

When Investors Enjoy Less Policy Risk: Divided Government, Economic Policy Change, and Stock Market Volatility in Germany, 1970–2005

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How does divided government affect the probability of economic policy change, and thus policy risk on financial markets? In contrast to the standard balancing model we argue that divided government, i.e., partisan conflict between the executive and the legislative branches, negatively affects the possibility of economic policy change. Using a simple spatial model we demonstrate that one should expect divided government to increase the probability of policy gridlock. Since divided government reduces the probability of economic policy change, financial markets can operate under lower policy risk in times of divided than in periods of unified government. For the empirical evaluation we exploit the fact that stock return volatility provides us with a measure of risk. If the gridlock argument does hold, stock return fluctuations should be lower under divided than under unified government. Our results confirm that divided government has a volatility reducing effect on the German stock market. This supports the view that divided government lowers policy risk.

KEYWORDS: Divided Government • Gridlock • Spatial Model • Policy Risk • Stock Market • Volatility • Germany • GARCH Modeling

Introduction¹

Divided government, i.e., “partisan conflict between the executive and the legislative branches” (Menefee 1991: 643), is a feature common to many democracies all over the world (Elgie 2001). Unsurprisingly, research on the economic and political consequences of divided government enjoys great popularity in the scientific community. While Alesina and Rosenthal

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(1995) analyzed the impact of divided government on economic key parameters such as growth and inflation, most studies concentrated on the impact of divided government on public policy in the U.S. (Mayhew 1991; Epstein and O'Halloran 1996; Coleman 1999; Howell et al. 2000). Only few studies have examined more subtle effects of divided government on trade (Karol 2000) and budgetary policies (Poterba 1994, McCubbins 1991), discretion granted to the executive branch (Epstein and O'Halloran 1996), and inflation risk (Fowler 2006). This paper identifies the reduction of stock market volatility as an empirically observable implication of divided government, which up to now has not received scholarly attention. We argue that divided government reduces the possibility of policy change, by that increasing the predictability of future economic policies. Therefore, under divided government stock markets can operate under lower policy risk.

We empirically evaluate whether divided government reduces policy risk on financial markets using daily German stock market data from 1970 to 2005. Exploiting the fact that return volatility provides us with a measure of risk, if the gridlock argument does hold, we should see return fluctuations to be lower under divided than under unified government. Our estimation results from least squares regressions, generalized autoregressive conditional heteroskedasticity (GARCH), and exponential GARCH (EGARCH) models show that divided government is indeed associated with less policy risk. This finding suggests that the gridlock perspective is superior to the policy moderation model.

The contribution of this article is twofold. First, this study increases our knowledge about the economic effects of divided government. Indeed, stock market volatility nowadays is a key factor in asset allocation, portfolio optimization, and risk management. Since political uncertainty drives systematic risk, which cannot be diversified, risk plays a crucial role for investors and their decision about whether to invest in capital markets. Our results emphasize the importance of institutional characteristics, thereby adding to the increasing body of literature on the relevance of politics and political institutions for stock market performance (Füss and Bechtel 2008; McGillivray 2004; Roberts 1990). An implication of this finding becomes apparent if viewed against the fact that to the extent financial actors are risk averse, high stock market volatility deters capital investors. Consequently, although political systems which use devices of power sharing may not be able to react as quickly to exogenous shocks as less consensual systems,

they may benefit from an advantage when it comes to attracting capital investment.

Second, our findings are relevant to the vast body of literature on the electoral causes of divided government. For example, Kedar (2006), Kern and Hainmueller (2006), and Lohmann et al. (1997) argue that middle-of-the-road voters intentionally bring about divided government by voting for parties whose ideal points may strongly differ from their own preferred policies (see also Garand and Lichtl 2000; Born 1994). Such reasoning takes as given Fiorina's (1991) balancing model, which assumes that divided government leads political actors to compromise on moderate policies, thereby leaving voters located at the center of the policy space better off under divided than under unified government (compensational voting). However, theoretically and empirically our analysis suggests that divided government does not result in policy moderation, which casts doubt on whether policy moderation based explanations of divided government are valid.

Previous Research

Divided government has received widespread scholarly attention. Many studies use assumptions about the effect of divided government in order to theorize about its causes. The most prominent examples are policy moderation based explanations for compensational voting (Kedar 2006) and the midterm loss phenomenon (Kern and Hainmueller 2006; Garand and Lichtl 2000; Lohmann et al. 1997). Based on the balancing model (Fiorina 1991), which assumes that divided government leads to the production of more moderate (economic) policies, voters located at the middle of the ideological spectrum are supposed to vote for extreme parties in order to bring about divided government, because this forces parties to compromise on more moderate policies.

Research on the economic consequences of divided government shows that partisan conflict of the executive and the legislative branches influences trade (Karol 2000; Lohmann and O'Halloran 1994) and budgetary policies (Alt and Lowry 1994; Poterba 1994; McCubbins 1991). Poterba (1994) finds that budget deficit reduction in the U.S. states is lower under divided than under unified government and Roubini and Sachs (1989) conclude that unified governments "respond more (and more quickly) to income shocks" (p. 823). O'Halloran (1994) and Lohmann and O'Halloran

(1994) argue that there is a central tendency of U.S. presidents to promote free trade. Such economic policy is more likely to find necessary political support if the party of the president controls the majority of congressional seats. In contrast, in times of divided government the president will be less successful in being granted authority to negotiate free trade agreements and thus, protectionist interests might prevail. Also Milner and Rosendorff (1997) conjecture that international trade agreements are less likely to be ratified under divided government. The evidence suggests that the level of non-tariff barriers significantly increases if there is partisan conflict between Congress and the President (Lohmann and O'Halloran 1994). More recently, Fowler (2006) finds that inflation risk is significantly lower in the U.S. if the party of the president does not control the majority in Congress.

Some research has also been done on the political effects of divided government in the United States. Based on an inspection of about 270 major statutes enacted between 1947 and 1990, Mayhew (1991) concludes that there is no clear difference between law production under unified and divided government: "On average, about as many major laws passed per Congress under divided control as under unified control" (p. 639). However, examining successful legislation may lead to biased inferences, as promising statutes could generally be more likely to be supported by both parties. Therefore, Edwards et al. (1997) regress the number of potentially important yet failed bills on a dummy variable which equals 1 in times of divided government and is 0 in periods of unified government. The results suggest that the probability of important legislation failing to pass increases by about 45 % under divided government. In a thorough analysis Coleman (1999) finds evidence supporting the conjecture that in the U.S. unified government is much more productive as regards the quantity of important legislative enactments. Howell et al. (2000) estimates that "periods of divided government depress the production of landmark legislation by about 30%, at least when productivity is measured on the basis of contemporaneous perceptions of important legislation" (p. 302).

We argue that divided government decreases policy risk on financial markets, because the probability of policy change is much lower under divided than under unified government. In order to empirically evaluate this claim, we examine the effect of divided government on stock return volatility, a standard measure of risk. If our theoretical argument is correct,

we should find stock return volatility to be lower in times of divided than in periods of unified government.²

Economic Policy Change: Moderation or Gridlock?

In order to generate rival empirically observable implications in what follows we first ask what predictions can be derived from Fiorina's (1991) balancing model with regard to the possibility of economic policy change under unified and divided government. Using this as our theoretical baseline we then set up a simple spatial model to demonstrate that under any but extreme conditions, divided government decreases the risk of policy change, because there is no policy alternative which all veto players prefer over the status quo.

Unified and Divided Government in the Balancing Model

The message of the balancing model by Fiorina (1991, 1992) and Alesina and Rosenthal (1995) is remarkably simple: If there are two parties with heterogeneous ideal points and both have to agree in order to enact a policy, the result will "be a weighted average of the positions of the parties that control each institution" (Fiorina 1992: 401). Let players i be parties (or party coalitions) $i \in I = \{l, r\}$. Players have symmetric, single-peaked utility functions U_i defined on a unidimensional left-right economic policy space $S \subseteq \mathfrak{R}$ with Elements s . In order to economize on notation, i also denotes the element in S which globally maximizes $U_i(s, i)$, i.e., $s = i$ is i 's ideal or bliss point. Suppose that l is the left-leaning and r is the right-leaning party or coalition, so $l < r$. For simplicity we assume that party leaders are sufficiently strong in order to ensure a high degree of party cohesion.³

² Although the use of stock market data constitutes a departure from more traditional approaches to estimating the economic effects of divided government, it should be noted that such data is increasingly used in order to learn about the impact of politics and political institutions on the economy and financial markets in particular (Bechtel 2008; Füss and Bechtel 2008; Herron et al. 1999; Roberts 1990). For example, McGillivray 2004 tests hypotheses on the redistributive economic effects of electoral systems and changes in government partisanship using stock returns. Gilligan and Krehbiel (1988) utilize stock market reactions for assessing the impact of different legislative decision rules in congress on the probability of certain policy outcomes.

³ This is a common assumption in spatial models of decision-making (see Krehbiel 1998, 1996). Certainly, it may be more or less valid depending on the system and period under

Now suppose a period of unified government, i.e., one party, say l , controls both the executive and the legislative. Of course, the adopted policy will be l , i.e., the party will implement its ideal economic policy.

Consider a period of divided government. The balancing model posits that in case there is partisan conflict between the executive and legislative branches (or the upper and lower chamber in our case), the chosen policy results from a bargaining process depending on l 's and r 's ideal point and l 's bargaining strength $\lambda \in \{0,1\}$. Let Z_b denote the zone of agreement under the balancing model, then $Z_b = \{s \in S \mid s = \lambda l + (1-\lambda)r\}$. Figure 1 illustrates the situation. From this perspective, divided government merely enlarges the set of possible policies, and therefore, it is less clear which policy will eventually be enacted. Any policy between l and r seems possible *ex ante*. But more importantly, gridlock is not a prediction which can be derived from the balancing model. This contrasts sharply with the opinion practitioners as well as many scholars hold about the impact of divided government on law production. In a concise review of the literature on the causes and consequences of divided government, David Brady (1993) emphasizes that most scholars "still believe that the consequences of divided government are stalemate and gridlock" (p. 192).

Divided Government and the Gridlock Argument

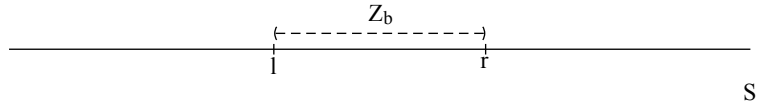
In contrast to the balancing argument, a widespread perception is that there are pronounced differences in the possibility (and direction) of policy change under divided and unified government. To see that, let $q \in S$ denote the status quo and define i 's acceptance set: $A_i = \{s \in S \mid U_i(s) > U_i(q) \wedge s \neq q\}$. Trivially, under unified government i will choose its own ideal point i as the new status quo. Now consider a period of divided government and construct the acceptance sets A_l and A_r . The zone of agreement or unanimity core can then be defined as $Z_g = \bigcap_{i \in I} A_i$.

We regard the size of the unanimity core Z_g as a measure of policy risk, because if this set is very large, many policy proposals exist which are preferred over the status quo. The risk of policy change can then be considered

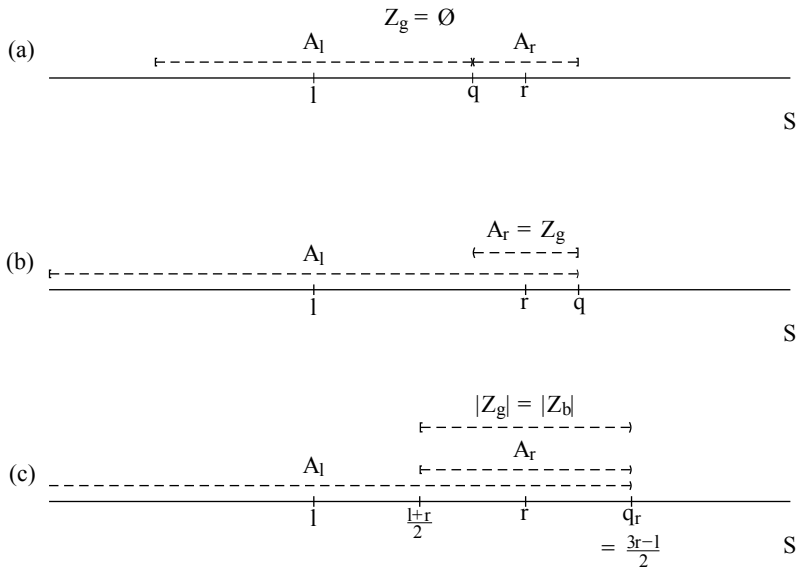
consideration. In case of the U.S., party strength may for example generally be considered to be lower than in European (parliamentary) systems, where party leaders possess coercive mechanisms which induce a high degree of party cohesion (Cox and McCubbins 1992; Döring 1995). Since we intend to apply the model to the German political system where party discipline is very pronounced, this assumption can be considered a reasonable simplification.

Figure 1: Economic policy change potential under divided government.

Balancing model



Gridlock model



to be very high. In contrast, if this set is empty, there exists no policy alternative on which all players agree. The probability of policy change, i.e., policy risk, is zero in this case. In order to make statements about the level of policy risk, define the volume $|Z_g|$ to be the length of the corresponding interval on S as measured by the distance function $d(s_1, s_2) : S \times S \rightarrow \mathfrak{R}$.

Imagine again a period of divided government, and in order to ensure direct comparability with the initial configuration used in the balancing model, suppose the location of l and r has not changed. It is not difficult to show, that under any but extreme conditions Z_g is relatively small or empty. For that consider the following three mutually exclusive and commonly exhaustive cases (see also Figure 1). (a) Suppose that $q \in [l, r]$, which means that the status quo can either be equal to l or r 's bliss point or may be located anywhere between l and r . In this case, the zone of agreement is

the empty set, because there is no policy on which both parties would agree given the location of the status quo. The risk of policy change is zero. (b) Now suppose a much less moderate location of the status quo where either $2l - r < q < l$ or $r < q < 2r - l$, which means that the status quo is even more extreme than the ideal point of the left-leaning or the right-leaning party. In this case, there are economic policies which are preferred over the status quo by both parties, but $|Z_g| = |A_l| \cap |A_r| < |Z_b|$, i.e., from the perspective of the gridlock model, policy risk is still strictly lower than what the balancing model would predict. (c) Finally, suppose that either $q < 2l - r$ or $q > 2r - l$. Then, there are policies which both players prefer and since $|Z_g|$ is now larger than $|Z_b|$, in this scenario policy risk is at least as high as predicted by the balancing model.

The gridlock perspective tells us that there is room for policy change only in scenarios (b) and (c). But is it reasonable to assume the status quo to be located either to the (extreme) right of r or to the left of l ? For that we need to switch to a more dynamic setting. Suppose a period of unified government. The party in government will implement its ideal point. Then, elections take place and produce a period of divided government. If ideal points remain the same, divided government still equals case (a). Only if the party which held government in the previous period (under unified government) changes its ideal point toward her political opponent, we are in case (b) and there is room for policy change.⁴ If the preference shift is very strong, the status quo is left far enough away from the player closest to q so that the unanimity set is as large or even larger than Z_b .

Obviously, cases (b) and (c) require additional explanatory effort in order to be justified as describing plausible scenarios. Are these additional conditions likely to be met in reality? Although the evidence shows that there is movement of parties' ideal policies across time, these changes are remarkably moderate (Franzmann and Kaiser 2006; Budge et al. 2001). Most importantly, recent research suggests that parties do not react to past election results by adjusting their policy positions (Adams et al. 2004). Thus, at best (b) and (c) seem to be special cases which do not depict generic situations. In sum, divided government should have a stability-enhancing effect in which the status quo is unlikely to be replaced, by that reducing the risk of policy change.

⁴ Another possibility is of course that both parties move together such that q is no longer an element of Z_g .

At this point, we need to address several possible objections. First, the previous analysis takes ideal point heterogeneity of parties as given. However, there is solid evidence in favor of party positions being strongly and persistently polarized – not only, but also – in Germany (Budge et al. 2001). This finding remains robust across different ideal point estimation methods (Debus 2007; Franzmann and Kaiser 2006). Thus, assuming heterogeneity of parties' ideal points in the country to which the model is applied in the subsequent empirical analysis seems justified. A second objection could be that divided government may not affect legislation which is relevant to the economy. This view may stem from a reading of the German basic law, which suggests that the second chamber (Bundesrat) only has veto powers when the states (Länder) have responsibility under the basic law. But as is well-known by scholars of German politics (Scharpf 1988) in reality most federal legislation on economic issues, such as employment benefits, social insurance, industrial policy, labor participation/co-determination rights, worker protection, working hours, early retirement and vocational training require the consent of both chambers. Therefore, if the opposition controls the second chamber, it enjoys extensive legislative veto power on economically important legislation (Bräuninger and König 1999). Moreover, the fact that most federal laws are administered by state bureaucracies additionally increases the leverage of the states (Degenhart 2007).

Third, it could be argued that the model is too simple, as it only takes into account those two players which control the upper and the lower chamber. For example, also the German federal constitutional court could be considered a veto player in the German political system (Komorowski and Bechtel 2006). However, incorporating additional veto players in the model would not weaken the conditions which have to be met in order for policy change to occur. At best, adding veto players leaves the unanimity core unchanged. This happens if the ideal point of this additional veto player either falls within the range of the unanimity core or coincides with the ideal point of another player. But if there is at least some small heterogeneity of interests, the conditions required for policy change to be possible get even more restrictive than they already are. This is because $\bigcap_{i \in I} A_i$ can not get larger if more players are added.

A fourth objection could be that we do not take into account transaction costs. But again, transaction costs would at best leave the set of policies whose net benefit to all relevant players is higher than the utility generated by doing nothing (preserving the status quo) unchanged. This would hap-

pen if transaction costs were zero, which is exactly what we have assumed. Under non-zero transaction costs, the utility derived from the policy with which the status quo is replaced must be even larger, as it now also has to outweigh transaction costs arising from changing the status quo. Therefore, the conditions required for policy change would get even more restrictive and consequently, the predictions of the model would not be weakened if additional players or transaction costs were taken into account.

Finally, one might argue that we present a tractable one-dimensional model of divided government and ask how the predictions change in multi-dimensional setting. The answer is twofold. First, a sufficient condition for the predictions of the gridlock and the balancing model to hold in the presence of multiple dimensions is that of “intermediate preferences” (Grandmont 1978). The intermediate preferences condition requires actors’ heterogeneity to be limited in that their preferences for a multidimensional policy can be projected on a unidimensional policy space. This condition is of course satisfied if all ideal points lie on a single line, i.e., they form an implicit dimension. Clearly, the intermediate preferences condition is trivially satisfied in our application. This is because studying divided government in our case means to consider at most two actors. Connecting their ideal points always forms a single dimension (given their ideal points are unequal) on which they can be located, even if the policy space has more than one dimension. Thus, the model presented here extends to a policy space of arbitrary dimensionality. Second, however, it is not our intention to add yet another model to the extensive theoretical literature on the consequences of multidimensionality on policy stability. In that respect, this study would not make a contribution, since the consequences are – at least in theory – well-known.⁵

Rather, our contribution lies in (1) demonstrating how the most prominent spatial models of politics can be used to study the (economic) consequences of divided government (in Germany), (2) showing that these models generate rival and refutable empirical predictions regarding the effect of divided government on policy risk present on financial markets, and (3) evaluating which model is superior empirically.

The balancing model predicts that divided government greatly enlarges the set of possible policy alternatives if compared to unified government, where one party determines policy. This leads us to expect that since policy

⁵ The most prominent work is McKelvey’s (1976) Chaos Theorem, the Plott (1967) condition and Shepsle’s (1979) structure induced equilibrium. See Mueller (1997) for a treatment of this vast body of work.

risk increases if we switch from unified to divided government, also uncertainty on the financial market place increases. This prediction contradicts the gridlock perspective, where divided government is associated with a decrease in policy risk, which reduces uncertainty in the economy. The reason is that under any but extreme conditions, there is no scope for political action, because the unanimity core is empty.⁶

How does this affect investors' trading behaviour, and in turn, stock market volatility? If divided government indeed produces reliable, long-term policy stability, financial theory, e.g., the capital asset pricing model (CAPM) (Sharpe 1964; Lintner 1965), posits that in equilibrium such a reduction in policy uncertainty must be reflected by lower systematic risk. If capital markets work, the reward-to-risk ratio must be identical for all risky assets. Thus, if divided government implies lower policy uncertainty, in the long-term it places a bound on the variance of the market portfolio, which is lower than that during periods of unified government (Elton et al. 2007: 286–94).

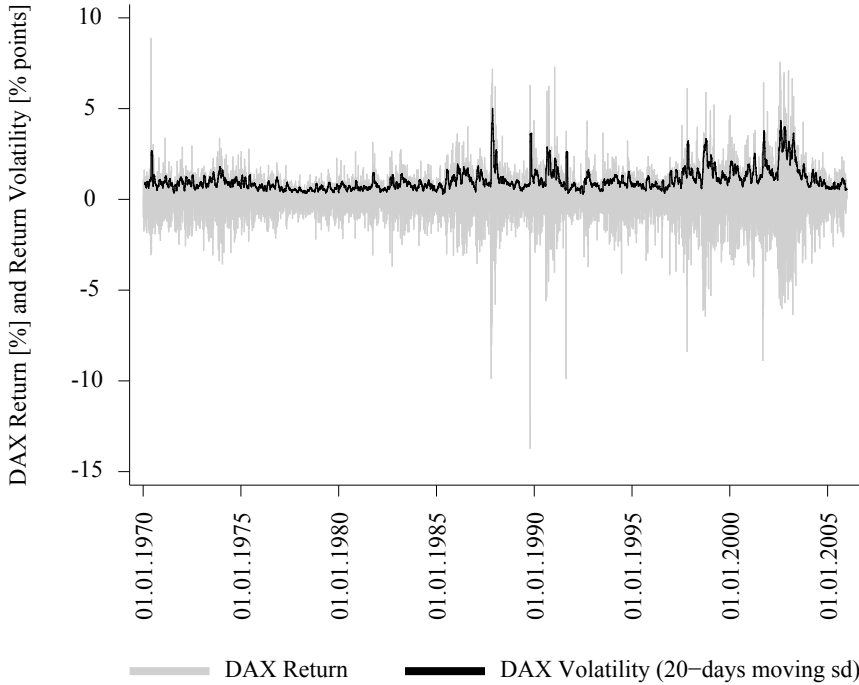
In our case, the important point is that long-term expectations about future policy conditions should be less uncertain during periods of divided government, which means they fluctuate less strongly. In other words, increased policy stability decreases the variance in investors' return expectations leading to a reduction in stock market volatility. Based on this relationship we expect that volatility is lower in periods of divided government, by that lending support to the gridlock model. In contrast, if the balancing model is superior, divided government should increase policy uncertainty leading to higher stock market volatility.

Empirical Estimation

In order to evaluate whether divided government is systematically associated with lower policy risk, we use daily German stock market data from 1970 to 2005 (9'266 observations). Examining the effect of divided government for stock market volatility on data from Germany is especially interesting, since much of the empirical evidence for the electoral causes of divided government is based on the analysis of data from the German

⁶ Krehbiel (1998, 1996) concludes that in general gridlock is equally likely under unified and divided government. Our theoretical predictions differ, mainly because he incorporates a supermajoritarian veto player, the filibuster pivot, which is specific to the U.S. political system.

Figure 2: DAX returns and volatility, 1970–2005.

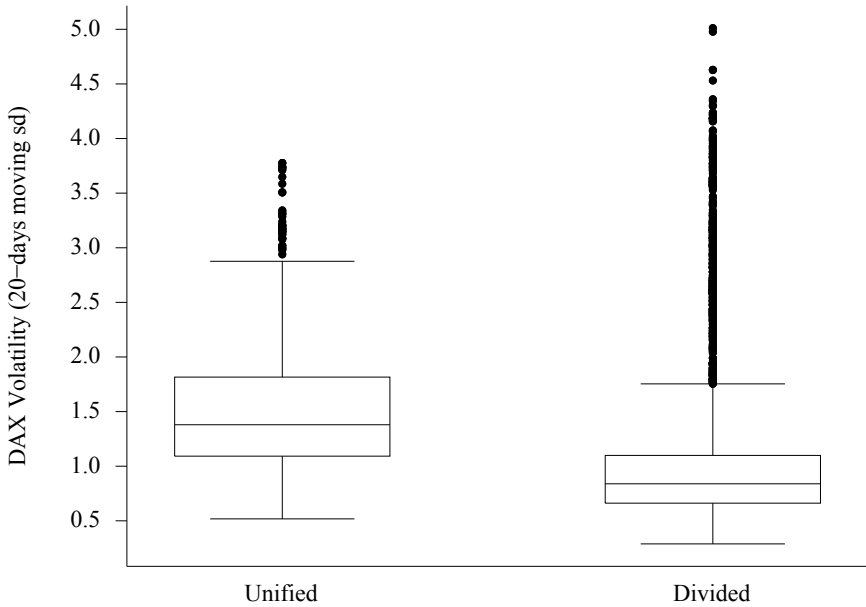


political system (Kedar 2006; Kern and Hainmueller 2006; Lohmann et al. 1997). Thus, in order to assess whether the assumption past studies have made about the consequences of divided government is justified, the use of German data seems particularly suitable.

Let p_t denote the continuously compounded return p at time t defined as $p \equiv \ln P_t - \ln P_{t-1}$, where P_t is the stock price at time t . Our dependent variable is *Financial Risk*, which is the return volatility of the major German stock market index (DAX). Following the standard approach in financial economics, we first define volatility as the 20-day moving sample standard deviation of the return.⁷ In the robustness section we will show that our substantial conclusions remain unchanged if we use a different opera-

⁷ Another possibility to measure volatility would have been to use the V-DAX data. However, this series starts not until 1994 and also experienced several crucial changes in how it is calculated. Therefore, we need to rely on our volatility measure calculated from the DAX return series. Augmented Dickey-Fuller as well as Phillips-Perron unit root tests reject the null of non-stationarity of both, the DAX return and volatility series. Since the return and volatility series are $I(0)$, fractional integration is not an issue.

Figure 3: DAX return volatility by divided government, 1970–2005.



tionalization. Figure 2 plots both, the DAX return and the return volatility series.

Our main explanatory variable is *Divided*, which equals 1 if the party in government holds the majority in both legislative chambers of Germany's federal system (Bundestag and Bundesrat) and takes on the value 0 otherwise.⁸ In order to gain a first graphical impression whether volatility under divided government is different from volatility under unified government, we use ordinary box-plots. Figure 3 shows box plots of stock market vola-

⁸ It could be argued that the meaning of the term "divided government" depends on the political system one has in mind. In the U.S. it means that the president and the majority in the legislature (Congress) do not belong to the same party. In Germany a party or party coalition is controlling the executive if and only if it controls the majority in the first chamber (Bundestag). However, if the Bundesrat (the second chamber) is under control of opposition parties, the opposition enjoys extensive legislative veto power. Thus, the situation is comparable to what is being called "divided government" in the U.S. in the sense that there is "partisan conflict between the executive and the legislative branches" (Menefee 1991: 643). Note that periods of grand coalitions, which only occur once at the end of our sample (in the second half of 2005), are coded as unified government. However, our conclusions remain the same if we recode this period as divided. Also, when deciding whether government is divided or unified we do not take into account state governments formed by a grand coalition.

tility distinguishing between divided and unified government. What can be seen with the naked eye is that volatility is on average higher under unified than under divided government, with the difference being about 0.5% points. Also statistically, this difference is pronounced. A one-sided two-sample Wilcoxon rank-sum test soundly rejects the null of volatility being the same under unified and divided government ($p < 0.000$).⁹ Of course, examining the influence of divided government more systematically requires controlling for other variables and applying an appropriate statistical model. Since we intend to use a 20-day moving standard deviation of DAX returns as our dependent variable, there is strong need to account for autocorrelation. The residuals of a regression with rolling return volatility as the dependent variable will almost surely be autocorrelated and therefore, although parameter estimates remain unbiased, their standard errors will be deflated. Thus, a least squares regression with Newey-West standard errors adjusted for a lag structure of order 20 seems most appropriate. By that our inferences remain robust against non-spherical disturbances.

Table 1 displays results from several model specifications in which we regressed *Risk* on our key explanatory variable *Divided* and several economic variables, which are standard in political economy and financial economics. We control for *Inflation*, the differenced daily money market *Interest* rate, and gross domestic product per capita (*GDP pc*).¹⁰ In order to pick up influences from political factors, we construct a comprehensive set of political control variables. Federal election dummies account for volatility effects from pre-electoral uncertainty before German federal elections from 1970 to 2005. This is important as some argue that pre-election periods are associated with additional policy uncertainty (Pantzalis et al. 2000). Also one might conjecture that coalition formation affects financial uncertainty, because it is unclear what government policy eventually will be until parties reach an agreement. Therefore, coalition formation indicators control for increased risk in the market because of coalition formation periods following Federal elections. A third battery of controls should account for confounding effects from state-level pre-electoral uncertainty: These equal 1 the week previous to state elections taking place in the German Bundesländer (state election dummies) and are 0 otherwise. Finally, a fourth set of dummy variables is intended to pick up effects from other

⁹ Applying a one-sided instead of a two-sided test does not change this result.

¹⁰ Results from unit root tests clearly suggest that these variables are stationary.

Table 1: The effect of divided government on unconditional stock market volatility, 1970–2005.

	(I)	(II)	(III)	Jackknife estimate	Jackknife SE
Divided	-0.483*** (0.074)	-0.470*** (0.074)	-0.414*** (0.079)	-0.414*** 0.018***	0.019 0.000
Interest Rate	-0.032*** (0.008)	-0.031*** (0.008)	-0.035*** (0.009)	-0.035*** 0.002***	0.002 0.000
Inflation (Δ)	-0.013 (0.058)	-0.010 (0.059)	0.018 (0.056)	0.018 0.082***	0.057 0.005
GDP pc (Δ)	0.000 (0.001)	0.000 (0.001)	0.001 (0.001)	0.001 0.001***	0.001 0.000
EMS92			0.610*** (0.036)	0.610*** 0.152***	0.028 0.022
Asian financial crisis			0.536** (0.186)	0.536*** 0.042***	0.048 0.002
Russian financial crisis			0.908*** (0.105)	0.908*** 0.165***	0.105 0.027
Constant	1.644*** (0.018)	1.625*** (0.076)	1.551*** (0.078)	1.551*** 0.019***	0.019 0.000
Elections (federal and state)		x	x	x	
Coalition formation		x	x	x	
Political events		x	x	x	
Adj R ²	0.11	0.12	0.16		
N	9233	9233	9233		

Note: Dependent variable: 20-days moving standard deviation of DAX return (unconditional volatility). OLS estimates with Newey-West standard errors (lag order = 20) in parentheses.

major political events, such as German reunification, votes of confidence in the parliament, wars, and terrorist attacks.

We start with a very parsimonious baseline specification (I) and then add control variables in order to examine whether the negative and significant point estimate for *Divided* remains robust (Models II–III). The coefficient remains negative and significant. Model III also comprises variables controlling for the crisis of the European monetary system in September 1992 (*EMS92*), the Asian as well as the Russian financial crises. Most importantly, according to our estimates from the fully specified Model (IV), times of divided government are associated with a reduction in unconditional DAX return volatility by 0.41% points on average. This supports the

conjecture of divided government reducing policy risk, because it is less likely that legislative action takes place which changes the status quo. For the final specification we also perform a jackknife analysis, omitting one case at a time. The coefficient for *Divided* is -0.41 with a jackknife standard error of .018 significant well below the 0.01 % level.

Robustness

We now examine the robustness of our results by applying a different way of conceptualizing return volatility within a Generalized Autoregressive Conditional Heteroskedasticity (GARCH) framework (Engle 2001; Bollerslev and Wooldridge 1992). GARCH models were first developed in financial econometrics and are standard in empirical finance nowadays.¹¹

GARCH models aim at taking into account the heteroskedasticity present in most stochastic processes in economics and finance. In particular, they aim to more accurately model a phenomenon known as volatility clustering. Volatility clustering is present if large deviations are mostly followed by large deviations, while small deviations tend to be followed by small deviations. As the results from several autocorrelation and Lagrange multiplier tests indicate, volatility clustering is indeed present in the DAX return series. Therefore, estimating a GARCH model is justified. We benefit from the availability of this technique, because it enables us to model stock return volatility as a function of the underlying return series as well as exogenous variables. Thus, we can assess the effect of divided government on the *conditional return* variance.

A GARCH model consists of a mean and a variance equation. The mean equation is defined as:

$$p_t = \mu_t + \zeta L_t + \sqrt{h_t} \varepsilon_t \quad (1)$$

where μ is a constant, L_t is a vector of exogenous variables, and $\{\varepsilon_t\}$ is a sequence of iid random variables with $E(\varepsilon_t) = 0$ and $Var(\varepsilon_t) = 1$. The conditional variance of the standard GARCH(1,1) model with exogenous variables is

$$h_t = \omega + \alpha \varepsilon_{t-1}^2 + \beta h_{t-1} + \pi d_t + \lambda_t X_{i,t} \quad (2)$$

The conditional variance is modeled by a constant ω , the prior shock ε_{t-1}^2 (ARCH term), the past variance h_{t-1} , the indicator variable *Divided* d_t , and

¹¹ For more advanced applications see Füss et al. (2007).

a vector of control variables $X_{i,t}$. Our main interest lies in estimating the coefficient π which captures the impact of divided government on financial uncertainty as measured by conditional stock return volatility. If policy risk is indeed systematically lower in periods of divided government, π should be significantly negative.

Table 2 (columns I and II) presents estimation results from GARCH(1,1) specifications. Following standard work in empirical finance, in the mean equation we model the return as a function of the *Dow Jones* return *Interest Rate*, *Inflation*, *GDP pc*, and a constant. At this point, we are not particularly interested in the factors influencing the mean return. Consequently, in what follows we will restrict attention to the variance equation, which models return volatility, our measure of financial uncertainty. Note that GARCH models are subject to several parameter restrictions. Fortunately, none of these is violated in any of our estimations. In all models (Table 2, I–IV) the constant is of positive sign and the ARCH (α) and GARCH (β) coefficients enter highly significant, positive, and their sum is smaller than 1, indicating a mean-reverting behavior.

Our primary interest lies in the coefficient of *Divided*, which is negative and significant in the baseline specification (I) and remains robust once we include additional control variables (II). This suggests that divided government is indeed associated with less policy risk, which leads to lower stock market volatility. It should not come as a surprise that the coefficient differs from the point estimate generated by the OLS procedure we applied above. First, stock return volatility is now measured differently. While we first used a 20-days moving average standard deviation of the DAX return, volatility is now modeled within a GARCH framework where the DAX return functions as the dependent variable. But most importantly, the variance equation now models influences on the *conditional* volatility, i.e., after all effects from the information set of the previous period have been taken into account. Therefore, although we should expect the effect of divided government on conditional volatility to be smaller than on unconditional volatility, the sign should remain the same. This is what we observe.

Table 2 also reports the Akaike information criterion (AIC) and results from Autoregressive Conditional Heteroskedasticity-Lagrange Multiplier (ARCH-LM) tests. The ARCH-LM does not reject the null hypothesis of no clustering in the residuals. This suggests that the GARCH approach was successful in capturing ARCH effects in the return series. The significant results from Ljung-Box-Q tests for a maximum lag of 5 ($Q(5)$) show that there is some information left in the residuals. However, squared residu-

Table 2: The Effect of Divided Government on Conditional Stock Market Volatility, 1970–2005.

	(I)	(II)	(III)	(IV)
	GARCH(1,1)	GARCH(1,1)	EGARCH(1,1)	EGARCH(1,1)
<i>Mean equation</i>				
Dow Jones ($\Delta \log$)	0.196*** (0.012)	0.197*** (0.012)	0.194*** (0.013)	0.195*** (0.014)
Interest	-0.012*** (0.004)	-0.011*** (0.004)	-0.006* (0.003)	-0.006* (0.004)
Inflation (Δ)	0.102 (0.182)	0.094 (0.176)	0.190 (0.281)	0.166 (0.257)
GDP pc (Δ)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)
<i>Variance equation</i>				
$\hat{\alpha}$	0.101*** (0.014)	0.096*** (0.016)	0.156*** (0.030)	0.149*** (0.030)
$\hat{\beta}$	0.879*** (0.014)	0.879*** (0.015)	0.979*** (0.004)	0.977*** (0.004)
$\hat{\gamma}$			-0.047*** (0.012)	-0.047*** (0.012)
Divided	-0.028** (0.012)	-0.023** (0.009)	-0.011** (0.006)	-0.012** (0.006)
EMS92		0.209 (0.243)		0.033 (0.056)
Asian financial crisis		0.059* (0.030)		0.024** (0.012)
Russian financial crisis		1.207 (0.767)		0.163** (0.069)
Constant	0.053*** (0.101)	0.051*** (0.013)	-0.108** (0.022) *	-0.103*** (0.023)
Elections (federal and state)		x		x
Coalition formation		x		x
Political events		x		x
R^2	0.03	0.03	0.03	0.03
AIC	2.84	2.84	2.84	2.84
LogL	-13107.25	-13079.47	-13103.25	-13078.98
ARCH-LM(1)	0.038	0.031	0.28	0.28
$Q(5)$	39.40***	37.71***	36.02***	33.71***

Table 2 (continued)

	(I)	(II)	(III)	(IV)
	GARCH(1,1)	GARCH(1,1)	EGARCH(1,1)	EGARCH(1,1)
$Q^2(5)$	1.97	2.06	5.04	5.42
JB	29709.94***	26473.27***	25457.88***	33051.22***
N	9233	9233	9233	9233

Note: Dependent variable: DAX return. Coefficients from conditional volatility models shown with semi-robust standard errors in parentheses. Conditionally standard normal error distribution assumed.

als ($Q^2(5)$) are no longer significantly autocorrelated. Normality (Jarque-Bera) tests indicate that the GARCH residuals deviate from what we would expect from a normal distribution. This is not a cause for concern, since Bollerslev and Wooldridge (1992) show that in a GARCH model the maximum likelihood estimates of the parameters are consistent even if the true distribution of the innovations is not Gaussian. Given our very large sample containing more than 9'000 observations, the parameter estimates are therefore very unlikely to be affected. Yet, the usual standard errors of the estimators are inconsistent if the assumption of Gaussian errors is violated. In this case semi-robust standard errors can be used. Since we apply these standard errors in the estimation, our inferences are robust to deviations in the normality of the residuals.¹²

Research in behavioral economics shows that individuals react more strongly to negative than to positive information (Kahneman 1979). Also, recent research in political science confirms that the effects of negative and positive information on public opinion are indeed asymmetric (Soroka 2006). This phenomenon is well-known in the realm of financial markets as the so called leverage effect (Black 1976): past negative price innovations more strongly influence volatility than positive innovations of the same magnitude. Do our results remain robust once we control for the leverage effect? As an additional robustness test which aims at further increasing confidence in the results, we re-estimated all specifications applying an exponential GARCH (EGARCH) model (Nelson 1991; Glosten et al. 1993). In an EGARCH(1,1) model the volatility dynamics is specified by :

¹² We re-estimated all models assuming generalized error and student-*t* distributions. The results did not change.

$$\ln h_t = \omega + \alpha \frac{|\varepsilon_{t-1}| + \gamma \varepsilon_{t-1}}{\sqrt{h_{t-1}}} + \beta \ln h_{t-1} + \pi d_t + \lambda_i X_{i,t} \quad (3)$$

where α picks up the volatility clustering and γ captures the leverage effect. If positive information hits the market, i.e.,

$$\frac{\varepsilon_{t-1}}{\sqrt{h_{t-1}}} > 0,$$

the effect is given by

$$\alpha(1+\gamma) \left| \frac{\varepsilon_{t-1}}{\sqrt{h_{t-1}}} \right|.$$

In case the previous shock was negative, which means that

$$\frac{\varepsilon_{t-1}}{\sqrt{h_{t-1}}} < 0,$$

the impact equals

$$\alpha(1-\gamma) \left| \frac{\varepsilon_{t-1}}{\sqrt{h_{t-1}}} \right|.$$

In case $\gamma = 0$, volatility responds symmetrically to past innovations. If a leverage effect exists, which we expect, γ is negative.¹³

The EGARCH estimation results are shown in columns III and IV in Table 2. Indeed, as the estimated coefficient γ is negative, there is an asymmetric effect on return volatility. Nevertheless, the substantial inferences concerning our key explanatory variable *Divided* remain the same and are also robust against the inclusion of a comprehensive set of economic and political control variables (column IV). The coefficient is still negative and significant. Thus, stock market volatility is significantly lower under divided than under unified government. This lends support to our argument, that divided government reduces policy uncertainty in the economy, because partisan conflict makes it unlikely that the status quo will be replaced by another policy.

¹³ Since the EGARCH model is specified in terms of log-volatility implies, there are no restrictions on the sign of the parameters estimated in the variance equation.

Conclusion

In this paper, we have examined how divided government influences policy risk on financial markets. We argue that divided government reduces the probability of policy change, and therefore, financial markets can operate under lower policy risk. As the theoretical analysis shows, under any but extreme conditions, divided government causes the unanimity core, i.e., the set of policy alternatives which are preferred by the players to be either empty or relatively small. This leads us to expect that policy risk should be lower on financial markets under divided than under unified government. Using daily German stock returns from 1970 to 2005, our results suggest that divided government is indeed associated with a reduction in return volatility.

This finding carries implications for the political economy of financial markets and future research on the effects and consequences of divided government. First, our results suggest that the effects of divided government are possibly more far-reaching than one might expect. Not only does divided government directly influence law production, the design of trade policies or discretion granted to the executive branch. Partisan conflict between the executive and the legislative branches also reduces stock market volatility, because it lowers risk arising from uncertainty about economic policy change. Second, it is well known that an increase in stock market volatility deters capital investment by risk-averse actors. If viewed against this background, an important implication of our result is that although political systems which use devices of power sharing may not be able to react to exogenous shocks as quickly as more majoritarian systems, they could benefit from an advantage when it comes to attracting capital investment. Third, policy moderation based explanations of divided government argue that middle-of-the-road voters intentionally bring about divided government, because this leads political actors to compromise. But as our analysis shows, for this argument to hold, policy risk should be higher under divided than under unified government. Since our findings do not support this hypothesis, research should be more skeptical towards policy moderation based explanations of divided government.

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Wann handeln Anleger unter geringerem politischen Risiko? Parteipolitischer Konflikt in der Legislative, Wirtschaftspolitik und die Aktienmarktvolatilität in Deutschland von 1970 bis 2005

Wie beeinflusst parteipolitischer Konflikt in der Legislative die Wahrscheinlichkeit wirtschaftspolitischer Veränderung und damit das politische Risiko auf Finanzmärkten? Im Gegensatz zum herkömmlichen „Balancing“-Modell, argumentieren wir, dass parteipolitisch gegensätzliche Mehrheitsverhältnisse die Wahrscheinlichkeit einer Veränderung der wirtschaftspolitischen Rahmenbedingungen reduziert. Mit Hilfe eines einfachen räumlichen Modells wird zunächst dargelegt, dass Parteikonflikt die Wahrscheinlichkeit einer gesetzgeberischen Blockade erhöht und Investoren deshalb auch nicht mit einer Änderung der wirtschaftspolitischen Bedingungen rechnen, unter denen Unternehmen zu agieren haben. Das politisch induzierte Risiko ist also im Vergleich zu einer Situation parteipolitischen Gleichklangs geringer. Für die empirische Überprüfung wird die Volatilität von Renditen des deutschen Aktienmarkts verwendet. Die Ergebnisse von konditionalen Volatilitätsmodellen legen nahe, dass das politische Risiko geringer ist, wenn Bundestag und Bundesrat von parteipolitisch gegensätzlichen Mehrheiten kontrolliert werden.

Quand les investisseurs profitent d'un risque politique réduit: gouvernement divisé, politique économique, et volatilité des valeurs en Allemagne, 1970–2005

Quelle est l'influence d'un gouvernement divisé (divided government) sur la probabilité d'un changement de la politique économique, et par conséquent sur le risque politique sur le marché financier? Contrairement au modèle classique de balance nous proposons qu'un gouvernement divisé, c'est-à-dire une situation où les branches exécutive et législative sont politiquement antagonistes, diminue le risque d'un changement de la politique économique. Un modèle spatial simple suggère qu'un gouvernement divisé augmente la probabilité d'obstruction politique. La probabilité alors réduite d'un changement de la politique économique devrait permettre aux marchés financiers d'opérer sous un risque politique diminué. Pour évaluer cette hypothèse, nous utilisons la volatilité des valeurs comme une mesure de risque. Si l'argument de l'obstruction est valable, les fluctuations des taux actuariels devraient être plus basses sous un gouvernement divisé que sous un gouvernement unifié. Nos résultats confirment que le gouvernement divisé a entraîné une diminution de la volatilité sur le marché des actions allemand, ce qui soutient l'hypothèse que le gouvernement divisé diminue le risque politique.

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