Elections and Markets: The Effect of Partisanship, Policy Risk, and Electoral Margins on the Economy

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Rational partisan theory's exclusive focus on electoral uncertainty ignores the importance of policy uncertainty for the economy. I develop a theory of policy risk to account for this uncertainty. Using an innovative measure of electoral probabilities based on Iowa Electronic Markets futures data for the United States from 1988 to 2000, I test both theories. As predicted by rational partisan theory, positive changes in the probability that the Left wins the Presidency or the Congress lead to increases in nominal interest rates, implying that expectations of inflation have increased. As predicted by the policy risk theory, positive changes in the electoral probability of incumbent governments and divided governments lead to significant declines in interest rates, implying that expectations of inflation risk have decreased. And as an extension to both theories, I find that electoral margins matter for the economy—partisan and policy risk effects depend not only on which party controls the government, but how large its margin of victory is.

How do elections affect the economy? Partisan theory (Hibbs 1977) suggests that changes in the partisan orientation of the party in power affect the economy because parties of the Left are more likely than parties of the Right to choose fiscal and monetary policies that stimulate employment, inflation, and growth. Rational partisan theory (Alesina 1987) agrees, but notes that if people rationally expect partisan differences then they adjust their economic behavior *prior to each election* in response to changes in the probability that each party will win. Extending the logic of Lucas (1977), this means that only *unexpected* electoral outcomes can have real effects on employment and growth, and these are transitory because there is no more uncertainty about future government policy once the result of the election is known.

This article advances a theory of policy risk, arguing that rational partisan theory's focus on *electoral* uncertainty misses an important point about *policy* uncertainty. Even when the outcome of an election is known, there may still be uncertainty about what economic policy the victors will implement. For example, it may be easier to anticipate the policy of incumbents than challengers, since they have recently given direct evidence of their preferences and competence while in office. Similarly, people might be more certain about the future policies of a divided government than a unified government since they may be less able to implement large policy changes. These differences in policy risk directly affect inflation risk and nominal interest rates (Barro 1976; Benninga and Protopapadakis 1983; Cox, Ingersoll, and Ross 1985; Fischer 1975; Kandel, Ofer, and Sarig 1996), which indirectly affect consumption, investment, and growth (Estrella and Hardouvelis 1991; Estrella and Mishkin 1998; Harvey 1988; Kamara 1997). Therefore it is important to understand not only potential differences in the *expected* policy outcome of the election, but also differences in the *uncertainty* surrounding that outcome.

This article also argues that the Presidential margin of victory is critical for capturing the full effect of both partisan and policy risk expectations on the economy. Recent theoretical and empirical work (Conley 2001; Fowler 2005; Fowler and Smirnov 2005) suggests that parties are more likely to propose and implement more extreme versions of their favorite policies after an election if they win by a wide margin. If people expect this, then rational partisan theory implies that inflation expectations rise as the expected vote share for the Left increases. Similarly, the theory

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of policy risk suggests that people should expect greater policy uncertainty as the absolute margin of victory for either party increases since a larger margin of victory may give the winning party leeway to implement the extreme version of its policies.

I formalize these arguments by specifying a model of nominal interest rates. I then develop an innovative approach to measure expectations of partisan and policy risk differences. Using election futures from Iowa Electronic Markets (IEM), I derive pre-electoral probabilities of various outcomes for U.S. Presidential and Congressional elections from 1988 to 2002 and analyze their impact on nominal interest rates implied by the futures market. As predicted by rational partisan theory, positive changes in the probability that Democrats win the Presidency or the Congress are associated with increases in nominal interest rates, implying that expectations of inflation have increased. As predicted by the policy risk theory, positive changes in the electoral probability of incumbent governments and divided governments are associated with declines in interest rates, implying that expectations of inflation risk have decreased. And as an extension to both theories, I find that partisan and policy risk effects depend not only on who controls political institutions, but how large their expected margin of victory is.

Extending Rational Partisan Theory

Partisan theory (Hibbs 1977) suggests that different parties systematically choose different combinations of inflation, unemployment, and growth because they represent different interests in the electorate. Left-wing parties like the Democratic Party in the United States are more likely to use inflationary fiscal and monetary policies to stimulate employment because of their affiliation with labor. Right-wing parties like the Republican Party are more likely to use less inflationary fiscal and monetary policies because of their affiliation with capital. This difference in inflationary outcomes is denoted $\pi_D > \pi_R$.

Rational partisan theory (Alesina 1987) agrees that there should be observable changes in the inflation rate that last for the duration of each party's term in office. However, if workers have full information about and rationally expect different inflation rates under Democratic and Republican administrations, they will update their wage contracts as soon as a new party takes office, diminishing any real effects on the economy. In fact, this updating process takes place *prior* to the election in response to changes in the probability that each party will win. Therefore, expectations of post-electoral inflation in a two-party system are the sum of the product of the inflation rate associated with each party (π_D,π_R) and its corresponding probability $(p,1-p)$ of winning the election, $E[\pi] = p\pi_D + (1-p)\pi_R$.

This theory applies generally to a unified government, but different branches of a government may have independent effects on economic policy. To address this issue, I extend rational partisan theory by assuming that new policies depend on a negotiation between the President and the Congress. Suppose this negotiation yields an outcome that is a simple linear combination of the outcomes associated with the policies preferred by the two branches of government (as in Mebane 2000 and Mebane and Sekhon 2002). If so, then the post-electoral inflation outcome can be written as

$$\pi = \alpha\pi_P + (1-\alpha)\pi_C \tag{1}$$

where π_P,π_C are the inflation rates associated with policies proposed by the President and Congress, and $\alpha \in (0,1)$ represents the relative impact the President has on the inflation outcome.

This assumption complicates the model because we must now consider four possible electoral outcomes instead of just two. Let π_{ij} be the inflation associated with a government in which party $i \in \{D,R\}$ controls the Presidency and party $j \in \{D,R\}$ controls the Congress, and let p_{ij} be the associated probabilities of each configuration of the government. Equation (1) suggests that the four outcomes for post-electoral inflation are:

$$\begin{aligned} \pi_{DD} &= \pi_D & \pi_{RD} &= \alpha\pi_R + (1-\alpha)\pi_D \\ \pi_{DR} &= \alpha\pi_D + (1-\alpha)\pi_R & \pi_{RR} &= \pi_R \end{aligned} \tag{2}$$

Suppose we observe separate measures of the probability that the Democrats win the Presidency and the Congress (p_P,p_C). As in Alesina (1987), we will assume that these probabilities are commonly understood and shared by all individuals in the economy. However, random events during the course of a campaign affect movements in these probabilities, so we can think of these measures as outcomes of a random variable. To infer *joint probabilities* such as the probability of a unified Democratic government, it might be tempting to use the product of these two probabilities, but this assumes that the measures are independent. There are at least two reasons to be suspicious of such an assumption. One is that winning the Presidency may create a "coattails" effect for the same party in Congress. If so, then measures of the probability that

the Democrats win the Presidency and the probability they win the Congress would covary *positively*. Alternatively, suppose that voters usually try to divide the government between the two parties. If so, then the probability that the Democrats win the Presidency and the probability they win the Congress would covary *negatively* with the opposite effect on the joint probabilities. Thus, *inferences* regarding the joint probabilities p_{ij} should each include a covariance term $c_{PC} = Cov(p_P,p_C)$ such that $p_{DD} = p_P p_C + c_{PC}$, $p_{RD} = p_P(1 - p_C) - c_{PC}$, $p_{RD} = (1 - p_P)p_C - c_{PC}$, and $p_{RR} = (1 - p_P)(1 - p_C) + c_{PC}$ (see web appendix at http://www.journalofpolitics.org for more information about the covariance). The expected inflation outcomes and their associated probabilities can be combined and simplified to derive a model of inflation expectations that includes electoral expectations for both branches:

$$E[\pi] = \sum_{ij} p_{ij}\pi_{ij} = (\pi_D - \pi_R)(\alpha p_P + (1-\alpha)p_C) + \pi_R \quad (3)$$

This equation suggests that an increase in the probability that the Democrats win *either* branch of government will increase inflation expectations.

A Theory of Policy Risk

Though rational partisan theory is persuasive in its focus on *electoral* uncertainty, it is silent on the issue of *policy* uncertainty. Alesina (1987) assumes future policies of election winners are fixed and known, but it is much more likely that there is some degree of uncertainty surrounding them. This uncertainty may result from not knowing exactly what economic policies a given party prefers and the inflation that would result if they were implemented. Even though it may be easy to rank-order the impact of Left and Right policies, it may be difficult to know if the victorious party will implement the moderate or extreme version of its proposals. Uncertainty may also arise because the effectiveness of a government in implementing policy varies, in part due to changing logistical competence and in part due to idiosyncrasies of the current institutional context (such as the personalities controlling legislative committees).

Policy uncertainty can have an effect on the real economy. A higher level of policy uncertainty increases the risk of holding assets with returns that depend on economic policies. For example, the decision to invest in a government bond is directly affected by the inflation rate since the real rate of return is equal to the nominal return minus the inflation rate. Any increase in the expected variance of inflation also increases the expected variance of the real return. This causes some investors to reallocate their money to other assets that have the same return but a lower level of total risk. As they do so, demand for the bond falls, as does its price. Thus, an increase in inflation risk increases interest rates, which can also have a negative impact on consumption, investment, and growth.

To derive an equation for inflation risk, I change rational partisan theory's assumption of known inflation outcomes for each party to random variables Π_D,Π_R with known means π_D,π_R, known variances σ_D,σ_R, and known covariance $C_{DR} = Cov(\Pi_D,\Pi_R)$. This assumption yields the same expected inflation rate as the model in which the inflation outcomes are known (equation 3), but it also yields variances implied by the equations in (2) for each of the four possible election outcomes:

$$\begin{aligned}
\text{var}(\pi_{DD}) &= \text{var}(\Pi_D) = \sigma_D \\
\text{var}(\pi_{DR}) &= \text{var}(\alpha\Pi_D + (1-\alpha)\Pi_R) \\
&= \alpha^2\sigma_D + (1-\alpha)^2\sigma_R + 2\alpha(1-\alpha)c_{DR} \\
\text{var}(\pi_{RD}) &= \text{var}(\alpha\Pi_R + (1-\alpha)\Pi_D) \\
&= \alpha^2\sigma_R + (1-\alpha)^2\sigma_D + 2\alpha(1-\alpha)c_{DR} \\
\text{var}(\pi_{RR}) &= \text{var}(\Pi_R) = \sigma_R
\end{aligned} \quad (4)$$

These variances can be used to derive the variance of the inflation rate conditional on electoral probabilities (see Casella and Berger 2002, 167): $\text{var}(\pi|ij) = E[\text{var}(\pi|ij)] + \text{var}(E[\pi|ij])$. Each of the two terms in this equation has a substantive interpretation. The first term (expectation of the variances) can be thought of as *policy risk*. This is the inflation risk associated with each of the four electoral outcomes weighted by the probability each occurs:

$$\begin{aligned}
\sigma_p &= E[\text{var}(\pi|ij)] = \sum_{ij} p_{ij}\,\text{var}(\pi_{ij}) \\
&= \alpha(\alpha(\sigma_D - \sigma_R) - 2(1-\alpha)(\sigma_R - c_{DR})) \\
&\quad p_P + ((1-\alpha)(1-\alpha)(\sigma_D - \sigma_R) \\
&\quad -2\alpha(\sigma_R - c_{DR}))p_C + 2\alpha(1-\alpha) \\
&\quad ((\sigma_D - \sigma_R) + 2(\sigma_R - c_{DR})) \\
&\quad (p_P p_C + c_{PC})
\end{aligned} \quad (5)$$

Notice that policy risk is a function of partisanship, but the relationship is complicated. Increases or decreases in electoral probabilities can either increase or decrease the overall risk depending on how uncertain people are about the policies each party will implement.

The second term (variance of the expectations) can be thought of as *electoral risk*, σ_e:

$$\sigma_e = \text{var}(E[\pi|ij]) = \sum_{ij} p_{ij}(E[\pi_{ij}] - E[\pi])^2 =$$
$$\left(\alpha^2 p_P(1-p_P) + (1-\alpha)^2 p_C(1-p_C)\right.$$
$$\left. + 2\alpha(1-\alpha)c_{PC}\right)(\pi_D - \pi_R)^2 \quad (6)$$

Notice that electoral risk is increasing in the difference in the inflation rates expected under the Democrats and Republicans. Intuitively, as the difference in policy outcomes increases, so does the size of the change in expectations after the election results are known. Note also that electoral risk is increasing in the closeness of p_P and p_C to .5, reflecting the impact of electoral uncertainty. The contribution of each of these factors depends on α, the relative impact of the branches of government—if the President is more responsible for the inflation rate, then electoral uncertainty in the Congress does not have much of an effect on inflation risk, and vice versa.

Divided Government

Several scholars have argued that divided governments react less quickly to economic shocks, which can increase levels of public debt and lead to higher real interest rates (Alt and Lowry 1994; Grilli, Masciandaro, and Tabellini 1991; Roubini and Sachs 1989a, 1989b). However, while divided governments may be less able to smooth *exogenous* economic shocks, they may also be less likely to create *endogenous* policy shocks because they are susceptible to gridlock. Responding to Mayhew (1991), a growing body of empirical work suggests that "important," "significant," "landmark," or "conflictual" legislation is less likely to pass under divided than unified government (Bowling and Ferguson 2001; Coleman 1999; Edwards, Barrett, and Peake 1997). The bureaucracy may also be affected—Epstein and O'Halloran (1996) find that under divided government agencies overseen by the executive but constrained by the legislature will not be able to make significant policy changes. Boix (1997) notes that divided governments tend to produce less policy change to the supply side of the economy, such as the level of public ownership of the business sector. These findings also concord with the comparative politics literature on veto players, which suggests that the potential for policy change decreases as the number of groups with institutional veto power increases (Tsebelis 1995).

Analysis of the model presented here paints a more complicated picture. Whether or not divided government yields less policy risk than unified government depends on both the risk associated with each party and the relative impact each branch of government has on policy. For example, suppose that *only* the Presidency or *only* the Congress matters for policy. If so, then this substantially reduces the effect of divided and unified government. Expectations of policy risk will merely be a function of uncertainty and electoral expectations for a single branch of government. Suppose instead that both the Presidency and Congress matter for policy, but the policies of one party are much more predictable than the other. Again, the effect of divided and unified government declines. Any increase in the probability that the unpredictable party wins either branch of government will increase risk, regardless of whether or not it also increases the probability of unified government. However, if (1) both branches matter and (2) there is similar uncertainty about both parties, then divided government forces the parties to negotiate and limits the range of policy changes that would be possible under unified government when one party has full control. Under these conditions divided government reduces policy risk by reducing the uncertainty associated with large policy changes.

Incumbency

Incumbent governments reveal some information about both their policy preferences and their effectiveness because they implement policies in the period immediately prior to the election. Comparatively, challengers must be assessed using information from their prior turn in office, which could be several years ago. In the interim, the challenger's preferences may have changed, the competence of their new leadership may be harder to assess (cf. Rogoff 1990; Rogoff and Siebert 1988), and the interaction between branches of government may be harder to predict. Thus a challenger victory should be associated with more policy uncertainty. For simplicity, suppose that this effect applies equally across parties, so that when the incumbent party loses the Presidency or the Congress, uncertainty increases by $\sigma_{ch,P}$ and $\sigma_{ch,C}$, respectively. This will not have any effect on electoral risk because it does not affect the mean inflation rate. However, it *will* affect policy risk because the variance is affected. Letting $p_{ch,P}$, $p_{ch,C}$ be the respective probabilities that the challenger party wins each branch, we can incorporate the effect of incumbency on the variance of inflation expectations. This has no impact on electoral risk, but it yields additional terms for policy risk: $E[\text{var}(\pi|ij,p_{ch,P},p_{ch,C})] = \sigma_P + p_{ch,P}\sigma_{ch,P} + p_{ch,C}\sigma_{ch,C}$.

Electoral Margins

So far I have only discussed the effect of winning an election. However, the margin of victory may also be important, particularly for the Presidency. When a party wins in a landslide, it frequently claims that it has won a "mandate" to govern and that the public is eager to support the policies of the new administration (Kelly 1983; Kramer 1977). Larger margins of victory mean the party "can do considerably more" (Stigler 1972, 99). On the other hand, if the election is close, public support for the winning party's proposed policies may be qualified.

Dahl (1990) argues that even if the margin of victory is large it is unclear whether overwhelming support for the winner translates into support for a particular policy. However, there is an intuitive reason to believe that electoral margins matter. A party that wins by a narrow margin of victory cannot afford to alienate its constituents at the very center of the political spectrum or else it may lose the next election. This reduces the credibility of the party's commitment to more extreme policy changes because any small sign of defection may force it to compromise with the opposition. A landslide victory gives a party more bargaining power because it can tolerate defections from the center without risking a loss of power. This intuition is confirmed both formally and empirically in Conley (2001) and Fowler and Smirnov (2005).

To model the effect of shocks to electoral margin on rational partisan theory, let the expected Democratic margin of victory be $\mu = (V_D - V_R)/(V_D + V_R)$ where V_D and V_R are the number of votes expected for the Democratic and Republican presidential candidates. Notice that μ is positive when the Democrat wins, negative when the Republican wins, and is proportional to the size of the victory. Suppose that parties offer economic policies during the campaign, but later shift them in response to the election outcome. Without loss of generality, assume that the size of this shift is proportional to the margin of victory μ and a random variable S denoting a shock with known mean s and known variance σ_s. The inflation expected under each electoral outcome conditional on this shock changes to $E[\pi_{ij}|S,\mu] = \pi_{ij} + s\mu$, which adds a term to the expression for expected inflation: $E[\pi|ij,S,\mu] = s\mu + \sum_{ij} p_{ij}\pi_{ij}$. The shock also changes the inflation risk associated with each electoral outcome: $\text{var}(\pi_{ij}|S,\mu) = \text{var}(\pi_{ij} + S\mu) = \text{var}(\pi_{ij}) + \sigma_s\mu^2$. This has no impact on electoral risk, but it does add a term to the overall expression for policy risk: $E[\text{var}(\pi|ij,S,\mu] = \sigma_P + \sigma_s\mu^2$.

Notice that inflation expectations are increasing in the margin of Democratic victory, μ. More Democratic votes mean higher inflation. In contrast policy risk is increasing in μ^2. This means that people expect more inflation risk when the margin of victory for *either* party increases because landslides yield bigger post-electoral shocks to policy. I thus expect larger margins of victory to be associated with higher nominal interest rates, *regardless of partisanship*.

Empirical Implications

The extended rational partisan theory implies that expectations of post-electoral inflation should increase with the probability of a Democratic victory in both branches of government and the expected vote share for the Democratic party. The theory of policy risk implies that expectations of inflation risk should increase with the probability of unified government (under certain conditions), the probability a challenger party wins either branch of government, and the vote margin for the winning candidate. These implications can be tested by examining the impact of electoral expectations on nominal interest rates. Figure 1 summarizes the joint predictions of these theories. Expected nominal interest rates fall the most when an incumbent Republican wins reelection in a divided government by a narrow margin. Conversely, interest rates are expected to rise most when a Democratic challenger wins unified control of the government by a landslide. However, the cross-cutting effects of partisanship and policy risk lead to ambiguous predictions in mixed cases, such as the reelection of an incumbent Democrat.

The finance literature (see Barro 1976; Benninga and Protopapadakis 1983; Cox, Ingersoll, and Ross 1985; Fischer 1975; Kandel, Ofer, and Sarig 1996) typically models nominal interest rates as a linear function of inflation expectations, inflation risk premia, and factors affecting the real interest rate. For factors affecting the real interest rate I follow Plosser (1982, 1987), Baxter (1989), and Alesina, Roubini, and Cohen (1997) by assuming that the real interest rate is a linear function of the growth in the money supply (*M1*), growth in inflation (*CPI*), unemployment (*UE*), and industrial production (*IP*). Letting a constant K absorb the baseline inflation, inflation risk, and real interest rate yields the following full equation for estimation:

Figure 1 Impact of Partisan Orientation and Policy Risk on Expectations of Nominal Interest Rates

Partisan Orientation	*Policy Risk* **High** (Challengers, Landslide Elections, Unified Governments)	*Policy Risk* **Low** (Incumbents, Close Elections, Divided Governments)
Left	**Higher Nominal Interest Rates**	**Ambiguous**
Right	**Ambiguous**	**Lower Nominal Interest Rates**

$$n = (\pi_D - \pi_R)(\alpha p_P + (1-\alpha) p_C) + \sigma_p + \sigma_e + \sigma_{ch,P} p_{ch,P} + \sigma_{ch,C} p_{ch,C} + s\mu + \sigma_s \mu^2 + \beta_{M1} M1 + \beta_{CPI} CPI + \beta_{UE} UE + \beta_{IP} IP + K + \varepsilon \quad (7)$$

To be clear, note that the main independent variables here are the observations of electoral probabilities (the p's) and vote share expectations (the μ's) implied by the IEM futures market. Parameter estimates in this specification provide explicit tests of separate parts of the rational partisan and policy risk theories. If $\pi_D - \pi_R = 0$, then the rational partisan and electoral risk theories can be rejected because there is no expected difference in the inflation outcomes of the two parties. Notice, however, that this is a joint test of both hypotheses—if $\pi_D - \pi_R > 0$ then it is possible that only one of the two hypotheses is not rejected. If $\alpha = 1$ then the extended rational partisan theory can be rejected because the Congress is not expected to have an effect on policy. We can reject the policy risk hypothesis only if $\sigma_P = 0$. Inspection of equation (5) shows that this is only true if *both* $\sigma_R - c_{DR} = 0$ and $\sigma_D - \sigma_R = 0$. The effect of incumbency on inflation risk can be rejected if $\sigma_{ch,P} = 0$ for the Presidency and $\sigma_{ch,C} = 0$ for the Congress. Finally, the effect of the margin of victory on expected inflation can be rejected if $s < 0$ and its effect on inflation risk can be rejected if $\sigma_s < 0$.

Futures Data

For the dependent variable, we need an appropriate measure for *post-electoral* nominal interest rates. Cohen (1993) solves this problem by combining spot prices for U.S. Treasuries with some linear assumptions about the term structure to interpolate what forward interest rates will be when the victor takes office. While this is a reasonable approximation of future interest rates, a simpler way to derive them is to use rates implied by treasury futures contracts.

A futures contract is a promise to buy or sell a specific asset on a given date (the settlement date) in the future at a price determined by the exchange (the settlement price). The price of these contracts includes consensus expectations of future prices and yields. Futures-based forecasts of nominal interest rates are typically more reliable than forecasts based on surveys or implicit forward rates (Hafer, Hein, and MacDonald 1992) and are used to predict important events such as changes in Federal Reserve policy (Krueger and Kuttner 1996). Therefore I use futures contracts for treasuries that settle after each election to derive expectations for post-electoral nominal interest rates. In particular, I focus on two-year and five-year bonds because these are the closest in duration to the term length for the House and Presidency.

Measuring Electoral Probabilities

Turning to the independent variables, the literature has had difficulty assessing the impact of elections on financial markets because the only electoral probability that is known with certainty is the result itself: $p = 1$ for the winner and $p = 0$ for all others. Past studies have thus tended to focus on market changes *after* the election (see Bachman 1992; Bernhard and Leblang 2002; Blomberg and Hess 1997; Cutler, Poterba, and Summers 1989; Niederhoffer 1971; Sheffrin 1989). However, if the market continuously updates its expectation of the electoral outcome *prior* to the election, it may help to explain why many of these studies do not observe large changes in interest rates on the day immediately following an election. For example, Clinton was the overwhelming favorite on the day prior to his election in 1996. It is thus reasonable to assume that most of whatever effect the market expected from a Clinton Presidency should already have been priced into the market *before* the election.

To improve on these approaches we need a reliable method for measuring election probabilities

before the election. Empirical models have typically been the most accurate predictors (Campbell 1992; Campbell and Garand 2000; Erikson 1989; Erikson and Wlezien 1994; Fair 1978, 1996; Gelman and King 1993; Rosenstone 1983), but these models are usually based on long-term economic data from several months to a year before the election. Effects of the campaign or idiosyncratic qualities of the candidates are treated as error terms in these models, so the mean prediction does not tend to vary much on a day-to-day or even month-to-month basis. Other attempts have used pre-electoral polling data to infer election probabilities. Chappell and Keech (1988), Suzuki (1992), Carlsen (1998), and Carlsen and Pedersen (1999) regress actual vote shares on presidential approval in the quarter before the election and use the coefficient and standard error to derive a probability that the incumbent will win more than 50% of the vote. Cohen (1993) goes a step further, using an option-pricing model to derive monthly implied election probabilities based on the current support level in polls and the volatility of past survey results. However, this model relies on specific parameterizations of the volatility and several restrictive assumptions about how new information is incorporated in each period.

Electoral Futures Markets

I propose a simpler solution using election futures prices from Iowa Electronic Markets (IEM). IEM is a real futures exchange where traders buy and sell contracts based on the outcome of elections. For example, in 1996 IEM made available a Clinton winner-take-all (WTA) contract. On Election Day a Clinton WTA contract is worth $1 if he wins and $0 if he loses. These contracts are traded and their prices fluctuate depending on consensus expectations of the probability that the candidate in question will win the election. WTA contracts are especially intuitive because their prices directly imply election probability.[1] That is, an individual who believes Clinton has a 65% chance of winning values the contract at $.65. The market price thus implies the consensus expectation of the probability the candidate will win.

WTA contracts exist for major parties in the House and major candidates for the Presidency. Daily closing prices on these contracts allow us to measure the probability of a Democratic victory for both institutions. Figure 2 shows an example of these probabilities for U.S. Presidential and House elections in 2000. In addition to WTA futures markets, IEM conducts markets in vote share (VS) for Presidential elections. On settlement these contracts pay a percentage of one dollar that is equal to the vote share received by the candidate in question. For example, a Democratic President vote share contract pays $.55 if the Democrats receive 55% of the vote. These contracts can be used to measure consensus expectations of the margin of victory. The web appendix describes how electoral probabilities and vote share expectations are derived from the IEM data and includes a number of technical details regarding the data.

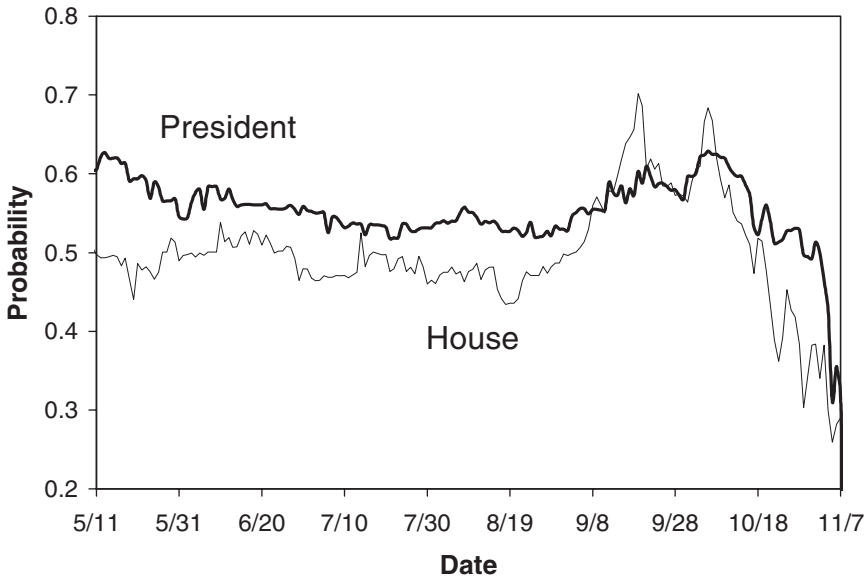
Why Use Futures Data?

In spite of the creativity of poll-based measures of electoral probabilities, there are several reasons to use futures prices instead. IEM market prices are updated continuously and daily historical data is available. This dramatically increases the number of observations over the poll-based method, allowing for more precise statistical inferences. Analytical comparisons of polls and election markets suggests that if market participants have access to polls then the market price is always a better predictor (Kou and Sobel 2004). This is because the market price incorporates all information the poll could plus private information from experts and empirical political economy models.

One might object to using IEM data because the universe of participants in this market is limited and subject to partisan bias. For example, Forsythe et al. (1992) show that the individuals who participate in these markets are more likely to be white, higher income, conservative, and Republican. Forsythe, Rietz, and Ross (1999) also show that traders in these markets tend to invest in the candidate or party they support. However, a growing literature (Berg, Forsythe, and Rietz 1997; Berg et al. 2003a; Berg, Nelson, and Rietz 2003b; Bohm and Sonnegaard 1999; Forsythe, Rietz, and Ross 1999; Forsythe et al. 1992) demonstrates that there is *no partisan bias* in the market price and suggests that election futures markets are *more reliable than polls* for predicting election outcomes. For example, Berg et al. (2003a) note that the election-eve IEM forecast has a lower mean

[1]This may seem unreasonably simplistic to readers familiar with optimal pricing models. For example, Malinvaud (1974) provides a general equilibrium proof that the futures market price should be a function of consensus forecasts, the risk-free interest rate, and the risk premium associated with the aggregate risk factor of the futures position. However, Berg et al. (2003a) and Berg, Nelson, and Rietz (2003b) use CAPM and APT models to show that no risk adjustment is required for the IEM futures market because the risk-free rate in the market is zero and neither an aggregate risk factor nor a premium for one can exist.

Figure 2 Probability that Democrats Would Win U.S. Elections in 2000



Note: Probabilities derived from Iowa Electronic Market winner-take-all contracts for the 2000 U.S. Presidential and House Elections.

prediction error than polls in 15 elections for which data on both exist (1.49% vs. 1.93%). Berg, Nelson, and Rietz (2003b) also compare major poll predictions of U.S. Presidential election outcomes to prices in the IEM vote share market. The IEM market prediction was closer to the election outcome 76% of the time ($n = 596$) and was not susceptible to predictable surges and declines (such as the post-convention surges for both parties observed in polling data). In sum, the literature on these markets suggests that IEM futures prices are the *best available data* for measuring pre-electoral probabilities.

This presents a puzzling discrepancy—how can the market perform so well when its participants are biased? In spite of evidence that many traders invest in their favorites, Forsythe, Rietz, and Ross (1999) show that these individuals do not drive the market. Instead, the market price is strongly influenced by a group of "marginal traders" with no preference bias in their portfolios. Marginal traders invest twice as much as average traders, *make* prices rather than *taking* them, and are six times less likely to make a trading mistake. Forsythe, Rietz, and Ross (1999) show that this group acts to correct imbalances that may be related to preference-oriented investment and helps to explain why the market price across several elections does not show partisan bias.

Estimation Procedures

I use maximum likelihood to estimate the coefficients in equation (7). Daily financial time series are usually subject to a high degree of serial correlation, so I use an error correction model (see Beck 1992; Beck and Katz 1995; King 1997). In this method the change in the dependent variable is regressed on the change in all the independent variables and the lagged levels of the dependent and independent variables. Estimates are statistically valid as long as the coefficient on the lagged dependent-variable level is significantly different from zero. To check for remaining serial correlation Beck and Katz (1995) suggest a Lagrange Multiplier Test in which the model residual is regressed on the lagged residual and the independent variables. If the coefficient on the lagged residual is not significantly different from zero, then serial correlation should no longer cause concern.

Daily financial time series are also subject to varying degrees of platykurtosis. That is, the probability of large shocks to nominal interest rates is larger than an assumption of normally distributed errors would imply. The statistics literature recommends correcting for these fatter tails in a variety of ways, but the most common for panel financial series is to assume a *t*-distribution of the error component of the model (see Adler, Feldman, and Taqqu 1998).

Results

Maximum-likelihood estimates are reported in Table 1 along with 95% confidence intervals derived from

Table 1 Impact of Electoral Outcomes on Interest Rates

Dependent Variable: Expected Post-Electoral Nominal Interest Rates			Two Year Maturity			Five Year Maturity		
	Symbol		MLE	95% Conf. Int.		MLE	95% Conf. Int.	
Model coefficients								
Relative influence of Presidency	α	*Change*	.57	.51	.64	.52	.46	.59
		Lagged Level	.48	.44	.56	.43	.38	.50
Partisan difference in inflation	$\pi_D - \pi_R$	*Change*	3.17	2.75	3.54	2.65	2.18	3.07
		Lagged Level	3.22	2.69	3.62	2.51	2.06	2.89
Partisan difference in inflation risk	$\sigma_D - \sigma_R$	*Change*	−1.21	−1.75	−.56	−1.21	−1.68	−.69
		Lagged Level	−2.12	−2.51	−1.60	−1.79	−2.12	−1.37
Republican inflation risk minus partisan covariance	$\sigma_R - c_{DR}$	*Change*	1.30	.92	1.63	1.21	.90	1.55
		Lagged Level	1.50	1.18	1.80	1.29	.99	1.60
Effect of challenger party in Presidency	$\sigma_{ch,P}$	*Change*	.08	−.21	.42	.33	.11	.55
		Lagged Level	−.30	−.49	.12	−.08	−.22	.04
Effect of challenger party in House	$\sigma_{ch,H}$	*Change*	.73	.26	1.20	.63	.30	.96
		Lagged Level	−.20	−.65	.30	−.19	−.51	.15
Effect of electoral margin on inflation	s	*Change*	1.45	.40	2.71	1.06	.14	2.05
		Lagged Level	2.09	1.19	3.12	1.60	.78	2.42
Effect of electoral margin on inflation risk	σ_S	*Change*	43.67	29.06	58.29	29.56	17.68	41.69
		Lagged Level	66.07	47.89	84.20	39.42	25.40	53.68
Economic Controls								
M1	β_{M1}	*Change*	−.03	−.09	.02	−.02	−.06	.02
		Lagged Level	−.02	−.06	.01	−.02	−.05	.00
Inflation	B_{CPI}	*Change*	−.06	−.46	.36	.00	−.29	.33
		Lagged Level	.07	−.03	.19	−.01	−.08	.07
Unemployment	B_{UE}	*Change*	−.34	−.93	.24	−.14	−.55	.27
		Lagged Level	−.14	−.19	−.10	−.03	−.06	.00
Industrial Production	B_{IP}	*Change*	−.01	−.12	.10	.00	−.08	.08
		Lagged Level	−.04	−.07	−.01	−.02	−.05	.00
Technical Parameters								
Lagged Dependent		*Change*	−.13	−.17	−.09	−.08	−.12	−.05
Variable		*Level*	−.34	−.38	−.29	−.22	−.27	−.18
Constant			.14	−.38	.67	−.21	−.61	.14
σ_Y			.25	.23	.26	.18	.17	.20
η			6.43	4.69	9.69	3.62	2.80	4.90
Mean Log Likelihood			−296.17			−10.92		
Lagrange Multiplier Test (effect of ε_{t-1} on ε_t)			−.04	−.09	.03	−.03	−.09	.04

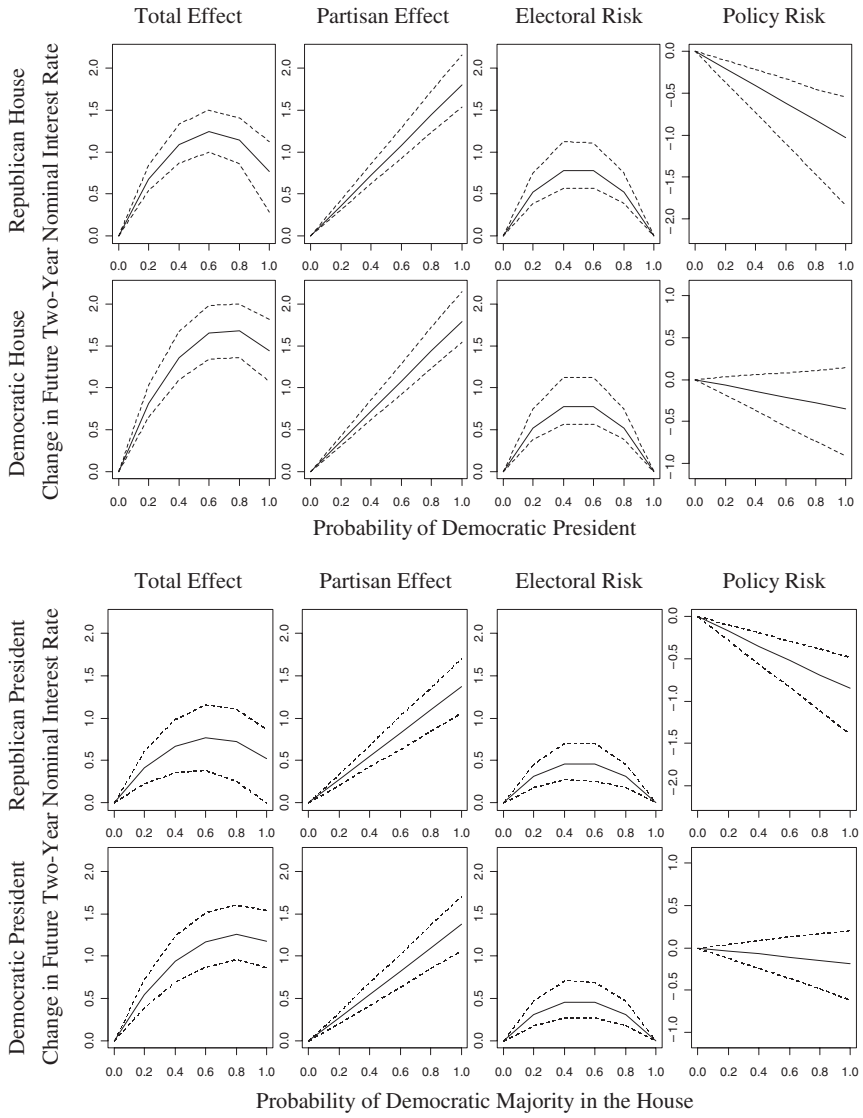
Note: Maximum-likelihood estimates of coefficients in equation using an error correction model assuming *t*-distributed errors. Confidence intervals calculated from profile likelihood.

the profile likelihood. Lagrange Multiplier Tests for each of the specifications indicate that serial correlation in the errors is not significant. Estimates of the additional degrees of freedom parameter η (for the *t*-distribution) show that platykurtosis is indeed present. The five-year model yields coefficients closer to zero than the two-year model, suggesting that elections have a stronger impact on two-year rates. This is not surprising since a new set of elections that may yield policy changes occurs every two years. To discuss the substantive results I use the model based on the two-year maturity to simulate first differences holding all variables constant at their means except the variables of interest. (For a full description of this technique see King, Tomz, and Wittenberg 2000.)

Partisanship

The first two rows of Figure 3 show how changing the probability of a Democratic President affects future

Figure 3 Effect of Partisanship on Two Year Nominal Interest Rates



two-year nominal interest rates. In the top row I assume the Republicans have won the House, while in the next row I assume the Democrats have won the House. The bottom two rows of Figure 3 show how changing the probability of a Democratic House affects interest rates. In the third row I assume the Republicans have won the Presidency, while in the bottom row I assume the Democrats have won the Presidency.

The first (left) column of Figure 3 shows the total effect of electoral probabilities on interest rates. Notice first that regardless of the orientation of the other body, Democrats in both the House and Presidency significantly increase nominal interest rates. For example, the upper-left graph shows that increasing the probability of a Democratic President from 0 to .6 increases the two-year rate by 1.4%. However, the relationship is curvilinear—interest rates only rise about .7% when the probability changes from 0 to 1. Thus, it is important to analyze the different components of the model separately. Column 2 shows the partisan effect of electoral probabilities on expected inflation, $E[\pi]$, column 3 shows the partisan effect on electoral risk, σ_e, and the last (right) column shows the partisan effect on policy risk, σ_p.

As predicted by rational partisan theory, elections have a significant effect on inflation expectations. Inflation is expected to be 1.8% higher when Democrats control the Presidency than when Republicans control it. This result is consistent with previous tests of rational partisan theory. In fact, Alesina, Roubini, and Cohen (1997, 91) estimate that "after 1972, the difference in the steady state inflation rate between a Democratic and Republican regime is about 1.8% per

year." Unlike past analyses, however, the extended model is the first to suggest that the party controlling Congress is also important. Inflation is expected to be 1.4% higher when Democrats control the House. This is close to the historical difference in inflation rates—from 1945 to 2004, inflation was .9% higher under the Democrats. The difference between the Presidency and the House reflects the estimate of α, the parameter in the model that determines the relative influence of the Presidency on inflation outcomes. This estimate suggests that the partisanship of the President accounts for about 60% of the policy impact on expected inflation while the partisanship of the House accounts for only 40%.

The partisan difference in expected inflation outcomes also has an effect on electoral risk. Notice that the effect of electoral risk on the interest rate reaches a peak when there is a 50-50 chance that the Democrats will win either branch of government. Increasing the probability of a Democratic President from 0 to .5 increases the interest rate by .8%, while increasing it from 0 to 1 has no impact on the rate at all. A 50-50 probability in the House also increases the interest rate by about .5%, suggesting electoral uncertainty in either branch of government has an effect. It is important to note that the effect of electoral risk is *nonpartisan*. Increasing the certainty of either a Republican or a Democratic victory lowers the interest rate because it reduces uncertainty about the identity of the party controlling policy, even if that party will ultimately choose policies that lead to higher inflation. Thus, previous work on the partisan effect on interest rates (e.g., Alesina, Roubini, and Cohen 1997) that did not include the effect of inflation risk may be missing an important control that could sharpen results.

Divided Government

The policy risk effect is more complicated than the partisan and electoral risk effects because it depends on the composition of both branches. When the *House* is under Republican control, increasing the probability of a Democratic President from 0 to 1 decreases policy risk by 1.0%. Conversely, when the *Presidency* is under Republican control, increasing the probability of a Democratic House from 0 to 1 decreases policy risk by .9%. Thus, even though Republicans are associated with lower absolute levels of inflation overall, *unified* Republican government is associated with *higher* inflation risk and nominal interest rates than either combination of divided government. In contrast, unified Democratic government seems to have no significant effect on nominal interest rates. This leaves open the possibility that the difference between unified Republican government and divided government is being driven instead by a perception that the Republican Party is associated with higher variance policy outcomes than the Democratic party. That would explain the negative coefficient on the difference in the party variances ($\sigma_D - \sigma_R$) in Table 1 and would also be consistent with the recent finding that stock market volatility decreases as the probability of a Democratic President increases (Leblang and Mukherjee 2004). Thus, there is only partial support for the hypothesis that divided government decreases inflation risk.

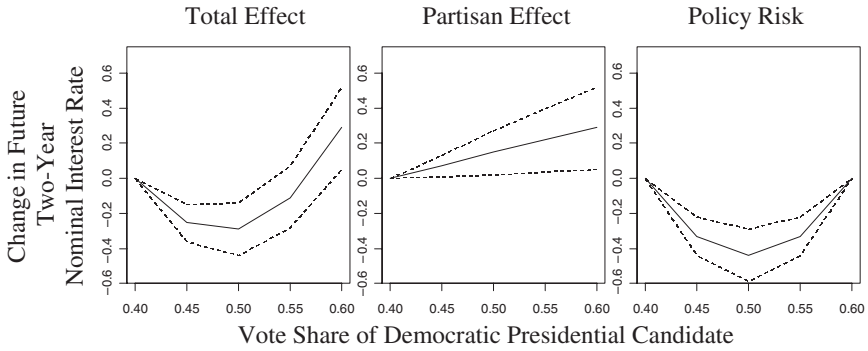
Incumbency

The model suggests that the probability that a *challenger* wins the Presidency and House has a significant effect on the nominal interest rate. However, the effect of incumbency depends on the term of the interest rate. Increasing the probability that the challenger party wins the Presidency from 0 to 1 has no significant effect on the two-year rate. In contrast, increasing the probability that the challenger party wins the House from 0 to 1 increases the two-year rate by .7%. These findings suggest that people have greater uncertainty about the policies that will result when there is turnover in the House than when there is turnover in the Presidency. When we change the dependent variable to the five-year interest rate, the effect of incumbency gets stronger for the Presidency and becomes significant at .3%, while the House effect declines to .6%. This may be due to the length of term for each office. House elections occur every two years, meaning that winners in the current election are expected to have a limited amount of time to affect policy. In contrast, Presidential elections occur every four years, so the executive's effect on policy might be expected to last for a longer time. Overall, the model suggests that investors do expect to be compensated for the greater risk they bear when a new party takes office, *even if they expect that party to implement policies that will lead to lower inflation.*

Electoral Margin

The Presidential margin of victory also has a significant impact on inflation expectations. Figure 4 shows how Democratic vote share affects nominal interest rates. In the left graph notice that increasing the vote share for the Democrats from 40% to 60% increases the two-year interest rate by about .3%. However, the effect is curvilinear because it includes both the par-

Figure 4 Effect of Vote Share on Nominal Interest Rates



tisan effect on inflation and the policy effect on inflation risk. The center graph shows that the increase in Democratic support yields a linear increase in expected inflation. Investors apparently expect landslides to give each party an opportunity to enact larger policy changes. This expectation also has a direct impact on inflation risk. The right graph shows that changing the election outcome from *either* 60-40 *or* 40-60 to 50-50 reduces the interest rate by about .4%. Thus, electoral margins appear to affect expectations of both inflation and policy risk.

Conclusion

Rational partisan theory predicts that people expect the Left to enact policies that lead to higher inflation (and higher nominal interest rates) and they update their expectations prior to the election as electoral probabilities change. The empirical test presented here supports this prediction, showing that nominal interest rates rise when Democrats become more likely to win either branch of government. The theory of policy risk extends rational partisan theory and predicts that challenger parties and unified government will be associated with greater policy uncertainty, higher inflation risk, and thus, higher interest rates. Consistent with the policy risk theory, the empirical model indicates that interest rates rise when the probability of incumbent victory falls. The model also suggests that an increase in the probability of divided government leads to lower interest rates, though support for this effect is limited by the possibility that the results are due to asymmetric risks associated with each party.

Both the rational partisan and policy risk theories are utilized to demonstrate that Presidential margins of victory have an effect on interest rate expectations. If people expect parties to adjust the policies they offer in response to the size of their victory (or loss) in the last election, then rational partisan theory implies that people should expect higher inflation as expected vote share for the Left increases. Similarly, the policy risk theory suggests that people should expect greater policy uncertainty as the margin of victory for *either* party increases since a larger margin of victory may give the winning party more leeway to implement the more extreme version of its policies. The empirical model confirms both expectations.

It is important not to draw too strong a conclusion from the evidence presented here since it is based on seven elections for a single country. However, the results are suggestive of new lines of research that could make contributions to several existing literatures. First, the policy risk theory is an important complement to the rational partisan theory because it helps to make sharper predictions about interest rate expectations. For example, previous work that did not control for incumbency (e.g., Cohen 1993) may have underestimated the partisan effect since both Democratic party incumbents and Republican party challengers may have an ambiguous effect on nominal interest rates. Future tests of partisan theory should therefore control for incumbency, the institutional division of power, and margins of victory.

Second, evidence of partisan expectations may help to explain recent anomalies uncovered in the partisan business cycle literature. Clark and Hallerberg (2000) develop a formal model that incorporates capital mobility, exchange rate regimes, and central bank independence into rational partisan theory. In the U.S. case where capital is mobile, exchange rates are flexible, and the central bank is independent, their model predicts that the partisanship of government should have no effect on the money supply. They are surprised, however, when their empirical data show that even in these conditions Leftist governments are associated with an expanded money supply. The

empirical evidence presented here suggests a possible explanation. Suppose that in reality there is no difference in the economic outcomes associated with Left and Right control of the government. If people *expect* the Left to produce higher inflation, then the market might punish new Left governments with higher nominal interest rates that slow the economy, forcing the "independent" central bank to stimulate the economy at the beginning of their term as people believed they would. Similarly, the central bank may feel the need to tighten monetary policy in response to falling nominal interest rates associated with a Right-wing victory. Thus, *expectations* of partisan differences might be critically important for creating *real* partisan differences in the money supply. Future formal macroeconomic models should investigate whether such self-reinforcing equilibria exist.

Third, the policy risk theory suggests the possibility of an *incumbent political business cycle*. If challenger governments cause higher interest rates until their preferred policies and competence become better known, then they might face a short-term reduction in growth and employment towards the beginning of their term in office. Alesina, Roubini, and Cohen (1997, 75–79) note that partisan effects on growth and employment appear to be strongest in the second year after a Challenger party takes control of the government. However, their data also supports the possibility of an incumbent cycle in the second year. From 1949 to 1994, incumbent Republican administrations experienced 1.68% more growth and .51% less unemployment than new Republican administrations on average. Incumbent Democrat administrations experienced 2.61% more growth and 1.40% less unemployment than new Democrat administrations. Thus incumbent governments seem to be associated with better economic performance, and this may be due in part to lower policy risk expectations. In future work these arguments about the incumbent political cycle should be formalized and tested with the same analysis that has previously been applied to partisan and political business cycles.

Fourth, the policy risk theory also suggests a reason for institutional balancing. There is a growing body of evidence for ticket-splitting as predicted by Alesina, Londregan, and Rosenthal (1993) and Alesina and Rosenthal (1995, 1996). For example, Scheve and Tomz (1999) show that the more surprised moderate voters are about the outcome of a presidential election, the lower the probability that they will support the president's party in the following midterm contest. These analyses are based on the assumption that extreme outcomes are moderated by the adjustment made by voters who want to bring policy back towards the center. The policy risk theory suggests another reason for balancing. Voters may attempt to divide the government in order to reduce *policy risk* and the negative effects it might have on the economy. This incentive might be enough to convince less ideologically driven voters to switch to their less preferred alternative for one of the two branches of government.

Finally, I hope that this use of IEM electoral futures has shown how this unique data set might be used to study other questions related to electoral probabilities. I encourage scholars to use election futures to test relationships between electoral probabilities and macroeconomic outcomes, such as those related to electoral surprise (Alesina, Roubini, and Cohen 1997; Chappell and Keech 1988; Roberts 1989). Future work should also reverse the dependent and independent variables to see what effect the economy, campaigns, and other factors have on the probability of election. Election futures markets have been conducted for several non-U.S. elections, so there are many possibilities to use the data in both American and comparative contexts.

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