Political Cycles and Stock Returns

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Abstract

We develop a model of political cycles driven by time-varying risk aversion. Heterogeneous agents make two choices: whether to work in the public or private sector and which of two political parties to vote for. The model implies that when risk aversion is high, agents are more likely to elect the party promising more fiscal redistribution. The model predicts higher average stock market returns under Democratic than Republican presidencies, explaining the well-known "presidential puzzle." Under sufficient complementarity between the public and private sectors, the model also predicts faster economic growth under Democratic presidencies, which is observed in the data.

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1. Introduction

Stock market returns in the United States exhibit a striking pattern: they are much higher under Democratic presidents than under Republican presidents. From 1927 to 2015, the average excess market return under Democratic presidents is 10.7% per year, whereas under Republican presidents it is only -0.2% per year. The difference, almost 11% per year, is highly significant both economically and statistically. This phenomenon is well known, having been carefully documented by Santa-Clara and Valkanov (2003).[1] However, the source of the return difference is unclear. After ruling out various potential explanations, most notably differences in risk, Santa-Clara and Valkanov conclude that the return difference is puzzling. They dub this phenomenon the "presidential puzzle."

We propose an explanation for this phenomenon, emphasizing the endogeneity of election outcomes. We argue that those outcomes depend on voters' time-varying risk aversion. When risk aversion is high, voters are more likely to elect a Democratic president; when risk aversion is low, they elect a Republican. Therefore, risk aversion is higher under Democrats, resulting in a higher equity risk premium, and thus a higher average return. In our story, the high risk premium is not caused by the Democratic presidency; instead, both the risk premium and the Democratic presidency are caused by high risk aversion.

To formalize our story, we develop a model of political cycles in which election outcomes are determined endogenously. The model features agents with heterogeneous skill and time-varying risk aversion. The agents make two decisions: they choose an occupation and elect a government. There are two occupations and two political parties. As for the occupation, each agent can be either an entrepreneur or a government worker. Entrepreneurs are risk-takers whose income is increasing in skill and subject to taxation. Government workers support entrepreneurial activity and live off taxes paid by entrepreneurs. Financial markets allow entrepreneurs to sell a fraction of their own firm and use the proceeds to buy shares in other firms and risk-free bonds. As for the election, agents choose between two political parties, a high-tax one and a low-tax one. The high-tax party, if elected, imposes a high flat tax rate on entrepreneurs' income; the low-tax party imposes a low rate. Under either party, the government runs a balanced budget. The election is decided by the median voter.

In equilibrium, agents' electoral and occupational choices are closely connected. Since entrepreneurs are taxpayers while government workers are tax recipients, entrepreneurs find

[1] Prior to Santa-Clara and Valkanov (2003), this fact was reported by several studies in practitioner journals, such as Huang (1985) and Hensel and Ziemba (1995). To simplify the exposition, we attribute the finding to Santa-Clara and Valkanov whose analysis is more formal and comprehensive.

it optimal to vote for the low-tax party while government workers vote for the high-tax party. As a result, the low-tax party wins the election if and only if more than half of all agents are entrepreneurs. The election outcome thus depends on agents' occupational choice.

The reverse is also true—agents' occupational choice depends on the election outcome. Agents find it optimal to become entrepreneurs if their skill is sufficiently high, exceeding a threshold. The threshold increases in the tax rate because a higher rate makes it more attractive to be a tax recipient rather than payer. This margin does not matter for the most-skilled agents, who choose entrepreneurship even when the tax rate is high, or the least-skilled agents, who choose government work even when the tax rate is low. But agents with intermediate skill choose their occupation based on the tax rate. When they expect the low-tax party to get elected, they become entrepreneurs; otherwise they become government workers. This flexibility gives rise to multiple equilibria, as we explain below.

Time-varying risk aversion shapes election outcomes by affecting agents' occupational choice, which in turn affects their electoral choice. Higher risk aversion makes entrepreneurship less attractive because agents dislike the risk associated with entrepreneurship. When risk aversion is high, more agents prefer the safe income from the government over the risky income from business ownership. An increase in risk aversion thus shrinks the ranks of entrepreneurs, thereby raising the likelihood of the high-tax party getting elected. Loosely speaking, when agents are more risk-averse, they demand a stronger safety net, and the high-tax party does a better job providing it through fiscal redistribution.

When risk aversion is either high enough or low enough, the economy has a unique equilibrium, but for intermediate values, there are multiple equilibria. When risk aversion is high enough, there is a unique equilibrium in which less than half of all agents become entrepreneurs and the high-tax party wins the election. When risk aversion is low enough, more than half of all agents become entrepreneurs and the low-tax party wins. When risk aversion is in between, there are two possible equilibria. If agents believe, for whatever reason, that the high-tax party is going to win, then less than half of them become entrepreneurs and the high-tax party indeed wins. But if agents believe the low-tax party is going to win, then most of them become entrepreneurs and the low-tax party wins. Which of the two "sunspot" equilibria we end up in is impossible to predict within the model.

Time variation in risk aversion generates political cycles. When risk aversion rises, the high-tax party's electoral prospects get better; when risk aversion falls, the low-tax party's chances improve. Therefore, risk aversion tends to be higher while the high-tax party is in office. If we interpret the high-tax party as Democrats and the low-tax party as Republicans, our model implies higher risk aversion under Democrats. The higher risk aversion translates into a higher risk premium, generating the presidential puzzle inside the model.

The model implies that when risk aversion is high, the high-tax party is more likely to get elected. It is hard to test this implication without observing risk aversion. Perhaps the best evidence in favor is the observed higher equity risk premium under Democrats. Additional support follows from two observations. First, people seem to become more risk-averse in times of economic turmoil. For example, Guiso et al. (2016) rely on survey evidence to show that risk aversion surged after the 2008 financial crisis, even among investors who did not experience financial losses.[2] Second, in turbulent periods, the high-tax party seems more likely to get elected. Broz (2013) examines bank crises in developed countries and finds that left-wing governments are more likely to be elected after financial crashes. Wright (2012) shows that U.S. voters are more likely to elect Democrats when unemployment is high. The two biggest financial crises over the past century also fit the bill. In November 1932, during the Great Depression, the incumbent Republican president Herbert Hoover lost the election to Democrat Franklin Roosevelt. In November 2008, at the peak of the financial crisis, the incumbent Republican George W. Bush was succeeded by Democrat Barack Obama. In both cases, elections took place in an atmosphere full of fear and turbulence, after big capital losses, when people are likely to be more risk-averse than usual.

We can also examine other predictions of the model. As noted earlier, when risk aversion is high, only highly-skilled agents become entrepreneurs. Therefore, under high risk aversion, entrepreneurs are more skilled, on average, so that the private sector is more productive. Agents with lower entrepreneurial skill work for the government. If such agents were entrepreneurs, they would contribute to growth directly. By working for the government, they contribute indirectly, by leveraging the productivity of highly-skilled entrepreneurs. If the indirect contribution is sufficiently strong, the model implies faster economic growth when risk aversion is high, which is when the high-tax party is in office.

We find empirical support for this prediction. From 1930 to 2015, U.S. real GDP growth under Democratic presidents is 4.9% per year, whereas under Republican presidents it is only 1.7%. The difference, 3.2% per year, is significant both economically and statistically. A partisan gap in economic growth rates has also been noted by Hibbs (1987), Alesina and Sachs (1988), Blinder and Watson (2016), and others based on shorter samples.

Our main theoretical results hold for risk aversion following any persistent process with sufficient variation. We also consider a specification that links risk aversion to the state of

[2]These authors propose a fear-based explanation for the high risk aversion. Malmendier and Nagel (2011) find that households with lower experienced stock market returns are less willing to take financial risk.

the economy, so that risk aversion is high when the economy is weak but low when it is strong. Political cycles then arise naturally. When the economy does well, risk aversion declines, helping the low-tax party win the election. Under that party, growth tends to be lower, leading to higher risk aversion, which helps the high-tax party win next time. Under the high-tax party, growth tends to be higher, leading to lower risk aversion, etc.

This paper aims to expand the intersection of finance and political economy. To finance, we contribute its first model of political cycles. To political economy, we add a new mechanism that generates such cycles along with novel implications for stock prices. To both literatures, we add a rational explanation for the presidential puzzle in stock returns.

In the earliest economic models of political cycles, beginning with Nordhaus (1975), the sole objective of political parties is to win elections. In these "opportunistic" models, all parties find it optimal to adopt the same policy in an effort to capture the median voter (Downs, 1957). Therefore, opportunistic models cannot explain any differences across Democratic and Republican administrations. Moreover, in practice, different parties pursue somewhat different policies. To accommodate this fact, the literature has developed "partisan" models of political cycles, originating with Hibbs (1977). Partisan models assume that different parties have different policy preferences, which are then translated into different policy platforms. We contribute to this literature by developing a new partisan model that has strong asset pricing implications. To our knowledge, none of the prior models make explicit predictions for the behavior of stock prices under different administrations.

In the traditional partisan view (e.g., Hibbs, 1977, 1987, and Alesina, 1987), Democrats prioritize growth over inflation while Republicans target inflation over growth. The two parties are assumed to represent different constituencies—Democrats represent the lower middle class and union members, while Republicans stand for the upper middle class and business owners—that have different preferences over inflation and growth. We maintain the assumption of the two constituencies but instead of inflation and growth, we emphasize the parties' different preferences over fiscal redistribution. We posit that Democrats prefer more redistribution than Republicans. We thus think of Democrats as the "high-tax" or "big-government" party, while viewing Republicans as the "low-tax" or "small-government" party. While these labels are simplistic, they have some empirical support. Looking across U.S. states, Reed (2006) finds that state tax burdens are higher when the state legislature is controlled by Democrats. Looking across developed countries, left-wing governments tend to be associated with an expansion of government revenue (Cameron, 1978, Tavares, 2004).[3]

[3] Cameron (1978) argues that the U.S. "Democratic party is not considered to be leftist" by international standards, but adds that "it is, of course, true that the party is to the left of the Republican party."

We add simple analysis at the U.S. federal level, showing that the federal tax/GDP ratio tends to rise under Democratic presidents and fall under Republican presidents.[4]

Our focus on tax policy is not the only difference between our model and traditional partisan models. In those models, agents have preferences over policies; in our model, they have preferences over consumption. In traditional models, parties choose their policies in pursuit of the median voter; in ours, tax policies are taken as given. We do not model tax policy choice in the interest of simplicity.[5] On the other hand, we let agents make not only electoral but also occupational choices; as a result, the identity of the median voter changes endogenously. We also allow their risk aversion to vary over time. Time variation in risk aversion translates into time variation in policy preferences. These novel modeling features play crucial roles in generating our predictions for stock prices.

A large literature in political economy is devoted to tests of political cycle models (see Dubois, 2016, for a recent review). One success of the partisan models is their ability to explain why we observe faster economic growth under Democrats. Some models predict this growth gap should be permanent (Hibbs, 1977), others argue it should be temporary (Alesina, 1987), but they agree on the sign. This agreement follows from their common assumption that Democrats prioritize growth over inflation. The same models also predict higher inflation under Democrats, a prediction that is less successful empirically (e.g., Drazen, 2000). To our knowledge, none of the existing political cycle models can explain the presidential puzzle in stock returns. Our model can, and it can also explain faster economic growth under Democrats without making any predictions about inflation.

Besides the finance literature on the presidential puzzle, cited earlier, our paper is also related to studies that analyze the market response to electoral outcomes. It is well known that the stock market tends to respond more favorably to the election of a Republican president.[6] This evidence is in line with our model: the election of a low-tax party is good news for investors because lower taxes imply higher after-tax cash flows to shareholders. On the technical side, our model is related to that of Pástor and Veronesi (2016), in which

[4]Survey evidence shows that taxation is a partisan issue. For example, Lewis-Beck and Nadeau (2011) find that voters who thought the rich should be taxed more than the poor strongly preferred the Democratic candidate (Obama) to the Republican candidate (McCain) in the 2008 U.S. presidential election.

[5]A richer model could attempt to endogenize the tax rates as equilibrium outcomes of the parties' policy decisions. If the two competing parties were purely opportunistic, caring only about winning the election, they would converge to the same tax rate preferred by the median voter. But if the two parties care not only about winning but also about the actual policy, convergence is only partial, resulting in two different platform tax rates, as assumed here (e.g., Alesina and Rosenthal, 1995).

[6]See, for example, Niederhoffer et al. (1970), Riley and Luksetich (1980), and Snowberg et al. (2007). The stock market also responded positively to the unexpected victory of Republican Donald Trump in the most recent U.S. presidential election, in November 2016.

agents make similar occupational choices in the presence of fiscal redistribution. However, our model is significantly richer in adding electoral choice and time-varying risk aversion. While their focus is on income inequality, ours is on political cycles.[7]

The paper is organized as follows. Section 2 develops our theoretical model and its implications. Section 3 shows our empirical results. Section 4 concludes. The proofs of all of our results are in the Online Appendix, which is available on the authors' websites.

2. Model

There is a sequence of electoral periods indexed by t. At the beginning of each period, a continuum of agents with unit mass is born. These agents immediately choose an occupation and elect a government. At the end of the period, agents consume and die.

Agents have identical preferences over end-of-period consumption:

$$U_t\left(C_{i,t+1}\right) = \frac{\left(C_{i,t+1}\right)^{1-\gamma_t}}{1-\gamma_t} \ , \tag{1}$$

where $C_{i,t+1}$ is agent i's consumption at the end of period t and $\gamma_t > 0$ is the coefficient of relative risk aversion.[8] Note that risk aversion γ_t varies over time but not across agents.

Agents are heterogeneous in entrepreneurial skill. Agent i is endowed with a skill level μ_i, which is randomly drawn from a normal distribution:[9]

$$\mu_i \sim N\left(0, \sigma_\mu^2\right) \ . \tag{2}$$

Agents with higher skill produce more output if they become entrepreneurs.

Each agent is endowed with one unit of human capital. Agents choose whether to deploy this capital in the private or public sector. Specifically, each agent chooses one of two

[7] This paper is also related to empirical studies that analyze the effects of electoral uncertainty, such as Boutchkova et al. (2012) and Julio and Yook (2012), as well as to the broader literature on political uncertainty, which includes the theoretical work of Pástor and Veronesi (2012, 2013) and the empirical work of Baker et al. (2016), Fernández-Villaverde et al. (2015), Kelly et al. (2016), among others. Related work also includes Belo et al. (2013) who relate political cycles to the cross-section of stock returns and Knight (2006) who analyzes the extent to which policy platforms are capitalized into stock prices.

[8] The mathematical expressions presented here assume $\gamma_t \neq 1$. For $\gamma_t = 1$, the agent's utility function is $\log(C_{i,T})$ and some of our formulas require slight algebraic modifications. See the Online Appendix.

[9] Without loss of generality, we set the mean of this distribution to zero, to simplify the algebraic presentation. None of our conclusions rely on the zero mean, though. In the Online Appendix, we consider the more general case of a non-zero mean and show that all of our theoretical predictions go through.

occupations: entrepreneur or government worker. Entrepreneurs produce output and pay taxes; government workers support entrepreneurial activity and consume taxes.

If agent i chooses to become an entrepreneur, he invests his capital in a private agent-specific technology that produces output equal to

$$Y_{i,t+1} = e^{\mu_i + \varepsilon_{t+1} + \varepsilon_{i,t+1}} G_t \ , \tag{3}$$

where ε_{t+1} is an aggregate shock, $\varepsilon_{i,t+1}$ is an idiosyncratic shock, and G_t is the government's contribution to production. All shocks are i.i.d. normal: $\varepsilon_{t+1} \sim N(-\frac{1}{2}\sigma^2, \sigma^2)$ and $\varepsilon_{i,t+1} \sim N(-\frac{1}{2}\sigma_1^2, \sigma_1^2)$, so that $\mathrm{E}(e^{\varepsilon_{t+1}}) = \mathrm{E}(e^{\varepsilon_{i,t+1}}) = 1$. All $\varepsilon_{i,t+1}$ are also i.i.d. across agents. The investment is made at the beginning of period t. The shocks are realized—and output $Y_{i,t+1}$ produced—at the end of period t, just before a new generation of agents is born. Each entrepreneur owns a firm that produces a single liquidating dividend equal to $Y_{i,t+1}(1 - \tau_t)$, where τ_t is the tax rate. The entrepreneur can use financial markets to sell off a fraction of his firm to other entrepreneurs. The proceeds from the sale can be used to purchase two kinds of financial assets: shares in the firms of other entrepreneurs and risk-free bonds. The bonds mature at the end of period t and are in zero net supply. Each entrepreneur faces a constraint inspired by moral hazard considerations: he must retain ownership of at least a fraction θ of his own firm. Due to this friction, markets are incomplete.

If agent i becomes a government worker, he contributes to production indirectly, by supporting entrepreneurs. In practice, governments support business in many ways: by maintaining law and order, building roads, providing education, supporting research, etc. We summarize all this support in the term G_t in equation (3).[10] This term enters equation (3) in a multiplicative fashion, indicating that government makes all entrepreneurs more productive. We assume that G_t is a positive and bounded function of the total mass of government workers. We do not make any other assumptions about G_t until Section 2.3. Each government worker consumes an equal share of the tax revenue paid by entrepreneurs. Government workers cannot sell claims to their future tax-financed income.

Since the model features only two types of agents, the types must be interpreted broadly. Entrepreneurs include not only employers but also private sector employees whose income is variable. Government workers include not only employees but also retirees, people on disability, or anyone collecting income from the government without directly producing output.

In the election, agents choose between two political parties, H (high-tax) and L (low-tax). The two parties differ in a single dimension: the tax rate they levy on entrepreneurs'

[10]Barro (1990) seems to be the first to include government as an input in a private production function.

income.[11] Party H favors a bigger government, so it promises a higher tax rate if elected. We denote the tax rates levied by parties H and L by τ^H and τ^L, respectively, where $\tau^H > \tau^L$. We take the two tax rates as given and assume that the parties implement those rates if elected.[12] Under either party, the tax proceeds are redistributed to government workers, so that the government always runs a balanced budget. The election is decided by the median voter. The key events in the model are summarized in Figure 1.

2.1. Equilibrium

At the beginning of each period, agents make two simultaneous choices: they select an occupation and elect a party. We solve for a Nash equilibrium in which each agent maximizes the expected utility in equation (1) while taking all other agents' choices as given. We first show how agents vote while taking occupational choices as given (Section 2.1.1), then how agents choose their occupations while taking electoral choices as given (Section 2.1.2), and finally we examine the equilibrium outcomes (Section 2.1.3).

Let V_i^E and V_i^G denote the expectations of utility in equation (1) conditional on agent i being an entrepreneur and government worker, respectively. Let $\mathcal{I}_t$ denote the set of agents who invest and become entrepreneurs at the beginning of period t. In equilibrium,

$$\mathcal{I}_t = \left\{ i : V_i^E(\gamma_t) \geq V_i^G(\gamma_t) \right\} \ . \tag{4}$$

Both V_i^E and V_i^G depend on $\mathcal{I}_t$ itself: each agent's utility depends on the actions of other agents. Solving for the equilibrium thus involves solving a fixed-point problem. The equilibrium mass of entrepreneurs is $m_t = \int_{i \in \mathcal{I}_t} di$. The mass of government workers is $1 - m_t$.

2.1.1. Electoral Choice

We assume that each agent votes for the party whose election would maximize the agent's utility. This "truthful voting" assumption seems reasonable because, due to their infinitesimal size, agents cannot affect the election outcome through strategic non-truthful voting.

[11] The simplifying assumption of single-dimensional party platforms is common in the literature. For example, Alesina and Rosenthal (1995) assume a one-dimensional model of policies throughout their book, arguing that "even though politics is full of nuances and complexities... there is now overwhelming evidence that low-dimensional models are appropriate simplifications... For all practical purposes, not much is lost by positing that political conflict is summarized by movements along a liberal-conservative line."

[12] This assumption of no difference between the parties' policy platforms and actual policies is often made in theoretical models of political cycles (e.g., Rogoff and Sibert, 1988).

Proposition 1. *Given $\mathcal{I}_t$, all entrepreneurs vote for party L and all government workers vote for party H. Therefore, party L wins the election if and only if* $m_t > 0.5$.

The intuition behind this proposition is simple. Given $\mathcal{I}_t$, the economy's expected total output is fixed. This output is divided among government workers, who get a share equal to the tax rate, and entrepreneurs, whose share is one minus the tax rate. Therefore, entrepreneurs vote for low taxes while government workers vote for high taxes.

We now explain in more detail why government workers vote for party H. Those workers consume tax revenue, which is the product of the tax rate and total output at the end of period t. Since only entrepreneurs engage in production, total output is

$$Y_{t+1} = \int_{j \in \mathcal{I}_t} Y_{j,t+1} \, dj \ . \tag{5}$$

For a given tax rate τ_t, total tax revenue is $\tau_t Y_{t+1}$. Since this revenue is distributed equally among $1 - m_t$ government workers, the consumption of any given worker is

$$C_{i,t+1} = \frac{\tau_t Y_{t+1}}{1 - m_t} = \tau_t \, \frac{m_t}{1 - m_t} \, G_t \, e^{\varepsilon_{t+1}} \, \mathrm{E}\left[e^{\mu_j} | j \in \mathcal{I}_t\right] \qquad \text{for all } i \notin \mathcal{I}_t \ , \tag{6}$$

where the second equality follows by substituting for output from equation (3). Government workers' consumption, and thus also V_i^G, clearly depend on $\mathcal{I}_t$.[13] Given $\mathcal{I}_t$, each government worker's consumption is proportional to τ_t, so his utility is proportional to $\tau_t^{1-\gamma_t}/(1-\gamma_t)$. It follows immediately that the worker is better off choosing τ^H over τ^L.

Next, we explain why entrepreneurs vote for party L. Entrepreneurs consume the proceeds of their investments. Entrepreneur i's firm pays a single after-tax dividend $Y_{i,t+1}(1-\tau_t)$. The equilibrium market value of this firm at the beginning of period t is therefore

$$M_{i,t} = \mathrm{E}_t \left[\frac{\pi_{t+1}}{\pi_t} \, Y_{i,t+1} \, (1 - \tau_t) \right] \ , \tag{7}$$

where π_t is the equilibrium state price density. To diversify, the entrepreneur sells the fraction $1-\theta$ of his firm for its market value $(1-\theta)\, M_{i,t}$ and uses the proceeds to buy shares in other entrepreneurs' firms and risk-free bonds. Each entrepreneur chooses a portfolio of stocks and bonds by maximizing his expected utility V_i^E. This portfolio depends on $\mathcal{I}_t$, so the entrepreneur's consumption and V_i^E depend on $\mathcal{I}_t$ as well. In equilibrium, each entrepreneur

[13] Since government workers do not invest, they do not bear any idiosyncratic risk. Yet their consumption is not risk-free: it depends on the aggregate shock ε_{t+1} because tax revenue depends on ε_{t+1}. Given our balanced budget assumption, there is no room for intertemporal smoothing by the government. Government workers are therefore not immune to business cycles: when the economy suffers a negative shock, tax revenue declines, and so does government workers' consumption. Empirically, the wages of public employees are indeed procyclical, though not as much as private sector wages (Quadrini and Trigari, 2007).

holds fraction θ of his portfolio in his own firm and $1-\theta$ in what turns out to be the value-weighted aggregate stock market portfolio. There is no borrowing or lending because risk aversion is equal across entrepreneurs. Entrepreneur i's consumption is given by

$$C_{i,t+1} = (1-\tau_t)\; G_t\, e^{\mu_i+\varepsilon_{t+1}}\left[\theta e^{\varepsilon_{i,t+1}} + (1-\theta)\right] \qquad \text{for all } i \in \mathcal{I}_t \;. \tag{8}$$

This consumption increases in μ_i, indicating that more skilled entrepreneurs, whose firms have higher market values, tend to consume more. Given $\mathcal{I}_t$, each entrepreneur's consumption is proportional to $1-\tau_t$. Entrepreneurs are thus clearly better off choosing τ^L over τ^H.

Proposition 1 shows that agents' electoral and occupational choices are closely connected in equilibrium. Since government workers vote for party H and entrepreneurs for party L, the election outcome depends on how agents split between the public and private sectors.[14]

2.1.2. Occupational Choice

In this subsection, we analyze how agents decide to become entrepreneurs or government workers, taking the electoral choice (i.e., the tax rate) as given.

Proposition 2. *Assume that party $k \in \{H, L\}$ is in power, so that the tax rate τ^k is given. Agent i chooses to become an entrepreneur if and only if*

$$\mu_i > \underline{\mu}_t^k \;, \tag{9}$$

where $\underline{\mu}_t^k$ is the unique solution to

$$\underline{\mu}_t^k \;=\; \log\left[\frac{\tau^k}{1-\tau^k}\right] + \log\left[\frac{1-\Phi\left(\underline{\mu}_t^k;\sigma_\mu^2,\sigma_\mu^2\right)}{\Phi\left(\underline{\mu}_t^k;0,\sigma_\mu^2\right)}\right] + \frac{\sigma_\mu^2}{2} - \frac{\log\left(\mathrm{E}\left\{\left[\theta e^{\varepsilon_{i,t+1}}+1-\theta\right]^{1-\gamma_t}\right\}\right)}{1-\gamma_t}\,, \tag{10}$$

and $\Phi(.;a,b)$ is the cumulative distribution function of the normal distribution with mean a and variance b. The equilibrium mass of entrepreneurs is given by

$$m_t^k = 1-\Phi\left(\underline{\mu}_t^k;0,\sigma_\mu^2\right) \;. \tag{11}$$

Equation (9) shows that only agents who are sufficiently skilled become entrepreneurs. Agents with lower skill become government workers. We emphasize that we define skill

[14] Some empirical support for Proposition 1 is provided by Kaustia and Torstila (2011) who find in Finnish data that left-wing voters are less likely to invest in stocks. Kaustia and Torstila also state the common view that "left-wing political preferences are characterized by such opinions as being in favor of redistribution..." If we interpret party H as left-wing and party L as right-wing, Proposition 1 implies that right-wing voters are stockholders but left-wing voters are not.

narrowly as *entrepreneurial* skill. The value of μ_i does not indicate general ability or prowess. An agent could in principle be an extremely capable public school teacher, police officer, or public official while at the same time being imperfectly suited for entrepreneurship.

The equilibrium mass of entrepreneurs in equation (11) is always strictly between zero and one. If it were zero, there would be no output for agents to consume. If it were one, there would be a large unallocated tax to be shared, and it would be worthwhile for some agents to become government workers and enjoy large tax-financed consumption. Therefore, this model guarantees an interior solution for the equilibrium mass of entrepreneurs.

By investigating how the skill threshold $\underline{\mu}_t^k$ from Proposition 2 responds to various parameter changes, we obtain the following corollary.

Corollary 1. *The equilibrium mass of entrepreneurs m_t^k is decreasing in the tax rate τ^k, risk aversion γ_t, idiosyncratic volatility σ_1, and the degree of market incompleteness θ.*

Corollary 1 identifies four variables whose high values discourage entrepreneurship. A high tax rate reduces entrepreneurs' after-tax income. A high risk aversion means low willingness to bear the idiosyncratic risk associated with entrepreneurship. A high idiosyncratic volatility implies that entrepreneurial risk is large, and a high degree of market incompleteness means that this risk cannot be diversified away. When the four variables are high, only the most skilled agents find it worthwhile to become entrepreneurs.

The four variables interact in interesting ways. For example, the negative impact of risk aversion on the amount of entrepreneurship is amplified by larger values of σ_1 and θ. In two special cases, risk aversion has no impact on entrepreneurship. The first case is $\sigma_1 = 0$, when entrepreneurship involves no idiosyncratic risk. The second case is $\theta = 0$, when markets are complete and all idiosyncratic risk can be diversified away. In both cases, the last term in equation (10), the only term featuring γ_t, drops out. But as σ_1 and θ rise, idiosyncratic risk becomes more important, boosting the role of γ_t. A particularly clean example is that of $\theta = 1$, for which the last term in equation (10) simplifies into $\gamma_t \sigma_1^2/2$.

2.1.3. Equilibrium Outcomes

Equipped with the results from Sections 2.1.1 and 2.1.2, we solve for the Nash equilibrium that characterizes agents' electoral and occupation choices. The following proposition shows that the equilibrium crucially depends on agents' risk aversion.

Proposition 3. *There exist two thresholds $\underline{\gamma} < \overline{\gamma}$ such that*

1. *For $\gamma_t > \overline{\gamma}$, there is a unique equilibrium: $m_t < \frac{1}{2}$ and party H wins the election*
2. *For $\gamma_t < \underline{\gamma}$, there is a unique equilibrium: $m_t > \frac{1}{2}$ and party L wins the election*
3. *For $\underline{\gamma} < \gamma_t < \overline{\gamma}$, there are two pure-strategy Nash equilibria that can both be supported:*
   (a) If agents believe party H will win, then $m_t < \frac{1}{2}$ and H indeed wins
   (b) If agents believe party L will win, then $m_t > \frac{1}{2}$ and L indeed wins

The two thresholds, $\underline{\gamma}$ and $\overline{\gamma}$, represent solutions to the following equations:

$$\frac{1}{2} = 1 - \Phi\left(\underline{\mu}_t^H\left(\underline{\gamma}\right); 0, \sigma_\mu^2\right) \tag{12}$$

$$\frac{1}{2} = 1 - \Phi\left(\underline{\mu}_t^L\left(\overline{\gamma}\right); 0, \sigma_\mu^2\right) , \tag{13}$$

where $\underline{\mu}_t^k(\gamma)$ is given in equation (10).

This proposition shows that when risk aversion is high enough, the economy is in the "H equilibrium," in which taxes are high and the majority of agents work for the government. When risk aversion is low enough, we are in the "L equilibrium": taxes are low and most agents are entrepreneurs. In between, either equilibrium is possible.

To understand Proposition 3, recall that the threshold $\underline{\mu}_t^k$ from Proposition 2 is increasing in the tax rate τ^k (see Corollary 1). Since $\tau^L < \tau^H$, we have $\underline{\mu}_t^L < \underline{\mu}_t^H$. The two thresholds, $\underline{\mu}_t^L$ and $\underline{\mu}_t^H$, divide the support of μ_i into three regions, creating three types of agents. The first type, agents with $\mu_i > \underline{\mu}_t^H$, are "always-entrepreneurs": they choose entrepreneurship in both H and L equilibria. The second type, agents with $\mu_i < \underline{\mu}_t^L$, are "never-entrepreneurs": they choose government work in both equilibria. The third type are agents with

$$\underline{\mu}_t^L < \mu_i < \underline{\mu}_t^H . \tag{14}$$

These intermediate-skill agents choose a different occupation depending on whether we are in the H or L equilibrium. The three types of agents are illustrated in Figure 2.

Since both thresholds $\underline{\mu}_t^L$ and $\underline{\mu}_t^H$ are increasing in γ_t, higher γ_t implies a smaller mass of always-entrepreneurs and a larger mass of never-entrepreneurs. When $\gamma_t > \overline{\gamma}$, the mass of never-entrepreneurs exceeds $\frac{1}{2}$ so that, given Proposition 1, we always end up in the H equilibrium. When $\gamma_t < \underline{\gamma}$, the mass of always-entrepreneurs exceeds $\frac{1}{2}$ and we always end up in the L equilibrium. When $\underline{\gamma} < \gamma_t < \overline{\gamma}$, the masses of both never-entrepreneurs and always-entrepreneurs are smaller than $\frac{1}{2}$, so it is the intermediate-skill agents from equation (14) who decide which of the two equilibria will be supported. Which equilibrium they pick cannot be determined within our model. Whatever these agents believe will actually happen—a nice example of a sunspot equilibrium. See Figure 3 for an illustration.

Given the indeterminacy of the equilibrium whenever $\underline{\gamma} < \gamma_t < \overline{\gamma}$, we need a rule for choosing between H and L in such scenarios. For simplicity, we assume that this choice is completely random, determined by the flip of a fair coin. The outcome of the coin flip is uncorrelated with γ_t as well as with all other variables in the model.

2.2. Implications for Stock Returns

Stock prices depend on which equilibrium $k \in \{H, L\}$ the economy is in. Several quantities in this subsection vary across the two equilibria, such as the tax rate τ_t^k, risk aversion γ_t^k, the mass of entrepreneurs m_t^k, the government's contribution G_t^k, and the threshold $\underline{\mu}_t^k$. We suppress the superscript k on these quantities to reduce notational clutter.

To calculate firm market values in equation (7), we need the equilibrium state price density π_t. We obtain it from entrepreneurs' first-order conditions: $\pi_t \propto e^{-\gamma_t \varepsilon_t}$. The equilibrium market value of firm i at the beginning of period t is then given by

$$M_{i,t} = (1 - \tau_t)\, e^{\mu_i - \gamma_t \sigma^2} G_t \; . \tag{15}$$

This expression is remarkably simple and intuitive. Firm value is increasing in both skill and government contribution because both raise expected pre-tax dividends. Firm value is decreasing in the tax rate because stockholders receive after-tax dividends. The value is also decreasing in aggregate volatility and risk aversion because agents dislike risk.

We obtain a closed-form solution for the value of the aggregate stock market portfolio by adding up the values from equation (15) across all entrepreneurs:

$$\begin{aligned} M_{P,t} &= (1 - \tau_t)\, e^{-\gamma_t \sigma^2} \mathrm{E}\left[e^{\mu_j} | j \in \mathcal{I}_t\right] G_t\, m_t \\ &= (1 - \tau_t)\, e^{-\gamma_t \sigma^2 + \frac{1}{2}\sigma_\mu^2} \left(\frac{1 - \Phi\left(\underline{\mu}_t; \sigma_\mu^2, \sigma_\mu^2\right)}{1 - \Phi\left(\underline{\mu}_t; 0, \sigma_\mu^2\right)} \right) G_t\, m_t \; . \end{aligned} \tag{16}$$

The market portfolio is worth $M_{P,t}$ at the beginning of period t and $(1 - \tau_t)\, Y_{t+1}$ at the end of period t. We compute the ratio of the two values, substituting for $M_{P,t}$ from equation (16) and for Y_{t+1} from equations (3) and (5). The aggregate stock market return is then

$$R_{t+1} = e^{\gamma_t \sigma^2 + \varepsilon_{t+1}} - 1 \; . \tag{17}$$

Recalling that $\mathrm{E}(e^{\varepsilon_{t+1}}) = 1$, we see that the expected stock market return is[15]

$$\mathrm{E}_t\left(R_{t+1}\right) = e^{\gamma_t \sigma^2} - 1 \;\approx\; \gamma_t \sigma^2 \;. \tag{18}$$

Proposition 4. *Assume that γ_t fluctuates sufficiently so that at least one of the events $\gamma_t < \underline{\gamma}$ and $\gamma_t > \overline{\gamma}$ occurs with nonzero probability, where $\underline{\gamma}$ and $\overline{\gamma}$ are from Proposition 3. Expected stock market return is then higher under party H than under party L:*

$$\mathrm{E}\left(R_{t+1} | \tau_t = \tau^H\right) \;>\; \mathrm{E}\left(R_{t+1} | \tau_t = \tau^L\right) \;. \tag{19}$$

This proposition follows from Proposition 3 and equation (18). Consider three scenarios: H, L, and H/L. Scenario H occurs whenever $\gamma_t > \overline{\gamma}$, in which case party H always wins the election. Scenario L occurs when $\gamma_t < \underline{\gamma}$, in which case party L always wins. Scenario H/L occurs when $\underline{\gamma} < \gamma_t < \overline{\gamma}$, when either party can win. Denote the expected returns in these scenarios by ER^H, ER^L, and $\mathrm{ER}^{H/L}$. It then follows from equation (18) that

$$\mathrm{ER}^L \;<\; \underline{\gamma}\sigma^2 \;<\; \mathrm{ER}^{H/L} \;<\; \overline{\gamma}\sigma^2 \;<\; \mathrm{ER}^H \;. \tag{20}$$

While ER^H is always earned under party H and ER^L under party L, $\mathrm{ER}^{H/L}$ can be earned under either party. Which party wins in the H/L scenario depends on "sunspots." As noted earlier, we assume this choice is determined by a random coin flip. Therefore, in the H/L scenario, expected returns are the same under both parties. Averaging across all three scenarios, it follows that expected return under party H is higher than under party L.

Proposition 4 summarizes our explanation of the presidential puzzle. We need two main assumptions: that risk aversion is sufficiently volatile, and that we can interpret party H as Democrats and party L as Republicans. Under those assumptions, expected market return under Democrats is higher than under Republicans, on average.

Expected stock returns in our model can be interpreted as risk premia, or returns in excess of the risk-free rate, because that rate is effectively zero. In the model, agents consume only once, at the end of the period. Therefore, there is no intertemporal consumption-saving decision that would pin down the risk-free rate. We thus use the bond price as the numeraire, effectively setting the risk-free rate to zero.

The risk premium embedded in stocks reflects the unpredictability of aggregate shocks (see equation (18)). There is no premium for idiosyncratic risk σ_1^2 even though that risk cannot be fully diversified away (as long as $\theta > 0$). The reason is that all firms have the same risk exposure, so that all entrepreneurs' positions are symmetric ex ante. There is no

[15] We can also define $r_{t+1} \equiv \log(1 + R_{t+1})$. The expected log return is $\mathrm{E}_t\left(r_{t+1}\right) = \left(\gamma_t - \frac{1}{2}\right)\sigma^2$.

risk premium for electoral uncertainty either because stocks are claims on dividends paid just before the next election. In our simple model, agents live for one period, and so do their firms. In a more complicated model in which firms' lives span elections, stock prices would move also in response to revisions in the probabilities of electoral outcomes, and electoral uncertainty would command a risk premium (e.g., Pástor and Veronesi, 2013, and Kelly et al., 2016). Our conclusions would likely get stronger because the impact of electoral uncertainty on stock prices would be larger under party H when risk aversion is higher. In Section 2.7, we analyze the asset pricing implications of electoral uncertainty in a different way, by considering a mixed Nash equilibrium in a special case of our simple model.

2.3. Implications for Economic Growth

To calculate economic growth in period t, we divide total output at the end of the period, Y_{t+1} from equation (5), by total capital invested at the beginning of the period. That capital is equal to one because each agent is endowed with one unit of capital and the mass of agents is also one. Therefore, economic growth in period t is simply equal to Y_{t+1}.

From equations (3) and (5), economic growth is given by

$$Y_{t+1} = \mathrm{E}\left(e^{\mu_i} | i \in \mathcal{I}_t\right) \, m_t \, G_t \, e^{\varepsilon_{t+1}} \ . \tag{21}$$

The first term on the right-hand side, $\mathrm{E}\left(e^{\mu_i} | i \in \mathcal{I}_t\right)$, is the average value of e^{μ_i} across all entrepreneurs. This term measures the average productivity of entrepreneurs, excluding the government's contribution. We refer to this term as private sector productivity.

Proposition 5. *Private sector productivity is higher under party H than under party L:*

$$\mathrm{E}\left(e^{\mu_i} | i \in \mathcal{I}_t, \tau = \tau^H\right) \ > \ \mathrm{E}\left(e^{\mu_i} | i \in \mathcal{I}_t, \tau = \tau^L\right) \ . \tag{22}$$

To understand this proposition, recall that in equilibrium $k \in \{H, L\}$, agent i is an entrepreneur if his skill exceeds a threshold: $\mu_i > \underline{\mu}_t^k$ (Proposition 2). This threshold is higher under party H: $\underline{\mu}_t^H > \underline{\mu}_t^L$ (Corollary 1). The average skill of entrepreneurs is thus higher under party H, and so is the average value of e^{μ_i}. The private sector is more productive under party H due to the selection of more skilled agents into entrepreneurship.[16]

[16] A closely related selection effect is emphasized by Pástor and Veronesi (2016). Those authors also look across OECD countries and find that countries with higher tax/GDP ratios tend to be more productive, as measured by GDP per hour worked, even after controlling for GDP per capita. Blinder and Watson (2016) find that two measures of U.S. productivity, labor productivity and total factor productivity (TFP), are both higher under Democratic than Republican administrations, but the difference is not statistically significant (for TFP, the p-value is 0.07). We do not emphasize this empirical implication because private productivity in Proposition 5 excludes the government's contribution G_t, unlike in the data.

Proposition 5 shows that a key component of growth, private sector productivity, is higher under party H than under party L. However, growth in equation (21) depends also on the product of private investment m_t and the government's contribution G_t. Under party H, m_t is lower (Corollary 1) but G_t could be higher; therefore, $m_t G_t$ could be higher or lower. How $m_t G_t$ compares between the H and L equilibria depends on the functional form for G_t.

The only assumptions we have made about G_t so far is that it is a positive and bounded function of $1 - m_t$, the mass of government workers. We now add the assumption that G_t is increasing in $1 - m_t$. With more workers, the government can make a larger contribution to aggregate output—more workers can build more infrastructure, teach more students, provide better legal protection, etc. The simplest increasing functional form is linear:

$$G_t = (1 - m_t)\, e^g \; . \tag{23}$$

One way to interpret this function is that each government worker produces e^g units of intermediate public output and G_t is an integral of that output across all $1 - m_t$ workers. If different workers contribute differently, e^g is the average worker's contribution. The value of g thus reflects the average productivity of the public sector.

Given equation (23), $m_t G_t$ is proportional to $m_t(1 - m_t)$. If the latter product takes similar values under both H and L equilibria then, given Proposition 5, growth is faster under party H. The product $m_t(1 - m_t)$ is equal under both equilibria if the equilibrium masses of entrepreneurs under those equilibria, m^H and m^L, are symmetric around $\frac{1}{2}$:

$$m^H + m^L = 1 \; . \tag{24}$$

The symmetry of m_t around $\frac{1}{2}$ seems natural—it means that the electoral majority is the same regardless of which party wins. For example, if $m^H = 0.48$ and $m^L = 0.52$, then the margin of victory is always 4%, whether the election is won by party H or L.

In general, m^H and m^L can take many different values depending on the realization of the state variable γ_t. For condition (24) to hold, the values of $m^H(\gamma_t)$ and $m^L(\gamma_t)$ must be spread out symmetrically around $\frac{1}{2}$ when the full probability distribution of γ_t and its equilibrium implications (Proposition 3) are taken into account. The condition is particularly easy to understand in the special case in which γ_t can take only two values, γ^H and γ^L, which lead to unique equilibria H and L. In this case, there is only one value of $m^H(\gamma^H)$ and one value of $m^L(\gamma^L)$. If these two values add up to one, condition (24) is satisfied.

Proposition 6. *Under the linearity of G_t and symmetry of m_t (conditions (23) and (24)), the expected economic growth under party H is higher than under party L:*

$$\mathrm{E}\left(Y_{t+1} | \tau_t = \tau^H\right) \; > \; \mathrm{E}\left(Y_{t+1} | \tau_t = \tau^L\right) \; . \tag{25}$$

The two assumptions in Proposition 6 are sufficient but not necessary. Any other assumptions that keep $m_t G_t$ similar under both parties would also deliver (25), thanks to Proposition 5. For example, it is enough for the symmetry condition (24) to hold only approximately.

The intuition behind Proposition 6 is that under party H, entrepreneurs are more skilled, and even though there are fewer of them, their high productivity is leveraged by stronger government support. For example, suppose voters kick out party L and elect party H. The mass of entrepreneurs shrinks from $m^L > \frac{1}{2}$ to $m^H < \frac{1}{2}$, which is harmful to growth. However, the entrepreneurs who quit are less skilled than those who stay. Moreover, the smaller private sector is supported by a larger public sector (because $1 - m^H > 1 - m^L$). Under conditions (23) and (24), the net effect is faster growth under party H.

A key ingredient of Proposition 6 is that G_t enters the production function (3) in a multiplicative fashion. The idea is that government provides complementarities that make businesses more productive. For example, one police officer contributes to the productive capacity of many businesses. Government thus contributes to output by leveraging the productivity of the private sector. Government support is particularly valuable to the most skilled agents. Such agents always choose entrepreneurship, regardless of who is in power. In contrast, intermediate-skill agents, those satisfying condition (14), choose entrepreneurship under party L but government under H. As entrepreneurs, these agents expand output through their private effort only, and not greatly so because their $\mu_i < \underline{\mu}_t^H$. As government workers, the same agents expand output more by leveraging the efforts of many higher-skilled entrepreneurs. For example, if an agent abandons his business of selling sandwiches and starts building roads, the economy suffers the loss of sandwiches, but it also gains because many businesses benefit from the common roads. Proposition 6 shows that under party H, intermediate-skill agents contribute more to aggregate growth by supporting top-skill agents than by investing on their own. The proposition holds under conditions (23) and (24), which ensure sufficient complementarity between the public and private sectors.[17]

Under the assumption (23), we obtain one more interesting result. If human capital were to be allocated by a social planner, she would choose m_t that maximizes expected total output (and then redistribute the output among agents to maximize welfare). Under condition (23), the welfare-maximizing value of m_t is equal to $m_t = 1 - \Phi(\frac{\sigma_\mu^2}{2}; 0, \sigma_\mu^2) < 0.5$. In other words, the social planner would assign fewer than half of agents, those with the highest skill, to entrepreneurship, and the remaining majority to government work.

[17] If condition (23) were replaced by $G_t = (1 - m_t)^\alpha e^g$, the complementarity would be present for any $\alpha > 0$. Condition (23) assumes $\alpha = 1$, but Proposition 6 holds more generally, when α is sufficiently high.

2.4. Endogenous Risk Aversion

So far, we have not discussed how risk aversion γ_t is determined. In all of our results, γ_t can be viewed as following any exogenous process (with the exception of Proposition 4, which requires sufficient volatility in γ_t). Our results are thus very general.

We obtain further insights by taking a stand on the evolution of γ_t. Evidence suggests that risk aversion rises after negative economic shocks (e.g., Guiso et al., 2016). Similarly, in models of habit formation, risk aversion rises in bad times and falls in good times (e.g., Campbell and Cochrane, 1999). We therefore endogenize γ_t by linking it to the state of the economy: $\gamma_t = \gamma(Y_t)$, which is decreasing in Y_t. That is, γ_t is high when the economy is weak (i.e., after low realizations of output Y_t at the end of the previous period), and vice versa.

Political cycles then arise naturally in the model. Suppose the economy is strong. Risk aversion is low, so party L is more likely to win the next election (Proposition 3). Under party L, economic growth is likely to be lower (Proposition 6), leading to higher risk aversion. As a result, the following election is more likely to be won by party H. Under H, growth is higher, leading to lower risk aversion and thus better electoral odds of party L. This natural cycle, in which the two parties alternate in office periodically, is summarized in Figure 4.

To formalize this result, we consider a special case of $\gamma(Y_t)$ for which the function takes only two values, high or low, depending on the state of the economy:

$$\gamma(Y_t) = \begin{cases} \gamma^H \ , \ \text{where} \ \ \gamma^H > \overline{\gamma} \ , & \text{for } y_t < \overline{y} \\ \gamma^L \ , \ \text{where} \ \ \gamma^L < \underline{\gamma} \ , & \text{for } y_t > \overline{y} \end{cases} \ , \tag{26}$$

where recall $y_t = \log(Y_t)$ and $\overline{y} = \mathrm{E}[y_t] - \frac{1}{2}\sigma^2$. We also let $\lambda^{H,L}$ denote the probability of an electoral shift from party H to party L, and $\lambda^{L,H}$ denote the probability of a reverse shift:

$$\lambda^{H,L} \equiv \text{Prob}(L \text{ wins election} \,|\, H \text{ is in power}) \tag{27}$$

$$\lambda^{L,H} \equiv \text{Prob}(H \text{ wins election} \,|\, L \text{ is in power}) \ . \tag{28}$$

Proposition 7. *Under the assumptions in equation (26) and Proposition 6, the probabilities of electoral shifts are given by*

$$\lambda^{H,L} \ = \ \lambda^{L,H} \ = \ \Phi\left(\frac{\mathrm{E}[y_{t+1}|H] - \mathrm{E}[y_{t+1}|L]}{2}\,;0,\sigma^2\right) \ > \ \frac{1}{2} \ . \tag{29}$$

This proposition formalizes the formation of endogenous political cycles. When party H is in power in period t, growth in period t tends to be faster, raising the likelihood of $y_{t+1} > \overline{y}$, in which case risk aversion jumps from γ^H to γ^L, which then results in a higher probability of party L winning the election at the beginning of period $t+1$. Under party L, it is more likely that $y_{t+2} < \overline{y}$, in which case risk aversion jumps from γ^L to γ^H, boosting the electoral prospects of party H at the beginning of period $t+2$, etc.

Interestingly, our model generates political cycles even in the absence of any aggregate shocks. When γ_t is fully driven by Y_t, the only aggregate shock in the economy is ε_t from equation (3). When we eliminate this shock by letting its volatility $\sigma^2 \to 0$, both $\lambda^{H,L}$ and $\lambda^{L,H}$ in equation (29) converge to one. In this limiting case, political cycles are fully deterministic, and the two parties alternate in office at each election.

2.5. Example 1: Two Values of Risk Aversion

We now offer a simple example, maintaining the two-regime assumption (26). We pick risk aversion values of $\gamma^L = 1$ and $\gamma^H = 5$. We select the tax rates $\tau^L = 32\%$ and $\tau^H = 34\%$. For the remaining parameters, we choose $\sigma_\mu = 10\%$ per year, $\sigma = 20\%$ per year, $\sigma_1 = 50\%$ per year, $\theta = 0.6$, and $g = -0.2$.[18] Each electoral period lasts four years.

With these parameter values, we obtain $\underline{\gamma} = 2.65$ and $\overline{\gamma} = 4.24$. Therefore, $\gamma^L < \underline{\gamma}$ and $\gamma^H > \overline{\gamma}$, so there is a unique equilibrium under each risk aversion. In the L equilibrium, the mass of entrepreneurs is $m_t^L = 56.3\%$; in the H equilibrium, it is $m_t^H = 42.2\%$. The expected returns are $\mathrm{E}(R_{t+1}|\tau^H) = 18\%$ and $\mathrm{E}(R_{t+1}|\tau^L) = 2\%$ per year. The expected growth rates are $\mathrm{E}(Y_{t+1}|\tau^H) = 3.82\%$ and $\mathrm{E}(Y_{t+1}|\tau^L) = 3.59\%$ per year. Both returns and growth rates are higher under party H. The transition probabilities are $\lambda^{H,L} = \lambda^{L,H} = 53.3\%$.

2.6. Example 2: Three Values of Risk Aversion

In this example, we keep the parameter values from Example 1, but we add one more value of γ_t to allow for the two-equilibrium scenario from Proposition 3. We let γ_t take three values:

$$\gamma(Y_t) = \begin{cases} \gamma^H = 5 & \text{for } y_t < \underline{y} \\ \gamma^M = 3 & \text{for } \underline{y} \le y_t \le \overline{y} \\ \gamma^L = 1 & \text{for } y_t > \overline{y} \end{cases}, \tag{30}$$

where $\underline{y} < \overline{y}$. We choose $\underline{y}$ and $\overline{y}$ such that all three scenarios occur with equal probabilities. Since $\underline{\gamma} = 2.65$ and $\overline{\gamma} = 4.24$, we have $1 < \underline{\gamma} < 3 < \overline{\gamma} < 5$. Therefore, when $y_t < \underline{y}$, there is a

[18]We pick $g < 0$ in equation (23) so that the public sector is less productive than the private sector (recall that $\mathrm{E}(\mu_i) = 0$). We assume lower public sector productivity because our definition of government workers includes not only employees but also retirees and other non-workers living off taxes. The level of g affects the average growth rate in the economy but not the sign of the difference in growth rates under H and L.

unique H equilibrium, and when $y_t > \overline{y}$, there is a unique L equilibrium. When $\underline{y} \leq y_t \leq \overline{y}$, there are two possible equilibria, H and L, one of which is selected by a coin flip.

This setting features four regimes: $(\tau_t, \gamma_t) = (\tau^H, \gamma^H), (\tau^H, \gamma^M), (\tau^L, \gamma^M), (\tau^L, \gamma^L)$. We solve for the transition probabilities in closed form and present them in the Online Appendix. From those, we compute the following quantities, all in annualized terms:

	τ_t	$\mathrm{E}(R_{t+1})$	$\mathrm{E}(Y_{t+1})$	m_t
Party H in power	34%	15.4%	3.8%	48.1%
Party L in power	32%	4.7%	3.6%	54.1%

The difference in average returns under parties H and L is 10.7% per year, which approximately matches the difference observed in the data. The difference in average growth rates is 0.2% per year, which is positive but smaller than the empirically observed difference.

Stock return volatility is equal to 21.4% per year under both parties. This volatility exceeds the instantaneous volatility of $\sigma = 20\%$ due to variation in the expected rate of return (see equation (18)). Under each party, the expected return can take two different values, one in the unique equilibrium and one in the two-equilibrium scenario.

In this setting, political cycles arise naturally through the mechanism described earlier. To illustrate those cycles, we simulate the model over a 90-year-long period.[19] Figure 5 plots average stock market returns over the simulated sample, which features 12 H administrations and 10 L administrations. Market returns under H administrations tend to exceed those under L administrations. Moreover, the returns under L administrations are occasionally negative. Both results are also present in the data, as we show in Section 3.

The examples presented here provide simple illustrations of the model's ability to generate political cycles. The model implies that stock returns and growth should both be higher under party H. While the return gap is about the same as in the data, the growth gap is smaller. We have experimented with other parameter values, finding similar results. There are many plausible parameter values generating a return gap of the right sign and magnitude. The growth gap also has the right sign, but its magnitude tends to be smaller than what we see in the data. Yet, to our knowledge, this is the first model that predicts a positive return gap. It is comforting that this simple model can match not only the sign but also the magnitude of the return gap, as well as the sign of the growth gap. Future work can aim to design a more sophisticated model that can match also the magnitude of the growth gap.

[19]Ninety years is approximately equal to the length of the sample used in our empirical work (1927-2015).

2.7. Announcement Effects

Stock prices often respond to the announcements of election outcomes, especially if those outcomes are unexpected. To analyze such responses in the context of our model, we step away from the pure-strategy Nash equilibria described in part 3 of Proposition 3. In both of those equilibria, each agent takes the choices of other agents as given, which precludes surprises about electoral outcomes at the time of the occupational decision. To introduce such surprises, we consider a mixed equilibrium for γ_t such that $\underline{\gamma} < \gamma_t < \overline{\gamma}$. To keep things simple, we consider the three-gamma case from equation (30), with $\gamma^L < \underline{\gamma} < \gamma^M < \overline{\gamma} < \gamma^H$.

Proposition 8. *There exists a value of $\gamma^M \in \left[\underline{\gamma}, \overline{\gamma}\right]$ for which the economy is in a mixed equilibrium with both parties H and L having the same probability of winning the election. In this equilibrium, $m_t = \frac{1}{2}$, and the median voter is indifferent between the two parties, choosing one of them randomly. In addition,*

(a) The stock market reaction to the election outcome is positive if party L wins but negative if party H wins:

$$AR_t^H \ < \ 0 \ < \ AR_t^L \ , \tag{31}$$

where AR_t^k is the announcement return after the victory of party $k \in \{H, L\}$.

(b) The risk premium for electoral uncertainty is positive:

$$\mathrm{E}\left(AR_t^k\right) \quad = \quad \frac{\left(\frac{1}{2} - w\right)\left(\tau^H - \tau^L\right)}{1 - \tau^H + w\left(\tau^H - \tau^L\right)} \ > \ 0 \ , \tag{32}$$

where

$$w \quad = \quad \frac{\left(1 - \tau^L\right)^{-\gamma^M}}{\left(1 - \tau^L\right)^{-\gamma^M} + \left(1 - \tau^H\right)^{-\gamma^M}} \ < \ \frac{1}{2} \ . \tag{33}$$

To understand part (a) of the proposition, note that the value of the aggregate stock market portfolio immediately after the election is

$$M_{P,t}^L \quad = \quad \frac{1}{2} G_t \, \mathrm{E}\left[e^{\mu_i} | i \in \mathcal{I}_t\right] e^{-\gamma^M \sigma^2} \left(1 - \tau^L\right) \quad \text{if party } L \text{ wins} \tag{34}$$

$$M_{P,t}^H \quad = \quad \frac{1}{2} G_t \, \mathrm{E}\left[e^{\mu_i} | i \in \mathcal{I}_t\right] e^{-\gamma^M \sigma^2} \left(1 - \tau^H\right) \quad \text{if party } H \text{ wins} \ . \tag{35}$$

Immediately before the election, the market portfolio's value is between the above values:

$$M_{P,t} \quad = \quad \frac{1}{2} G_t \, \mathrm{E}\left[e^{\mu_i} | i \in \mathcal{I}_t\right] e^{-\gamma^M \sigma^2} \left[w\left(1 - \tau^L\right) + (1 - w)\left(1 - \tau^H\right)\right] \ , \tag{36}$$

where w is in equation (33). The announcement return after the victory of party k is

$$AR_t^k = \frac{M_{P,t}^k}{M_{P,t}} - 1 \ , \tag{37}$$

which is positive for $k = L$ and negative for $k = H$ because $M^H_{P,t} < M_{P,t} < M^L_{P,t}$. Stock prices fall when party H is elected because the higher tax rate means lower after-tax dividends. These predictions are supported by the evidence cited in footnote 6, which shows that the market tends to respond more favorably to the election of a Republican president.

Part (b) of the proposition shows that agents require a risk premium for holding stocks during the electoral announcement. This risk premium, which is equal to the expected value of the announcement return AR^k_t, compensates stockholders for the uncertainty about which of the two tax rates will be applied to their dividends at the end of period t. Finally, the equation for γ^M that satisfies Proposition 8 is given in the Online Appendix.

To illustrate the announcement effects, we take the parameter values from Section 2.6, except that we set $\gamma^M = 3.38$, which is the value for which Proposition 8 obtains. In that case, the announcement returns are $AR^H_t = -1.42\%$ and $AR^L_t = 1.57\%$. The risk premium for electoral uncertainty is the average of these two values, or 0.08%. This value is relatively small because the two tax rates, τ^L and τ^H, are relatively close (32% vs. 34%).

3. Empirical Analysis: Democrats vs Republicans

In this section, we provide simple empirical evidence related to our model. In Section 3.1, we compare U.S. stock market performance under Democratic and Republican presidents, extending the analysis of Santa-Clara and Valkanov (2003) to a larger sample. In Section 3.2, we examine our assumption that the Democratic party favors more fiscal redistribution. In Section 3.3, we compare economic growth under Democratic and Republican presidents. In Section 3.4, we examine the conditions in which Democrats and Republicans are elected.

3.1. Stock Market Performance

Santa-Clara and Valkanov (2003) compare average U.S. stock market returns under Democratic and Republican presidents between years 1927 and 1998. We extend their analysis through the end of 2015. We construct a series of monthly excess stock market returns by subtracting the log return on a three-month Treasury bill from the log return on the value-weighted total market return.[20] We obtain both series from the Center for Research in Security Prices (CRSP), where they are available back to January 1927.

[20] Santa-Clara and Valkanov (2003) also use log returns. Simple returns lead to very similar results. Also note that by using excess returns, we effectively eliminate any effects of inflation.

We construct a monthly time series of a Democrat dummy variable, D, which we define as $D = 1$ if a Democratic president is in office and $D = 0$ otherwise. We handle transitions by assuming that a president is in office until the end of the month during which he leaves. For example, if a new president assumes office on January 20, we assign the month of January to the old president and the month of February to the new president.[21] We find $D = 1$ in 52.5% of all months between January 1927 and December 2015, indicating that time in the White House is split roughly equally between Democrats and Republicans. Figure 6 plots average excess stock market returns for the 23 administrations between 1927 and 2015.

Table 1 compares average market returns under Democratic and Republican presidents. In the full sample period 1927 through 2015, the average excess stock market return under Democratic presidents is 10.69% per year, whereas it is only -0.21% under Republican presidents. This is a striking result—all of the equity premium over the past 89 years has been earned under a Democratic president! The Democrat-minus-Republican difference, 10.90% per year, is significant both economically and statistically ($t = 2.73$). To assess statistical significance, we regress returns on D and compute the t-statistic for the slope based on standard errors robust to both heteroscedasticity and autocorrelation.

When we split the sample period into two equally long subperiods, the results in both subperiods are strikingly similar: almost 11% per year under Democrats and -0.2% under Republicans. Even in three equally long subperiods, returns are always higher under Democrats, with the difference ranging from 4.57% to 14.46% per year. The evidence of Santa-Clara and Valkanov (2003) is clearly robust to the addition of 17 more years of data. In fact, the evidence is even stronger out of sample: in 1999–2015, the Democrat-minus-Republican return gap is 17.39% per year ($t = 2.14$), compared to 9.38% ($t = 2.05$) in the 1927–1998 period analyzed by Santa-Clara and Valkanov (2003).

Our model generates higher average returns under Democratic presidents through time-varying risk aversion. When risk aversion is high, the equity risk premium is high, and at the same time a Democrat is more likely to get elected. Since risk aversion is persistent, the high equity risk premium persists well into the Democratic presidency. Analogously, when risk aversion is low, a Republican gets elected, and the low equity risk premium persists into the Republican presidency. However, as time passes, risk aversion mean-reverts, and so should the equity premium. Therefore, our story predicts that the Democrat-minus-Republican return gap should be highest when computed over the early years of presidency.

Table 2 shows that this is indeed the case. The Democrat-minus-Republican return gap

[21] Assigning January to the new president leads to very similar results.

is huge, 36.88% per year, when averaged over the first year of presidency alone. Over the first two years, the difference is 15.55%; over the first three years, it is 12.43%. All of these values exceed the full-term average of 10.90%, indicating a high difference in risk premia early in the presidential term and a lower difference late in the term.

3.2. Tax Burden

To explain the presidential puzzle in our model, we interpret the high-tax party as Democrats and the low-tax party as Republicans. It is often argued that Democrats tend to favor bigger government than do Republicans. To provide further evidence, we compare changes in the tax burden under Democrat versus Republican presidents. We measure the tax burden by the ratio of total federal tax to GDP, which we obtain from the Bureau of Economic Analysis (BEA). BEA provides the data back to 1947Q2 on a quarterly basis, and also further back to 1929 on an annual basis. The tax/GDP series exhibits trends and high persistence. For example, it trends up from 3.3% in 1929 to 17.2% in 1951, before drifting down to 7.9% in 2009 and finishing at 12.0% in 2015. To account for this persistence, we focus on first differences in the tax/GDP ratio.

Table 3 shows that the tax burden tends to rise under Democratic presidents and fall under Republican presidents. Under Democrats, the tax/GDP ratio rises by 0.44% per year, on average, whereas under Republicans it falls by 0.30% per year. The Democrat-minus-Republican difference of 0.74% per year is highly significant ($t = 3.15$). Subperiod results are very similar to the full-sample results. While the individual Democrat and Republican averages are sometimes insignificant, their difference is significant in both equally long subperiods ($t = 2.07$ in 1929–1972 and $t = 3.04$ in 1972–2015). The results look similar even in all three equally long subperiods, with lower significance due to shorter samples. In short, it seems reasonable to interpret Democratic presidents as favoring more tax-based redistribution and Republican presidents as favoring less.

In our simple model, the tax rate changes as soon as the new administration is elected. In reality, it takes time for tax changes to be implemented. Our assumption has some empirical support in that tax changes tend to happen early during presidential terms. When we isolate the presidents' first year in office, the Democrat-minus-Republican difference is 2.19% per year ($t = 2.77$), three times higher than the full-term difference. When we isolate the first two years in office, the difference is 1.61% ($t = 3.85$), and when we look at the first three years, the difference is 1.08% ($t = 3.40$). All of these values exceed the full-term difference of 0.74% mentioned above. We do not tabulate these numbers to save space.

3.3. Economic Growth

Our model predicts faster economic growth under Democratic presidents. Table 4 and Figure 7 show that this is indeed the case. We obtain real GDP growth data from BEA back to 1930. In the full sample period 1930 through 2015, the average GDP growth under Democratic presidents is 4.86% per year, whereas it is only 1.70% under Republican presidents. The Democrat-minus-Republican difference, 3.16% per year, is significant both economically and statistically ($t = 2.40$).[22] When we split the full sample into two or three equally long subperiods, we find that the Democrat-minus-Republican gap is positive in all subperiods. The gap is not always statistically significant, but it is always economically significant, equal to at least 0.47% per year in all six time periods considered in Table 4.

Earlier studies report that the Democrat-minus-Republican growth gap is larger in the first half of the presidential term (e.g., Alesina and Sachs, 1988, Blinder and Watson, 2016). We confirm this finding in our longer sample. The partisan growth gap over the first two years of presidency is 3.34% per year ($t = 3.73$), which exceeds the full-term average of 3.16% per year. This evidence is consistent with the model of Alesina (1987), which predicts that the partisan growth gap should be temporary due to the adjustment of inflation expectations. It is also broadly consistent with our story in that risk aversion mean-reverts over time. If we interpret our model strictly, allowing agents to choose their occupations only when elections take place, the partisan growth gap should last throughout the presidential term. But if agents could reoptimize also in between elections, they would respond to the mean reversion in risk aversion by adjusting their occupational choices in anticipation of the next election outcome, resulting in a gradual reduction in the partisan growth gap.

3.4. Electoral Transitions

Our model predicts that the high-tax party is more likely to get elected when risk aversion is high, and vice versa. To test this prediction, we need to make some assumptions about risk aversion, which is not directly observable. In Section 2.4, we assume that risk aversion is high in a weak economy but low in a strong economy. Under that additional assumption, our model predicts that transitions from party L to party H are more likely to happen when the economy is weak, and vice versa. We now examine this prediction.

We run logistic regressions in which the dependent variable is a dummy variable indicating

[22] We follow the same approach to assessing statistical significance as in Sections 3.1 and 3.2: we regress GDP growth on the Democrat dummy D and compute the t-statistic for the slope coefficient, based on standard errors robust to both heteroscedasticity and autocorrelation.

transitions from one party to the other. The variable is equal to one for months in which one party wins the presidential election while the incumbent president is from the other party. Our sample contains five elections resulting in transitions from a Republican president to a Democratic president (1932, 1960, 1976, 1992, 2008) and four elections resulting in the reverse transition (1952, 1968, 1980, and 2000). Given the small numbers of transitions, we include only one independent variable at a time. We consider three such variables: log stock market excess return, real GDP growth, and realized market variance estimated from daily data within the month. We average each of these variables over the previous m months, where $m \in \{3, 6, 12, 36\}$. Our regressions thus examine the extent to which election outcomes depend on economic conditions over the previous three months to three years.

Table 5 shows that transitions from a Republican president to a Democratic president tend to be preceded by poor economic performance. Regardless of the horizon, such transitions are preceded by low returns, low GDP growth, and high volatility. Surprisingly, despite the low number of transitions, many of these relations are statistically significant.[23] In contrast, no relation is significant for reverse transitions from Democrats to Republicans. This evidence thus offers half-way support for the joint hypothesis that our model holds and that risk aversion is inversely related to economic conditions as measured here.

Why do we find nothing for reverse transitions? First, the power of our test is low since we observe only four such transitions. Second, risk aversion may contain a component independent of the three measures of economic conditions examined here. Finally, our model treats incumbents and challengers symmetrically, so it does not predict that incumbent presidents tend to be kicked out in bad times.[24] That fact pulls opposite to our mechanism for transitions from Democrats to Republicans, so the interaction of the two should be expected to produce a no-result such as we observe in the right column of Table 5. It could be useful to extend our model to incorporate the incumbent-challenger asymmetry. We do not attempt such an extension here. Our objective is simply to highlight a new mechanism driving political cycles, one capable of explaining the presidential puzzle.

[23] The predictive power of market volatility could make the reader wonder whether the presidential puzzle is driven by higher volatility under Democratic presidents. However, Santa-Clara and Valkanov (2003) dismiss such a possibility. We confirm that average volatility is, in fact, slightly lower under Democrats.

[24] This fact is documented by Fair (1978) and others. While this fact is not predicted by the model presented here, it is predicted by the models of Pástor and Veronesi (2012, 2013) and Kelly et al. (2016).

4. Conclusions

We develop an equilibrium model of political cycles driven by voters' time-varying risk aversion. This novel mechanism generates the presidential puzzle of Santa-Clara and Valkanov (2003) inside the model. The model implies that both stock returns and economic growth should be higher under Democratic administrations, as we observe in the data.

Our model assumes a single policymaker. This assumption ignores many complications of democratic institutional structure, such as the interaction between the executive and the legislature (e.g., Alesina and Rosenthal, 1995). Yet this assumption is often made in theoretical models in the interest of simplicity (e.g., Alesina, Roubini, and Cohen, 1997). The assumption also seems appropriate given our interest in the presidential puzzle. While Santa-Clara and Valkanov (2003) find stock returns to be related to the presidential cycle, they find no relation to Congressional variables. Similarly, Blinder and Watson (2016) find that the partisan advantage in GDP growth is correlated with Democratic control of the White House but not with Democratic control of the Congress. Nonetheless, interactions between the President and the Congress can be examined in future theoretical work.

Future work can also extend our model in other ways. Endogenizing tax rates might help us understand the time variation in those rates. Adding learning about government quality could generate asymmetries between incumbents and challengers. Allowing for heterogeneity in risk aversion could produce additional asset pricing implications. More broadly, there is much work to be done at the intersection of finance and political economy.

- **Beginning** of period t:
  - Risk aversion γ_t drawn
  - Agents born, choose $\begin{cases} \text{Occupation: } \begin{cases} \text{Entrepreneur} \\ \text{Government worker} \end{cases} \\ \text{Party: } \begin{cases} \text{High-tax} \\ \text{Low-tax} \end{cases} \end{cases}$
  - Entrepreneurs start firms, invest, trade

- **End** of period t:
  - Firms produce output $Y_{i,t+1}$, pay taxes and dividends
  - Agents consume $C_{i,t+1}$, die

Figure 1. Model overview and timeline.

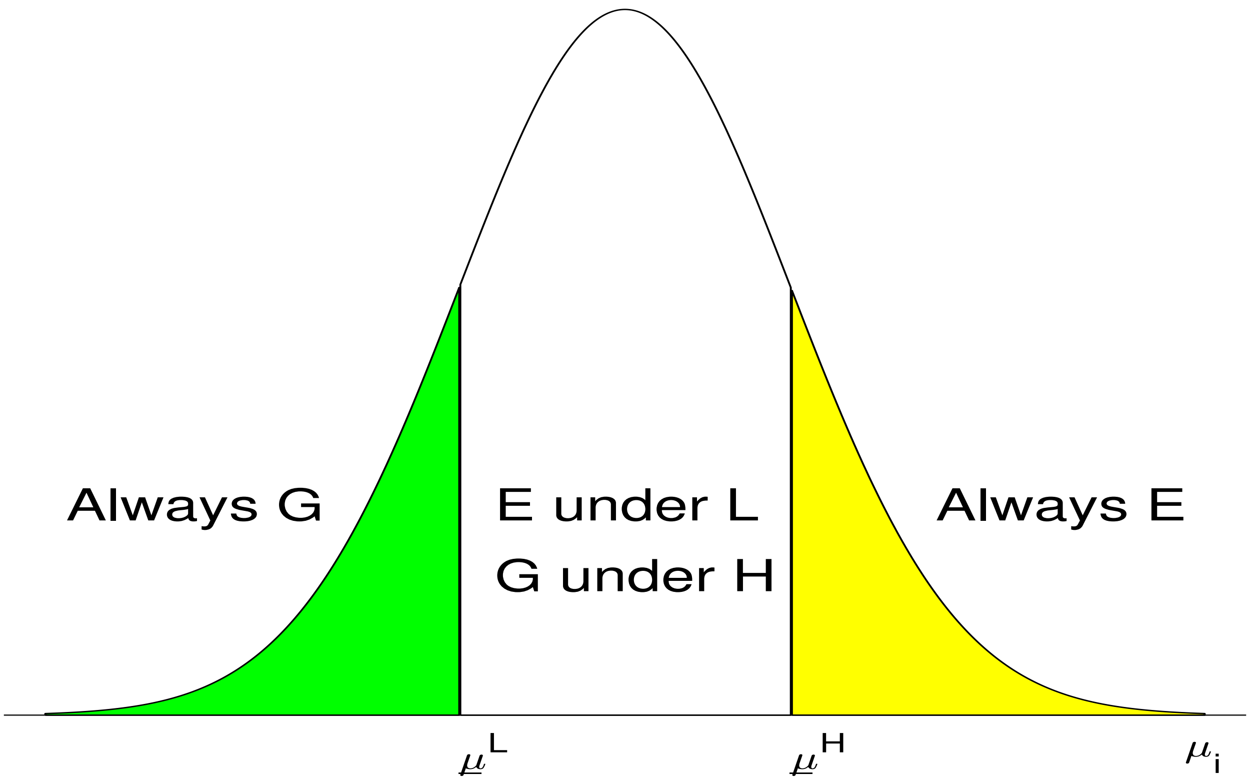

Figure 2. Occupational choice. Agents whose entrepreneurial skill $\mu_i > \underline{\mu}^H$ always choose to be entrepreneurs, regardless of which party is in power. Agents whose $\mu_i < \underline{\mu}^L$ always choose to be government workers. Intermediate-skill agents, for whom $\underline{\mu}^L < \mu_i < \underline{\mu}^H$, choose to be entrepreneurs when party L is in power but government workers when party H is in power.

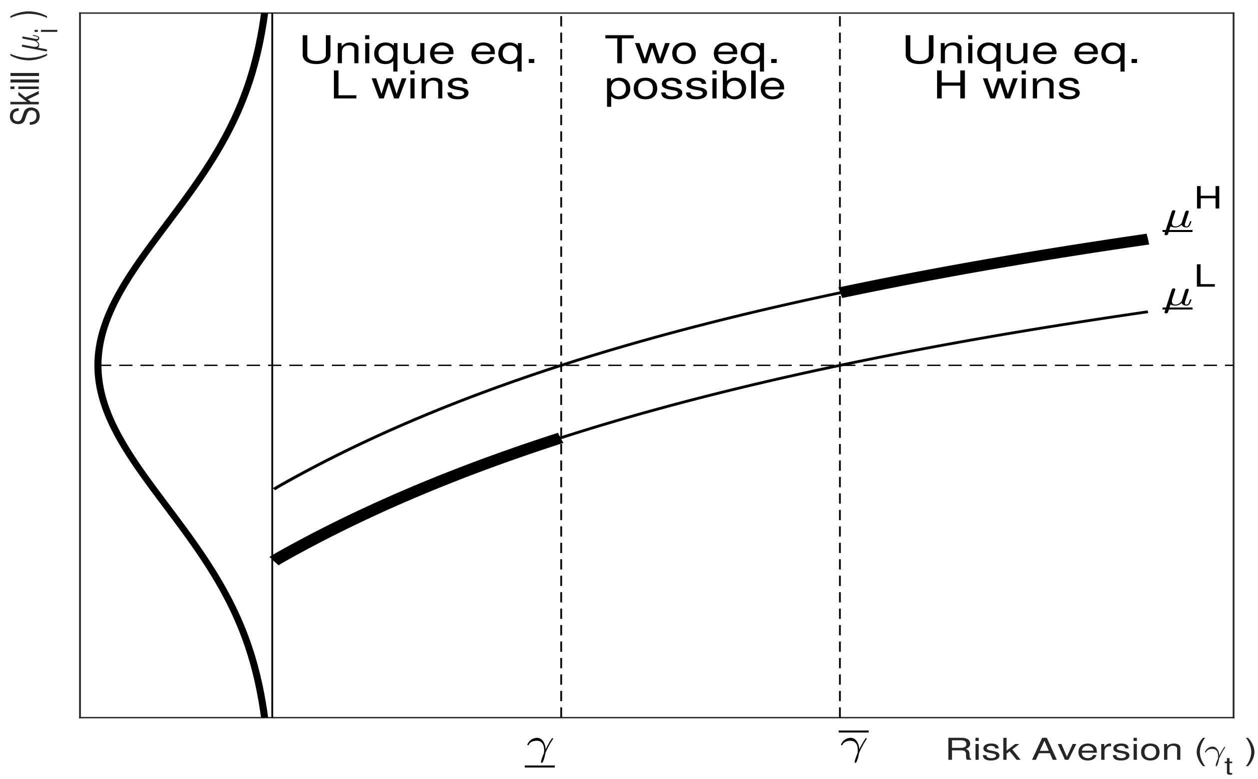

Figure 3. Equilibrium outcomes. For $\gamma_t > \overline{\gamma}$, both $\underline{\mu}^H$ and $\underline{\mu}^L$ are positive; as a result, there is a unique equilibrium in which the median voter is a government worker and party H wins the election. For $\gamma_t < \underline{\gamma}$, both $\underline{\mu}^H$ and $\underline{\mu}^L$ are negative; as a result, there is a unique equilibrium in which the median voter is an entrepreneur and party L wins the election. For $\underline{\gamma} < \gamma_t < \overline{\gamma}$, two equilibria, H and L, are possible.

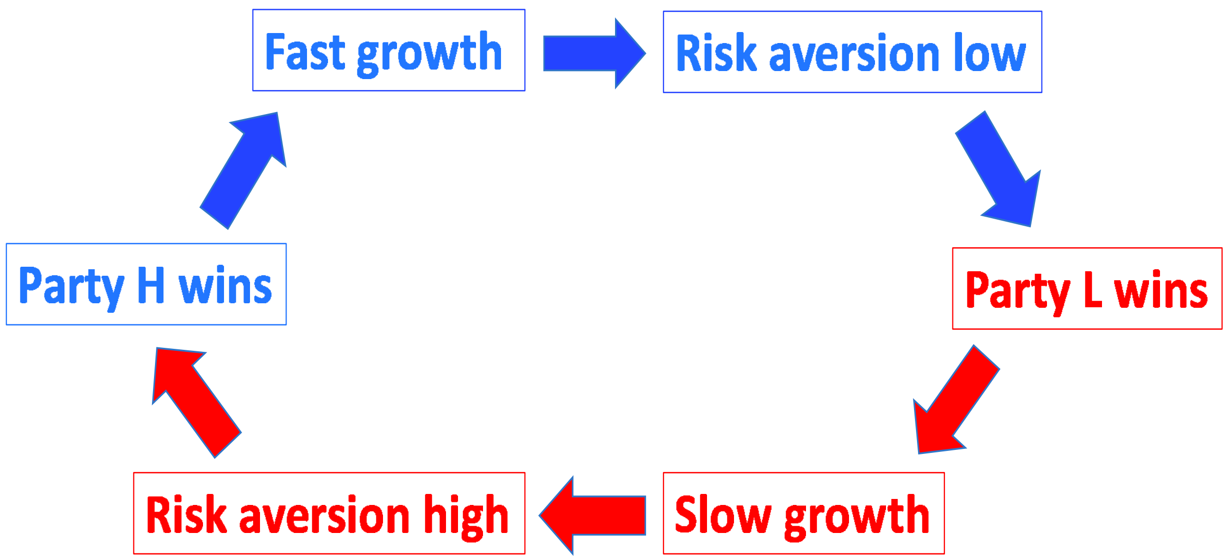

Figure 4. Political cycles under endogenous risk aversion. This figure describes the formation of political cycles in the model when risk aversion is modeled as negatively related to the state of the economy.

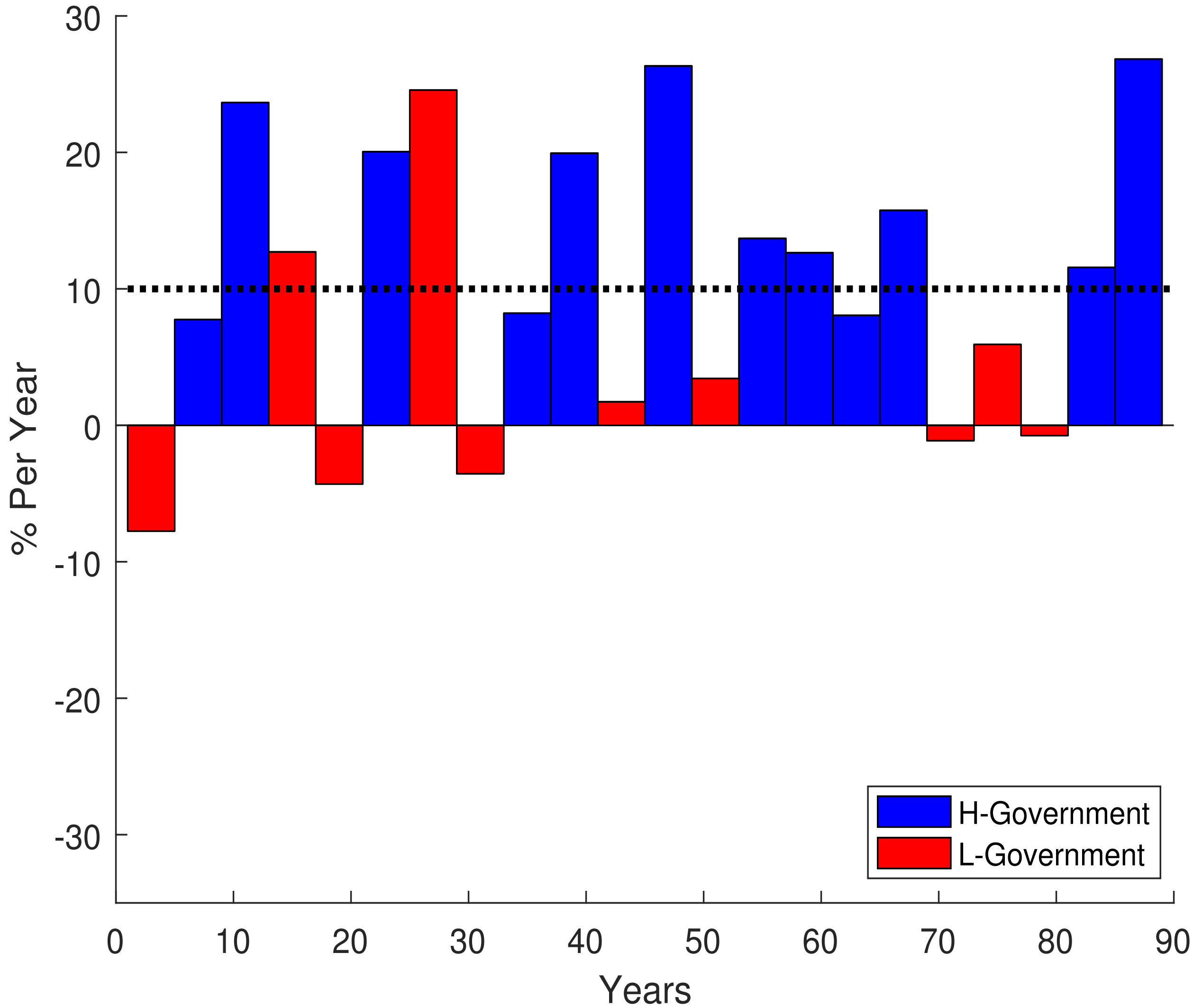

Figure 5. Average stock market returns simulated from the model. This figure plots average excess stock market returns for a 90-year-long illustrative segment of political cycles simulated from our model. The returns are plotted for periods over which party H is in power (blue bars) and periods over which party L is in power (red bars). The horizontal dotted line plots the unconditional mean return.

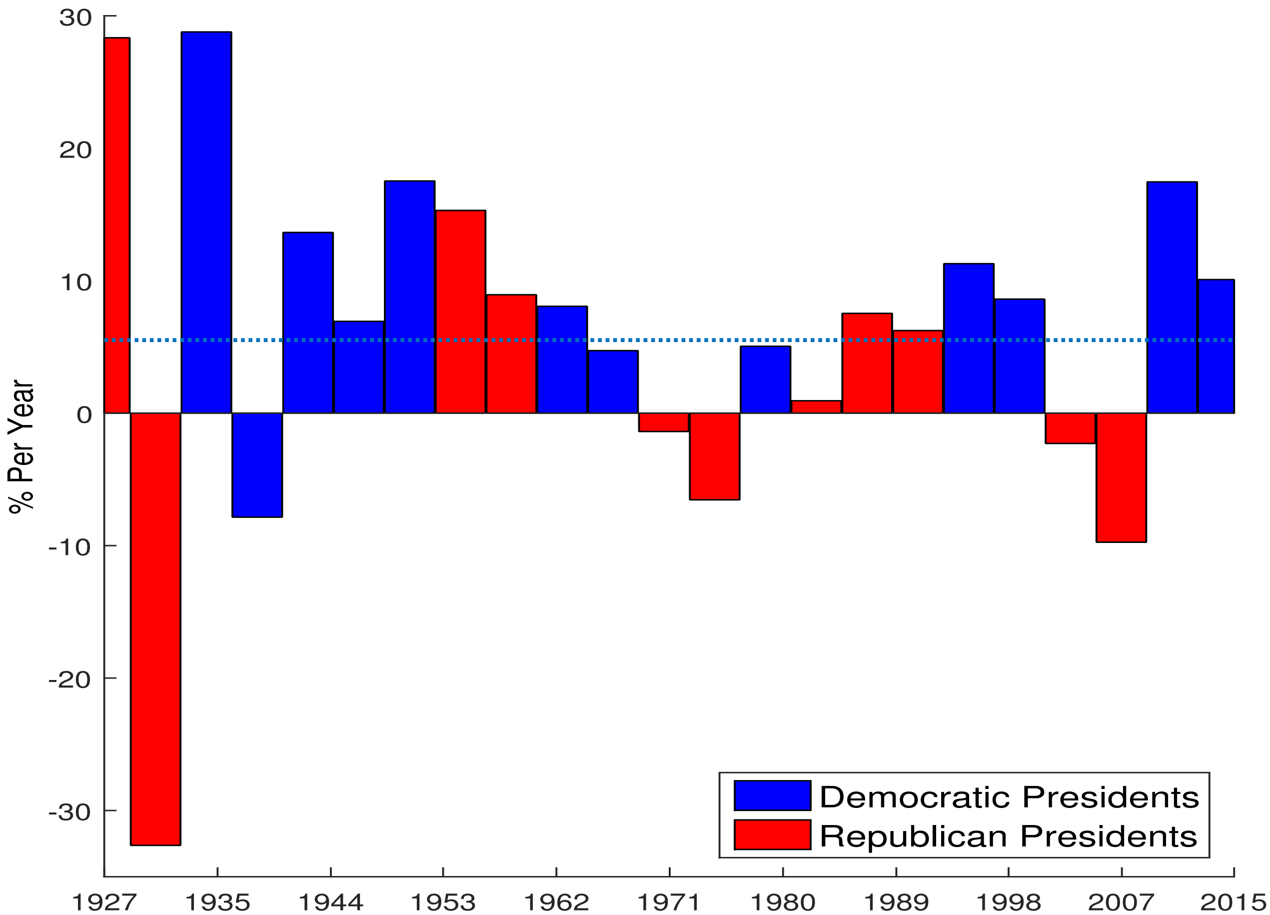

Figure 6. Average market returns under Democrat vs Republican presidents. This figure plots average U.S. excess stock market returns under each of the 23 administrations between 1927 and 2015, from President Coolidge through President Obama. We plot log returns on the CRSP value-weighted market index in excess of log returns on the three-month Treasury bill. Presidents are assumed to be in office until the end of the month during which they leave office. The horizontal dotted line plots the unconditional mean return.

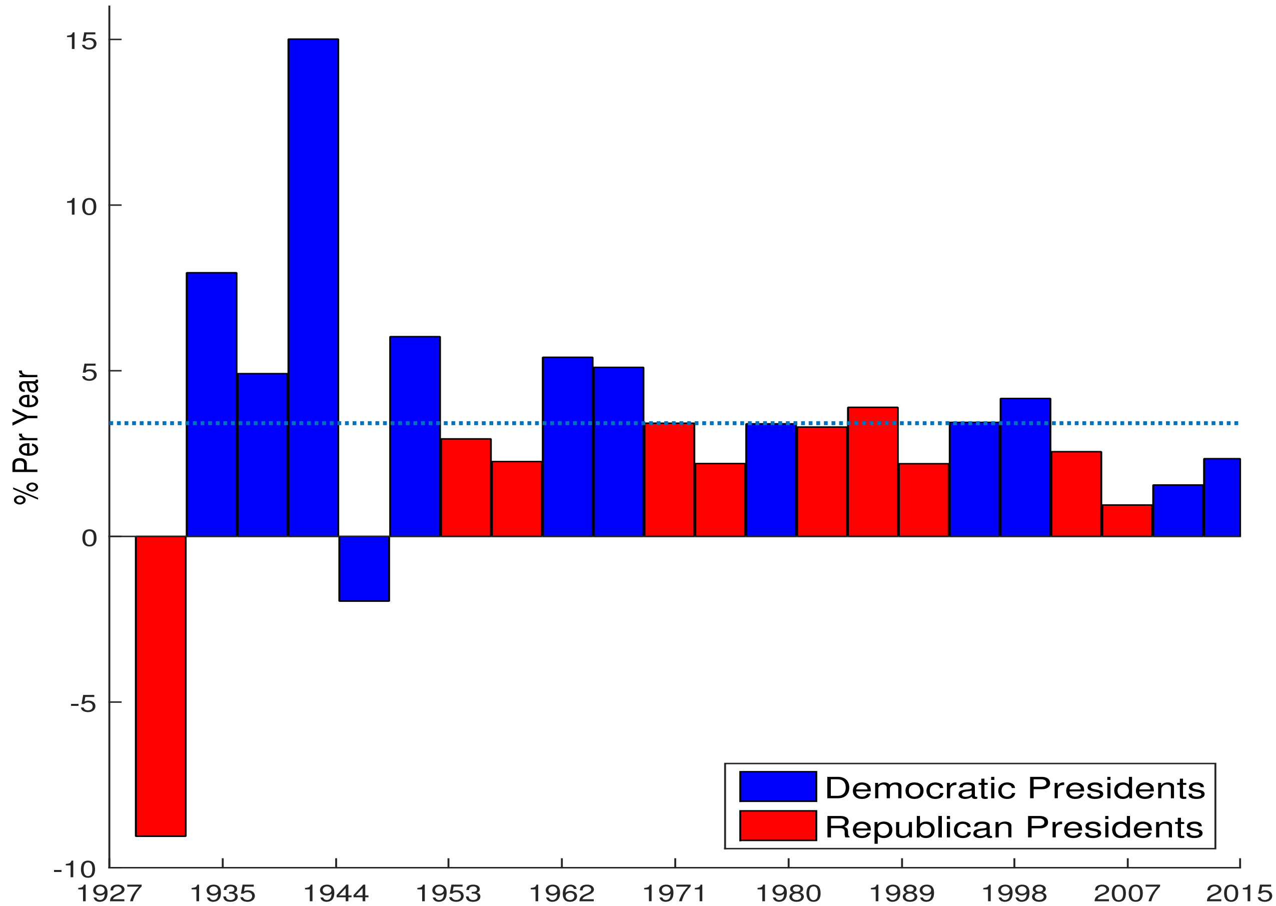

Figure 7. Average GDP growth under Democrat vs Republican presidents. This figure plots average U.S. real GDP growth under each of the 22 administrations between 1930 and 2015, from President F. D. Roosevelt through President Obama. We begin in 1930 because that is when GDP growth data from BEA begin. Presidents are assumed to be in office until the end of the month during which they leave office. The horizontal dotted line plots the unconditional mean growth rate.

Table 1
Average Stock Market Returns under Democratic and Republican Presidents

This table reports average excess stock market returns under Democratic presidents, Republican presidents, and the Democrat-minus-Republican difference. Excess stock returns are computed monthly as the log return on the value-weighted total stock market in excess of the log return on a 3-month T-bill. Returns are reported in percent per year, for the full sample period as well as for subperiods. Presidents are assumed to be in office until the end of the month during which they leave office. t-statistics, reported in parentheses, are computed based on standard errors robust to heteroscedasticity and autocorrelation.

	Democrat	Republican	Difference
1927:01–2015:12	10.69	-0.21	10.90
	(4.17)	(-0.07)	(2.73)
1927:01–1971:06	10.80	-0.20	11.00
	(2.83)	(-0.03)	(1.58)
1971:07–2015:12	10.52	-0.22	10.74
	(3.46)	(-0.06)	(2.24)
1927:01–1956:08	12.58	-1.89	14.46
	(2.51)	(-0.20)	(1.37)
1956:09–1986:04	5.94	1.38	4.57
	(1.62)	(0.37)	(0.85)
1986:05–2015:12	11.99	-0.99	12.98
	(3.49)	(-0.21)	(2.17)
1927:01–1998:12	10.52	1.15	9.38
	(3.54)	(0.32)	(2.05)
1999:01–2015:12	11.37	-6.02	17.39
	(2.48)	(-0.91)	(2.14)

Table 2
Average Stock Market Returns in the Presidents' Early Years in Office

This table reports average excess stock market returns under Democratic presidents, Republican presidents, and the Democrat-minus-Republican difference over the full sample period January 1927 to December 2015. The results are computed over subsets of presidents' terms corresponding to their first one, two, or three years in office. Full-term results are identical to those reported in the first row of Table 1.

	Democrat	Republican	Difference
Year 1 in office	21.75	-15.13	36.88
	(2.03)	(-1.94)	(2.70)
Years 1 and 2 in office	11.47	-4.08	15.55
	(1.73)	(-0.66)	(1.56)
Years 1, 2, and 3 in office	15.00	2.57	12.43
	(3.11)	(0.56)	(1.67)
Full term	10.69	-0.21	10.90
	(4.17)	(-0.07)	(2.73)

Table 3
Taxes under Democratic and Republican Presidents

This table reports average changes in the federal tax/GDP ratio under Democratic presidents, Republican presidents, and the Democrat-minus-Republican difference. Changes in tax/GDP are in percent per year, for the full sample period as well as for equally long subperiods. t-statistics, reported in parentheses, are computed based on standard errors robust to heteroscedasticity and autocorrelation.

	Democrat	Republican	Difference
1929:01–2015:12	0.44	-0.30	0.74
	(2.48)	(-1.94)	(3.15)
1929:01–1972:06	0.47	-0.26	0.73
	(1.60)	(-1.33)	(2.07)
1972:07–2015:12	0.41	-0.32	0.73
	(3.92)	(-1.47)	(3.04)
1929:01–1957:12	0.61	-0.17	0.78
	(1.51)	(-0.61)	(1.59)
1958:01–1986:12	0.17	-0.27	0.44
	(1.11)	(-1.11)	(1.52)
1987:01–2015:12	0.44	-0.36	0.81
	(3.64)	(-1.35)	(2.76)

Table 4
Average GDP Growth under Democratic and Republican Presidents

This table reports average GDP growth under Democratic presidents, Republican presidents, and the Democrat-minus-Republican difference. GDP growth is reported in percent per year, for the full sample period as well as for equally long subperiods. t-statistics, reported in parentheses, are computed based on standard errors robust to heteroscedasticity and autocorrelation.

	Democrat	Republican	Difference
1930:01–2015:12	4.86	1.70	3.16
	(4.87)	(1.96)	(2.40)
1930:01–1972:12	6.11	0.36	5.75
	(4.06)	(0.18)	(2.33)
1973:01–2015:12	3.02	2.54	0.47
	(7.12)	(4.98)	(0.76)
1930:01–1958:08	6.46	-1.86	8.31
	(3.07)	(-0.63)	(2.33)
1958:09–1987:04	4.64	3.16	1.47
	(7.09)	(4.40)	(1.50)
1987:05–2015:12	2.91	2.21	0.70
	(7.59)	(4.32)	(1.27)

Table 5
Predicting Electoral Transitions

This table reports the estimated slopes and their t-statistics from a logistic regression model. The left-hand side variables, given in column headings, are dummy variables that are equal to one if the given electoral transition occurs in the current month and zero otherwise. The left column reports results for elections resulting in transitions from a Republican president to a Democratic president. The right column corresponds to transitions from a Democratic president to a Republican president. Each regression has a single right-hand side variable. The right-hand side variables are log stock market return in excess of the risk-free rate, real GDP growth, and realized market variance estimated from daily data within the month. Each right-hand side variable is the average of the corresponding quantity computed over the previous m months, where $m \in \{3, 6, 12, 36\}$ varies across the four panels.

	Transition from Republicans to Democrats	Transition from Democrats to Republicans
	Panel A. Lag of 3 months	
Stock return	-13.66	-0.32
	(-1.33)	(-0.02)
GDP growth	-0.17**	-0.01
	(-2.38)	(-0.12)
Market variance	10.66***	-10.00
	(3.38)	(-0.43)
	Panel B. Lag of 6 months	
Stock return	-16.19	10.94
	(-1.03)	(0.48)
GDP growth	-0.17**	-0.04
	(-2.26)	(-0.38)
Market variance	12.35***	-11.39
	(2.57)	(-0.47)
	Panel C. Lag of 12 months	
Stock return	-36.44**	11.99
	(-2.09)	(0.39)
GDP growth	-0.14*	-0.02
	(-1.80)	(-0.22)
Market variance	13.58**	-6.67
	(2.02)	(-0.34)
	Panel D. Lag of 36 months	
Stock return	-66.33**	60.22
	(-2.46)	(0.93)
GDP growth	-0.17*	0.07
	(-1.95)	(0.66)
Market variance	12.59	-20.56
	(1.15)	(-0.65)

*: significant at 10% level; **: significant at 5% level; ***: significant at 1% level

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