Voter Uncertainty and Economic Conditions: A Look into Election Competitiveness

Christopher V. Lau*

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Abstract

It is widely know that the state of the economy has a substantial effect on how voters vote. Unforunately, voter uncertainty during particular economic conditions is often overlooked. In this study, I attempt to uncover how uncertain voters are during an election by uncovering a relationship between election competitiveness and the state of the economy. Essentially, if an election is competitive, the outcome is as good as random; overall, voters are uncertain of who they want to govern the state. I use congressional elections from 1900 to 1976 to analyze these potential effects and find that the change in prices has the greatest effect on election competitiveness. Moreover, I find that, contrary to expectations, inflation actually makes candidates who are opposing an incumbent less competitive. Furthermore, I find that unemployment has very little effect on election competitivness; this is in line with the previous analysis of Gerald Kramer (1971) and George Stigler (1973). In the end, it is found that increases in the percent change of GNP lead to decreases in electoral competition, as predicted. Also, increases in inflation cause elections without incumbents to become more competitive, while at the same time making elections with third party incumbents less competitive. Elections where incumbents are either Democrats or Republicans are left ambiguous.

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1 Introduction

Over the past sixty years, economists and political scientists have tried to uncover the properties of voting and elections. The goal of these studies is to develop and test theories as to why voters vote for particular candidates; is it because of the candidates themselves or the party they belong to? Or, is it because of some outside source? For example, David Lee, Enrico Moretti, and Matthew Butler (2004) tried to shed light on a property of voting by answering the question, "Do voters affect or elect policies?" Here, they wanted to decipher between which voting theory was dominating, policy convergence or policy divergence. In policy convergence, candidates moderate their platforms to address the median candidate; they converge to the same platform in an attempt to gain as many votes as possible. Obviously, this can only exist when the promises candidates make are credible. Policy divergence drops the assumption that candidate promises are credible, and concludes that voters vote for the candidate who shares the closest policy platform to their own, since they know any promise by the candidate will be broken. Using close elections as a quasi-experiment, Lee, Moretti, and Butler found that voters do not affect policies, and instead elect them. Thus, the hypothesis that candidates alter their positions with the hope of winning the election fails; the leading explanation presented was that "the difficulty in establishing credible commitments to moderate policies" dominates any possible effect of convergence.

A very common election hypothesis that is often tested is economic voting; the concept that economic conditions affect election outcomes. While the acceptance of this hypothesis has been well established, Richard Nadeau and Michael Lewis-Beck (2001) attempted uncover another property: whether voters were retrospective or prospective. That is, do voters cast their vote based on a candidate's (or party's) past economic record, or on what they expect the economy to be in the future if a candidate is elected? Using presidential elections from 1956 to 1996 , Nadeau and Lewis-Black found that retrospective voting is used when a popularly elected president is running for reelection,

and prospective voting is used otherwise[1].

Along similar lines, I too would like to uncover and test a property of elections. Specifically, I would like to see whether or not economic conditions influence uncertainty among voters. I begin my analysis with the assumption that a competitive election implies, on average, that voters are unsure of who they would like to vote for, i.e. the "representative voter" is uncertain of who they want to see in office. Thus, under this assumption, I use election competitiveness as a proxy for how unsure voters are in a given election. This assumption seems quite reasonable; Lee, Moretti and Butler essentially used this assumption to form their quasi-experiment. They interpreted a close election as an election with an outcome that is as good as random.

A large proprtion of the current literature has revealed that an incumbent loses votes when their macroeconomic performance is poor. Ideally, I would like to answer the question: do these losses in incumbent vote shares benefit a single competing candidate, or benefit all other candidates in the election? Much of the current literature has assumed the two party system (all other candidates outside of the two parties are not considered), however examining almost any Congressional ballot clearly indicates voters usually have more than two options. The problem with restricting analysis to two parties is that we never get to see how other candidates are affected. When there are two candidates, an incumbent losing votes clearly implies that the challenger will gain more, however if we introduce more candidates, it is not clear that a single candidate will obtain the entire incumbent residual. It could very well be the case that the incumbent's residual votes are retained by a third party candidate. It is even possible that the "primary" challenger loses votes to third party candidates, thus leaving the effect of the economy on election outcome lower than the "true value". Thus, in this study, I would like to extend past the typical two-party analysis, and see whether or not third party candidates earn more votes during years of economic downturn.

[1]To test retrospective voting, change in the Nation Business Index (NBI) was used as a proxy. To test prospective voting, change in the Economic Future Index (EFI) was used as a proxy.

I will proceed by sectioning this paper in the following way: Section 2 will deal with a review of the past literature. I will summarize major economic voting theories and findings, as well as address a study dealing with election competitiveness. Section 3 will present two models I would like to test. Section 4 discusses the data I used, and estimation. Section 5 gives the results of my empirical analysis, and Section 6 concludes.

2 Literature Review

Before beginning our analysis of competitive elections, it will be useful to properly understand a few economic voting theories, and the empirical test that support them. Gerald Kramer (1971) developed an empirical model to test how economic conditions affect voting percentages of congressional candidates. Here, he made a crucial assumption for a voter's decision rule: voters only look at the performance of the incumbent. That is, voters will vote for the incumbent if they deem his or her performance satisfactory. Otherwise, the voter will allow the opposition a chance to govern. Kramer assumes that voters completely ignore the qualities of all non-incumbent candidates and only focus on those of the incumbent when making a decision. Under this assumption, Kramer developes the following statistical model:

$$y_t = V + \lambda T + \delta_t[\alpha + \beta\Delta_t] + \eta_t$$

where y_t is party A's share of the two-party vote, T allows for trends in partisanship, δ_t is +1 if A is the incumbent and -1 if B is the incumbent, Δ_t is a proxy for incumbent performance, and η_t is a stochastic error term that consists of the net effects that affect y_t, not explained by the other covariates. In this model, V is considered the base vote for party A, λ is the time trend coefficient, α is the incumbent's advantage, and β reflects the effect of the incumbent's performance in office.

Kramer dealt with the error term, η_t, in two seperate ways. First he tested his model

under the assumption that η_t satisfies the Gauss-Markov assumptions by using Ordinary Least Squares. Next, he assumed that during presidential elections, congressional candidates obtained a "coattail" effect; that is, congressional candidates are effected by the fact that they are a member of the same party as a presidental candidate. Since a political party can be considered as a "team," congressional candidates can be effected by the campaign of the highly publicized presidental candidate. Thus, Kramer assumes:

$$\eta_t = u_t + \gamma v_t$$

where u_t is the disturbance from the congressional election, v_t is the disturbance in the presidental election, and γ (with $0 \leq \gamma \leq 1$) is the effect of the presidential campaign on the congressional vote. In Kramer's analysis, he esitmated $\hat{\gamma}$ using maximum likelihood techniques, then preformed a weighted least squares with a weight that was a function of $\hat{\gamma}$. In addition, the proxies used in Δ_t were (in percent change form) real income, prices, and unemployment.

The results of his study found that all of the estimated equations explained a significant amount of the vote; it was found that a likelihood ratio test of the hypothesis that all coefficients except for the intercept and time trend term were zero was significant. In addition, the models had R^2 values between 0.48 and 0.64, indicating that all of the equations explained a half to two-thirds of the variance in the vote. The coefficients on the income terms in all of his equations were positive and significant, as expected (increases in income increase an incumbent's vote share), while the coefficients on price were negative, with only a few significant. The coefficients on unemployment consistently had the wrong sign (positive), however none were significantly different from zero. Kramer explains this by a variety of factors, most notably, the possibility that those who are typically unemployed at normal unemployment levels are also less politically active. Suprisingly, all of the incumbency coefficients (α) were small and insignificant, indicating

that incumbency does not have an effect on vote share, contrary to intuition.

In the end, Kramer concluded that election outcomes are substantially responsive to changes that occur under the incumbent party. Specifically, he found that a 10% decrease in per capita real income would cost the incumbent party 4 to 5 percent of the vote share, all else equal. Furthermore, Kramer concluded that real income was the most important factor in determining election outcomes, and that incumbency itself was unimportant.

George Stigler (1973) attempted to further justify Kramer's findings of an insignificant effect on unemployment, and improve his model. After replicating Stigler's analysis using the change in unemployment, relative change in per capita real income, and price level, Stigler continues to find that there is not a significant relationship between vote share and unemployment. His justification for this was that moderate changes in unemployment would most likely affect a small proportion of the voting population. Stigler also recognizes that multicollinearity may be a problem; the correlation between unemployment and per capita real income is -0.78.

A few improvments and variations Stigler made on Kramer's work included restoring data from years the United States was in war (Kramer had dropped them), regressing over two-year changes in economic activity, and demeaning the economic condition variables[2]. With these modifications, it was found that both changes in real income and changes in price both significantly affect the vote share between Democrats and Republicans within an election. Stiger follows this analysis by questioning whether or not voters directly evaluate economic conditions as a basis for voting; a decline in the economy is not always due to poor governing by Congress. In addition, voters may not abandon an incumbent because of a small hiccup; one does not sell stock in a corporation just because it performed poorly on one day. Instead, Stigler argues that the voter judges which candidate could maintain a high and steady rate of growth of income. To do this, voters use past experiences to forecast how well a candidate (or party) will govern. Specifically,

[2]Stigler also tried to regress the change in vote share on the change in economic conditions. This regression resulted in a significant coefficient for income, and an insignificant coefficient for prices.

voters discount previous economic conditions by $(1/(1+r))^t$, where r is a discount rate. In other words, past performance does influence how voters vote, yet not as strongly as Kramer had assumed. Using discount rates of 0.10 and 0.25, Stigler found that there is no significant relationship between vote share and average income performance. As a result, "voters disregard average income experience in deciding between the parties."

Ray Fair (1979) attempted to create a generalized model of the works by Kramer and Stigler, which he followed by testing on Presidential elections. Instead of accepting either of the theories assumed by Stigler or Kramer, Fair incorporated them in his model. He first assumed a utility function for voter i's expected future utility if either the Democratic or Republican presidential candidate was elected at time t:

$$\begin{aligned} U_{it}^D &= \xi_i^D + \beta_D M_t^D \\ U_{it}^R &= \xi_i^R + \beta_R M_t^R \end{aligned}$$

where M_t^D and M_t^R are vectors of preformance proxies for the last time a Democrat and Republican were in office, respectively[3]. ξ_i^D and ξ_i^R are voter i's respective utility for the Democrat's and Republican's candidate, given economic performance. β_D and β_R are vectors of coefficients.

It follows that voter i votes for the Democratic candidate when $U_{it}^D > U_{it}^R$, i.e., we can let $V_{it} = 1\{U_{it}^D > U_{it}^R\}$. Rearranging, he defined

$$\begin{aligned} \psi_i &= \xi_i^R - \xi_i^D \\ q_t &= \beta_D M_t^D - \beta_R M_t^R \end{aligned}$$

[3]To be exact, in Fair's study, he lets

$$\beta_D M_t^D = \beta_1 \frac{M_{td1}}{(1+\rho)^{t-td1}} + \beta_2 \frac{M_{td2}}{(1+\rho)^{t-td2}} \text{ and } \beta_R M_t^R = \beta_3 \frac{M_{tr1}}{(1+\rho)^{t-tr1}} + \beta_4 \frac{M_{tr2}}{(1+\rho)^{t-tr2}}$$

where $tc1$ is the last time party C was in office, $tc2$ is the second-to-last time party C was in office, M_{tc1} is party C's economic performance the last time party C was in office, M_{tc2} is party C's economic performance the second-to-last time they were in office, and ρ is a discount rate

so that $V_{it} = 1\{q_t > \psi_i\}$. Fair assumes that ψ_i has a uniform distribution between some numbers $a+\delta_t$ and $b+\delta_t$, where a and b are constant across all elections. Thus, ψ (where the subscript is dropped due to aggregation) has a cumulitive distribution function of

$$F(\psi) = \begin{cases} 0 & \text{for } \psi < a + \delta_t; \\ \frac{\psi - a - \delta_t}{b-a} & \text{for } a + \delta_t \leq \psi \leq b + \delta_t; \\ 1 & \text{for } \psi > b + \delta_t \end{cases}$$

It follows that the percent share of votes for the Democratic candidate is simply $F(q_t)$, i.e. $V_t = -\frac{a}{b-a} + \frac{q_t}{b-a} - \frac{\delta_t}{b-a}$. He eventually simplifies this to a form $\alpha_0 + \alpha_1 q_t + v_t$, where $\alpha_0 = -\frac{a}{b-a}$, $\alpha_1 = \frac{1}{b-a}$, and $v_t = \frac{\delta_t}{b-a}$. Inserting q_t gives an estimatable equation. Furthermore, after inspection of the residuals, v_t, Fair finds that the problem of heteroskedasticity exists; he solves this by using a general least squares procedure.

Fair applys his generalized model to presidential elections by specifying the measures of economic performance to be the growth rate of GNP per capita, the absolute value of the growth rate of prices, the level of unemployment and the change in unemployment, over one, two, three and four years, giving him sixteen possible measures. He estimated 48 equations, with up to four regressors in each equation and found that the growth rate of GNP per capita was the best measure of performance, with a coefficient of 0.0116. This implies that a one percentage point increase in the growth rate of GNP per capita is associated with a 1.16% increase in the incumbent party's vote share. Unlike Kramer, Fair found that the incumbent has an average advantage of about 3.5%. Furthremore, he concludes that voters do not consider the past performance of the non-incumbent party, and only consider the events that occured in the incumbent's last term, which is consistent with Kramer's initial assumption.

Fair acknowledges that his findings are very limited; since he worked with only presidential elections, he used 16 observations. Thus, we must take Fair's empirical results with a grain of salt.

The preceding studies have allowed us to examine the relationship between elections and economic activity. We can now take a look at how electoral competitiveness has previously been treated. Alan Abramowitz (1991) tried to explain why U.S. House incumbents in the 1980's were winning by larger margins compared to the 1950's and 1960's. He notes that the proportion of House incumbents to win over 60% of the vote increased from 64% in the 1960's to 78% in the 1980's. Abramowitz tries to explain this phenomenon by creating a model that explained competition; he regressed margin of victory or defeat of the incumbent on a group of explanatory regressors[4], and finds that the most important determinant to the level of competition in House elections is the challenger's campaign spending. Interestingly, the coefficient on the incumbent's amount of spending was insignificant, indicating that the margin of victory is not influenced by how much money the incumbent spends. Unfortunately, Abramowitz does not address whether or not the condition of the economy has an effect on competition; there is no clear direction to the causal relationship between competition and campaign spending. Non-incumbent candidates may be spending more because of the fact that the election is competitive; they already have a chance to win.

In addition, it is quite apparent that the state of the economy can affect how much money a non-incumbent candidate gathers and spends. Unfortunately, either direction of this relationship seems feasible. It could easily be the case that during a period of strong economic performance, rival candidates are able to obtain more funding. Likewise, during dismal economic times, contributors may be discouraged by the incumbent's performance, thus fund alternative candidates. In either situation, if my hypothesis is true, it could be the case that economic conditions influence competition, which influences campaign spending, in which case the economy is the true cause of competitiveness in U.S. House elections.

[4]Regressors included partisanship of the district, incumbent's personal popularity, incumbent's seniority, the type of committees the incumbent has served on, the incumbent's rate of defection from his party, the incumbent's campaign spending, the challenger's campaign spending, the challenger's experience, and the party affiliation of the incumbent

3 Model

In this section, I will derive a basic model that can be used to estimate some election properties of interest. What makes this model different than those used in previous studies is two-fold. First, I will examine competitiveness, rather than outcome. Second, I will explain this competitiveness using all n_t candidates in each election, rather than assuming third party candidates are negligible. One main advantage of this model is its ability to disentagle incumbency effects in multi-candidate (greater than two) elections , a concept that has rarely been studied in the previous literature. Specifically, I will present two models, each with different assumptions regarding the use of "coattail" effects, i.e. the effect of presidential incumbency on local elections. The second model is a generalization of the first, with variations in the assumptions used to check the robustness of the original specification, thus I will explain the first model in detail, and explain the other in less.

3.1 The baseline model

I will present my model in a similar derivation to that done by Ray Fair. First, we assume that election t has n_t candidates running for office. We can define U_{ict} to be the future expected utility of voter i in election t if candidate c wins. For voter i to vote for candidate c, the future expected utility of voter i voting for candidate c will exceed her expected future utility of voting for any of the other $n_t - 1$ candidates in election t. This is equivalent to saying the future expcted utility of voting for candidate c exceeds the maximum utility gained from voting for any of the other $n_t - 1$ candidates. Then, we can let $P_{it}(c)$ be a variable that indicates whether or not voter i voted for candidate c in election t, i.e. the variable is equal to one if candidate c was voted for, and 0 if the candidate was not. That is:

$$P_{it}(c) = \begin{cases} 1 & \text{if } U_{ict} > \max_{k \neq c} U_{ikt}; \\ 0 & \text{otherwise.} \end{cases}$$

Then, let us define X_t to be a vector of covariates that describe the performance of the economy during election t, I_{ct} to be an indicator variable[5] for whether or not candidate c was an incumbent in election t, PTY_{ct} to be an indicator for whether or not candidate c belongs to a major political party (Democrat or Republican) in election t, and PRS_{ct} to be an indicator for whether or not candidate c is of the same party as the current presidential administration in election t. Define the future expected utility of voter i voting for candidate c in election t as:

$$U_{ict} = V_{ct} + \epsilon_{ict} \quad (1)$$

$$V_{ct} = \gamma + \beta_1 I_{ct} + X_t'\beta_2 + X_t' \cdot I_{ct}\beta_3 + \beta_4 PTY_{ct} + PTY_{ct} \cdot X_t'\beta_5 + \beta_6 PRS_{ct} + \xi_{ct} \quad (2)$$

where γ is a constant and $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$, and β_6 are vectors of coefficients. Here, I assume that political party status helps influence the effect of economic conditions on competitiveness. Specifically, if candidate c belongs to a major political party, she should be helped by a strong economy, and hurt by a weak one; candidates' expected performance is associated with their party. Since major party candidates are most often in power, they take the greatest responsibility.

I define ξ_{ct} as the stochastic error term from candidated c, which is the same across all voters i who participate in election t, and ϵ_{itc} as the stochastic error term for voter i when voting for candidate c in election t. If we assume that ϵ_{itc} is independently and identically distributed according to an extreme value distribution, we can solve for the probability that the representative voter, voter i, votes for candidate c as a multinomial logit model:

$$P_t(c) = \frac{e^{V_{ct}}}{\sum_{j=1}^{n_t} e^{V_{jt}}}, c = 1, ..., n_t$$

That is, the percent voted for candidate c in election t is $P_t(c)$.

To measure competitiveness of all candidates, I observe that the incumbent candidate

[5]In cases where indicator variables are multiplied by vectors, the variable is then either the identity matrix, or the zero matrix

is typically considered as the most competitive. Thus, any judgement in competition should be relative to the incumbent candidate, if one exists in the election. If we define $P_t(I)$ as the proportion voted for the incumbent candidate in election t, we can measure competitiveness of candidate c in election t as $P_t(c)/P_t(I)$. If an election is competitive, this "competitiveness ratio" should be 1 for all candidates in election t. As a result, the farther away the ratio is from 1, the less competitive the election.

However, not all elections have incumbents. This gives us a chance to measure incumbency effects on competitiveness. For elections with incumbents, let $P_t(1) = P_t(I)$. In elections without incumbents, I let $P_t(1)$ be defined as the proportion of votes gained by the candidate whose last name is alphabetically first, $P_t(A)$. If an election is competitive, it should not matter who the other candidates are being compared against; the ratio should be hypothetically 1 for all candidates, assuming alphabetic ordering of candidate names is independent of qualifications and vote-getting ability. Thus, define INC_t as an indicator variable for whether or not there is an incumbent in election t, so that $P_t(1)$ can be defined as:

$$P_t(1) = \begin{cases} P_t(I) & \text{if } INC_t = 1; \\ P_t(A) & \text{if } INC_t = 0. \end{cases}$$

An implication of this definition is that candidate 1 is the incumbent when there exists an incumbent in the election, and is the first alphabetical candidate when there does not exist an incumbent. In addition, we define the competitiveness ratio for candidate c in election t as $P_t(c)/P_t(1)$. Notice that each election should have $n_t - 1$ competitiveness ratios, since comparing a candidate against herself will always yield a ratio of 1. In other words, if we examine $n_t - 1$ ratios, we can solve for the last, thus we are given complete information regarding voting proportions in election t.

Let us assume that $P_t(1) \neq 0$. Then, using the multinomial logit model from the

utility function, an estimatable equation can be formulated:

$$\begin{aligned}
\frac{P_t(c)}{P_t(1)} &= \frac{e^{V_{ct}}/\sum_{j=1}^{n_t} e^{V_{jt}}}{e^{V_{1t}}/\sum_{j=1}^{n_t} e^{V_{jt}}} = \frac{e^{V_{ct}}}{e^{V_{1t}}} \\
log[\frac{P_t(c)}{P_t(1)}] &= log(\frac{e^{V_{ct}}}{e^{V_{1t}}}) \\
log[P_t(c)] - log[P_t(1)] &= V_{ct} - V_{1t}
\end{aligned}$$

Using equation (2):

$$\begin{aligned}
V_{ct} - V_{1t} &= \gamma + \beta_1 I_{ct} + X_t'\beta_2 + X_t' \cdot I_{ct}\beta_3 + \beta_4 PTY_{ct} + PTY_{ct} \cdot X_t'\beta_5 + \beta_6 PRS_{ct} + \xi_{ct} \\
&\quad -(\gamma + \beta_1 I_{1t} + X_t'\beta_2 + X_t' \cdot I_{1t}\beta_3 + \beta_4 PTY_{1t} + PTY_{1t} \cdot X_t'\beta_5 + \beta_6 PRS_{1t} + \xi_{1t}) \\
&= -\beta_1(I_{1t}) - X_t' \cdot I_{1t}\beta_3 + \beta_4(PTY_{ct} - PTY_{1t}) + X_t'\beta_5(PTY_{ct} - PTY_{1t}) + \\
&\quad \beta_6(PRS_{ct} - PRS_{1t}) + (\xi_{ct} - \xi_{1t})
\end{aligned}$$

Since candidate 1 is defined as the incumbent if there exists one, and the first alphabetical candidate when there is not, we can observe that $I_{1t} = INC_t$, i.e. if there is an incumbent in the election, then candidate 1 is the incumbent. Furthermore, $PTY_{ct} - PTY_{1t}$ can take on three values: 1 if candidate c is in a major political party and candidate 1 is not, 0 if both candidates are not in a major political party or both candidates are in a major political party, and -1 if candidate c is not in a major political party and candidate 1 is in a major political party. Therefore, we can define:

$$P_{ct} = \begin{cases} 1 & \text{if candidate } c \text{ is in a major political party and candidate 1 is not;} \\ -1 & \text{if candidate } c \text{ is not in a major political party and candidate 1 is;} \\ 0 & \text{otherwise.} \end{cases}$$

Similarly, $PRS_{ct} - PRS_{1t}$ can take on three values: 1 if candidate c belongs to the party of the current president, 0 if neither or both candidates belongs to party of the current president, and -1 if candidate 1 belongs to the party of the current president. We then

define:

$$CT_{ct} = \begin{cases} 1 & \text{if candidate } c \text{ belongs to the party of the president;} \\ -1 & \text{if candidate 1 belongs to the party of the president;} \\ 0 & \text{otherwise.} \end{cases}$$

This will allow us to measure "coattail" effects. Therefore, if we let $\eta_{ct} = \xi_{ct} - \xi_{1t}$, we can simplify:

$$log[P_t(c)] - log[P_t(1)] = \alpha_0 INC_t + INC_t \cdot X_t'\alpha_1 + \alpha_2 P_{ct} + P_{ct} \cdot X_t'\alpha_3 + \alpha_4 CT_{ct} + \eta_{ct} \quad (3)$$

where $\alpha_0 = -\beta_1$, $\alpha_1 = -\beta_3$, $\alpha_2 = \beta_4$, $\alpha_3 = \beta_5$, and $\alpha_4 = \beta_6$. The term η_{ct} represents the net effect of factors not explicitly considered in the model above.

It should be noted that if there is no incumbent in the election, if the two candidates being compared are either both apart of a major political party, or are both not, and if neither or both candidates belong to the President's party, then the competitiveness ratio will depend completely on the stochastic error term. This is quite intuitive: If there is no incumbent and both candidates are from "unknown" political parties, the candidate to win more votes should win by a very slight margin and should be essentially random. Similarly, if there is no incumbent and both candidates are from major political parties, the candidate who wins more votes should depend on other factors not explicitly explained in the model; usually unobservable (rather, unmeasureable) characteristics. That is, in an election where no one is already well known (not the incumbent), then voting decisions should depend on party affiliations. If the effect of each candidate's party affiliation cancels out, i.e. the two candidates both belong to major political parties, or both belong to minor political parties, then the election should be relatively close and random. In these types of elections, economic performance is not considered because either both candidates belong to minor political parties, in which case they take no responsibility for the economy, or they both belong to a major political party, where the effect cancels out.

I now examine the error term, η_{ct}, further. Two other factors that could influence the closeness of an election is trends in time and the number of candidates in the election. Let T represent time trend; it takes the value 1 for the first year an election is held in the sample, and N for the N^{th} year after. For example, in the sample used in the next section, we start from elections taking place in 1900. Thus, elections in this year will have $T = 1$. In 1902, $T = 2$, and in 1970, $T = 36$. In addition, we would also like to analyze how elections with incumbents are affected over time. To do this, we include the interaction between incumbent in election status and time, i.e. $INC_t \cdot T$.

Furthermore, let C_t be a vector of indicator variables for the number of candidates in election t. Precisely, if $C_{1t} = 1\{\exists$ 1 candidate in election $t\}$,...,$C_{11t} = 1\{\exists$ 11 candidates in election $t\}$, then:

$$C_t' = \begin{bmatrix} C_{1t} & C_{2t} & ... & C_{10t} & C_{11t} \end{bmatrix}$$

It follows that we can decompose η_{ct} into the following:

$$\eta_{tc} = \alpha_5 T + \alpha_6 INC_t \cdot T + C'\alpha_7 + v_{ct}$$

where α_5, α_6 and α_7 are vectors of coefficients, and v_{ct} is interpreted as the net effect of factors not explicitly considered by the model. Replacing this decomposition into equation (3) gives:

$$log[P_t(c)] - log[P_t(1)] = \alpha_0 INC_t + INC_t \cdot X_t'\alpha_1 + \alpha_2 P_{ct} + P_{ct} \cdot X_t'\alpha_3 + \alpha_4 CT_{ct} + \alpha_5 T + \alpha_6 INC_t \cdot T + C'\alpha_7 + v_{ct} \quad (4)$$

If it is assumed that $v_{ct} \sim N(0, \sigma^2)$, then an ordinarly least squares regression can be used to estimate the coefficients.

Each coefficient can be used to assess a property of elections. α_0 measures the effect of having an incumbent in an election on competitiveness, α_1 measures how economic performance affects competitivness when an incumbent is in the election, α_2 measures the effect of being in a major political party, α_3 measures how economic performance affects

competitiveness when a candidate is a member of a major political party, α_4 measures the effect of competitiveness on being in the same political party as the president, α_5 measures time trend effects when there is no incumbent in the election, α_6 measures time trend coefficients when there exists an incumbent in the election and α_7 measures the effect of the number of candidates in an election.

In general, we expect to see $\alpha_0 < 0$, i.e. on average, having an incumbent in the election makes all other candidates less competitive. Furthermore, α_2 should be greater than zero; if candidate c is a member of a major political party and candidate 1 is not, we expect candidate c to be more competitive relative to candidate 1. Since being a member of the presidential political party should help a candidate, we expect to see $\alpha_4 > 0$. The sign of the time trend coefficient α_5 is ambiguous; evaluating how competitiveness changes over time when there is no incumbent in the election can be reasoned to be both positive and negative. However, we might expect it to be close to zero. Finally, according to Abramowitz (1991), House elections with incumbent candidates have become less competitive over time, thus we hope to find $\alpha_6 < 0$, i.e. incumbents win by greater amounts in later years.

When looking at the economic performance proxies, we would expect to see the coefficient on the interaction between party status and GNP to be positive; if candidate c is in a major party and candidate 1 is not, then an increase in GNP should help the candidate who is in a major party. The coefficient on the interaction between party status and prices, and between party status and unemployment, should be negative; increases in these variables indicate that there has been poor economic performance, thus elections should become more competitive for those not in a major political party. The coefficients on the interaction between incumbent in election status and economic performance variables should be as follows: the interaction with GNP should be negative, while the interaction with prices and unemployment should be positive. That is, poor economic performance should should lead to increased competition for alternative

candidates against the incumbent.

3.2 Non-incumbent coattail effects

In this second model, I try explain coattail effects in a different manner. In the previous model, I measured coattail effects within the individual's utility function through the use of the indicator variable PRS_{ct}. However, it is very well possible that individual voters do not give an extra benefit to the incumbent for being apart of the president's party. In this case, I redefine equation (1) as:

$$U_{itc} = \gamma + \beta_1 I_{ct} + X_t'\beta_2 + X_t' \cdot I_{ct}\beta_3 + \beta_4 PTY_{ct} + PTY_{ct} \cdot X_t'\beta_5 + \beta_6 PRS_{ct}(1 - I_{ct}) + \epsilon_{itc} \quad (5)$$

That is, a candidate is affected by the presidential party only if they are not the incumbent. Through similar derivations of model 1, if we let:

$$CTE_{ct} = \begin{cases} PRS_{ct} & \text{if } I_{1t} = 1 \\ E_{ct} & \text{if } I_{1t} = 0 \end{cases}$$

It follows that the equation to be estimated becomes:

$$log[P_t(c)] - log[P_t(1)] = \alpha_0 INC_t + INC_t \cdot X_t'\alpha_1 + \alpha_2 P_{ct} + P_{ct} \cdot X_t'\alpha_3 + \alpha_4 CTE_{ct} + \alpha_5 T + \alpha_6 INC_t \cdot T + C'\alpha_7 + v_{ct} \quad (6)$$

Again, if $v_{ct} \sim N(0, \sigma^2)$, we can use OLS procedures to estimate the coefficients. In addition, all coefficients should have the same interpretation as before.

4 Data and Estimation

To estimate the relationship between economic conditions and competition, I use results from congressional elections. There are two main reasons I chose this dataset. The first reason is that there is a very large number of observations; since congressional elections

are held for every district, in every state, every two years, we can bypass some of the problems of limited observations found in previous studies, such as that acknowledged by Fair (1979). The second reason is that non-major party candidates can be more influential in congressional elections. That is, third party candidates need less resources to be competitive and are less likely to be at a disadvantage because of well known major party candidates.

Data for congressional elections was collected from the Inter-University Consortium for Political and Social Research. In this data set, I received the following information for each candidate: identification codes, the year of election, party of the candidate, the number of votes cast for the candidate, the total number of votes cast in the election, the number of candidates in the election, a dummy variable for incumbency, and a dummy variable for outcome. From this information, I was able to form the dependent variable, $log(P_t(i)/P_t(1)), \forall t, \forall i \neq 1$.

To obtain data on economic performance, I chose to use data on national economic indicators. This choice was made over state or district data because Congress typically affects national policies, rather than local, thus they should be judged at the national level. Precisely, I used the economic data provided in Fair's (1979) article in the *Review of Economics and Statistics*. In the appendix, I present Table A, where the data for performance proxies are displayed: percent change in real per capita GNP (in 1972 dollars) over one and two years, percent change in unemployment rates over one and two years, and percent change in GNP deflator (with 1972 = 100.0) over one and two years. The years covered in this study are from 1900 to 1976; after ensuring that each election has $n_t - 1$ observed candidates, where n_t is the number of candidates in election t, I end up with 29,967 observations.[6]

In Table 1 I present a decomposition of the percent voted statistic, $P_t(c)$. It can be found that on average, the incumbent wins 62.3% of the vote when they are in an election;

[6]We have only $n_t - 1$ candidates per election, since one candidate is used as the denominator of the competitiveness ratio.

this clearly indicates that my assumption of an incumbent's superior competitiveness is correct. Furthermore, of non-incumbents, those who are members of major parties win 39.5% of the vote on average, and those who are not members of major parties only win 3.9% of the vote.

Table 1: Summary of Percent Vote by Incumbent and Party Status

	Incumbents		Non-Incumbents in Major Party		Non-Incumbents not in Major Party	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Percent voted for in election	0.623	0.143	0.395	.146	0.0391	0.0820

In Table 2, I present statistics to summarize some of the important covariates. Upon inspection, over two-thirds of congressional elections from 1900 to 1976 had three or more candidates, indicating that the typical assumption of two candidates is weak. The fact that a large proportion of elections involve more than two candidates is the primary reason why this paper examines all candidates in a given election; two party models do not fully explain most elections. In addition, 84.9% of elections contained an incumbent and 61.9% of the candidates were members of a major political party. About half of those who were members of a major political party were members of the same party as the President.

Table 2: Summary of Covariates

	Percentage	S.D.		Percentage	S.D.
C2	0.325932	0.468727	C9	0.001182	0.034353
C3	0.276444	0.447244	C10	0.000468	0.021632
C4	0.235092	0.424061	C11	0.000245	0.015658
C5	0.107715	0.310024	PRS	0.310573	0.462733
C6	0.035578	0.185238	INC	0.848741	.3583132
C7	0.012305	0.110246	I	0.279587	0.448801
C8	0.005038	0.070801	PTY	0.618917	0.485658

CN = Percent of elections with N candidates

PRS = Percent of candidates in same party as President

INC = Percent of elections with an incumbent

I = Percent of candidates who are incumbents

PTY = Percent of candidates in a major party

4.1 The baseline model

We can now proceed to estimate the coefficients of interest. If we assume $E(v_{ct}) = 0$, then the following OLS estimates of equation (4), presented in Table 3, will be correct. As a base case for interpretation, Table 3 presents equations that include the economic condition variables growth in GNP and change in inflation[7]. Precisely, if we let $G1_t$ and $G2_t$ be the growth rate of GNP over 1 and 2 years at election t, respectively, and $Pr1_t$ and $Pr2_t$ be the change in inflation over 1 and 2 years at election t, respectively, then:

$$X_t' = \begin{bmatrix} G1_t & Pr1_t \end{bmatrix} \text{ for equation 4.1.1}$$
$$X_t' = \begin{bmatrix} G2_t & Pr2_t \end{bmatrix} \text{ for equation 4.2.1}$$

The only difference, then, between equations 4.1.1 and 4.2.1 is the lag structure of the desired economic variables. Equation 4.1.1 contains economic variables that are lagged one year. That is, for the year 1970, if we let $GNP(X)$ be the annual GNP for year X, $G1_{1970}$ is given by:

$$G1_{1970} = \frac{GNP(1970) - GNP(1969)}{GNP(1969)}$$

We can find the change in price level in a similar manner. Equation 4.2.1 containts economic variables that are lagged two years, i.e. for the year 1970, we replace $GNP(1969)$ with $GNP(1968)$ to obtain $G2_{1970}$.

[7]Growth and inflation were used because unemployment has been previously shown to be an inaccurate measure for economic conditions, and this regression explained the most variability in the data.

Table 3: Regression Output for Equation (4)

	4.1.1				4.2.1			
	Coef.	S.E.	t	$P > \|t\|$	Coef.	S.E.	t	$P > \|t\|$
INC	-1.46584	0.031155	-47.05	0	-1.49354	0.031303	-47.71	0
$INC \cdot G$	-0.49058	0.23245	-2.11	0.035	0.174485	0.169531	1.03	0.303
$INC \cdot Pr$	-1.51518	0.30675	-4.94	0	-0.60523	0.166943	-3.63	0
P	4.182622	0.032108	130.27	0	4.086285	0.031953	127.88	0
$P \cdot G$	0.850794	0.370161	2.3	0.022	1.485549	0.271976	5.46	0
$P \cdot Pr$	-3.13866	0.475446	-6.6	0	-0.93914	0.246123	-3.82	0
CT	0.109576	0.044544	2.46	0.014	0.106718	0.044623	2.39	0.017
T	0.005501	0.001084	5.08	0	0.005426	0.001084	5	0
$INC \cdot T$	-0.24235	0.046803	-5.18	0	-0.23826	0.046881	-5.08	0
$Adj - R^2$	0.7041				0.704			

Note: Standard errors are robust; 4.X.1 uses economic changes over X year(s)

Equation 4.1.1 shows that all of the coefficients are significantly different from zero at the 5% level. In equation 4.2.1, the only coefficient that is not significantly different from zero at the 5% level (nor the 10% level) is the interaction between incumbency and growth in GNP. Note that all coefficients that do not involve an economic condition variable are similar in both equations, as we would expect. In addition, they are of the same sign as we had predicted earlier; the non-incumbent time trend coefficient is slightly, yet significantly, positive. The coefficients of terms that do involve economic conditions variables, however, are very different in the two equations. A change in price over one year has a larger effect in absolute value on candidates who are in an election with an incumbent and/or are members of a major party than over two years, yet growth in GNP over two years affects major party candidates more than growth over one year. Finally, all significant coeffficients on terms that involve economic conditions variables hold the correct sign except for the interaction between prices and incumbency. This can possibly be explained by the fact that voters directly observe nominal wages, and not real. Increases in the price levels will usually lead to increases in nominal income. This increase may give voters the perception that their congressional representative's performance is satisfactory, and thus will reelect the incumbent.

In Table B of the appendix, I present variants of the above two equations that I also tested. For $X \in \{1, 2\}$, $4.X.2$ includes only growth in GNP, $4.X.3$ includes only changes in prices, $4.X.4$ includes only changes in unemployment, and $4.X.5$ includes changes in prices and unemployment.

4.2 Non-incumbent "coattail" effects

The second model adds the assumption that incumbents do not gain from being a member of the current president's party, yet non-incumbents find this quality beneficial. To support this assumption, Table 4 presents the average percent vote of candidates by presidential party status and incumbency. It can easily be seen that, on average, incumbents who are not a member of the President's party earn a slightly higher percent of the vote than incumbents who are members of the President's party. Furthermore, of non-incumbents, those who are a member of the President's party earned a much larger proportion of the votes compared to those who were not members of the President's party. It is quite clear that incumbents gain no advantage from having the same political affiliation as the President, unlike non-incumbents, therefore justifying the use of the second model.

Table 4: Percent vote by Presidential party status and incumbency

	Incumbent	Non-incumbent
Member of President's party	0.608464	0.493548
Not a member of President's party	0.639486	0.252267

Again, for interpretation, I use growth in GNP and change in inflation to measure the effect of economic conditions on congressional election competitiveness. In Table 5, equation 6.1.1 presents the regression output using changes in economic variables over one year, while equation 6.2.1 presents the regression output using changes in economic variables over two years.

Table 5: Regression Output for Equation (6)

	6.1.1				6.2.1			
	Coef.	S.E.	t	$P > \|t\|$	Coef.	S.E.	t	$P > \|t\|$
INC	-1.78038	0.03924	-45.37	0	-1.80274	0.03918	-46.01	0
$INC \cdot G$	-0.40881	0.224286	-1.82	0.068	0.157099	0.163701	0.96	0.337
$INC \cdot Pr$	-1.46412	0.29524	-4.96	0	-0.5856	0.160205	-3.66	0
P	4.005888	0.033395	119.95	0	3.910756	0.033219	117.73	0
$P \cdot G$	0.97041	0.363731	2.67	0.008	1.528109	0.267442	5.71	0
$P \cdot Pr$	-3.48784	0.467465	-7.46	0	-0.5856	0.160205	-3.66	0
CTE	0.693637	0.043776	15.85	0	0.68799	0.043848	15.69	0
T	0.005202	0.001087	4.79	0	0.005097	0.001087	4.69	0
$INC \cdot T$	-0.39607	0.024758	-16	0	-0.39275	0.024805	-15.83	0
$Adj - R^2$	0.7067				0.7065			

Note: Standard Errors are robust, 6.X.1 uses economic changes over X year(s)

As expected, the relationship between using one and two year changes of economic condition variables is the same as that presented by Table 3: changes in competition for major party candidates and candidates facing an incumbent are most drastic when examining prices over one year. Likewise, growth seems to have very little effect on competition when there is an incumbent, however helps a major party candidate the most when it is examined over two years. It should be noted that the coefficient on the interaction between incumbency and growth of GNP changes from significant at 5% significance in equation 4.1.1, to insignificant at 5% significance in equation 6.1.1, which implies that after controlling for the fact that incumbents do not recieve any beneficial "coattail" effect, growth in GNP does not significantly affect the competitiveness of an election involving an incumbent.

Comparing Table 3 and Table 5 shows that including non-incumbent "coattail" effects result in an increase in the absolute effect of having an incumbent in the election. In addition, the effect of being a major party candidate is slightly smaller, while the "coattail" effects and the incumbency time trend effect are both larger in absolute value. The coefficients on the interaction between incumbent in election status and both of the economic condition variables decreased in absolute value, and the coefficients on the interaction between major party status and the economic condition variables increased.

This implies that including non-incumbent coattail effects causes major political party status to be more responsive to changes in the economy, relative to before the effects were included, while incumbent in election status becomes less responsive.

Similar to the baseline mode, I used different combinations of economic condition variables in variant regressions, but felt that those presented in Table 5 fit the relationship between competitiveness and the economy the best. In the appendix, I use Table C to present the other regressions used.

5 Results

5.1 Evaluation of findings

After finding estimates for both the baseline model and non-incumbent coattail effect model, it seems that economic conditions do have an effect on competitiveness of congressional elections. To ensure this is true, I test whether or not the coefficients on all variables that include an economic condition variable are not influential in the equation and are identically zero, i.e. if we let δ_{XY} be the coefficient on the interaction between X and Y, where $X \in \{INC_t, P_{ct}\}$ and $Y \in \{G1_t, G2_t, Pr1_t, Pr2_t\}$, then we test the null hypotheses at $\alpha = 0.05$, $H_0 : \delta_{INC_tG1_t} = \delta_{INC_tPr1_t} = \delta_{P_{ct}G1_t} = \delta_{P_{ct}Pr1_t} = 0$, and $H_0 : \delta_{INC_tG2_t} = \delta_{INC_tPr2_t} = \delta_{P_{ct}G2_t} = \delta_{P_{ct}Pr2_t} = 0$, for both equations (4) and (6). Table 6 presents the results of these hypothesis tests:

Table 6: F-tests for relationship of joint relationships

Equation	4.1.1	4.2.1	6.1.1	6.2.1
F-statistic	15.81	12.68	17.86	14.07
$P > F$	0	0	0	0

Note: df = (4, 29947)

Thus, we can reject the null hypothesis that economic conditions are not related to competitiveness in all four equations at $\alpha = 0.05$. We still do not know anything about how particular economic changes related to competitiveness; since changes in each

particular economic variable are broken up between incument in election and major party statuses, we cannot see the total effect of how an increase in inflation, for example, affects the competitiveness of a particular candidate. To analyze this, we must recognize that there are six kinds of candidates:

1. In an election with an incumbent and apart of a major political party, while the "base" candidate[8] is not.
2. In an election with an incumbent and not apart of a major party, while the "base" candidate is.
3. In an election with an incumbent with both candidates either apart of a major political party, or not.
4. Not in an election with an incumbent and a member of a major party, while the "base" candidate is not.
5. Not in an election with an incumbent and not a member of a major party, while the "base" candidate is.
6. Not in an election with an incumbent with both candidates either apart of a major political party, or not.

The effect of economic conditions on the competitiveness of candidates type six is zero, by assumption. The effect of economic conditions for candidates type four is the coefficient of the interaction between major party status and the economic variable of interest. The effect of candidates type five is the coefficient of the interaction between major party status and the economic variable of interest multiplied by -1. The coefficient on the interaction between incumbent in election status and the economic variable of interest is the effect of the economy on competitiveness for candidates type three. The sum of the coefficients on both interaction terms that involve the economic variable of interest is the effect on the competitiveness of candidates type one, while the difference is the effect on candidates type two.

We expect competitiveness of candidates type two, type three, and type five to have a positive relationship with inflation, competitiveness of candidates type four to have a

[8]By "base" candidate, I am referring to candidate 1

negative relationship with inflation, and competitiveness of candidates type six to have no relationship with inflation[9]. As noted earlier, the coefficient on incumbent in election status and inflation (essentially, candidate type three) was of the wrong expected sign (negative), however I already supplied a possible reason for this (voters observe nominal wages). In addition, the relationship between inflation and competitiveness is ambiguous for candidate type one; an increase in inflation should cause an increase in competitiveness for some candidate c since an incumbent is in the election, however it should also cause a decrease in competitiveness since candidate c is of a major party. This relationship, because of the ambiguity, is of particular interest to test.

The relationships represented by candidates type three through six have been tested in the previous section when evaluating whether or not the coefficients were significantly different from zero[10]. Then we can run an F-test for the following null hypotheses, at $\alpha = 0.05$:

1. $H_0 : \delta_{INC_tP1} + \delta_{P_{ct}P1} = 0$, in favor of the alternative $H_A : \delta_{INC_tP1} + \delta_{P_{ct}P1} < 0$.
2. $H_0 : \delta_{INC_tP2} + \delta_{P_{ct}P2} = 0$, in favor of the alternative $H_A : \delta_{INC_tP2} + \delta_{P_{ct}P2} < 0$.
3. $H_0 : \delta_{INC_tP1} - \delta_{P_{ct}P1} = 0$, in favor of the alternative $H_A : \delta_{INC_tP1} - \delta_{P_{ct}P1} > 0$.
4. $H_0 : \delta_{INC_tP2} - \delta_{P_{ct}P2} = 0$, in favor of the alternative $H_A : \delta_{INC_tP2} - \delta_{P_{ct}P2} > 0$.

The results of the four hypothesis tests are presented below in Table 7. Seeing that δ_{INC_tP1}, $\delta_{P_{ct}P1}$, δ_{INC_tP2}, and $\delta_{P_{ct}P2}$ are all significantly negative, it is sensible to test whether or not candidates type one are less competitive when inflation increases, i.e. it is beneficial to be an incumbent from a non-major party against an opponent from a major party during times of increasing inflation. Here, we only test the hypotheses for equation (6). Corresponding hypotheses are tested for equation (4) in Table D of the appendix.

[9]Since an increase in inflation should represent the same economic condition as a decrease in the growth of GDP, we expect the relationship between growth and competitiveness to be opposite in sign as the relationship between inflation and competitiveness.

[10]All coefficients involving inflation were significant, while the interaction between growth in GNP and incumbency were insignificant for equations 4.2.1, 6.1.1, 6.2.1. The coefficient on the interaction between prices and incumbency was of the wrong expected sign, however was significantly negative.

Table 7: One-sided F-tests for sign of inflation relationship in equation (6)				
Hypothesis	1	2	3	4
F-statistic	53.88	17.56	26.21	7.32
$P > F$	1.092×10^{-13}	23.35×10^{-7}	1.54×10^{-7}	0.0034
Note: df = (1, 29947)				

At $\alpha = 0.05$, we can reject the four null hypotheses. Thus, the competitiveness of candidates type one are negatively related to inflation; the benefits the incumbent from a non-major political party gains outweighs the losses from increased inflation when facing a major party opponent. However, it should be noted that in general, the benefit of being an incumbent outweighs the losses from inflation, contrary to our original expectations. In addition, the competitiveness of candidates type two are positively related to inflation, as we had hoped; third party candidates become more competitive against the incumbent when inflation increases.

Similarly, I can analyze the potential relationships for candidates type one and two when using the growth in GNP instead of inflation. The null hypotheses at $\alpha = 0.05$ are:

5. $H_0 : \delta_{INC_tG1} + \delta_{P_{ct}G1} = 0$, in favor of the alternative $H_A : \delta_{INC_tG1} + \delta_{P_{ct}G1} > 0$.
6. $H_0 : \delta_{INC_tG2} + \delta_{P_{ct}G2} = 0$, in favor of the alternative $H_A : \delta_{INC_tG2} + \delta_{P_{ct}G2} > 0$.
7. $H_0 : \delta_{INC_tG1} - \delta_{P_{ct}G1} = 0$, in favor of the alternative $H_A : \delta_{INC_tG1} - \delta_{P_{ct}G1} < 0$.
8. $H_0 : \delta_{INC_tG2} - \delta_{P_{ct}G2} = 0$, in favor of the alternative $H_A : \delta_{INC_tG2} - \delta_{P_{ct}G2} < 0$.

Table 8 gives the output of the four hypothesis tests using equation (6). I also tested the hypotheses using equation (4); these are presented in Table D of the appendix.

Table 7: One-sided F-tests for sign of growth relationship for (6)				
Hypothesis	5	6	7	8
F-statistic	1.15	19.17	20.91	38.78
$P > F$	0.14177	6.01×10^{-6}	2.42×10^{-6}	2.408×10^{-10}
Note: df = (1, 29947)				

For hypothesis five, we fail to reject the null hypothesis that the effect of growth in GNP over one year on competitiveness is zero for candidate type one; there is no relationship between changes in GNP over one year and competitiveness of elections

for major party candidates competing against non-major party incumbents. There is, however, a positive relationship when voters examine growth in GNP over two years. The negative relationships confirmed in hypotheses seven and eight are as expected; increases in GNP hurt third-party candidates in elections that contain incumbents. To summarize the types of candidates and the change in their competitiveness as a response to the economy, Table 8 is presented below for changes in inflation, and Table 9 for changes in growth.

So far, I have ignored the potential relationship between competitiveness and unemployment. This is because, similar to what Kramer and Stigler have found, the relationship between unemployment and elections, specifically competitiveness, is essentially insignificant. Like Stigler, I argue that this finding is intuitive. Unemployment is not only the result of a poor economy, but also of poor performance by workers, who are potential voters. Corporations often fire those who they can afford to dispose of: those who are young and unqualified, and those who are inadequate and unmotivated. If these are the types of people who are less likely to vote, then their "displeasure" of being laid off will not be voiced in an election, thus there would be no relationship between unemployment and election competitiveness. That is, those who actually do vote will vote as if unemployment was not a problem (since it is not for them!). Therefore, inflation and growth in GNP should be more appropriate factors to consider.

When debating which economic variable, inflation or growth, affects election competitiveness more, the previous analysis concludes that inflation is a more important factor. This result is quite inuitive: prices are completely observable by voters. Voters can respond to changes in prices because they often see them change first hand; everyday, voters buy products for business and pleasure. They know when prices and wages increase, and can make voting decision regarding them easily. The growth in GNP is not as easily observable; it is not apparent to everybody in the voting population that there has been a mild decrease in the rate that GNP increases. Not everybody readily knows

or observes this fact. As a result, voters make voting decisions primarily from observable factors, such as prices; in turn, these voting decisions will either increase or decrease the competitiveness of an election.

5.2 Election competitiveness and voter uncertainty

We return back to the original question of this paper: how does voter uncertainty change with economic conditions? We initially assumed that voters are more uncertain when elections are more competitive. However, the previous analysis has focused on how the competitiveness of individual candidates respond to the economy; we can now evaluate how overall election competitiveness changes. For an election to be more competitive, we expect to see those who typically obtain the most votes to have a decrease in their competitiveness ratio, and those who typically obtain the least votes to have an increase in their ratio. That is, when facing an incumbent, major party candidates should have an increase or no change in the competitiveness ratio, while third party candidates should have an increase in the competitiveness ratio. When not facing an incumbent, major party candidates should have a decrease in their competitiveness ratio, while third party candidates should still have an increase.

Table 8: Summary of changes in competitiveness of candidate c caused by changes in inflation

Candidate		c	
		Major Party	Third Party
1	Incumbent/Major Party	↓	↑
	Incumbent/Third Party	↓	↓
	Non-incumbent/Major Party	–	↑
	Non-incumbent/Third Party	↓	–

Note: All relationships are determined from F-tests from Section 5.1

Type X : Candidate c; Candidate 1

Type 1: Major; Incumbent/Third

Type 2: Third; Incumbent/Major

Type 3: Third; Incumbent/Third and Major; Incumbent/Major

Type 4: Major; Non-incumbent/Third

Type 5: Third; Non-incumbent/Major

Type 6: Third/Non-incmbent/Third and Major; Non-incumbent/Major

From examining Table 8, we can decipher how the competitiveness of each type of candidate reacts to changes in inflation; this will allow us to interpret the reaction in overall election competitiveness. In Table 8, the rows are essentially the types of elections, while the columns are the types of candidates in these elections. That is, the rows give qualities of candidate 1, the columns give qualities of candidate c, and the relationships (the arrows) in the table represent changes in the competitiveness ratio for increases in inflation[11]. For example, in an election without an incumbent and where the "base" candidate belongs to a third party, a major party candidate c is predicted to become less competitive relative to the "base" candidate when there are increases in inflation. This situation corresponds to the last row, first colomn in Table 8. Furthermore, we can interpret the relationship between changes in inflation and election competitiveness by ensuring that there are no conflicting relationships across election type (the rows). It should be noted that $-$ is interpreted as neutral, so if, for example there are three candidates, and one candidate has no change $(-)$ in competition relative to the "base" candidate and another has an increase $(\uparrow)$ in competition relative to the "base" candidate, then electoral competition has increased overall. If there are conflicting relationships, i.e. one type of candidate increases competition $(\uparrow)$, while another decreases $(\downarrow)$, the interpretation is left ambiguous.

It is easy to tell that in elections without incumbents, candidates who are members of non-major parties benefit the most from increases in inflation[12], while major party candidates either have a decrease in competitiveness, or no change. Thus, we can conclude that elections with no incumbents become more competitive as the change in inflation increases. The cases when there exists an incumbent in the election is a little more difficult to interpret. When the incumbent is a third party candidate, we can determine

[11]To be clear, $\uparrow$ indicates an increase in the competitiveness ratio, $\downarrow$ indicates a decrease in the competitiveness ratio, and $-$ indicates no change

[12]In the bottom row of Table 8, the decrease in a major candidate's competitiveness is actually an increase in the third party candidate's competitiveness, since the "base" candidate is a non-incumbent from a third party.

that the advantage of being a third party candidate outweighs any possible disadvantage of being an incumbent when inflation increases, which makes elections less competitive. We should note that these elections are very rare; elections that contain non-major party incumbents have only occured in 3.36% of all congressional elections between 1900 and 1976. When the incumbent is of a major party, an opponent from another major party actually loses votes, while third party candidates gain votes. Therefore, if there are enough quality third party candidates, elections can become more competitive when inflation increases, however the relationship is not well defined in general.

We can also examine how competitiveness responds to changes in GNP. Table 9 presents information similar to that found in Table 8. Clearly, in all election cases, when GNP increases, competition decreases or does not change; that is, third parties gain less of the vote share in all cases they are not the incumbent (with corresponding increases for major party candidates) and there is no change when the incumbent is a third party candidate. This is consistent with the hypothesis that an increase in GNP will cause a decrease in electoral competition.

Table 9: Summary of changes in competitiveness of candidate c caused by changes in GNP

Candidate		c	
		Major Party	Third Party
1	Incumbent/Major Party	–	↓
	Incumbent/Third Party	–	–
	Non-Incumbent/Major Party	–	↓
	Non-Incumbent/Third Party	↑	–

Note: All relationships insignificantly different from zero were considered as no change (–).

5.3 Problems and possible improvements

Throught this paper, I have tried to minimize the number of errors made. However, a few potential problems do arise; I would like to address them in this section. One potential criticism is the use of Table 4 to justify non-incumbent coattail effects. The problem arises because of the fact that the President always belongs to a major political party. Thus, since major party candidates tend to earn higher percentages of the vote share in

general, the disparity found for non-incumbents may just reflect the fact that candidates in third parties earn such a small portion of the vote. In Table 10, I present the percent vote of non-incumbents broken down by Presidential and major party status. It is found that non-incumbents who are major party candidates actually do earn more if they are not a member of the President's party. Note that since there has never been a third party candidate as president, there are no observations for candidates who are not from a major party and of the same party as the President.

Table 10: Percent vote of non-incumbents by Presidential and candidate party status

	Non-incumbent (Major party)	Non-incumbent(Non-major party)
Member of President's party	0.388908	-
Not a member of President's party	0.401123	0.039111

By observation, it seems that being apart of a major political party will negate the potential of coattail effects. This can be seen through Table 11; candidates who are members of the President's political party earn just as much as as candidates who are member's of the other major political party.

Table 11: Percent vote by Presidential and candidate party status

	Member of Major Party	Not a member of major party
Member of President's party	0.493548	-
Not a member of President's party	0.494519	0.056255

Thus, we can adjust the model to incorporate this fact. Let

$$U_{itc} = \gamma + \beta_1 I_{ct} + X_t' \beta_2 + X_t' \cdot I_{ct} \beta_3 + \beta_4 PTY_{ct} + PTY_{ct} \cdot X_t' \beta_5 + \beta_6 PRS_{ct}(1 - PTY_{ct}) + \epsilon_{itc} \quad (7)$$

However, since if $PRS_{ct} = 1$, then $PTY_{ct} = 1$, the term $PRS_{ct}(1 - PTY_{ct})$ becomes zero, and we are left with the regression equation:

$$log[P_t(c)] - log[P_t(1)] = \alpha_0 INC_t + INC_t \cdot X_t' \alpha_1 + \alpha_2 P_{ct} + P_{ct} \cdot X_t' \alpha_3 + \alpha_5 T + \alpha_6 INC_t \cdot T + C' \alpha_7 + v_{ct} \quad (8)$$

I estimate this regression for my standard base case[13] in Table E of the appendix. John Ferejohn and Randall Calvert (1984) found that Presidential coattail effects are

[13]By standard base case, I am referring to the regression that uses prices and growth in GNP to be proxies for economic conditions.

inconsistent over time; coattail voting has been more important in certain historical periods, such as the New Deal Era, and less important in others. Future studies in electoral competitions may want to incorporate this fact to recieve better estimates.

Another problem that exists is the potential for correlated standard errors. Recall that our competitiveness variable was formed by dividing $P_t(c)$ by $P_t(1)$. Since ξ_{ct} was an error term presented in the logit model for $P_t(c)$ and ξ_{1t} was an error term presented in the logit model for $P_t(1)$[14], the error term of our regression equation becomes $\eta_{tc} = \xi_{ct} - \xi_{1t}$, where ξ_{1t} is the same for all candidates c in election t. Since the error terms of each candidate within an election have something in common, that is ξ_{1t}, they are correlated. Again, future studies may want to address this issue by clustering the standard errors.

Finally, one last improvement to this study can be made. If my hypothesis that prices are used to evaluate candidates because they are easy to observe is true, nominal price changes may give more reliable estimates. Voters vote according to how they *think* the economy is doing; they may not actually know the exact state of the economy, but instead vote according to what they observe.

6 Conclusion

The goal of this study is to examine how voter uncertainty is related to the condition of the economy. To do this, I used election competitiveness to represent how uncertain voters are during that election. It was determined that changes in the growth of GNP caused elections to be less competitive; this is consistent with the hypothesis that changes in the state of the economy affect how competitive elections are. Specifically, growth in GNP indicates that the economy is strong, so voters are more inclined to support candidates who are the incumbent and/or from major political parties, i.e. Democrats and Republicans. Therefore, a successful economy is associated with voter certainty. For

[14] ϵ_{ict} was the other error term, which was assumed to be *i.i.d.* with an extreme value distribution to form the multinomial logit model

the most part, voters know they should continue voting for the incumbent, or major party candidate, and not switch to alternative parties. Likewise, a decline in the growth of GNP creates more electoral competition, indicating that voters are uncertain of who should be in charge.

Unfortunately, the interpretation of the economy's effect on election competitiveness is not as easy when considering other macroeconomic variables. Specifically, when analyzing inflation, we cannot simply say, "an increase in inflation leads to a increase in competition." Instead, the relationship is more complicated; we must look at different election cases. In elections without an incumbent, increases in inflation cause the election to become more competitive, thus implying voter uncertainty. In elections where the incumbent is not from a major political party, it is quite clear that competition decreases. While there are very few elections where the incumbent is of an alternate party, these findings make sense: voters who deviate from the "mainstream" by switching to third party candidates are really expressing their dissatisfaction with the current political system (Stigler, 1973). If increases in inflation cause individuals to switch to third party candidates, then those who switched in the previous election to elect the third party incumbent have no incentive to switch back to a major party candidate. In addition, those who did not switch in the previous election will proceed to do so. Finally, in elections with incumbents who are members of major political parties, the findings are more ambiguous. It is possible that increases in inflation can cause an increase or a decrease in electoral competition. This is unfortunate, since 81.57% of congressional elections from 1900 to 1976 contained a major party incumbent.

Therefore, we can conclude there is a negative relationship between growth in GNP and voter uncertainty in all elections, and a positive relationship between increases in prices and voter uncertainty, however this only applies to elections that do not include an incumbent. Of these two economic variables, inflation seemed to have the largest effect on individual candidate competitiveness. Changes in unemployment were also

considered, however were often found to be the least significant of the three. This finding is consistent with past literature, however the importance of prices has been studied less. Future studies may want to address the ambiguous outcome: inflationary changes in elections with major party incumbents. These elections are in high frequency, thus the geniune effect of inflation on competitiveness in this type of election would provide the most information regarding the true relationship of interest.

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A Appendix

A.1 Table A

Table A: Data

Year	G	dG1	dG2	U	dU1	dU2	P	dP1	dP2
1900	1620	0.008717	0.082888	5	-0.015	-0.074	16.08	0.04824	0.081372
1902	1755	-0.01071	0.083333	3.7	-0.003	-0.013	16.48	0.033229	0.024876
1904	1751	-0.031527	-0.002279	5.4	0.015	0.017	16.88	0.01199	0.024272
1906	2021	0.095393	0.154198	1.7	-0.026	-0.037	17.69	0.027294	0.047986
1908	1813	-0.100248	-0.102919	8	0.052	0.063	18.29	-0.0076	0.033917
1910	2009	0.007018	0.108108	5.9	0.008	-0.021	19.43	0.028587	0.062329
1912	2110	0.040947	0.050274	4.6	-0.021	-0.013	20.1	0.041451	0.034483
1914	1958	-0.061811	-0.072038	7.9	0.036	0.033	20.44	0.010381	0.016915
1916	2035	0.063774	0.039326	5.1	-0.034	-0.028	23.72	0.123638	0.16047
1918	2273	0.124135	0.116953	1.4	-0.032	-0.037	34.17	0.167008	0.440556
1920	2032	-0.061432	-0.106027	5.2	0.038	0.038	39.87	0.14012	0.166813
1922	2078	0.143014	0.022638	6.7	-0.05	0.015	32.16	-0.05328	-0.19338
1924	2240	-0.021834	0.07796	5	0.026	-0.017	32.56	-0.01214	0.012438
1926	2500	0.044714	0.116071	1.8	-0.014	-0.032	33.3	0.003919	0.022727
1928	2447	-0.006496	-0.0212	4.2	0.009	0.024	32.76	0.008	-0.01622
1930	2315	-0.103408	-0.053944	8.7	0.055	0.045	31.79	-0.03315	-0.02961
1932	1815	-0.144272	-0.215983	23.6	0.077	0.149	25.67	-0.11176	-0.19251
1934	1893	0.071307	0.042975	21.7	-0.032	-0.019	27.26	0.084759	0.06194
1936	2310	0.12793	0.220285	16.9	-0.032	-0.048	27.97	0.006839	0.026045
1938	2286	-0.048293	-0.01039	19	0.047	0.021	28.61	-0.02388	0.022882
1940	2601	0.065984	0.137795	14.6	-0.026	-0.044	29.1	0.024648	0.017127
1942	3371	0.133872	0.29604	4.7	-0.052	-0.099	34.83	0.106417	0.196907
1944	4097	0.062225	0.215366	1.2	-0.007	-0.035	37.12	0.01978	0.065748
1946	3374	-0.155444	-0.176471	3.9	0.02	0.027	43.92	0.156703	0.18319
1948	3326	0.0237	-0.014226	3.8	-0.001	-0.001	53.13	0.069014	0.209699
1950	3517	0.069322	0.057426	5.3	-0.006	0.015	53.64	0.019966	0.009599
1952	3813	0.020337	0.084163	3	-0.003	-0.023	58	0.012747	0.081283
1954	3779	-0.03028	-0.008917	5.5	0.026	0.025	59.69	0.013757	0.029138
1956	3976	0.003534	0.05213	4.1	-0.003	-0.014	62.9	0.031486	0.053778
1958	3902	-0.018612	-0.018612	6.8	0.025	0.027	66.06	0.015995	0.050238
1960	4078	0.002212	0.045105	5.5	0	-0.013	68.67	0.017032	0.03951
1962	4284	0.041829	0.050515	5.5	-0.012	0	70.55	0.018331	0.027377
1964	4557	0.038041	0.063725	5.2	-0.005	-0.003	72.71	0.015645	0.030617
1966	4991	0.047429	0.095238	3.8	-0.007	-0.014	76.76	0.032831	0.055701
1968	5241	0.033524	0.05009	3.6	-0.002	-0.002	82.57	0.044925	0.07569
1970	5248	-0.01409	0.001336	4.9	0.014	0.013	91.36	0.053506	0.106455
1972	5608	0.04842	0.068598	5.6	-0.003	0.007	100	0.04145	0.094571
1974	5729	-0.023854	0.021576	5.6	0.007	0	116.41	0.100284	0.1641
1976	5880	0.053763	0.026357	7.7	-0.008	0.021	133.79	0.051395	0.1493

G = real per capita GNP (1972 dollars)
U = civilian unemployment rate, P = GNP deflator (1972 = 100)
dX1 = percent change in X over 1 year, dX2 = percent change in X over 2 years

A.2 Table B

Table B: Alternatives to Equation (4)

	4.1.2	4.1.3	4.1.4	4.1.5	4.2.2	4.2.3	4.2.4	4.2.5
INC	-1.516^{*}	-1.463^{*}	-1.525^{*}	-1.472^{*}	-1.524^{*}	-1.489^{*}	-1.516^{*}	-1.487^{*}
$INC \cdot G$	-0.737^{*}	-	-	-	0.0253	-	-	-
$INC \cdot Pr$	-	-1.637^{*}	-	-1.442^{*}	-	-0.559^{*}	-	-0.507^{*}
$INC \cdot U$	-	-	1.950^{*}	0.906	-	-	0.868^{**}	0.295
P	4.082^{*}	4.181^{*}	4.084^{*}	4.203^{*}	4.040^{*}	4.117^{*}	4.086^{*}	4.133^{**}
$P \cdot G$	0.216	-	-	-	1.227^{*}	-	-	-
$P \cdot Pr$	-	-2.778^{*}	-	-3.287^{*}	-	-0.563^{**}	-	-0.809^{*}
$P \cdot U$	-	-	0.424	-2.0754^{**}	-	-	-0.404	-1.316^{***}
CT	0.110^{**}	0.109^{**}	0.110^{**}	0.109^{**}	0.109^{**}	0.110^{**}	0.111^{**}	0.109^{*}
T	0.0056^{*}	0.0052^{*}	0.0054^{*}	0.0052^{*}	0.0054^{*}	0.0055^{*}	0.0051^{*}	0.0052^{*}
$INC \cdot T$	-0.244^{*}	-0.241^{*}	-0.244^{*}	-0.242^{*}	-0.244^{*}	-0.239^{*}	-0.245^{*}	-0.240^{*}
$Adj - R^2$	0.7036	0.7039	0.7035	0.7040	0.7038	0.7035	0.7035	0.7036

Notes: Significant at 0.01: *; significant at 0.05: **, significant at 0.10:***

4.X uses economic changes over X year(s); standard errors are robust

A.3 Table C

Table C: Alternatives to Equation (6)

	6.1.2	6.1.3	6.1.4	6.1.5	6.2.2	6.2.3	6.2.4	6.2.5
INC	-1.821^{*}	-1.777^{*}	-1.829^{*}	-1.785^{*}	-1.828^{*}	-1.797^{*}	-1.821^{*}	-1.795^{*}
$INC \cdot G$	-0.653^{*}	-	-	-	0.009	-	-	-
$INC \cdot Pr$	-	-1.565^{*}	-	-1.398^{*}	-	-0.543^{*}	-	-0.492^{*}
$INC \cdot U$	-	-	1.783^{*}	0.765	-	-	0.849^{**}	0.288
P	3.899^{*}	4.005^{*}	3.902^{*}	4.029^{*}	3.858^{*}	3.944^{*}	3.903^{*}	3.961^{*}
$P \cdot G$	0.252	-	-	-	1.211^{*}	-	-	-
$P \cdot Pr$	-	-3.089^{*}	-	-3.663^{*}	-	-0.747^{*}	-	-1.033^{*}
$P \cdot U$	-	-	0.428	-2.365^{**}	-	-	-0.365	-1.527^{**}
CTE	0.674^{*}	0.692^{*}	0.674^{*}	0.695^{*}	0.677^{*}	0.683^{*}	0.677^{*}	0.687^{*}
T	0.0053^{*}	0.0049^{*}	0.0051^{*}	0.0049^{*}	0.0052^{*}	0.0052^{*}	0.0049^{*}	0.0048^{*}
$INC \cdot T$	-0.389^{*}	-0.394^{*}	-0.388^{*}	-0.397^{*}	-0.390^{*}	-0.388^{*}	-0.389^{*}	-0.392^{*}
$Adj - R^2$	0.7060	0.7064	0.7060	0.7066	0.7063	0.7060	0.7059	0.7061

Notes: Significant at 0.01: *; significant at 0.05: **, significant at 0.10:***

6.X uses economic changes over X year(s); Standard Errors are robust

A.4 Table D

Table D: One-sided F-tests for sign of inflation and growth relationship for equation (4)

Hypothesis	1	2	3	4
F-statistic	44.69	17.56	16.93	2.71
$P > F$	1.17×10^{-11}	1.395×10^{-5}	1.94×10^{-5}	0.0497
Hypothesis	5	6	7	8
F-statistic	0.45	17.58	19.71	35.35
$P > F$	0.25207	1.39×10^{-5}	4.53×10^{-6}	1.39×10^{-9}

Note: df = (1, 29947)

A.5 Table E

Table E: Regression output for equation (8)

	8.1.1				8.2.1			
	Coef.	S.E.	t	$P > \|t\|$	Coef.	S.E.	t	$P > \|t\|$
INC	-1.46526	0.031165	-47.02	0	-1.49292	0.031314	-47.68	0
$INC \cdot G$	-0.49708	0.232955	-2.13	0.033	0.175629	0.16991	1.03	0.301
$INC \cdot P$	-1.51414	0.307409	-4.93	0	-0.60749	0.167267	-3.63	0
P	4.199873	0.031669	132.62	0	4.103187	0.031529	130.14	0
$P \cdot G$	0.842985	0.370772	2.27	0.023	1.489718	0.272492	5.47	0
$P \cdot P$	-3.14013	0.476283	-6.59	0	-0.94587	0.246525	-3.84	0
T	0.005564	0.001087	5.12	0	0.005486	0.001088	5.04	0
$INC \cdot T$	-0.13585	0.01317	-10.31	0	-0.13454	0.0132	-10.19	0
$Adj - R^2$	0.704				0.7041			

Standard errors are robust; 8.X.1 uses economic changes over X year(s)