the need for any government to form or speculation that no government may be possible, which will often be framed as a sense that new elections will be necessary.

Line 8. Potential for success of coalition (Pot on coding sheet). This category codes for the potential of the coalition to work out. If the source thinks the coalition will happen, then code positive; if the source thinks the coalition will not work out, negative. If the source is ambivalent or does not make a particular claim about the potential of success, code mixed. The question to ask is "Will this coalition happen?".

Line 9. Evaluation of coalition (Eval on coding sheet). This category codes the source's evaluation of the coalition's ability to govern Austria well. The question to ask in this cateogry is "Does the source think the coalition ought to govern Austria?". The previous category codes for whether or not the coalition will happen; this category codes for whether or not it should happen. If the source thinks the coalition would be good for Austria, code 510. If the source thinks it would be detrimental for Austria, code 520. If the source thinks the effects would be mixed or that the coalition needs some changes to work well, code 530. If the source is neutral, code 540.

Appendix 2: Coding Categories

100 Source

- 110 OVP Party Leader (Schüssel)
- 111 OVP Party Other
- 120 SPO Party Leader (Klima)
- 121 SPO Party Other
- 130 FPO Party Leader (Haider)
- 131 FPO Party Other
- 140 Green Party Leader (Van der Bellen)
- 141 Green Party Other
- 150 Austrian President (Klestil)
- 160 European Union (Not specific)
- 161 European Council/Council of Ministers
- 162 European Parliament
- 163 European Commission
- 164 Specific Member State
- 170 Media: Journalistic commentary on coalitions
- 171 Austrian Business Leaders
- 172 Public, including polls on various coalitions
- 173 Other Austrian elites
- 180 Other sources, including American and Israeli responses

200 Action

- 210 Conditional statement: party might enter this coalition, if conditions are right; a testing of the waters approach; or actions conditional on those of other actors in the process
- 220 Definitive statement: party definitely wants to enter this coalition, party will pursue this course of action, no conditions on action
- 230 Informal meetings between parties, past or present (Sondierunggespräche)
- 240 Formal meetings between parties, past or present (with formateur)
- 250 Formal offers

300 Coalition under discussion

- 302 New elections
- 305 All party government
- 310 OVP minority
- 311 OVP in opposition

320 OVP-SPO (unclear who is PM)
321 OVP-SPO (with OVP as PM)
322 OVP-SPO (with SPO as PM)
330 OVP-FPO (unclear who is PM)
331 OVP-FPO (with OVP AS PM)
332 OVP-FPO (with FPO as PM)
340 OVP-Green (unclear who is PM)
341 OVP-Green (with OVP as PM)
342 OVP-Green (with Green as PM)
344 OVP with any other party
345 "Best heads" government SP-VP-Green (excludes FP)
350 SPO Minority
351 SPO in opposition
360 SPO-FPO (unclear who is PM)
361 SPO-FPO (with SPO as PM)
362 SPO-FPO (with FPO as PM)
370 SPO-Green (unclear who is PM)
371 SPO-Green (with SPO as PM)
372 SPO-Green (with Green as PM)
374 SPO with any other party
380 FPO Minority
381 FPO in opposition
390 FPO-Green (unclear who is PM)
391 FPO-Green (with FPO as PM)
392 FPO-Green (with Green as PM)
394 FPO with any other party
396 Green with any other party
399 Green minority

400 Potential success of the coalition
410 Positive potential for coalition: coalition is likely to happen
420 Negative potential for coalition: coalition not likely to happen
430 Mixed potential for coalition: coalition may or may not happen
440 Neutral on potential; purely evaluative

500 Evaluation of the coalition

- 510 Positive evaluation of the coalition: The coalition would be good for Austria and should be pursued
- 520 Negative evaluation of the coalition: The coalition would be bad for Austria and should not be pursued
- 530 Mixed evaluation of the coalition: The coalition has its good and bad sides or needs work to become good governing coalition
- 540 Neutral evaluation of the coalition: Does not provide an evaluation of the coalition

999 No data

Appendix 3: Updating Beliefs about "Likely" Mentions for Each Coalition

The data on market beliefs was constructed using formulae from Granato (1996). The standard Bayesian updating formula to calculate the posterior mean, θ_t, for a normal prior distribution with informative priors is:

$$\theta_t = \frac{\frac{1}{\sigma^2_{t-1}}\theta_{t-1} + \frac{N\mu}{\sigma^{*2}_t}}{\frac{1}{\sigma^2_{t-1}} + \frac{N}{\sigma^{*2}_t}} \tag{A1}$$

where

θ_{t-1} =mean of prior probability that the net number of likely mentions>0

σ^2_{t-1} =prior variance

μ =data based probability that the net number of likely mentions>0

σ^{*2}_t =data based variance

N=sample size at time t.

The formula to calculate the prior variance is:

$$\sigma^2_t = \frac{1}{\frac{1}{\sigma^2_{t-1}} + \frac{N}{\sigma^{*2}_t}} \tag{A2}$$

In order to calculate μ, we convert the net number of likely mentions to a probability using the simple formula for z-scores:

$$z^* = \frac{-(\text{net likely mentions})}{\sqrt{\frac{\sigma^*_t}{N}}} \tag{A3}$$

And

$$\mu = \text{normprob}(z^*). \tag{A4}$$

Table 1: Construction of Policy Positions

Two Dimensional Mapping

Economic Dimension		
Pro-Market		**Pro-State Intervention**
Free Enterprise (401)		Market Regulation (403)
Incentives (402)	minus	Economic Planning (404)
Protectionism Negative (407)		Protectionism Positive (406)
Economic Orthodoxy (414)		Controlled Economy(412)
Welfare State Limitation (505)		Nationalization (413)
		Welfare State Expansion (504)
		Labor Groups: Positive (701)

Social Dimension		
Authoritarian		**Not Authoritarian**
Military: Positive (104)		Anti-Imperialism (103)
Freedom and Human Rights (201)		Military: Negative (105)
Constitutionalism: Positive (203)		Peace (106)
Political Authority (305)	minus	Internationalism: Negative (109)
National Way of Life: Positive (601)		Democracy (202)
Traditional Morality: Positive (603)		Education Expansion (506)
Law and Order (605)		
Social Harmony (606)		

Numbers in Parentheses are Variable Numbers from Budge et. al 2001.

Table 2: Median Abnormal Returns

Country	Distribution of Sample Medians (90% CI) Lower Bound	Upper Bound	Year	Stock Market Campaign Period	Stock Market Coalition Formation	Bond Market Campaign	Bond Market Coalition Formation
Austria							
Stock	-0.0019328	0.001988	1986	-0.0005885	-0.00004307	0.0001311	-0.0001121
Bond	-0.001273	0.0010699	1990	0.0002256	0.0002523	0.0001714	-0.0001414
			1994	**-0.006589**	-0.0004874	0.0001953	-0.0000713
			1995	-0.0016361	-0.0002163	**-0.0020079**	-0.0009593
			1999	-0.0008775	-0.0011471	0.0005602	0.0001122
			2002	-0.0000301	-6.80e-07	0.0001666	0.0000886
Belgium							
Stock	-0.0016507	0.0014802	1991	**0.0021227**	0.0012774	0.0000114	-0.0000394
Bond	-0.0014552	0.0012502	1995	-0.0011541	0.0006662	0.0002584	0.0006638
			1999	-0.0002834	-0.0006215	**0.0022127**	-0.0007477
Denmark							
Stock	-0.0018749	0.0016851	1990	**-0.003777**	0.0007388	-0.0009063	**-0.0038628**
Bond	-0.0015368	0.0009053	1994	**-0.0028325**	**-0.0061963**	0.0005887	**-0.0055288**
			1998	**0.0023255**	-0.0000297	**0.0010647**	-0.0001934
			2002	-0.0005774	**-0.0030919**	**-0.0019065**	**0.0014709**
Germany							
Stock	-0.0015979	0.0020122	1987	-0.0002905	**-0.0058861**	-0.0000274	0.0003943
Bond	-0.0013799	0.0011773	1990	**-0.0017298**	**-0.0021259**	-0.0001616	0.0001241
			1994	0.000324	-0.0009129	-0.0007845	**0.0016875**
			1998	**-0.0063612**	**0.0046136**	-0.0010983	-0.0011321
			2002	**-0.0175089**	0.**0053511**	**-0.0028443**	0.0003309
Italy							
Stock	-0.0021796	0.0023358	1992	-0.0017864	0.0003919	-0.0001381	0.0009376
Bond	-0.0013989	0.0012227	1994	0.0021119	**0.007157**	0.0020303	**-0.0018708**
			1996	-0.0004206	-0.0008322	**-0.0015833**	-0.0012186
			2001	0.0001126	-0.0013333	0.0000608	**0.0021541**
Netherlands							
Stock	-0.0014173	0.0014477	1989	**-0.0036485**	-0.0009451	**0.0014144**	0.0007913
Bond	-0.0013276	0.00092	1994	0.000019	-0.0000425	**-0.0015522**	**0.0016503**
			1998	**0.0015243**	-0.001293	**0.0013195**	-0.0010117
			2002	0.0000693	**-0.0023527**	-0.0011382	**-0.0014513**
Norway							
Stock	-0.0019768	0.0013945	1993	0.0002349	**0.0038867**	0.0003755	-0.000058
Bond	-0.0015599	0.0012748	1997	**0.0023807**	0.0007153	-0.0014518	-0.0008827
			2001	0.0011275	**-0.0047032**	-3.00e-06	-0.0024356
Sweden							
Stock	-0.0026282	0.0019195	1991	**0.0031793**	**-0.0082774**	-0.0008207	-0.0008097
Bond	-0.0015945	0.0013813	1994	**0.0038937**	**-0.0032976**	-0.0010826	**-0.0038475**
			1998	**-0.0110025**	**-0.0031068**	**-0.0021337**	**-0.0037438**
			2002	**-0.0046112**	**-0.0055447**	**-0.0028696**	-0.0003858
France							
Stock	-0.0017635	0.0017937	1986	**-0.0040662**	**0.0201192**	**-0.0027635**	**0.0051359**
Bond	-0.0015074	0.00101	1988	0.**0045964**	-0.0010025	**0.0010153**	**0.0064287**
			1993	0.0004526	**0.0035556**	0.0008322	-0.0009558

				1997	0.0008216	0.0002165	-5.11e-06	-0.0006315
				2002	0.0004078	**-0.0264532**	0.0003109	**-0.0227762**
UK								
	Stock	-0.001265	0.0015633	1987	**0.0053119**	**0.0026232**	0.0005457	**0.0020877**
	Bond	-0.0013565	1.11E-03	1992	**-0.0025057**	**0.0607718**	**0.0013918**	**-0.0476509**
				1997	0.0003142	**0.005321**	0.0009643	**-0.0028301**
				2001	**-0.0014187**	**-0.0014725**	**0.0019134**	**0.0047915**

Table 3: Average Abnormal Returns During Coalition Formation Periods

	Stock Market AAR		Bond Market AAR		
	OLS with Robust Standard Errors	Robust Regression	OLS with Robust Standard Errors	Robust Regression	OLS with Robust Standard Errors[a]
Campaign AAR	0.654*	0.712**	0.580*	0.393*	0.397*
	(3.48)	(4.05)	(2.46)	(2.63)	(3.03)
Strong Party	0.003**	0.003**	0.001	0.001*	0.001*
	(3.51)	(3.30)	(1.01)	(2.21)	(2.02)
Constant	-0.002**	-0.002*	-0.001	-0.001*	-0.001*
	(3.79)	(2.54)	(2.16)	(2.22)	(2.62)
Observations	25	25	25	25	24
R-squared	0.40	0.50	0.30	0.40	0.45

* significant at 5%; ** significant at 1%

[a]Omits Sweden 1994

Table 4: Politically-Induced Abnormal Returns

	(1) PIAR-Stock	(2) PIAR-Bond
Proportional Representation	-0.004**	-0.005**
	(8.90)	(21.17)
Strong Party	-0.001**	0.000
	(5.95)	(1.58)
Capital Controls	-0.001**	0.000*
	(6.17)	(1.99)
E.M.S.	-0.000*	-0.000**
	(2.16)	(2.73)
Euro	0.000	0.000**
	(1.54)	(3.37)
Fixed Exchange Rate	-0.000	0.000
	(0.68)	(0.19)
Central Bank Independence	-0.003**	0.002**
	(4.51)	(4.91)
Daily Counter	0.000	-0.000**
	(1.23)	(2.69)
Year	0.000*	-0.000**
	(1.99)	(6.39)
United Kingdom	-0.002**	-0.002**
	(3.11)	(7.17)
Austria	0.001**	0.001**
	(3.08)	(5.84)
Belgium	0.002**	0.001**
	(8.12)	(9.23)
Denmark	-0.001	0.000*
	(1.79)	(2.33)
France	0.001*	-0.004**
	(1.97)	(17.67)
Germany	-0.000	0.001**
	(1.35)	(5.37)
Italy	0.003**	0.002**
	(13.00)	(17.48)
Netherlands	0.002**	0.003**
	(7.06)	(17.88)
Norway	0.004**	0.003**
	(13.73)	(23.87)
Constant	-0.062	0.117**
	(1.86)	(6.50)
Observations	1786	1786

Models estimated via Zellner's Seemingly Unrelated Regression. The correlation between the residuals of the stock and bond equations is 0.4596 (p=.0000) Absolute value of z statistics in parentheses.

* significant at 5%; ** significant at 1%

Table 5: Rolling Correlation Between Stock Markets and Bond Markets

	(1) UK	(2) Austria	(3) Belgium	(4) Denmark	(5) France	(6) Germany	(7) Italy	(8) Netherlands	(9) Norway	(10) Sweden
U.S. Correlation	0.770**	0.235**	0.329**	0.374**	0.447**	0.394**	0.633**	0.499**	0.397**	0.671**
	(12.27)	(3.62)	(3.37)	(5.14)	(6.24)	(6.67)	(8.57)	(6.42)	(3.89)	(11.77)
Campaign	0.039	0.103	-0.075*	0.168**	0.127*	0.002	-0.111**	0.267**	0.017	0.113
	(0.90)	(1.79)	(2.25)	(2.84)	(2.32)	(0.02)	(4.40)	(3.20)	(0.26)	(1.76)
Coalition Formation	0.012	-0.017	-0.098	0.100	0.112**	-0.059	-0.114**	0.036	0.065*	0.147**
	(0.22)	(0.45)	(1.17)	(1.54)	(2.80)	(0.50)	(3.58)	(0.31)	(2.53)	(2.78)
Cabinet Dissolution	0.029	0.037		-0.093**	0.102		-0.066		0.210**	-0.126**
	(1.15)	(0.57)		(4.08)	(1.27)		(1.92)		(5.22)	(4.96)
Strong*Campaign		-0.109*	-0.262**	-0.182**		0.127	0.247**	-0.301	0.000	-0.154*
		(2.03)	(3.12)	(2.63)		(1.02)	(3.00)	(0.58)	(0.24)	(2.29)
Strong*Coal. Form.		-0.104	-0.259**	-0.237**		0.084	0.224*	-0.068**		-0.240**
		(1.31)	(8.85)	(3.97)		(0.73)	(2.44)	(3.29)		(4.77)
Constant	-0.046	-0.016	-0.063	-0.134**	-0.052	-0.019	-0.132**	-0.066	-0.061	-0.076**
	(1.42)	(0.55)	(1.56)	(4.40)	(1.68)	(0.78)	(4.00)	(1.77)	(1.28)	(3.37)
Observations	4573	4573	3399	3507	4573	4550	2944	3790	2508	3529

t-statistics in parentheses. The model also includes change in the price of gold, oil and sectoral performance as controls. These coefficients and t-statistics are not reported for ease of presentation.

*p<5%

**p<1%

Table 6: Austrian Bond Market—VAR Results

	Model I		Model II	
	1	2	3	4
Variable	Δr_t	S_t	Δr_t	S_t
Net Mentions	-0.0014	-0.0027		
SPO-OVP	(0.0024)	(0.0028)		
Net Mentions	-0.0000	-0.0012*		
OVP-FPO	(0.0001)	(0.0007)		
Net Mentions	0.0000	0.0020		
SPO-FPO	(0.0006)	(0.0071)		
Posterior			-0.2422*	0.1953
SPO-OVP			(0.1239)	(0.1498)
Posterior			0.3628*	-0.5516*
OVP-FPO			(0.2161)	(0.2613)

Coefficients are multiplied by 100.
Cell entries are parameter estimates from a bivariate VAR that includes 3 lags of each dependent variable (not reported). Standard errors are in parentheses.
N=85 for all models.
S_t is the spread between the long (10 year) and short (overnight) interest rate on Austrian government bonds.
Δr_t is the change in the short interest rate
*p<.10
Both models pass diagnostic tests for residual serial correlation, normality and heteroscedasticity at the .10 level.

Figure 1A

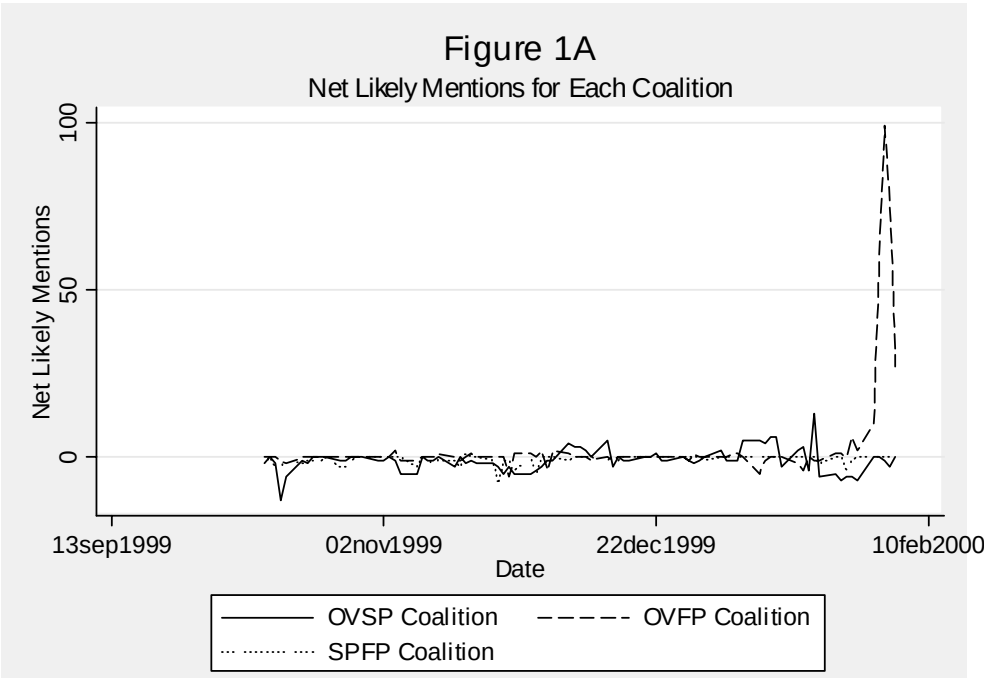
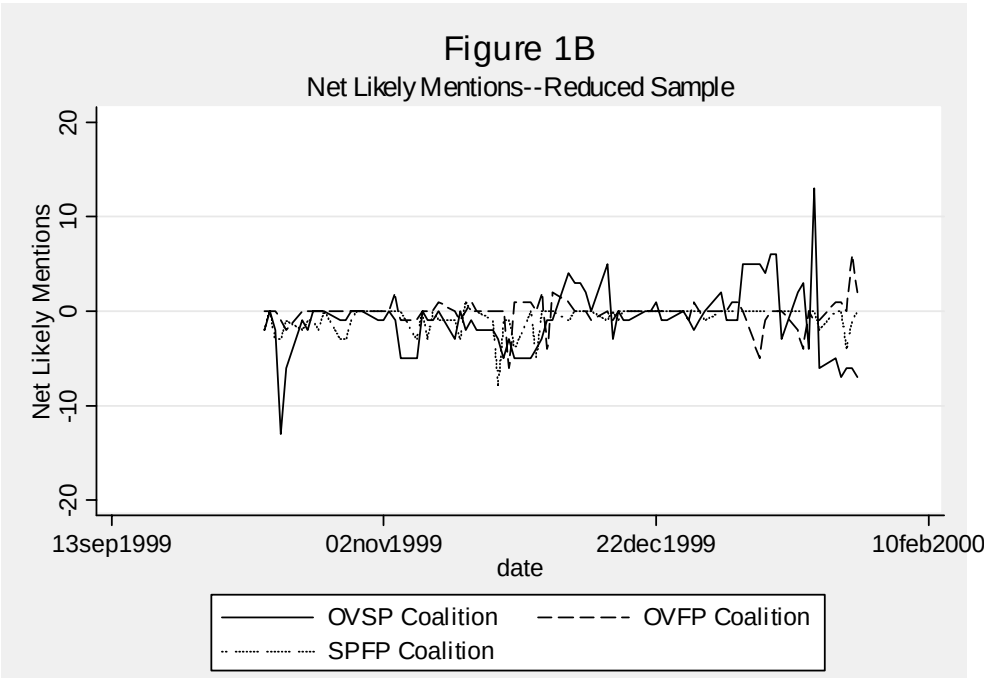


Figure 1B



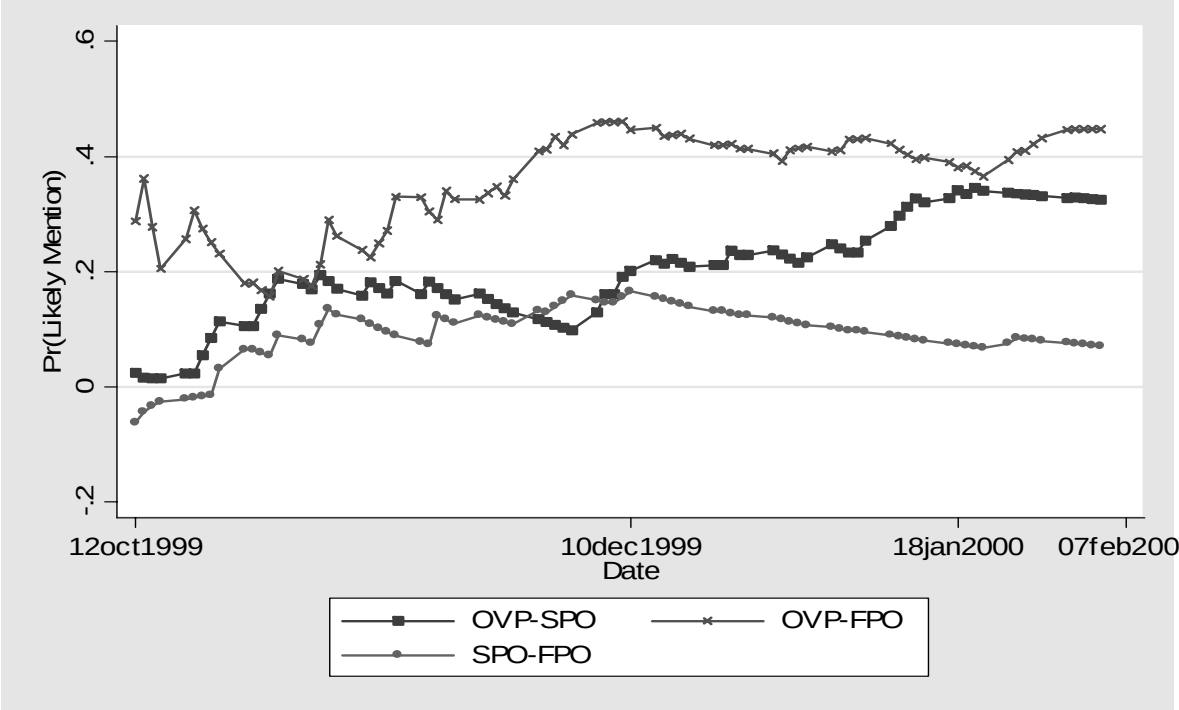


Figure 2: Posterior Likelihoods for Each Coalition

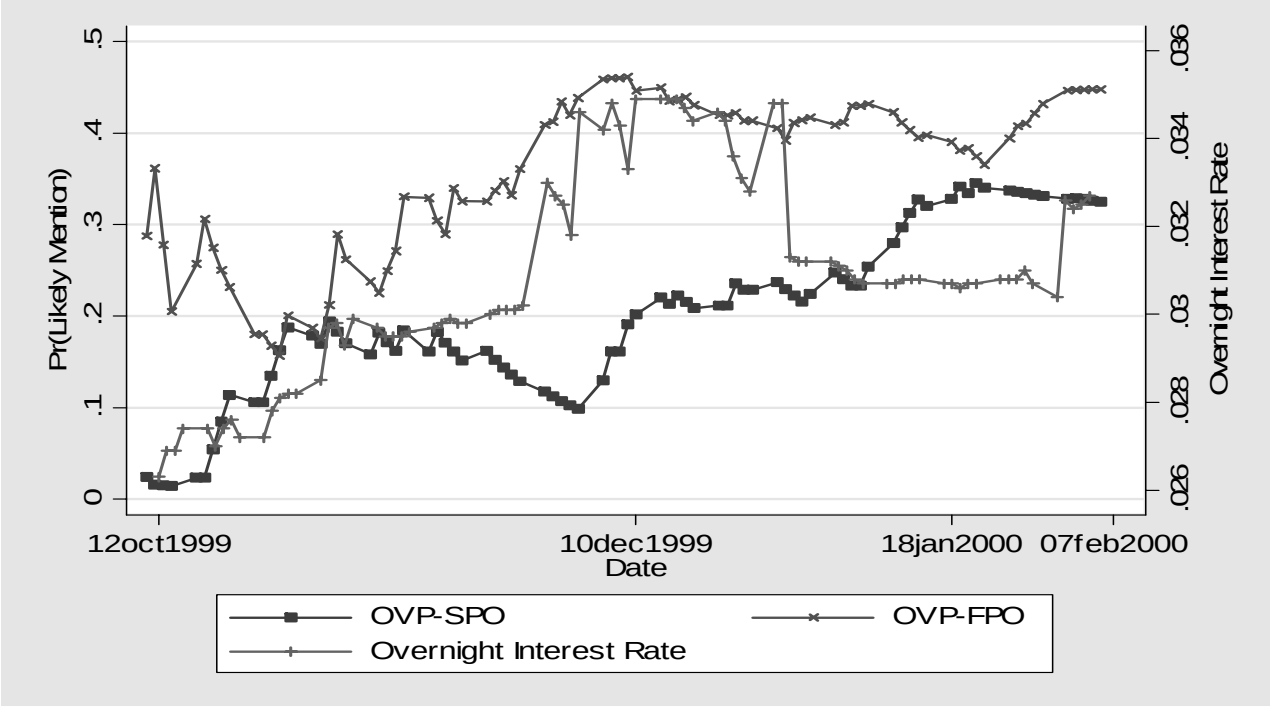


Figure 3: Posterior Likelihoods for Coalitions and Overnight Interest Rates