Unfinished Preliminary Draft
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Partisanship, Incumbency, Mandates, and Divided Government: The Impact of Elections on Markets

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September 17, 2001

I thank Jim Alt, Peter Hall, Torben Iversen, Lisa Martin, Jim Stock, members of the Harvard Research Seminar in Positive Political Economy, and the Workshop on Political Economy and Rational Choice for helpful comments.

Do participants in the economy have different expectations about the economic preferences of different types of political candidates? If so, do workers and investors react to changes in their electoral probabilities? Alesina (1987) develops a rational partisan business cycle theory on an affirmative answer to both questions. He assumes that parties of the left and right systematically choose different combinations of inflation, unemployment, and growth, but workers and investors rationally expect this and adjust their wage contracts 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 will be transitory because contracts will be revised soon after the result of the election is known.

This paper advances a theory of policy risk, arguing that the 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 substantial uncertainty about what economic policy the victors will implement. For example, it may be harder to anticipate the future policy of challengers than incumbents, since the latter have recently given direct evidence of their preferences and competence while in office. Similarly, investors might be less certain about the future policies of a unified government than a divided government since the latter will be less able to implement dramatic policy changes. Greater policy uncertainty can have an indirect effect on financial market returns, since it will increase the risk of holding assets that are affected by government policy. Specifically, real returns from bonds become riskier when investors are less certain about future inflation. Investors must be compensated for this risk with higher mean real returns. If this premium is significant, then investors are likely not only concerned with potential differences in the *expected* policy outcome of the election, but also differences in the *uncertainty* surrounding that outcome. Since different electoral outcomes will lead to different levels of policy risk, changes in electoral probabilities should also affect the expected size of the policy risk premium. Specifically, a

decrease in the probability of the electoral outcome associated with higher policy risk should lead to a decrease in nominal interest rates.

This paper develops an innovative approach to discover if participants in the economy actually perceive a difference between parties and update their expectations *prior* to the election in a consistent way. Using daily data from election futures traded on the Iowa Electronic Markets website at the University of Iowa, we derive pre-electoral probabilities of various outcomes for U.S. Presidential and Congressional elections from 1988-2000. Then we regress changes in the daily prices of bond futures on changes in these pre-election probabilities. As predicted by Alesina's rational partisan business cycle theory, positive changes in the electoral probabilities of left wing candidates lead to increases in nominal interest rates, implying that expectations of inflation have increased. As predicted by our theory of policy risk, this paper finds that positive changes in the electoral probability of incumbent governments and divided governments lead to significant declines in interest rates. And as an extension to both sets of hypotheses, we find that investors believe that mandates matter. Apparently, partisan and policy risk effects depend not only on who controls political institutions, but how large their margin of victory is.

Section one and two of this paper discuss the rational partisan theory and our theory of policy risk and develop related hypotheses. Section three discusses how we use futures market contract prices to measure the dependent and independent variables used in our statistical analysis. Section four develops methodology for dealing with missingness in the data, and section five derives the regression model and reviews the logic of the error correction model used to test the hypotheses. Section six reviews results, discusses the implications of these results for the hypotheses, and provides a simple analysis of the expected effect of a counterfactual Gore election outcome on interest rates. Section six summarizes the main findings and concludes with some implications for other literatures.

1. THE RATIONAL PARTISAN THEORY

The idea that different kinds of parties pursue different economic policies has a long history in the political economy literature. Hibbs (1977) originally argued that left wing and right-wing parties systematically choose different combinations of inflation, unemployment, and growth because they represent different interests in the electorate. Specifically, left-wing parties like the Democratic Party in the United States are more likely to use fiscal and monetary policy to stimulate employment because of their affiliation with labor. Right-wing parties like the Republican Party are more likely to use fiscal and monetary policy to fight inflation because of their affiliation with capital. As a result, we should expect to see inflation, growth, and unemployment correlate with partisan changes in control of the government.

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 left and right administrations, they will update their wage contracts as soon as a new party takes office. In fact, this updating process takes place before the election in response to changes in the probability that each party will win. This means that only unexpected outcomes will have real effects on employment and growth, and these will be transitory because contracts will be revised soon after the result of the election is known.

Empirical evidence for the macroeconomic conclusions of the Rational Partisan Theory has been mixed (Alesina and Roubini 1992; Alesina, Roubini, Cohen 1997; Alt and Lowry 1994; Carlsen 1998; and Hibbs, Carlsen, and Pedersen 1998). However, there is evidence that a partisan difference is perceived by voters and economic agents. For example, Garfinkel and Glazer (1994) note that unions time contract negotiations to avoid electoral uncertainty. Voters also seem to be conscious of partisan differences: Lowry et al (1998) find that Republican

gubernatorial candidates lose votes if their party increases the size of the state budget while Democrats may actually be rewarded for small increases.

If partisan control is really expected to have an impact on inflation, we should observe the bond markets reacting to changes in election probabilities. When the probability of a right-wing victory increases, nominal interest rates should fall because the expected inflation component of those yields will be lower. Conversely, when the probability of a left-wing victory rises, interest rates should rise. This leads us to the partisan control hypothesis:

> *H1. Nominal interest rates increase as the probability of left party electoral victory increases.*

Confirmation of this hypothesis will provide strong support for rational partisan theory, since it is unclear why interest rates would otherwise changes in response to changes in electoral probabilities.

The first hypothesis applies generally to the whole government, but if subunits of the government have a distinct effect on economic policy, we should see a partisan effect for each of the subunits as well. In other words, for the U.S. case hypothesis one should be true individually for partisan control of the House, Senate, and the Presidency. However, there is disagreement about the degree to which these different institutions of government are held accountable for economic policy. The President is typically charged with sending a budget to the legislature, signing or vetoing economic policy bills, and nominating key officials like the Secretary of the Treasury and the Chairman of the Federal Reserve. Voters seem to be aware of the President's importance in this regard. There is much evidence that Presidential election outcomes are influenced by real growth in GDP (see Hibbs 1987, Keech 1995) and real disposable income (see Bartels and Zaller 2001), suggesting that voters believe the President affects economic policy. Investors, as a subset of that group, may therefore expect partisan differences in the outcome of the presidential election to lead to differences in interest rates.

Similarly, Congress is charged with passing appropriation bills and confirming the appointment of government stewards of economic policy. However, voters send conflicting signals about whether or not they hold the Congress accountable and evidence for a link between economic performance and Congressional election outcomes is mixed (see Alesina and Rosenthal 1995; Alesina et al 1993; Erickson 1990; Jacobson 1990). This suggests to many scholars that voters hold the President more accountable than the Congress for the state of the economy. Indeed, in a recent study of coordination and institutional balancing, Mebane (2000) finds that a small but significant group of voters rationally anticipate that the executive will be somewhat more important that the legislature in determining post-election policy. If investors agree with voters and assign more responsibility for the economy to the President, we should expect partisan differences to matter more for expectations of the presidential election than they do for congressional elections. This leads us to a relative impact hypothesis:

> *H2. Financial markets react more strongly to changes in party control of the Presidency than to changes in party control of the Congress.*

So far we have only discussed the effect of winning an election, regardless of the size of the margin of victory. However, there is reason to believe that the margin of victory also matters, particularly for the Presidency. When a candidate wins by a wide margin, she is said to have a "mandate" to govern, indicating that the public is eager to support the policies of the new administration (Kelly 1983). On the other hand, if the election is close, public support for the winning candidate's proposed policies will be qualified. Do landslide victories for a given party therefore increase the partisan effect of their victory on expectations for economic policy? Do narrow victories cause policy to drift towards opposition party preferences, thereby reducing the size of the partisan effect?

Responding to the first question, 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. Only scientific opinion surveys, he says, can tell us what the populace really wants. However, there is an intuitive reason to believe that mandates 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.[1] 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 thus gives a party more bargaining power because it can tolerate a few defections from the center without risking a loss of power.

The mandate effect can be tested by observing how the market reacts to changes in the expected vote share for each party. Assuming the partisan control hypothesis is true, interest rates should increase in response to increases in expected left party vote share. This is because increasing popular support for the left will either constrain economic policy if the right wins or it will lead to more radical increases in inflation if the left wins. These effects are stated in the partisan mandate hypothesis:

H3: Nominal interest rates increase as the expected vote share of the left increases.

Tests of this hypothesis are intimately connected to tests of the partisan control hypothesis because expected vote share and probability of election are likely to move in tandem. Any reaction to a change in expected vote share may actually be a reaction to changing probability of victory. Therefore, tests of the impact of a mandate must control for changes in election probabilities. If an effect exists above and beyond the partisan control effect, it should confirm the hypothesis.

[1] The recent Jeffords defection from the Republican party in a 50-50 US Senate illustrates how alienation of moderates

2. A THEORY OF POLICY RISK

Though the rational partisan theory is persuasive in its focus on *electoral* uncertainty, it is silent on the issue of *policy* uncertainty. Alesina (1987) assumes the 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 levels of inflation, unemployment, and growth a given government prefers. 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 preferences.[2] Uncertainty may also arise because the effectiveness of a given government in implementing policy varies, in part due to varying logistical competence and in part due to idiosyncrasies of the current institutional context (such as the personalities controlling legislative committees). Finally, uncertainty may be a function of the interaction effects of the policies of new administrations with status quo policies or the current state of the 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 will also increase the expected variance of the real return. This variance does not directly affect the expected return of the bond, but it does increase the risk. *Ceteris paribus*, an increase in inflation risk will cause 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. The lower price means that the bond's expected rate of return increases since the coupon payments remain the same. Thus, an increase in

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might be dangerous even prior to an election.

[2] For example, Grier and Grier (2000) confirm that Mexican elections create uncertainty about inflation prior to the election, but they also find that inflation uncertainty can increase after the election once a candidate is chosen.

inflation risk indirectly increases the expected return of the bond. Another way to think of this is that investors must be offered a premium to compensate them for the increased risk. Specifically, the policy risk premium is the total amount of the return that is attributable to policy risk.

There are at least three effects electoral outcomes may have on the policy risk premium. First, investors may perceive a difference between incumbents and challengers. The incumbent government has revealed some information about both its policy preferences and its effectiveness because it implements 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 party's preferences may have changed, and the competence of their new leadership may be harder to assess. Thus an incumbent victory should be associated with a lower policy risk premium than a challenger victory. Moreover, we should observe the bond markets reacting to changes in the electoral probabilities of the challenger and the incumbent. When the probability of an incumbent victory increases, nominal interest rates should fall because the policy risk premium of those yields will be lower. Conversely, when the probability of a challenger victory rises, interest rates should rise. This leads us to the challenger risk hypothesis:

> *H4. Nominal interest rates increase as the probability of electoral victory by the challenger increases.*

It is important to realize that this preference for incumbents should exist regardless of the partisan orientation of the opposition. If the right party is in opposition we still expect the partisan control effect to push interest rates down as the probability of a right-wing victory increases. However, the higher risk premium associated with their status as a challenger will substantially dampen the partisan control effect. This suggests that when we search for partisan effects it is important to control for the effects of incumbency. If these two effects are of the same magnitude, the difference between right challenger and left incumbent may be ambiguous (see Figure 1).

The second effect electoral outcomes may have on the policy risk premium is related to divided government. Several scholars have argued that divided governments react less quickly to economic shocks (Alt and Lowry 1994; Alesina and Perotti 1995; Roubini and Sachs 1989a,b; Grilli, Masciandaro, and Tabellini 1991), which can increase levels of public debt and lead to higher real interest rates. However, while divided governments may be less able to cope with *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 (Krehbiel 1997; Edwards et al 1997; and Coleman 1999; Bowling and Ferguson 2001).[3] 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) also finds 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.

Assuming that we believe that unified governments are more likely to make large policy changes, what effect does this have on policy risk? Suppose that the return r(N,S) on government debt is a function of random variable N, the policies of the newly elected government, and random variable S, status quo policies and other factors relating to the state of the economy. Suppose also that Var(S)>0 since the mean effect of current policies and economic conditions is known but not with certainty, and Var(N)>0 since there will be some uncertainty about the exact location of the

[3] Krehbiel's results showed a positive and significant relationship between unified governments and the incidence of "landmark" legislation (p. 71). In a regression using a different measure for the dependent variable, he finds a positive effect that is not significant. Confusingly, he uses this evidence to claim that divided governments are not associated with gridlock, even though the sign is consistent and the lack of significance may be the result of extremely low (16-19) degrees of freedom. Far from proving a claim that there is no relationship, at most the evidence suggests that we cannot yet confirm the hypothesis using his approach.

policy shift. If the return is strictly a linear function r=N+S with no interactive effects, then the variance will not be a function of the mean of the new policies:

$$Var(r)=Var(N+S)=Var(N)+Var(S)+2Cov(N,S).$$

If, on the other hand, we make the reasonable assumption that the return is also a function of interaction effects r=NS between the new policies and the current state of the economy and other policies, then variance of the return is an increasing function of the mean E[N]:

$$Var(r)=Var(NS)=Var(N)Var(S)+E[N]^2Var(S)+E[S]^2Var(N).$$

This formula assumes that shocks from N and S are independent, but covariance of the shocks will not change the result unless we assume that it is sufficiently negative to balance the risk from larger policy changes. To be clear, let us compare the variance of a smaller policy change with mean E[N]>0 and a larger policy change E[N+a]> E[N].[4] Larger mean policy changes will create more uncertainty when

$$Var((N+ a)S)>Var(NS).$$

The left side expands to $Var(NS)+ a^2Var(S)+ aCov(NS,S)$ and from this we can derive the condition

$$aVar(S)>-Cov(NS,S).$$

Notice that the relative size of the policy change a acts as a scale parameter, increasing the effect of status quo variance as the policy change gets larger and larger. In order for the condition to be false, the interaction shocks must negatively covary with status quo shocks, since a and Var(S) are both positive. Substantively, there is no reason to assume that this is true because it would imply that interaction effects always smooth the effect of new policies. But even if they did have this property, it would need to be strong enough to overcome the scaled variance associated with uncertainty about status quo policy and the current state of the economy. Thus, divided government probably reduces policy risk by reducing the uncertainty associated with larger policy changes.

[4] Though the results presented here are one-sided, the reasoning is symmetric and also holds for E[N-a]< E[N]<0.

Let us assume that investors think that unified governments are better able to smooth macroeconomic shocks, but are also more likely to create policy shocks. If this is true, then the relationship between unified government and interest rates will depend on which they fear most. If they think interest rates are more susceptible to macroeconomic shocks, they will require a larger risk premium when divided government wins election. If on the other hand they think interest rates are more susceptible to policy shocks, they will require a larger risk premium when a unified government wins. The orientation of investors probably has a lot to do with the problems facing a particular country. The robust performance of the US economy from 1988-2000 probably reduced investor fear of macroeconomic shocks, so for our data we expect unified government to be associated with higher policy risk.[5] Prior to an election investors should therefore adjust their expectations for the risk premium in line with the probability that the same party will win both the legislature and the executive. To test whether this is true we propose the unified government risk hypothesis:

> *H5. Nominal interest rates increase as the probability of unified government increases.*

An initial attempt to test this hypothesis might use an aggregate probability that either the left or the right would win both branches of government. However, this could mistakenly pick up a partisan interaction effect if it is not symmetric to both parties. In other words, if the magnitude of the positive impact on inflation when the left controls both branches is significantly larger than the negative impact when the right controls both branches, it could produce a significant and net positive estimate of the impact of unified government on interest rates. We therefore must test the

[5] However, future cross-country tests should anticipate the expected effect to be a function of the source of recent shocks to the economy. For example, an economy that suffers large shocks from volatile commodity prices may cause investors to prefer the faster response unified governments can provide, even if it carries with it the risk of larger policy changes.

hypothesis for each party separately, and if the result is robust to both parties we can conclude that it is due to the policy risk effect rather than an asymmetric partisan effect.

The third and final effect electoral outcomes may have on the policy risk premium is related to executive mandate. In the partisan mandate hypothesis (H3) we posit that larger mandates increase the effect of left and right government victories on inflation because higher levels of public support allow them to make larger policy changes. Meanwhile, in the unified government risk hypothesis (H5) we posit that large policy changes are associated with greater policy risk because of their uncertain interactive effects with current policy and the state of the economy. Combining these two observations, we can posit that *regardless of partisan orientation*, larger margins of victory are associated with greater policy risk. This mandate risk effect can be tested by observing how the market reacts to changes in the expected margin of victory, represented by the absolute value in the difference in vote share between the left and right candidate. If the effect exists, interest rates should increase in response to increases in expected margin of victory because increasing popular support for any candidate increases the likelihood of significant policy change. We therefore propose the mandate risk hypothesis:

> *H6: Nominal interest rates increase as the expected vote share of the winning candidate increases.*

This hypothesis complements the partisan mandate hypothesis (H3) because it allows us to control for the separate impact that a margin of victory has on nominal interest rates.

3. **DATA**

For our dependent variable, we obviously need an appropriate measure for nominal interest rates. Conventional assets like stocks and bonds may feel the effect of changing election probabilities since many investors anticipate holding these assets until after the election. However,

other investors will have a much shorter-term view, which means that the effect of the elections on conventional asset prices may be difficult to detect, especially if the election is weeks or months away. Thus we need a measure of post-election interest rates. Cohen (1993) solves this problem by combining various spot prices for US 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, we do not need to make any assumptions about the term structure if we instead use bond 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). Thus these contracts explicitly measure expectations of future prices. Anyone who buys and holds a contract for a U.S. Treasury Bond until the settlement date will receive a Treasury bond on that date. Thus, if a 30 Year US Treasury Bond contract is priced to yield 5.5% then that is the market's view on what the 30 year spot interest rate will be on the settlement date because all unsettled contracts are exchanged for equivalent bonds on that date. The Chicago Board of Trade conducts markets for US Treasury Note and Treasury bond futures (including two-year, five-year, ten-year, and thirty year maturities) and the Chicago Mercantile Exchange conducts a market for 91 day Treasury Bill futures. CSI Data makes available daily historical data for these markets for the December and March contracts immediately succeeding each election.[6] Given that some of these markets are new for the time period under consideration, and some are more popular with traders than others, liquidity can sometimes be low, especially when contracts are first traded. This will increase noise in the data since larger bid-ask spreads associated with low liquidity reduce the reliability of the final price as an indicator of the true market expectation of future interest rates. However, unless liquidity is

[6] The results that follow are all based on the December contract immediately following the election, but results prove to be robust when we use the March contracts.

associated with the independent variables it should not bias the results. Methods of calculating yields are reported in the Appendix.

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; Blomberg and Hess 1997; Cutler et al. 1989; Niederhoffer 1971; and 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 the market 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 *the day 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 (Fair 1978, 1996; Rosenstone 1983; Erikson 1989; Campbell 1992; Gelman and King 1993; Erikson and Wlezein 1994; and Campbell and Garand 2000), 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 not 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. Polls cannot be used directly because they measure support rather than probability. For example, a 60% approval rating in the polls may translate into a considerably larger probability of victory. Therefore, scholars have attempted to model the relationship between these support levels and actual election probabilities. Chappel and Keech (1988), Suzuki (1992), and Carlsen (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. Unfortunately, this method yields very few data points. Cohen (1993) goes a step further, proposing an option-pricing model to derive monthly implied election probabilities based on the current support level 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.

This paper proposes a simpler solution using election futures prices from the Iowa Electronic Markets (IEM).[7] IEM is a real futures exchange where traders open accounts with $5.00 to $500.00 to trade 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 was worth $1.00 if he won and $0.00 if he lost.[8] These contracts are traded and their price fluctuates from day to day depending on the market's expectation of the probability that the candidate in question will win the election. In fact, WTA election futures prices directly imply election probability. Each trader values a contract based on her assessment of the probabilities of the settlement price. This is because the expected value of the contract incorporates the probabilities of outcomes affecting it:

$$E[\text{Clinton WTA contract}]=\$1.00*Pr(\text{Clinton wins})+\$0.00*Pr(\text{Clinton Loses})$$

Rearranging, it is easy to see that Pr(Clinton wins)=E[Clinton WTA contract]. That is, an individual who believes Clinton has a 65% chance of winning values the contract at $0.65. If someone else

[7] Iowa Electronic Markets makes available daily historical data on their website at http://www.biz.uiowa.edu/iem/history.html. Other academics are also beginning to use this data to model electoral probabilities (see Herron et al 1999).

[8] Technically speaking, the contract pays only if the candidate in question wins the popular vote, a result that usually coincides with victory (the recent Bush-Gore debacle notwithstanding).

offers to sell this contract to her for less, she should be willing to buy it because the expected return is

$$E[\text{Return}]=E[\text{Clinton WTA contract}]-\text{price}$$

For example, if someone offers her a price of $0.40, she can expect to make $0.65-$0.40=$0.25. In a futures market, she and other market participants have the opportunity to use their individual beliefs about election probabilities to reap such returns by buying or selling contracts. Thus, at the aggregate level the market price should reflect some weighted probability estimate of all market participants. If the Clinton WTA contract is trading at $0.40 while the vast majority of traders believe he has more than a 40% chance of winning, they will buy more contracts and the price will rise. Similarly, a widespread perception that his chances are lower than 40% will lead to increased selling and the price of the contract will fall.

In spite of the creativity of poll-based approaches, there are at least six good reasons to use futures prices instead. First, IEM market prices are updated continuously and daily historical data is available. This dramatically increases the number of observations over the poll-based method, which should allow for much more precise statistical inferences. Second, preferences revealed in the futures market are more reliable than preferences expressed in polls. Poll respondents may not have an incentive to answer sincerely the questions posed to them, but investors will lose money if the expectations upon which they base their investment decisions turn out to be incorrect. The investment decisions revealed in market prices are therefore more likely to represent true expectations.[9]

Third, futures markets more efficiently incorporate information about expectations by weighting sentiment according to the stake of each participant. Most polls either aggregate the

[9] There is a possibility that partisan individuals may manipulate the market by buying their favorite party or candidate. However, any short term effect this may have on prices provides an arbitrage opportunity for sufficiently-capitalized investors whose object is to make money.

expectations of each respondent equally or use inductive methods to weight them based on past poll estimates. In contrast, market prices are weighted towards the expectations of better-informed participants. Investors with the largest stakes will not only have the greatest impact on market prices but also have a greater incentive to acquire information about possible outcomes. Moreover, the market selects against investors with consistently poor information by penalizing them with sub-market returns and (perhaps) driving them to other endeavors. In this way the best information has the strongest impact on the election probabilities implied by market prices.[10]

Fourth, analytical modeling of polls and election markets suggests that if market participants have access to polls then the market price will always be a better predictor (Kou and Sobel 2001). This is because the market price incorporates all information the poll could plus outside or private information from experts and empirical political economy models. The market price is also less likely to suffer biases induced by model choice or sampling since consistent bias provides an arbitrage opportunity that will pay off once the election is held. Fifth, preliminary empirical research confirms that election futures markets are more reliable than polls for predicting election outcomes (Berg et al 1997; Berg et al 1998; Bohm and Sonnegard 1999; Forsythe et all 1998; and Forsythe et al 1999). These studies compare polls and futures prices on the day before the election for several elections and also notes that vote shares implied by vote share contract prices were off by only two-tenths of a percentage point in both the 1992 and 1996 U.S. presidential elections. Finally, accounts of the impact of election futures on financial markets have been creeping into the mainstream business press (Burns 1996). Though the evidence is anecdotal, it indicates that some investors are

[10] The efficient market hypothesis cannot explain the impact of the price as information itself. Anyone who has watched the Nikkei or the Nasdaq bubbles will be quick to point out that the information content of the price itself may be enough to drive prices forward. There is nothing we can do in the context of the present analysis to relieve these worries. However, the amount of data and the degree of variation is growing large enough that the effects of self-reinforcing asset price booms and busts should not bias the results, especially if analysis remains at the level of daily shocks. If anything, the contamination of fundamental pricing by technical short term effects should obscure the effects we seek, increasing standard errors of the estimates and making us more confident when we find significant effects based on the efficient markets assumption.

beginning to incorporate the election probabilities implied by the futures market into their investment decisions.

WTA contracts exist for major parties in the House and major candidates for the Presidency.[11] Daily closing prices on these contracts allow us to measure the probability of a Democratic (left-wing) victory for both institutions. Moreover, we can use the measurements to derive the probabilities of incumbent and unified government.[12] In addition to WTA futures markets, IEM also conducts markets in vote share (VS) for the 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.[13] For example, a Democratic President vote share contract pays $0.55 if the Democrats receive 55% of the vote. In theory, WTA markets and VS markets should measure different phenomena. Winner-take-all futures markets are about control. No matter what the vote totals are, if a party wins the election it will have access to the procedural powers of its office. Vote share markets, on the other hand, are about mandate. The size of the margin represents the overall willingness of the populace to support the new government. Since these two measures are correlated, it is important to include both of them in any specification. Otherwise, we might be capturing the effect vote share has on election probabilities or vice versa.

It is important to note that IEM never closes, so their historical data record prices at midnight when they have absorbed all the prime-time news. This contrasts with financial markets

[11] WTA data also exist for the Senate, but this series is shorter than the series for the House and does not include data for 1994, the one time the Senate changed parties. Due to lack of variation, multiple imputation estimates could exhibit considerable bias so data for the Senate has not been used, and it probably should not be used in cross-election analysis until the Senate changes parties.

[12] The measurement specifications are given in the appendix, along with trading volumes for each underlying contract. Measurement of joint probabilities assumes independence of the outcomes of elections for the different branches, which is unlikely given the coattails effects noted in several elections. IEM actually has joint probability contracts for the House and Senate (e.g. a contract that Republicans will win *both* the House and the Senate). When this variable was included instead of separate variables for the House and Senate, substantive results did not change. This suggests that we should not be overly concerned about the independence assumption, and concerns about the use of Senate data should take precedence (for now) over concerns about correlated outcomes.

that close in the afternoon before critical campaign information is released. Therefore election futures must be lagged by one day to make sure that today's financial markets know about yesterday evening's political news.[14] This has the added benefit that it resolves a problem of endogeneity. Contemporaneous observations of the dependent and independent variable could cause confusion about which direction the causality flows. For example, a rising bond market may improve an incumbent candidate's chances of winning as the literature on growth and electoral success indicates, but we do not want this to contaminate an analysis of the effect of incumbent probabilities on the policy risk premium.

Finally, we should control for the effect of economic information on financial markets. Following Plosser (1982, 1987), Baxter (1989), and Alesina, Roubini, and Cohen (1997), we used inflation, unemployment, industrial production, money supply, and equity prices for controls.[15] Inflation is the one-month change in the inflation rate and unemployment is the unemployment rate, both as reported by the Bureau of Labor Statistics. A major difficulty with approaches based on monthly data (such as Cohen 1993) is that they assume a one-month lag in economic variables because the market gets data for the prior month. However, based on release dates published in the Bureau of Labor Statistics, CPI data has been released as late as eight weeks after-the-fact. Therefore, these models probably give the market more prescience than it actually has. To solve this problem, control data are matched with release dates to specify precisely when the market receives the information. This is especially important since our tests are based on daily data.

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[13] These vote shares represent two-way party vote shares, and thus only measure the support of the Democrats and Republicans relative to one another. Future analyses would do well to incorporate information on third party vote shares, but so far these contracts have been offered sporadically and inconsistently, making use of them difficult.
[14] It might be better to get midnight prices for financial futures that trade overnight on Globex and Project A, but these markets are thin and the data is often not reliable.

4. COPING WITH MISSING DATA

A huge problem when dealing with IEM futures data is that available contracts have changed from year to year. For example, in 1988 only the presidential vote share contract was offered. In 1994 there was only a House control market. Moreover, these earlier markets were less liquid and lasted for shorter periods of time. The tremendous variation in these contracts makes organization of the data extremely difficult. In the past three elections, more contracts have been offered for longer periods of time, and they have gradually become more standardized to be comparable across elections. However, there are still huge overlapping gaps in the data in which we are interested.

The standard approach used in social science when missing values are encountered is to delete either the whole variable or the whole case from the data set. Given the paucity of empirical studies that have used IEM's election futures, variable deletion seems to have been the method of choice so far. Meanwhile, case deletion wastes valuable information and in many situations substantially reduces the number of observations available. In our analysis listwise deletion would decrease the number of cases to less than one tenth of the original set of observations! We do have a good quantity of information over the last three elections so it would be helpful if we could leverage this information so that we can use data from previous periods.

To correct for this problem we use Amelia, a program based on a multiple imputation method to fill in the missing data (King, Honaker, Joseph, and Scheve 1998). The program is based on the expectation maximization algorithm with importance sampling (EMis). It assumes that the missing data is distributed normally, uses the observed data to estimate a set of parameters for this distribution, and then draws random numbers from this distribution to impute the missing values for several sample data sets. It should be emphasized that *these numbers do not necessarily have to be what we would realistically expect them to be*—their sole function is to represent the known distribution of the

[15] Money supply (M1 and M2) and equity prices (S&P500) were not found to have a significant effect and were dropped

data we can actually observe so that we can use the other observed data points in the line to pursue our analysis.

We perform regressions on ten of the imputed data sets and use the combined results to get point estimates and standard errors, and to simulate predicted values.[16] King (1998) and Rubin (1987) note that the efficiency of the estimators based on the procedure increases very quickly and that relative efficiency with data sets as low as 3-10 is the same as with infinite imputations. The results are unbiased and at least as efficient as listwise deletion. King et al suggest that as many variables as possible be included in the data set to be imputed, and the higher the correlation with the variables of interest or with missingness in the variables, the more efficient the imputation will be. However, there is an upper bound on the number of variables (p) that can be included because the number of parameters that must be estimated is $p(p+3)/2$. Since we have about 1500 observations, this limits the number of variables we can include, especially if we must include lags for each variable as the error correction model dictates.

5. THE MODEL

The basic assumption underlying the hypotheses and the analyses is that nominal interest rates are a linear function of expected inflation, policy risk premia, and real interest rates:[17]

$$E[i] = E[\pi] + E[s] + E[r]$$

We do not directly observe any of the components of the nominal interest rate. However, unless there are contradictory hypotheses about the relationship between the independent variables and

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from the analysis to improve the efficiency of multiple imputation (see below).

[16] The coefficient estimates are simply a mean of the coefficients derived from the regression model on each imputed data set. Standard error estimates similarly are based on the mean standard error, but they also include the sample variance across imputed data sets to incorporate uncertainty about the imputed values.

[17] There are undoubtedly other sources of risk premia than the policy risk premia, but these are assumed to be incorporated in the real interest rate variable (which we will assume is fixed for the purposes of this analysis). The Fisher equation also incorporates the marginal tax rate, but unless the tax rate affects bonds differently than other assets it should not bias the results to assume it is a fixed component of the real rate of return.

other components, then evidence of correlation with nominal interest rates is assumed to imply correlation with the component in question.

Inflation expectations are modeled to be affected by several things. The rational partisan hypothesis posits that parties of the left and right choose different fixed levels of inflation such that $\pi_L > \pi_R$ and that expectations of inflation therefore weight these separate possibilities with the probability that either party will win: $Pr(L) \cdot E[\pi_L] + Pr(R) \cdot E[\pi_R]$. Since the probability of left and right victories sum to one, this simplifies to $E[\pi_L - \pi_R] \cdot Pr(L) + E[\pi_R]$. To test the relative effect hypothesis we must know the independent partisan impact for both the House and the Presidency. Thus, we must include one partisan equation for the House and one for the Presidency. The partisan mandate hypothesis indicates that the vote share of the left candidate VS_L for president will have some weighted direct relationship to expected inflation. Additionally, we can specify economic variables that affect inflation expectations. These include the rate of change in the consumer price index CPI, the level of unemployment UE, and the rate of growth in industrial production IP, and they are weighted according to the amount of variance in inflation they can explain. If we group variables we assume are fixed such as $E[\pi_R]$ into a constant term C, we get a general model for the inflation component:

$$E[\pi] = E[\pi_{LH} - \pi_{RH}] \cdot Pr(L_H) + E[\pi_{LP} - \pi_{RP}] \cdot Pr(L_P) + \beta_1 VS_L + \beta_2 CPI + \beta_3 UE + \beta_4 IP + C$$

The model for the risk premium takes a similar form. The challenger risk hypothesis suggests that incumbent and challenger governments are associated with different fixed risk premia such that $s_{Ch} > s_I$. Expectations of risk premia therefore weight these separate possibilities with the probability that either will win: $Pr(Ch) \cdot E[s_{Ch}] + Pr(I) \cdot E[s_I]$. Probabilities sum to one so this simplifies to $Pr(Ch) \cdot E[s_{Ch} - s_I] + E[s_I]$. The unified government risk hypothesis suggests that there may be a difference in fixed risk premia for unified and divided governments as well, such that $s_U >$

s_D. This expectation yields an analogous formula: $Pr(U) \cdot E[s_U - s_D] + E[s_D]$. As noted above, we must test this hypothesis separately for left and right parties to avoid a spurious result due to asymmetric partisan interaction effects. Finally, the mandate risk hypothesis indicates that the vote share of the winning candidate for president will have some weighted direct relationship to the risk premium $\beta_5 VS_W$. Combining these effects and grouping fixed terms into a constant, we get a general model for the risk premium component:

$$E[s] = Pr(Ch) \cdot E[s_{Ch} - s_I] + Pr(U_L) \cdot E[s_{UL} - s_{DL}] + Pr(U_R) \cdot E[s_{UR} - s_{DR}] + \beta_5 VS_W + C$$

If we put expectations of inflation and the risk premium into the original equation for the nominal interest rate and we incorporate the fixed real interest rate into the constant[18], we get:

$$E[i] = E[\pi_{LH} - \pi_{RH}] \cdot Pr(L_H) + E[\pi_{LP} - \pi_{RP}] \cdot Pr(L_P) + \beta_1 VS_L + \beta_2 CPI + \beta_3 UE + \beta_4 IP + Pr(Ch) \cdot E[s_{Ch} - s_I] + Pr(U_L) \cdot E[s_{UL} - s_{DL}] + Pr(U_R) \cdot E[s_{UR} - s_{DR}] + \beta_5 VS_W + C$$

The largest problem with choosing a model to estimate the coefficients for this equation is the large degree of serial correlation present in all of the variables. Augmented Dickey Fuller tests reveal that the long term daily bond yields are very close to having a unit root, so a simple lagged-dependent-variable model could be misleading. Beck (1992) suggests an error correction model (ECM) in these situations as a means of dealing with potential integration and cointegration (see also Beck and Katz 1995; and King 1997).[19] Franzese (2000) elaborates that in this method we regress the first difference of the dependent variable on the first difference of all the independent variables and the lagged levels of the dependent and independent variables:

$$\Delta y_{i,t} = a + b\Delta x_{i,t} + d(y_{i,t-1} - g x_{i,t-1}) + e_{i,t}$$

[18]Alesina, Roubini, and Cohen (1997) report that they could find no relationship between real interest rates and the partisan composition of government.

[19] However, it should be noted that a simple lagged dependent variable model produces similar results in our case.

This method produces statistically valid estimates as long as the coefficient on the lagged dependent-variable level is significantly different from zero. It also has the added feature that we can differentiate between long and short-term effects. The β coefficients on the first differences represent the short-term impact of the independent variables ? X on ? Y, while the ? coefficients represent the long-term impact of X on Y.[20] If the market over- or under-reacts to small changes in electoral probabilities, then the short-term coefficients will be different than the long-term coefficients. To the extent that the two measures are similar, we can infer that the market is incorporating new information quickly and without bias given its longer-term equilibrium value.

Finally, pooling data from multiple elections increases the likelihood that the effects are real and persist over time, but it may also risk overestimation of the standard errors if effects are correlated across elections. We thus estimate the model using panel corrected standard errors (Beck and Katz 1995).[21] We also used panel dummies—they did not change the results and the hypothesis that the dummies were significantly different for any two panels could not be rejected, so they are excluded. We further tried weighted least squares to ensure that different numbers of observations across panels did not bias the results. They did not.

The model presented so far assumes normality in the data, but the tails of the distribution of the dependent variables exhibit varying degrees of platykurtosis. That is, the probability of a large significant shock is somewhat larger than the ordinary model assumes. The statistics literature recommends correcting for these fatter tails in a variety of ways (Adler et al 1998), but the most common for panel financial series is to assume a t-distribution of the error component of the

[20] See Franzese (2000) and Iversen and Wren (1998) for recent uses of an ECM to separate long and short term effects.
[21] Due to non-rectangularity of the data, I utilized a Gauss procedure written by Robert Franzese (cite) to calculate the panel corrected standard errors.

model.[22] Using GAUSS we program a maximum likelihood estimation procedure that incorporates such a distribution and estimates a parameter for the degree of fatness of the tails.

6. **RESULTS**

Results of the normal and t-distributed models are reported in Tables 1 and 2 in the Appendix. LaGrange multiplier tests for each of the specifications indicate that serial correlation in the errors is not significant. In general, the results present strong evidence that investors do incorporate electoral probabilities into their pricing of government bonds. Moreover, the effects of electoral probabilities appear to be strongest in the range we would expect for 2 and 5 year maturities, covering the term of the current House and President. To discuss the following results we use the more restrictive t-distributed assumption (Table 2) and the two year maturity (column 2), and we focus on long term effects, which can be ascertained by examining the coefficients on the lagged levels.

The partisan control hypothesis (H1) is strongly supported for both the House and the Presidency. The expected inflation differential between Democrat and Republican control is 0.3% to 1.2% for the House, and 0.4% to 1.6% for the President. Notice that the relative effects hypothesis (H2) is rejected, as the effect of partisan control of the Congress seems to be as strong as it is for the President. These inflation differentials may seem small until one considers that the resulting difference in nominal interest rates affects everything in the economy from credit card rates and car and home loans to corporate and government debt. According to Alesina, the real effect of this inflation difference may only be short-lived because adjustments like the updating of wage contracts may occur soon after the outcome of the election is known. However, the impact of the election on inflation should be longer lasting. Notice in Table 2 that the inflation differential is most

[22] Another common technique is the use of GARCH models, but panel GARCH methodology is not yet well-developed.

significant for the two to five year time frame, but becomes much smaller and insignificant for the ten and thirty year bonds. Apparently the market withholds judgement on longer-term inflation rates until the next election cycle.

The estimate of the effect on vote share supports the partisan mandate hypothesis (H3) and lends further support for the rational partisan theory. Interpreting these coefficients is somewhat different than for the probability variables since there is very little chance that one of the candidates will win 100% of the vote. A 10% margin of victory, however, is not out of the question and the results indicate that investors expect a victory by the Democrats of this magnitude would lead to 0.1% to 0.4% higher inflation than if they barely won.[23] This effect is smaller than the effect for partisan control (H1), but the fact that it is significant is very important. Several authors have conjectured that the mandate is important, but no other study has shown a quantitative effect of the mandate on the economy.

The policy risk theory is also supported by the findings. Turning first to the challenger risk hypothesis (H4), we see that an election in which the challenger party wins control of either the House or the Presidency will cause nominal interest rates to rise by 0.3% to 1.1%. This means that investors 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*. The greater uncertainty associated with new governments of both the left and right may lead to an incumbent cycle in the economy. If new governments face interest rates that are temporarily higher they may be forced to stimulate the economy or face a reduction in growth. Similarly, incumbent governments may enjoy short-term booms at the beginning of their second terms. Future work should apply to incumbency

[23] In order to compare a 0% margin of victory to a 10% margin of victory, we must compare the results in which the Democrat wins 50% and 55% of the vote, respectively. Thus substantive results are obtained by multiplying the vote share coefficients by 0.05.

the same study of real economic effects that have already been applied to partisanship in order to verify whether or not an incumbent cycle exists.

The unified government risk hypothesis (H5) is also confirmed. As we might expect from the partisan control hypothesis (H1), if the left controls both branches of government interest rates will be 0.5% to 1.5% higher. However, when the right controls both branches interest rates also rise by 0.6% to 2.8%. This suggests that the partisan interaction effect has already been appropriately modeled with linear terms for the House and Presidency, and that any remaining interaction effect can be attributed to the risk associated with unified government. While this is a significant finding, it should be emphasized that these results cover a very short time period for a single country where good macroeconomic performance probably reduced fears of exogenous economic shocks. Future tests across countries or for longer time periods may find that policy risk expectations depend on the relative vulnerability of the economy to endogenous policy shocks versus exogenous economic shocks.

Finally, as anticipated the mandate risk hypothesis (H6) is also confirmed. A 10% margin of victory by any candidate will tend to produce interest rates that are 0.1% to 0.4% higher. This result reinforces two previous hypotheses. First, mandates matter here as they did in the partisan mandate hypothesis (H3), indicating that investors expect presidential candidates to be able to enact larger policy changes if they are elected by a wide margin of victory. Second, the potential for larger policy changes tends to be associated with greater uncertainty as it is in the unified government hypothesis (H5). Many institutional models of government ignore public support or the uncertainty associated with changing candidates, assuming that all that matters is who controls the office and what their

platform is. However, if the effectiveness of the victors is a function not only of winning but by how much, it may completely change their incentives.[24]

All of these results are summarized graphically in Figures 2 and 3. These figures show the distribution of 1000 simulations of the change in the two and five year bond yields as a result of a fixed change in the variables of interest. For example, in the top graph of figure two, the impact of the left winning the house peaks around 0.8%, and most of the simulations appear to fall between 0.3% and 1.2%. Some of the distributions are narrower than others, which indicates greater certainty about the estimated effect. However, notice that none of the distributions cross the zero line—this indicates that all the estimates are significantly different from zero.

Combining the rational partisan theory and our theory of policy risk, we can see that the bond market benefits most when an incumbent Right candidate wins reelection by a narrow margin.[25] The market reacts most negatively to the landslide election of a challenger Left candidate. However, the cross cutting effects of partisan orientation and policy risk lead to ambiguous predictions in mixed cases, such as the reelection of an incumbent Left candidate (See Figure 1). The most recent US Presidential election provides an excellent example of this ambiguity. If we were to rely on only the rational partisan theory we might expect Gore, the Left candidate, to be associated with higher levels of inflation and therefore higher nominal interest rates. However, Figure 4 shows the counterfactual difference between a Gore and a Bush victory, holding all other things equal. Using the t-distributed version of the model, we simulate 1000 elections in which Gore barely wins instead of Bush. The model suggests that a Gore victory would have yielded 1% to 2% *lower* nominal interest rates. Apparently, the policy risk effects of incumbency and divided

[24] For example, many models of legislatures assume costs of mobilization use a minimax criterion in which the victor only wants to win by one vote. Rational choice explanations of voting similarly focus almost exclusively on the probability of being the pivotal voter.

[25] And at least for the data used here, the market also benefits from divided control of government.

government would have been enough to overwhelm the partisan effect of a higher expected inflation rate.

7. CONCLUSION

The strongest conclusion we can draw from the model is that investors expect the left to deliver higher levels of inflation. They expect this more or less equally for both legislative and executive branches, and they expect the effect to be stronger if left candidates win by wide margins. These results lend support to the rational partisan theory because they suggest not only that there is a partisan difference in economic policy, but that the market rationally expects this difference. And while the rational partisan theory does a good job of helping us to understand the importance of pre-electoral uncertainty, its assumption of post-electoral policy certainty misses the important effect of policy risk on the economy. Bond markets apparently incorporate a premium for this policy risk, as evidenced by lower nominal interest rates associated with the electoral probabilities of incumbents, divided governments, and close elections.

It is important not to draw too strong a conclusion from the evidence presented here. It is, after all, based on inconsistent measures from only six elections for a single country. However, the results are suggestive of new lines of research that could make contributions to several existing literatures. At a minimum, the theory of policy risk presented here is an important complement to the rational partisan theory because it helps us to make sharper predictions about interest rate expectations. For example, previous work that did not control for incumbency may have underestimated the partisan effect since both left wing incumbents and right wing challengers may have an ambiguous effect on nominal interest rates. Controls for the margin of victory and the institutional division of power should also be included for the same reason.

The results from the partisan hypotheses speak directly to recent developments 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 the rational partisan theory. In the US 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 leftist governments are associated with an expanded money supply. The evidence presented here concurs with their empirical finding because it is clear that bond markets expect higher inflation under left government. These independent tests suggest that their theory needs revision.

Another implication relates to the incumbency advantage. There is overwhelming evidence in the political science literature that incumbents have an advantage over challengers in elections (for an example see Gelman and King 1990). Many explanations of incumbency advantage have tended to focus on the ability of politicians to use resources to deter high quality challengers and manipulate voters (see for instance Levitt and Wolfram 1997). Alesina and Rosenthal (1995) further assert that voters prefer incumbent Congresspersons because experience and seniority advantages allow them to funnel more resources to their districts. This paper suggests an additional source of incumbency advantage. Assuming that voters vote instrumentally and are aware of the challenger risk effect, many of them may prefer the incumbent party simply because they will be able to avoid the negative impact of policy instability.[26]

Support for the policy risk hypotheses also has implications for the literature on institutional balancing. There is a growing body of evidence for ticket-splitting as predicted by

[26] This may not be enough to change many voting decisions if constituent services are the most important factor in their consideration. However, if policy risk is part of many voter's utility functions then the effect of reduced uncertainty could be pivotal in close elections.

Alesina et al (1993) and Alesina and Rosenthal (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 moderate voters who want to bring policy back towards the center. However, the policy risk hypothesis suggests another reason for balancing. If voters are risk averse, they will prefer incremental changes to large policy changes because they reduce policy volatility. This makes no assumptions about the location of the median voter's preferences because voters at all points along the spectrum will derive utility from lower risk.

Finally, if investors expect partisan differences in economic policy we can assume one of two things. If these expectations are good predictors of the real effects of elections on future policy, then we have further supported the rational partisan theory not only by demonstrating that these expectations exist, but by providing evidence that there may be real partisan differences in policy. On the other hand, if these real effects cannot be substantiated, then we have discovered rational expectations that are not based in reality and which beg to be explained. Why would the market respond to partisan electoral probabilities if there were no real partisan or incumbent effects? One possible explanation is that market expectations become a self-fulfilling prophecy. If financial markets previously reacted to elections because of partisan or policy risk differences, these effects may exhibit a considerable amount of inertia. Even if parties of the left and right would otherwise converge on economic policy, the market might punish parties of the left with higher nominal interest rates, forcing them to stimulate the economy as the market feared they would. Similarly, a newly elected right-wing government may feel the need to tighten fiscal and monetary policy in response to rallies in the bond markets. Under these conditions *partisan differences in economic policy might never converge* since the expectation helps to drive the partisan difference.

This paper has demonstrated how futures market data can be used to test hypotheses about economic expectations, but it has only scratched the surface. We should begin to use election futures to test relationships between electoral probabilities and macroeconomic outcomes. Roberts (1989), Chappell and Keech (1988), and Alesina, Roubini, and Cohen (1997) all use electoral polls to try to measure electoral surprise and its impact on the economy. This work could probably benefit from the greater accuracy of futures-based probabilities. We should also reverse the dependent and independent variables to see what factors affect incumbency. Finally, these results should eventually be incorporated into a dynamic endogenous model of both incumbency and the economy to be sure that our assumptions about causality are correctly specified.

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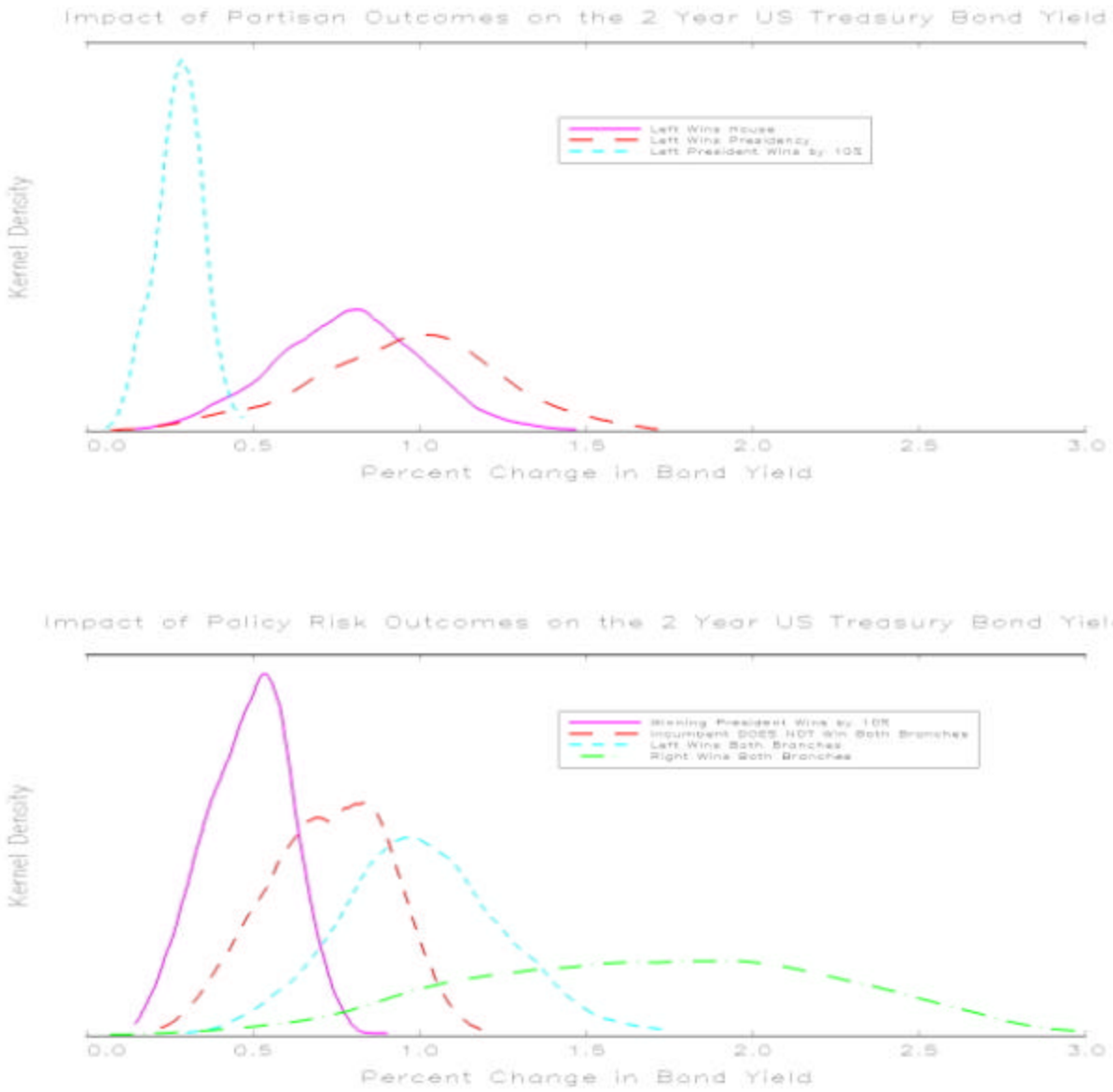
Figure 1. Theoretical Impact of the Policy Risk Premium and Partisan Orientation on Expectations of Nominal Interest Rates

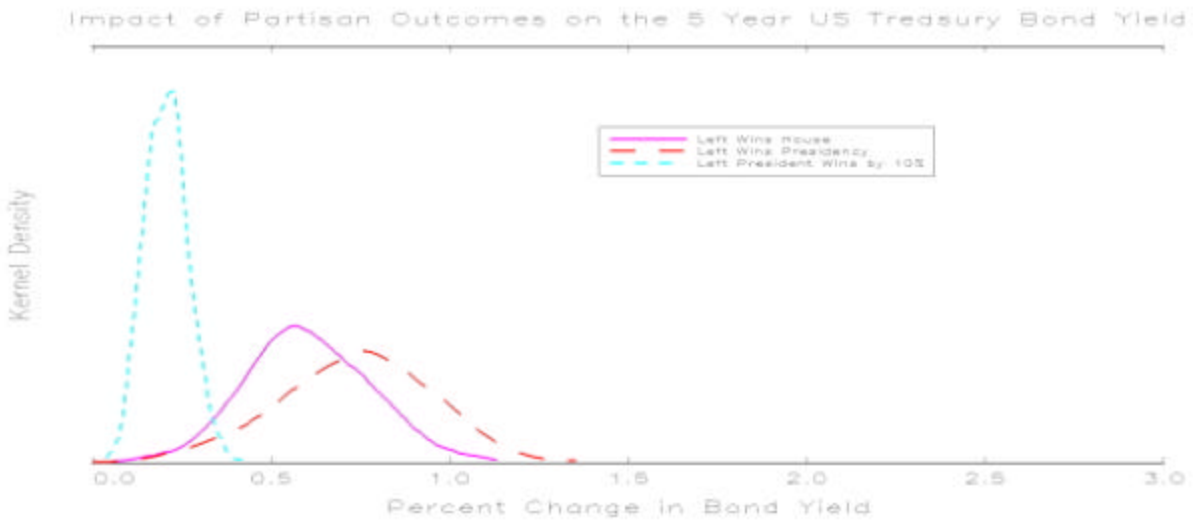
Partisan Orientation	*Policy Risk Premium* **High** (Challengers, Unified Governments, Landslide Elections)	*Policy Risk Premium* **Low** (Incumbents, Divided Governments, Close Elections)
Left	High Interest Rates	Ambiguous
Right	Ambiguous	Low Interest Rates

Figure 2. Relative impact of Partisan and Policy Risk Outcomes on the 2 Year Treasury Bond Yield[27]



[27] These graphs were produced by drawing 100 sets of coefficients from the variance-covariance matrix of the parameter estimates for the regression on each of the ten imputed data sets, for a total of 1000 sets of coefficients (see King et al 2000 and King et al 2001). Coefficients were then multiplied by a first difference. The first difference for probabilities is simply 1, the difference between winning (p=1) and losing (p=0). The first difference for vote shares is based on the difference between a tie (a 0% margin of victory) and a 10% margin of victory, which corresponds to outcomes in which a candidate wins 50% and 55% of the vote, respectively. Thus the first difference for vote shares is 0.05.

Figure 3. Relative impact of Partisan and Policy Risk Outcomes on the 5 Year Treasury Bond Yield



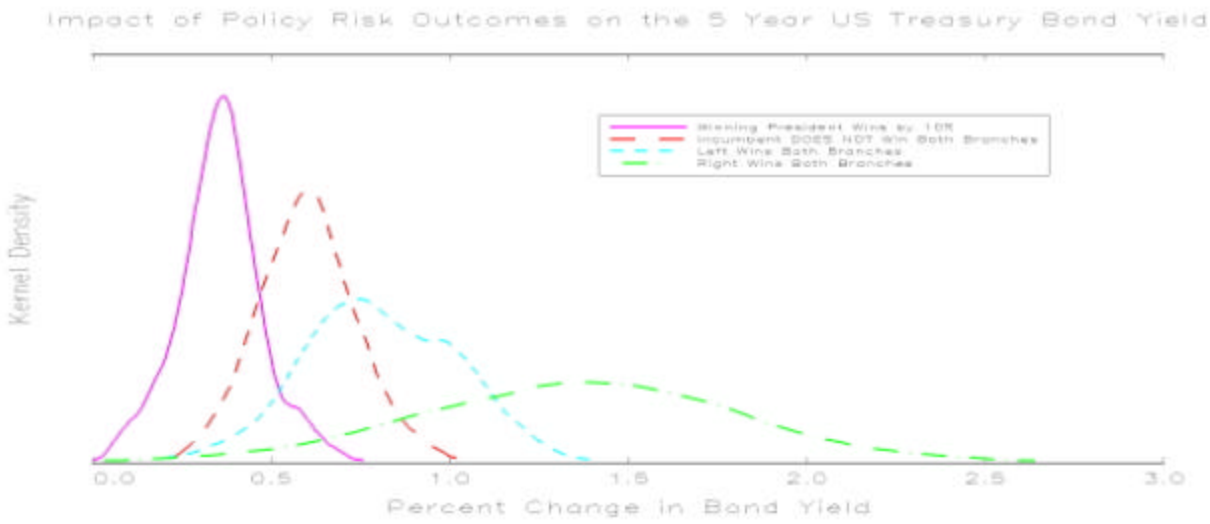


Figure 4. Counterfactual Impact of a Gore Victory on the 2 Year Treasury Bond Yield

Table 1. Impact of Electoral Outcomes on Interest Rates (Normal Assumption)[a]

		Dependent Variables: Yields Implied by US Govt. Bond Futures Contracts				
		3 Month Maturity	2 Year Maturity	5 Year Maturity	10 Year Maturity	30 Year Maturity
Partisan Variables						
Probability Democrats Win House	*Change*	0.93**	0.92**	1.00**	0.76**	0.71**
		(0.17)	(0.21)	(0.22)	(0.15)	(0.13)
	Lagged Level	0.82**	0.83**	0.80**	0.59**	0.48**
		(0.24)	(0.23)	(0.21)	(0.18)	(0.16)
Probability Democrats Win Presidency	*Change*	0.41	0.65**	0.49	0.50**	0.41**
		(0.24)	(0.33)	(0.31)	(0.21)	(0.20)
	Lagged Level	0.72**	0.93**	0.85**	0.65**	0.53**
		(0.26)	(0.32)	(0.29)	(0.22)	(0.20)
Vote Share of Democrat Presidential Candidate	*Change*	1.25	2.24**	1.33	1.38	1.20
		(0.82)	(1.01)	(1.11)	(0.78)	(0.73)
	Lagged Level	2.20**	2.87**	2.24**	2.13**	2.04**
		(0.66)	(0.79)	(0.68)	(0.52)	(0.52)
Policy Risk Variables						
Probability Challenger Wins At Least One Branch	*Change*	0.58**	0.53**	0.52**	0.34**	0.26**
		(0.16)	(0.14)	(0.14)	(0.15)	(0.12)
	Lagged Level	0.74**	0.72**	0.67**	0.46**	0.31**
		(0.18)	(0.20)	(0.17)	(0.13)	(0.14)
Probability Left Controls Both Branches	*Change*	0.77**	0.95**	0.82**	0.72**	0.74**
		(0.20)	(0.19)	(0.23)	(0.13)	(0.14)
	Lagged Level	0.90**	1.01**	0.95**	0.75**	0.71**
		(0.24)	(0.26)	(0.25)	(0.26)	(0.22)
Probability Right Controls Both Branches	*Change*	0.99**	1.04	0.93	0.58	0.60
		(0.43)	(0.62)	(0.51)	(0.43)	(0.34)
	Lagged Level	1.71**	1.63**	1.45**	0.97**	0.95**
		(0.58)	(0.66)	(0.60)	(0.42)	(0.36)
Vote Share of Winning Presidential Candidate	*Change*	1.24	3.46**	2.43	1.41	1.58
		(1.08)	(1.60)	(1.62)	(0.88)	(1.14)
	Lagged Level	2.51**	4.83**	3.70**	2.48**	2.80**
		(0.86)	(1.35)	(1.38)	(1.18)	(0.96)
Economic Controls						
Inflation	*Change*	0.07	0.13	0.19	0.15	0.01
		(0.48)	(0.47)	(0.46)	(0.37)	(0.29)
	Lagged Level	0.08	0.14	0.06	0.05	0.02
		(0.16)	(0.15)	(0.11)	(0.12)	(0.09)
Unemployment	*Change*	-0.44	-0.28	-0.33	-0.24	-0.09
		(0.60)	(0.57)	(0.55)	(0.46)	(0.39)
	Lagged Level	-0.41**	-0.20**	-0.02	0.06**	0.11**
		(0.03)	(0.04)	(0.03)	(0.03)	(0.03)
Industrial Production	*Change*	0.04	0.00	0.01	-0.03	-0.03
		(0.08)	(0.10)	(0.08)	(0.07)	(0.06)
	Lagged Level	-0.10**	-0.11**	-0.11**	-0.09**	-0.09**
		(0.03)	(0.03)	(0.03)	(0.02)	(0.02)
Model Parameters						
Lagged Dependent Variable		-0.57**	-0.58**	-0.53**	-0.45**	-0.43**
		(0.04)	(0.04)	(0.05)	(0.04)	(0.04)
Constant		1.52**	-0.79	-0.87	-0.60	-0.95
		(0.67)	(0.76)	(0.80)	(0.65)	(0.56)
LaGrange Multiplier Test		-0.23	-0.24	-0.25	-0.23	-0.23
		(0.23)	(0.24)	(0.23)	(0.21)	(0.21)

[a]Error correction model using ordinary least squares estimation and assuming stochastic component is normally distributed. Standard errors are panel corrected.
*p<.05, ** p<.01

Table 2. Impact of Electoral Outcomes on Interest Rates (t-Distributed Assumption)[b]

		Dependent Variables: Yields Implied by US Govt. Bond Futures Contracts				
		3 Month Maturity	2 Year Maturity	5 Year Maturity	10 Year Maturity	30 Year Maturity
Partisan Variables						
Probability Democrats Win House	*Change*	0.55**	0.87**	0.78**	0.07	0.05
		(0.20)	(0.21)	(0.21)	(0.05)	(0.04)
	Lagged Level	0.46**	0.78**	0.60**	0.06	0.03
		(0.21)	(0.23)	(0.18)	(0.05)	(0.05)
Probability Democrats Win Presidency	*Change*	0.25	0.66**	0.42	0.08	0.05
		(0.19)	(0.32)	(0.29)	(0.06)	(0.05)
	Lagged Level	0.51**	0.95**	0.73**	0.10	0.04
		(0.23)	(0.30)	(0.23)	(0.07)	(0.05)
Vote Share of Democrat Presidential Candidate	*Change*	0.78	2.13**	1.09	0.20	0.08
		(0.66)	(0.98)	(0.93)	(0.21)	(0.19)
	Lagged Level	1.53**	2.78**	2.07**	0.35**	0.22
		(0.72)	(0.74)	(0.62)	(0.17)	(0.15)
Policy Risk Variables						
Probability Challenger Wins At Least One Branch	*Change*	0.42**	0.52**	0.43**	0.05	0.02
		(0.16)	(0.14)	(0.13)	(0.04)	(0.03)
	Lagged Level	0.54**	0.72**	0.60**	0.05	0.03
		(0.20)	(0.20)	(0.14)	(0.04)	(0.04)
Probability Left Controls Both Branches	*Change*	0.55**	0.93**	0.69**	0.09**	0.05
		(0.22)	(0.19)	(0.21)	(0.04)	(0.03)
	Lagged Level	0.70**	1.00**	0.80**	0.10	0.05
		(0.27)	(0.25)	(0.22)	(0.06)	(0.04)
Probability Right Controls Both Branches	*Change*	0.69	1.04	0.83**	0.09	0.07
		(0.36)	(0.63)	(0.40)	(0.10)	(0.06)
	Lagged Level	1.28**	1.69**	1.36**	0.17	0.09
		(0.51)	(0.59)	(0.47)	(0.12)	(0.09)
Vote Share of Winning Presidential Candidate	*Change*	0.71	3.37**	2.06	0.09	0.11
		(0.87)	(1.57)	(1.59)	(0.38)	(0.27)
	Lagged Level	1.84**	4.87**	3.58**	0.33	0.29
		(0.81)	(1.29)	(1.21)	(0.28)	(0.23)
Economic Controls						
Inflation	*Change*	0.18	0.10	0.15	0.00	0.01
		(0.32)	(0.46)	(0.45)	(0.08)	(0.05)
	Lagged Level	0.06	0.12	-0.02	0.01	0.00
		(0.11)	(0.15)	(0.11)	(0.03)	(0.02)
Unemployment	*Change*	-0.39	-0.29	-0.35	-0.09	-0.05
		(0.40)	(0.53)	(0.38)	(0.15)	(0.11)
	Lagged Level	-0.28**	-0.19**	-0.01	0.01	0.01
		(0.09)	(0.04)	(0.03)	(0.01)	(0.01)
Industrial Production	*Change*	0.03	0.00	0.00	-0.01	0.00
		(0.06)	(0.10)	(0.07)	(0.02)	(0.01)
	Lagged Level	-0.07**	-0.11**	-0.09**	-0.02**	-0.01**
		(0.03)	(0.03)	(0.03)	(0.01)	(0.01)
Model Parameters						
Lagged Dependent Variable		-0.38**	-0.56**	-0.41**	-0.05**	-0.03**
		(0.12)	(0.05)	(0.06)	(0.01)	(0.01)
Constant		0.92	-0.92	-1.27	-0.19	-0.18
		(0.60)	(0.71)	(0.68)	(0.18)	(0.18)
s		0.26**	0.41**	0.31**	0.08**	0.06**
		(0.05)	(0.02)	(0.02)	(0.01)	(0.00)
ϱ		2.54**	13.80	3.94**	0.84**	0.74**
		(0.83)	(13.25)	(1.05)	(0.05)	(0.04)
LaGrange Multiplier Test		-0.17	-0.23	-0.20	-0.13	-0.13
		(0.20)	(0.24)	(0.21)	(0.16)	(0.16)

[b]Error correction model using maximum likelihood estimation and assuming stochastic component is t-distributed.
*p<.05, ** p<.01

Appendix: Variable Descriptions

Variables	Contracts/ Panels	Observations	Description
Dependent Variables			
3 Month Maturity	Dec. 88	107	Change in future 3 month Treasury bill yield in percent. Calculated as (100 – futures price).
	Dec. 92	201	
	Dec. 94	100	
	Dec. 96	204	
	Dec. 98	163	
	Dec. 00	60	
2 Year Maturity	Dec. 92	102	Change in future 2 year Treasury note yield in percent. Calculated as the effective yield at the current futures price of a 2 year bond with a biennial coupon of 8 percent.
	Dec. 94	81	
	Dec. 96	93	
	Dec. 98	89	
	Dec. 00	69	
5 Year Maturity	Dec. 88	107	Change in 5 year Treasury note future yield in percent. Calculated as the effective yield at the current futures price of a 5 year bond with a biennial coupon of 8 percent for 1988-1998 and 6 percent for 2000.
	Dec. 92	170	
	Dec. 94	100	
	Dec. 96	159	
	Dec. 98	142	
	Dec. 00	97	
10 Year Maturity	Dec. 88	107	Change in 10 year Treasury note future yield in percent. Calculated as the effective yield at the current futures price of a 10 year bond with a biennial coupon of 8 percent for 1988-1998 and 6 percent for 2000.
	Dec. 92	200	
	Dec. 94	100	
	Dec. 96	216	
	Dec. 98	191	
	Dec. 00	114	
30 Year Maturity	Dec. 88	107	Change in 30 year Treasury note future yield in percent. Calculated as the effective yield at the current futures price of a 30 year bond with a biennial coupon of 8 percent for 1988-1998 and 6 percent for 2000.
	Dec. 92	200	
	Dec. 94	100	
	Dec. 96	216	
	Dec. 98	191	
	Dec. 00	216	
Partisan Variables			
Probability Left Wins House (PDH)	1994	142	[HM.DEM + (1 - HM.REP)] / 2
	1996	93	[RH.lose + (1- (RH.hold + RH.gain)) + (NhNs + NhRs) + (1 - (RhRs + RhNs)] / 4
	1998	274	"
	2000	309	"
Probability Left Wins Presidency (PDP)	1992	117	[P.CL + (1 - (P.BU + P.PE)] / 2
	1994	142	1
	1996	310	[(CLIN + OTDEM) + (1 - (REP + ROF96)] / 2
	1998	275	1
	2000	189	[Dem + (1 - (Rep + Reform)] / 2
Vote Share[28] of Left Presidential Candidate (VSDP)	1988	153	[(Dukakis + Jackson) / (Dukakis + Jackson + Bush)]
	1992	288	[(D.BR + D.CL + D.HA + D.KE + D.RF + D.TS) + (1 - R.BU)] / 2
	1996	276	[V.CLIN + (1 – V.DOLE)] / 2
	2000	305	[DemVS / (DemVS + RepVS)]

[28] To improve the normality of the data prior to imputation, vote share variables were transformed with the formula ln(x/(1-x)). After imputation they were untransformed with the formula 1/(1+exp(-x)). See Honaker et al 2000.

Appendix: Variable Descriptions, continued

Variables	Contracts/ Panels	Observations	Description
Policy Risk Variables			
Probability Incumbent Party Wins Both Branches (PIHP)	1994	142	[PDH * PDP]
	1996	93	[(1 - PDH) * PDP]
	1998	274	"
	2000	189	"
Probability Left Controls Both Branches (PDHP)	1994	142	[PDH * PDP]
	1996	93	
	1998	274	
	2000	189	
Probability Right Controls Both Branches (PDHP)	1994	142	[(1 – PDH) * (1 – PDP)]
	1996	93	
	1998	274	
	2000	189	
Vote Share of Winning Presidential Candidate (VSWP)	1988	153	abs[VSDP – 50] + 50
	1992	288	
	1996	276	
	2000	305	
Economic Controls			
Inflation	1988	153	Most recent one month rate of growth in the consumer price index as reported by the Bureau of Labor Statistics.
	1992	288	
	1994	142	
	1996	310	
	1998	275	
	2000	311	
Unemployment	1988	153	Most recent unemployment rate as reported by the Bureau of Labor Statistics.
	1992	288	
	1994	142	
	1996	310	
	1998	275	
	2000	311	
Industrial Production	1988	153	Most recent one month rate of growth in the industrial production index as reported by the Federal Reserve Board.
	1992	288	
	1994	142	
	1996	310	
	1998	275	
	2000	311	

Note: Abbreviations in calculations for probabilities and vote shares based on election futures contracts are taken directly from Iowa Electronic Markets. Negative implied values are set to zero. Panels are based on the following periods: 6/10/88 – 11/9/88, 1/22/92 -11/4/92, 6/21/94 - 11/9/94, 1/2/96 - 11/6/96, 2/3/98 - 11/4/98, and 1/3/00 – 11/8/00. These periods include all days for which at least one bond futures price and one election futures contract price are observed within the year of the election.