Supplemental Materials for "Is the Party System Affected by Booms and Busts?"

Appendix A1: Cases and Descriptive Statistics, Presidential Elections

Country	Freq.	Years
Argentina	9	1973, 1983, 1989, 1995, 1999, 2003, 2007, 2011
Armenia	3	1998, 2003, 2008
Austria	9	1965, 1971, 1974, 1980, 1986, 1992, 1998, 2004, 2010
Benin	4	1996, 2001, 2006, 2011
Bolivia	8	1980, 1985, 1989, 1993, 1997, 2002, 2005, 2009
Brazil	5	1994, 1998, 2002, 2006, 2010
Bulgaria	4	1996, 2001, 2006, 2011
Cape Verde	4	1996, 2001, 2006, 2011
Central African Republic	1	1999
Chile	5	1970, 1993, 1999, 2005, 2009
Colombia	12	1966, 1970, 1974, 1978, 1982, 1986, 1990, 1994, 1998, 2002, 2006, 2010
Comoros	1	2010
Costa Rica	12	1966, 1970, 1974, 1978, 1982, 1986, 1990, 1994, 1998, 2002, 2006, 2010
Croatia	3	200, 2005, 2009
Dominican Republic	11	1970, 1974, 1978, 1982, 1986, 1990, 1994, 1996, 2000, 2004, 2008
Ecuador	8	1984, 1988, 1992, 1996, 1998, 2002, 2006, 2009
El Salvador	5	1989, 1994, 1999, 2004, 2009
Finland	7	1968, 1978, 1982, 1988, 1994, 2000, 2006
France	7	1969, 1974, 1981, 1988, 1995, 2002, 2007
Georgia	1	2008
Ghana	2	2004, 2008
Guatemala	10	1970, 1974, 1978, 1982, 1990, 1995, 1999, 2003, 2007, 2011
Guinea Bissau	2	2005, 2009
Honduras	7	1985, 1989, 1993, 1997, 2001, 2005, 2009
Iceland	1	1980
Indonesia	1	2009
Ireland	3	1973, 1997, 2011
Kenya	2	2002, 2007
Kyrgyzstan	2	2009, 2011
Liberia	1	2011
Lithuania	4	1997, 2002, 2004, 2009
Macedonia	3	1999, 2004, 2009
Madagascar	2	2001, 2006

Malawi	3	1999, 2004, 2009
Mali	3	1997, 2002, 2007
Mauritania	1	2007
Mexico	1	2006
Mongolia	4	1997, 2001, 2005, 2009
Nicaragua	5	1990, 1996, 2001, 2006, 2011
Niger	1	2011
Nigeria	5	1983, 1999, 2003, 2007, 2011
Panama	6	1968, 1989, 1994, 1999, 2004, 2009
Paraguay	4	1993, 1998, 2003, 2008
Peru	5	1985, 1990, 2001, 2006, 2011
Philippines	4	1992, 1998, 2004, 2010
Poland	3	2000, 2005, 2010
Portugal	7	1980, 1986, 1991, 1996, 2001, 2006, 2011
Romania	4	1996, 2000, 2004, 2009
Senegal	1	2007
Sierra Leone	2	2002, 2007
Slovakia	2	2004, 2009
Slovenia	2	2002, 2007
South Korea	3	1997, 2002, 2007
Sri Lanka	3	1999, 2005, 2010
Taiwan	3	2000, 2004, 2008
Ukraine	4	1994, 1999, 2004, 2010
United States of America	11	1968, 1972, 1976, 1980, 1984, 1988, 1992, 1996, 2000, 2004, 2008
Uruguay	7	1966, 1971, 1989, 1994, 1999, 2004, 2009
Venezuela	9	1968, 1973, 1978, 1983, 1988, 1993, 1998, 2000, 2006

Variable	Mean	Std. Dev.	Min	Max
Δln(Effective Number of Presidential Candidates)	0.010	0.404	-1.28	1.31
Growth Rate in 12 Months before the Election	3.548	4.280	-20.45	14.86
Incumbent Running for Reelection	0.354	0.479	0.00	1.00
Δlog(Valid Votes Cast in the Election)	0.104	0.224	-0.42	1.54
First Four Elections	0.575	0.495	0.00	1.00
Ethnolinguistic Fragmentation	0.426	0.254	0.00	0.90

Appendix A2: Results without Logging Electoral Fragmentation

As noted in the text, I have logged the effective number of candidates, following Taagepera (2007). The logged specification is not the traditional one in the literature and so in Table A1 I model the unlogged effective number of presidential candidates and reach similar conclusions as those in the text.

	[1]
GDP Growth Rate	-0.052**
	(0.018)
Elected by Absolute Majority	-0.024
	(0.174)
Elected by Qualified Majority	-0.073
	(0.229)
Elected by Electoral College	-0.048
	(0.323)
Elected by ATV	0.177
	(0.489)
ΔLog(Number of Valid Vote)	-0.807*
	(0.323)
First Four Elections	0.092
	(0.148)
Ethnolinguistic Fragmentation	-0.303
	(0.319)
President Running for Reelection	-0.342*
	(0.155)
Constant	0.509*
	(0.212)
Random-Effects Parameters	
Country	0.000
	(0.000)
Country-Election	1.276
	(0.111)
Chi square	24.66***
N Elections	262
N Countries	59
Crossed Random Effect Model with Standard Errors in Parentheses.	
* p<0.05, ** p<0.01, *** p<0.001 (two-tailed)	

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Appendix A3: Model with Fixed Effects

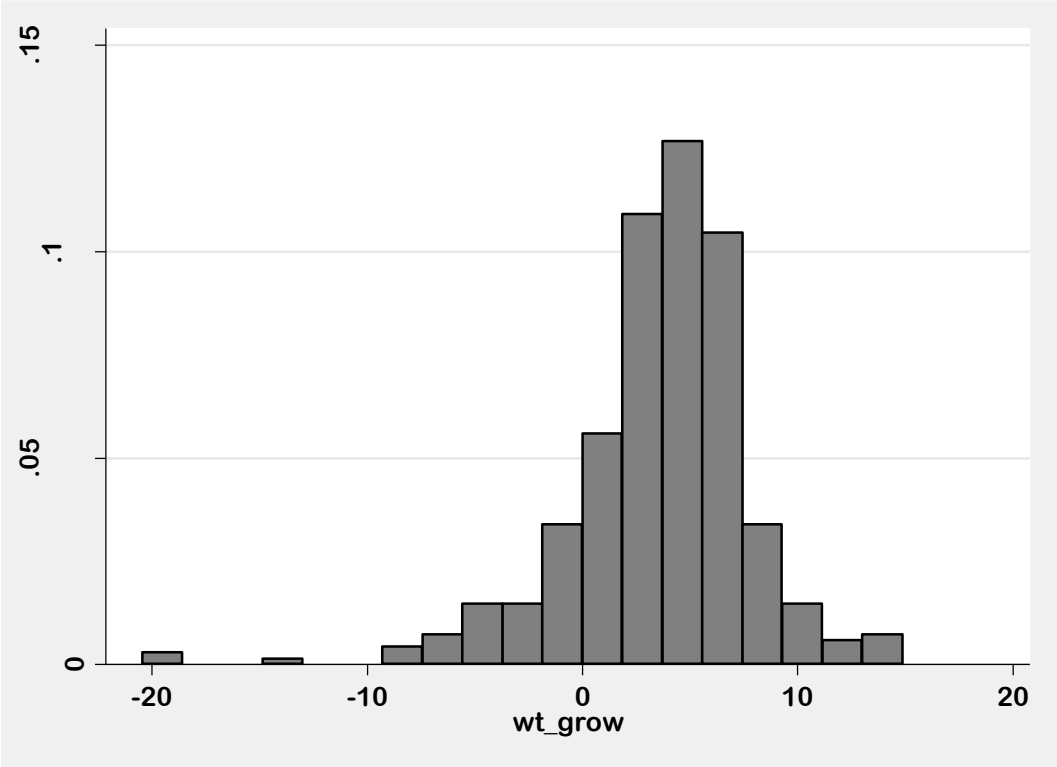
I am interested in isolating the effect of changes within cases. In the paper, I used a first difference model to do this. Here I use a fixed effects model with an Ar(1) correction to hold

average level of fragmentation within each country constant. The results are consistent with those in the paper: deviations from the sample mean are associated with the growth rate, although the significance is lower.

	[1]
GDP Growth Rate	-0.008°
	(0.005)
Elected by Absolute Majority	-0.003
	(0.096)
Elected by Qualified Majority	-0.061
	(0.106)
Elected by Electoral College	0.033
	(0.175)
Elected by ATV	(omitted)
ΔLog(Number of Valid Vote)	0.049
	(0.065)
First Four Elections	-0.002
	(0.054)
Ethnolinguistic Fragmentation	(omitted)
ΔPresident Running for Reelection	-0.109**
	(0.040)
Constant	0.397
	(0.843)
Chi square	1.70°
N Elections	261
N Countries	58
Fixed Effects Model with Standard Errors in Parentheses and Ar(1) Adjustment. * p<0.05, ** p<0.01, *** p<0.001 (two-tailed)	

Appendix A4: Presidential Fragmentation Dropping Outliers with Regards to Growth

Most growth rates in this sample are between -10 and 10 percent, but there are some extreme values:



Thus in the table below I run the models excluding all cases with growth rates that lie beyond |15%| or beyond |10%|. In the results below, the statistical significance of the growth coefficient is reduced somewhat but remains negative even with these fastest/slowest growing cases removed.

	Growth<|15%|	Growth<|10%|
GDP Growth Rate	-0.011°	-0.012°
	(0.006)	(0.007)
Elected by Absolute Majority	-0.005	-0.023
	(0.055)	(0.054)
Elected by Qualified Majority	-0.021	-0.026
	(0.072)	(0.070)
Elected by Electoral College	0.012	0.008
	(0.101)	(0.099)
Elected by ATV	0.046	0.034
	(0.153)	(0.162)
ΔLog(Number of Valid Vote)	-0.255*	-0.265**
	(0.102)	(0.100)
First Four Elections	0.037	0.040
	(0.046)	(0.046)
Ethnolinguistic Fragmentation	-0.102	-0.110
	(0.100)	(0.098)

ΔPresident Running for Reelection	-0.145**	-0.156***
	(0.049)	(0.049)
Constant	0.154*	0.170**
	(0.067)	(0.066)
Random-Effects Parameters		
Country	0.000	0.000
	(0.000)	(0.000)
Country-Election	0.125	0.119
	(0.011)	(0.011)
Chi square	24.43**	28.01***
N Elections	261	250
N Countries	58	57
Crossed Random Effect Model with Standard Errors in Parentheses. * p<0.05, ** p<0.01, *** p<0.001 (two-tailed)		

Appendix A5: Cases and Descriptive Statistics for the Legislative Cases

Table 1: Description of Cases

Country	**Years**	**N districts**	**Notes**
Argentina	1985, 1987, 1989, 1991, 1993, 1995, 1997, 1999, 2001, 2003, 2005, 2007, 2009, 2011, 2013	24	
Brazil	1986, 1990, 1994, 1998, 2002, 2006, 2010	25 27	 After 1986, Goiás was split and Tocantin formed. Those 2 districts are only included after 1990.
Cape Verde	1996, 2001, 2006	15 17	 Sao Miguel and Tarrafal were a single district in 1996 and then split into distinct districts in subsequent elections. The combined district is excluded from the analysis in 1996.
Colombia	1974, 1978, 1982, 1986 2002, 2006, 2010, 2014	26 33	Redistricting occurred in 1991. Eight new districts were added and two (Valle and Quindio) were deleted; election data is not available after that until 1998 We have electoral data for 1998 but not data on district magnitude
Costa Rica	1962, 1966, 1970, 1974, 1978, 1982, 1986, 1990, 1994, 1998, 2002, 2006, 2010, 2014	7	
Denmark	1964, 1966, 1968 1971, 1973, 1975, 1977, 1979, 1981, 1984, 1987, 1988, 1990, 1994, 1998	23 17	 Subnational boundaries were reformed in 1970 and districts reflect the new boundaries
Finland	1983, 1987, 1995, 1999, 2003, 2007, 2011	15	
Honduras	1997, 2001, 2005, 2009	18	
Iceland	1963, 1967, 1971, 1974, 1978, 1979, 1983, 1987, 1991, 1999 2003, 2007, 2009, 2013	8 6	In 1987 the process of allocating seats across districts was changed but the districts themselves were not In 2000 the electoral system was reformed, changing the structures of the districts

Italy	1958, 1963, 1968, 1972, 1976, 1979, 1983, 1987, 1992	32	
Latvia	1993, 1995, 1998, 2002, 2006, 2010, 2011	5	
Norway	1977, 1981, 1985, 1989, 1993, 1997, 2001, 2005, 2009	19	
Paraguay	2003, 2008, 2013	18	
Peru	2006, 2011	25	
Portugal	1976 1979, 1980, 1983, 1985, 1987, 1991, 1995, 1999, 2002, 2005, 2009, 2011	19 20	The three Azores districts are not included in the analysis because we do not have two elections for them 1979 is the first election where the Azores are combined into one district.
Romania	1992, 1996, 2000, 2004	42	
South Africa	1994, 1999, 2004, 2009	9	
Spain	1977, 1979, 1982, 1986, 1989, 1993, 1996, 2000, 2004, 2008	52	
Sweden	1964, 1968, 1970, 1973, 1976, 1979, 1982, 1985, 1988, 1991, 1994 1998, 2002, 2006, 2010	28 29	1969 saw a reform that increased the number of seats in the parliament from 233 to 350 without changing the structure of district boundaries; in 1974 it was reduced to 349 In 1994 redistricts were redrawn
Switzerland	1963, 1967, 1971, 1975, 1979, 1983, 1987, 1991, 1995, 1999, 2003, 2007	26	Switzerland's smaller districts occasionally see candidates run unopposed-these districts are excluded from the analysis (as are the subsequent elections that would require a lagged vote total)

Variable	Mean	Std. Dev.	Min	Max
Δln(Effective Number of Parties Winning Votes)	0.020	0.212	-1.04	1.51
Δln(Effective Number of Parties Winning Seats)	0.021	0.223	-1.022	1.313
Δln(M)	0.004	0.128	-0.69	0.69
Presidential Election Year	0.204	0.403	0.00	1.00
Δlog(Valid Votes Cast in the Election)	0.021	0.111	-1.32	1.45
First Four Elections	0.374	0.484	0.00	1.00
Ethnoliguistic Fragmentation	0.283	0.218	0.007	0.886

Appendix A6: Legislative Results without Logged Specification

Just as with the presidential election analysis, I logged the effective number of parties winning votes and seats. To prove that the results are robust to the variable specification, I replicate the analyses in Table 2 with the dependent variables unlogged. Growth continues to have a significant, negative effect notwithstanding the dependent variable being logged before first differenced.

	ΔEffective Number of Parties Winning Votes	ΔEffective Number of Parties Winning Seats
GDP Growth Rate	-0.048***	-0.026***
	(0.007)	(0.008)
ΔLn(M)	0.291*	1.793***
	(0.115)	(0.147)
Presidential Election Year	-0.292**	0.377*
	(0.103)	(0.173)
ΔLog(Number of Valid Votes)	0.333**	-0.476*
	(0.125)	(0.188)
First Four Elections	-0.016	0.098
	(0.062)	(0.062)
Ethnolinguistic Fragmentation	0.039	-0.106
	(0.326)	(0.246)
Constant	0.232	0.119
	(0.142)	(0.105)
Random-effects Parameters		
Country	0.135	0.049
	(0.046)	(0.028)
Year	0.204	0.092
	(0.048)	(0.028)
District	0.000	0.000
	(0.000)	(0.000)
District-Election	0.544	0.362
	(0.014)	(0.011)

Chi square	60.93***	170.88***
N Elections N Districts N Countries	22 532 3092	17 371 2159
Crossed Random Effect Model with Standard Errors in Parentheses. ° p<0.10, * p<0.05, ** p<0.01, *** p<0.001 (two-tailed)		

Appendix A7: Legislative Races Modeled with Fixed Effects

Instead of isolating the effect of growth on fragmentation within districts over time with first differences, in the table below I use district fixed effects. While these results do not explicitly correct for clustering at the country level and thus have standard errors that are too small, the slopes are in the same direction as those in Table 2.

	Ln(Effective Number of Parties Winning Votes)	Ln(Effective Number of Parties Winning Seats)
GDP Growth Rate	-0.005*** (0.001)	-0.006*** (0.002)
ΔLn(M)	0.055** (0.021)	0.371*** (0.037)
Presidential Election Year	-0.032° (0.018)	-0.188** (0.070)
ΔLog(Number of Valid Votes)	0.221*** (0.030)	0.254*** (0.044)
First Four Elections	-0.050*** (0.015)	-0.044** (0.019)
Ethnolinguistic Fragmentation	(omitted)	(omitted)
Constant	0.120 (0.095)	-0.323* (0.148)
F	16.40***	35.70***
N Elections N Districts N Countries	22 532 3092	17 371 2159
Fixed effects model with an AR(1) correction with Standard Errors in Parentheses. ° p<0.10, * p<0.05, ** p<0.01, *** p<0.001 (two-tailed)		