

Web Appendix

Do output contractions trigger democratic change?

Paul J. Burke and Andrew Leigh

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This Web Appendix presents: 1) A game-theoretic model on why negative income shocks may increase the likelihood of democratic change; 2) Additional empirical results; 3) A comparison of alternative measures of democratic change; 4) A description of the construction of the commodity export price index and related robustness checks; 5) Definitions of all variables.

A-I. A model of democratic change after negative income shocks

We present a simple game-theoretic demonstration of one mechanism via which democratic change may be more likely following output contractions.

A. The game

Consider a game of two players: an “autocrat” (who represents an autocratic government) and a “citizen” (a representative agent of the people, or a critical grouping of the people). The autocrat’s choice set includes two potential choices: 1) maintaining the status quo of autocratic governance, or 2) providing increased political rights to the citizen (some degree of democratic change). The citizen’s choice set consists of two possibilities: 1) acquiescing to autocratic rule, or

2) protesting autocratic rule.¹ The game is played twice: in year 1, and again in year 2. Neither player has perfect information on the other player's payoffs.

Figure A1 displays a normal-form representation of the game, with utility payoffs for the citizen and autocrat, respectively, in parentheses.

Figure A1. Regime choice game

		Autocrat	
		<i>Status quo</i>	<i>Confer political rights</i>
Citizen	<i>Acquiesce</i>	(s, t)	(u, v)
	<i>Protest</i>	(w, x)	(y, z)

Let the citizen's utility function in year t be:

$$(1) \quad U_t = U_{t-1} + f(\Delta Y_t, \Delta D_t, C_t)$$

where ΔY_t is the change in per capita national income in year t , ΔD_t is the change in democratic freedoms in year t ,² C_t is the cost of protesting in year t , and:

$$(2) \quad \frac{\partial U_t}{\partial \Delta Y_t} > 0, \quad \frac{\partial U_t}{\partial \Delta D_t} > 0, \quad \frac{\partial U_t}{\partial C_t} < 0$$

$$(3) \quad C_t = 0 \text{ if the citizen chooses to acquiesce or the autocrat chooses to confer political rights}$$

¹ In a real-world game, the citizen may be able to decide on the degree to which he or she acquiesces to or protests autocratic rule along a continuum. For parsimonious representation here, we assume citizens are faced with only two distinct choices.

² Benefits to the citizen from increased democracy may include an increase in 1) the citizen's ability to select the national leader into the future, and 2) the share of GDP flowing to the citizen. However, the empirical literature provides mixed evidence on the expected impact of democratization on economic growth and inequality.

- (4) $C_t > 0$ if the citizen chooses to protest and the autocrat chooses to maintain the status quo
- (5) $\Delta D_t = 0$ if the autocrat chooses to maintain the status quo
- (6) $\Delta D_t > 0$ if the autocrat chooses to confer political rights.

A1: The cost of protesting is a positive function of the economic growth rate, so that $C_t'(\Delta Y_t) > 0$.

This assumption appears justified, given that one of the largest costs of protesting is the opportunity cost of time, and a stronger economy in year t increases the opportunity cost of time in year t .³ If the citizen becomes unemployed or switches to being a student as a result of a fall in the economic growth rate, the opportunity cost of protesting may drop particularly significantly. This assumption is equivalent to assuming that protesting is, in the short run, an inferior good.

A2: Protesting increases the citizen's expectation of the likelihood of democratic change during year t (p_t).

A3: p_t and ΔD_t are not direct functions of ΔY_t . This allows for a partial equilibrium analysis.

³ Michael Bratton and Nicolas van de Walle (1992, p. 424) argue that political protests in sub-Saharan Africa have been “spurred by deepening economic hardship”; Dipak K. Gupta, M.C. Madhavan, and Andrew Blee (1998, p. 600) that faster per capita GDP growth “dampens the spirits of protest”; Daron Acemoglu and James A. Robinson (2001) that the cost of revolutionary activity is lower during recessions; Jenny A. Minier (2001, p. 1000) that “as wages increase, the opportunity cost of demonstrating also increases”; Paul J. Zac and Yi Feng (2003, p. 9) that “as wages rise, the opportunity cost of demonstrating increases”; and Sam H.K. Tang and Linda C.W. Yung (2008, p. 245) that economic growth “increases the opportunity cost of participating in democratic movements”.

For exposition, we adopt the utility function:

$$(7) \quad U_t = U_{t-1} + \alpha \Delta Y_t + \beta \Delta D_t - C_t(\Delta Y_t)$$

Adopting an additive- rather than multiplicative-form utility function appears appropriate, given that ΔD_t and/or $C_t(\Delta Y_t)$ may be equal to zero. α and β are assumed to be fixed.

The expected net benefit to the citizen of protesting is:

$$(8) \quad B_{\text{Protest},t} = p_t \beta \Delta D_t - (1 - p_t) C_t(\Delta Y_t)$$

Let us look at the best response strategies of both players.

Autocrat:

A4: If the citizen acquiesces to autocratic rule, the autocrat's best response is to choose the status quo over conferring political rights. In terms of payoffs, $t > v$.

A5: If the citizen (strongly) protests autocratic rule, the autocrat's position becomes untenable, and the autocrat's best response is to confer some political rights.⁴ In terms of payoffs, $z > x$.

Citizen:

By (3) and (6), if the autocrat chooses to confer political rights, the citizen's best response is to protest autocratic rule (equivalent to accepting the new rights), so that $y > u$.

⁴ Bratton and van de Walle (1992, p. 434) argue that "elites almost invariably prefer the status quo to the unknown; only when their position becomes unsustainable do they seek instead to manage an inevitable change".

A6 (initial condition): In year 1, $B_{Protest,t} < 0$. The citizen's best response if the autocrat chooses to maintain the status quo is to acquiesce to autocratic rule. The acquiescence of the citizen in year 1 arises due to the costs of protesting against the status quo.

From *A4-A6* and (3)-(6), the best response choices of the two players in the game are indicated by the underlined payoffs in Figure A2. There are two Nash equilibria to the game in year 1: (Acquiesce, Status quo) and (Protest, Confer political rights). Initially, given that this is an autocracy, the game is assumed to be at the (Acquiesce, Status quo) equilibrium (*A6*). This initial equilibrium prevails because the citizen, wary of the costs of protesting autocratic rule in the case that the autocrat opts not to confer greater political rights, decides to acquiesce. Intuitively, the autocratic equilibrium is maintained in the first period because the citizen would prefer not to pay the switching costs of moving to the more democratic equilibrium.

Figure A2. Best response strategies in year 1

		Autocrat	
		<i>Status quo</i>	<i>Confer political rights</i>
Citizen	<i>Acquiesce</i>	<u>(s, t)</u>	(u , v)
	<i>Protest</i>	(w , x)	<u>(y, z)</u>

B. The economic growth rate and the likelihood of democratic change

What could potentially lead to a switch from the prevailing Nash equilibrium (Acquiesce, Status quo) to the alternative Nash equilibrium (Protest, Confer political rights) in year 2? A negative shock to income may trigger such a switch.

Proposition 1: *The likelihood of democratic change in year t is a negative function of the economic growth rate.*

The first differential of (8) with respect to ΔY_t is:

$$(9) \quad \frac{\partial B_{Protest,t}(\Delta Y_t)}{\partial \Delta Y_t} = -(1 - p_t)C'_t(\Delta Y_t) < 0 \text{ (by A1)}$$

If the citizen chooses to protest, this results in the breakdown of the prevailing autocratic equilibrium, and democratic change (by A5). The citizen's choice of whether to protest is made on the basis of B . Thus, the probability of democratic change during year t (η_t) is a positive function of the expected net benefit of protest in year t :

$$(10) \quad \eta_t = f(B_{Protest,t}(\Delta Y_t)) \quad \text{with}$$

$$(11) \quad \frac{\partial \eta_t}{\partial (B_{Protest,t}(\Delta Y_t))} > 0$$

The first differential of the probability of democratic change with respect to ΔY_t is:

$$(12) \quad \frac{\partial \eta_t}{\partial \Delta Y_t} = \frac{\partial \eta_t}{\partial (B_{Protest,t}(\Delta Y_t))} \cdot \frac{\partial (B_{Protest,t}(\Delta Y_t))}{\partial \Delta Y_t} < 0 \text{ (from 9 and 11)}$$

Thus, the higher the rate of economic growth in year t , the less likely the citizen is to protest autocratic rule, and the less likely the country is to experience democratic change. If ΔY_2 is sufficiently low that $B_{Protest,2} > 0$, the (Acquiesce, Status quo) equilibrium will break down in year 2 (Figure A3). In this case, the only remaining Nash equilibrium is (Protest, Confer political

rights). Thus, a reduction in the switching costs faced by the citizen can lead to the more democratic Nash equilibrium (Protest, Confer political rights).

Figure A3. Best response strategies in year 2
Autocrat

		<i>Status quo</i>	<i>Confer political rights</i>
Citizen	<i>Acquiesce</i>	(s, \underline{t})	(u, v)
	<i>Protest</i>	(\underline{w}, x)	$(\underline{y}, \underline{z})$

A lower economic growth rate in year t will, *ceteris paribus*, induce the citizen to substitute toward protest and reduce the viability of the autocratic equilibrium. If a large group of citizens are affected in a similar way, the collective action problem associated with anti-government protests is likely to become much easier to solve. Whether (12) holds empirically is the focus of the paper. We also explore whether protests indeed coincide with economic slowdowns and precede democratic change.

A-II. Empirics: additional estimation results

Table A1-Democratic change events regressions with interaction terms

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable	Democratic change events				Autocratic change events			
Estimation	LPM	IV (Fuller 1)	LPM	IV (Fuller 1)	LPM	IV (Fuller 1)	LPM	IV (Fuller 1)
Excluded instruments	None	All	None	All	None	All	None	All
GDP per capita growth _{<i>t-1</i>}	-0.0010** (0.0005)	-0.0127** (0.0064)	-0.0004 (0.0005)	-0.0203* (0.0114)	-0.0005 (0.0004)	0.0178 (0.0161)	-0.0005 (0.0005)	0.0074 (0.0079)
GDP per capita growth _{<i>t-1</i>} *Country-specific development level _{<i>t-2</i>}	-0.0002 (0.0003)	-0.0068 (0.0139)			-0.0007 (0.0005)	-0.0257 (0.0329)		
GDP per capita growth _{<i>t-1</i>} *POLITY score _{<i>t-1</i>}			0.0001 (0.0001)	-0.0011 (0.0014)			-0.0001 (0.0001)	-0.0005 (0.0013)
Country-specific development level _{<i>t-2</i>}	-0.0151** (0.0076)	-0.0116 (0.0529)	-0.0155** (0.0075)	-0.0402*** (0.0144)	-0.0010 (0.0057)	0.1321 (0.1730)	-0.0041 (0.0050)	0.0057 (0.0137)
POLITY score _{<i>t-1</i>}	-0.0098*** (0.0015)	-0.0092*** (0.0019)	-0.0099*** (0.0015)	-0.0087*** (0.0023)	0.0087*** (0.0012)	0.0117*** (0.0044)	0.0088*** (0.0012)	0.0097*** (0.0019)
Tenure of regime _{<i>t-1</i>} (years)	0.0010* (0.0006)	0.0017 (0.0022)	0.0010* (0.0006)	0.0004 (0.0015)	0.0019*** (0.0004)	0.0050 (0.0052)	0.0018*** (0.0005)	0.0020*** (0.0005)
Democracy in region _{<i>t-1</i>} (percent of countries)	0.0005 (0.0006)	-0.0003 (0.0008)	0.0006 (0.0006)	-0.0009 (0.0012)	-0.0008*** (0.0003)	-0.0005 (0.0007)	-0.0008*** (0.0003)	-0.0007* (0.0003)
Country and year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>F</i> statistic on excluded instruments -		1.05	-	2.11	-	0.38	-	2.40
Stock-Yogo critical values	-	4.44/7.16	-	4.44/7.16	-	4.44/7.16	-	4.44/7.16
Partial <i>R</i> ² on excluded instruments -		0.011, 0.002	-	0.011, 0.011	-	0.008, 0.003	-	0.008, 0.005
Observations	2,897	2,897	2,897	2,897	3,598	3,598	3,598	3,598
Number of democratic change events	118	118	118	118	63	63	63	63
Countries	121	121	121	121	141	141	141	141

Years: 1963-2001

Notes: A democratic change event is the year-*t* commencement of a 3 or more point increase in POLITY score that occurs within 3 years, flagged by a positive REGTRANS score; an autocratic change event is the year-*t* commencement of a 3 or more point decrease in POLITY score that occurs within 3 years, flagged by a negative REGTRANS score. The set of all instruments includes the precipitation instrument_{*t-1, t-2*}, the temperature instrument_{*t-1, t-2*}, and the commodity price instrument_{*t-1*}. Robust standard errors clustered by country are in parentheses. GDP per capita growth is scaled so that one percentage point of additional growth is 1, not 0.01. The country-specific development level variable equals 0 when a country's *t-2* per capita GDP is within 30 log points of its sample average *t-2* per capita GDP, +1 (-1) when 30-60 log points above (below) its sample average, and +2 (-2) when 60 or more log points above (below) its sample average. Estimates control for the secondary school enrollment rate (percent gross) and the percent of the population aged 65 years and above in year *t-2*. The sample excludes country-years in which the *t-1* POLITY score exceeds 7. The full set of instruments is used to instrument for two explanatory variables (GDP per capita growth and the interaction of this variable) in columns 2, 4, 6, and 8. Reported Stock-Yogo critical values are the 5 percent significance level critical values for weak instruments tests based on, respectively, 30 percent and 5 percent maximal Fuller relative bias. The null of weak instruments is rejected in the case that the *F* statistic on the excluded instruments exceeds the Stock-Yogo critical value/s. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

Table A2-Using Penn World Table GDP and GDI growth data

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Democratic change events				Autocratic change events			
Estimation	LPM		IV (Fuller 1)	IV (Fuller 1)	LPM		IV (Fuller 1)	IV (Fuller 1)
Excluded instruments	None	All	Weather instruments _{$t-1, t-2$}	Commodity price instrument _{$t-1$}	None	All	Weather instruments _{$t-1, t-2$}	Commodity price instrument _{$t-1$}
<i>Panel A: GDP per capita growth, World Development Indicators</i>								
GDP per capita growth _{$t-1$}	-0.0008*	-0.0134**	-0.0156**	-0.0004	-0.0003	0.0113	0.0112	-0.0005**
	(0.0005)	(0.0064)	(0.0073)	(0.0061)	(0.0004)	(0.0099)	(0.0096)	(0.0002)
<i>F</i> statistic on excluded instruments	-	6.32	7.07	4.21	-	3.61	4.46	0.00
Partial <i>R</i> ² on excluded instruments	-	0.011	0.009	0.002	-	0.006	0.006	0.000
<i>Panel B: GDP per capita growth, Penn World Table</i>								
GDP per capita growth _{$t-1$}	-0.0002	-0.0099*	-0.0154**	-0.0003	-0.0003	0.0072	0.0087*	-0.0065
	(0.0004)	(0.0058)	(0.0077)	(0.0037)	(0.0003)	(0.0048)	(0.0052)	(0.0064)
<i>F</i> statistic on excluded instruments	-	3.73	3.40	1.69	-	7.71	8.91	4.19
Partial <i>R</i> ² on excluded instruments	-	0.008	0.004	0.003	-	0.009	0.008	0.001
<i>Panel C: GDI per capita growth, Penn World Table</i>								
GDI per capita growth _{$t-1$}	0.0004	-0.0009	-0.0168**	-0.0002	-0.0002	0.0002	0.0070	-0.0012
	(0.0005)	(0.0008)	(0.0084)	(0.0007)	(0.0004)	(0.0013)	(0.0050)	(0.0013)
<i>F</i> statistic on excluded instruments	-	10.75	2.50	28.52	-	10.07	6.72	26.06
Partial <i>R</i> ² on excluded instruments	-	0.081	0.003	0.077	-	0.047	0.008	0.038
Country and year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Stock-Yogo critical values	-	4.03/6.42	4.63/7.63	12.71/24.09	-	4.03/6.42	4.63/7.63	12.71/24.09
Observations	2,809	2,809	2,809	2,809	3,526	3,526	3,526	3,526
Number of events	115	115	115	115	59	59	59	59
Countries	120	120	120	120	140	140	140	140

Years: 1963-2001

Notes: A democratic change event is the year- t commencement of a 3 or more point increase in POLITY score that occurs within 3 years, flagged by a positive REGTRANS score; an autocratic change event is the year- t commencement of a 3 or more point decrease in POLITY score that occurs within 3 years, flagged by a negative REGTRANS score. The weather instruments include the precipitation instrument _{$t-1, t-2$} and the temperature instrument _{$t-1, t-2$} . Robust standard errors clustered by country are in parentheses. Per capita growth is scaled so that one percentage point of additional growth is 1, not 0.01. Estimates control for the country-specific development level in year $t-2$, the POLITY score in year $t-1$, the tenure of the regime in year $t-1$ (years), the percent of countries in the region that are democracies in year $t-1$, the secondary school enrollment rate (percent gross) in year $t-2$, and the percent of the population aged 65 years and above in year $t-2$. The country-specific development level variable equals 0 when a country's $t-2$ per capita GDP/GNI is within 30 log points of its sample average $t-2$ per capita GDP/GNI, +1 (-1) when 30-60 log points above (below) its sample average, and +2 (-2) when 60 or more log points above (below) its sample average. The sample in columns 1-4 excludes country-years in which the $t-1$ POLITY score exceeds 7. The sample in columns 5-8 excludes country-years in which the $t-1$ POLITY score is less than -7. Reported Stock-Yogo critical values are the 5 percent significance level critical values for weak instruments tests based on, respectively, 30 percent and 5 percent maximal Fuller relative bias. The null of weak instruments is rejected in the case that the *F* statistic on the excluded instruments exceeds the Stock-Yogo critical value/s. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

Table A3-Instrumental variable results for democratic change events: sub-samples
(Table 6 continued)

Sample	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Full	More agricultural	Less agricultural	Low mean GDP per capita	High mean GDP per capita	Sub-Saharan Africa	Rest of world
<i>Panel A: All instruments</i>							
GDP per capita growth _{<i>t</i>-1}	-0.0140** (0.0063)	-0.0154** (0.0063)	-0.0102 (0.0091)	-0.0144** (0.0071)	-0.0074 (0.0130)	-0.0110 (0.0072)	-0.0109 (0.0104)
<i>F</i> statistic on excluded instruments	6.66	5.63	2.90	5.00	2.10	4.38	3.27
Partial <i>R</i> ² on excluded instruments	0.011	0.014	0.011	0.010	0.010	0.011	0.011
Chow test <i>p</i> -value of equality with parameter estimate in column 1	-	0.86	0.63	0.86	0.22	0.45	0.56
Stock-Yogo critical values: 4.03/6.42							
<i>Panel B: Precipitation instruments</i>							
GDP per capita growth _{<i>t</i>-1}	-0.0112 (0.0085)	-0.0143* (0.0079)	-0.0015 (0.0164)	-0.0143 (0.0106)	0.0022 (0.0129)	-0.0132* (0.0077)	-0.0016 (0.0212)
<i>F</i> statistic on excluded instruments	3.50	3.91	1.18	2.53	1.58	2.76	1.54
Partial <i>R</i> ² on excluded instruments	0.004	0.007	0.002	0.003	0.003	0.005	0.003
Chow test <i>p</i> -value of equality with parameter estimate in column 1	-	0.59	0.50	0.62	0.16	0.70	0.38
Stock-Yogo critical values: 7.49/13.46							
<i>Panel C: Temperature instruments</i>							
GDP per capita growth _{<i>t</i>-1}	-0.0173** (0.0078)	-0.0180* (0.0093)	-0.0140 (0.0101)	-0.0133* (0.0077)	-0.0210 (0.0156)	-0.0159 (0.0117)	-0.0134 (0.0104)
<i>F</i> statistic on excluded instruments	14.65	9.36	4.84	8.58	4.57	4.66	7.15
Partial <i>R</i> ² on excluded instruments	0.007	0.008	0.008	0.008	0.005	0.005	0.008
Chow test <i>p</i> -value of equality with parameter estimate in column 1	-	0.93	0.74	0.60	0.67	0.69	0.57
Stock-Yogo critical values: 7.49/13.46							
Country and year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,897	1,464	1,433	1,452	1,445	1,224	1,673
Number of democratic change events	118	50	68	57	61	43	75
Countries	121	54	67	59	62	43	78
Estimation: IV (Fuller 1)							
Years: 1963-2001							

Notes: Panel A is identical to Panel A of Table 6. The dependent variable indicates the commencement of democratic change events, which involve a 3 or more point increase in POLITY score that occurs within 3 years, flagged by a positive REGTRANS score. The set of all instruments includes the precipitation instrument_{*t*-1, *t*-2}, the temperature instrument_{*t*-1, *t*-2}, and the commodity price instrument_{*t*-1}. Robust standard errors clustered by country are in parentheses. GDP per capita growth is scaled so that one percentage point of additional growth is 1, not 0.01. Estimates control for the country-specific development level in year *t*-2, the POLITY score in year *t*-1, the tenure of the regime in year *t*-1 (years), the percent of countries in the region that are democracies in year *t*-1, the secondary school enrollment rate (percent gross) in year *t*-2, and the percent of the population aged 65 years and above in year *t*-2. More agricultural countries are those with a 1961 labor force share in agriculture equal to the sample median level (72 percent) or higher; non-agricultural countries are others. Low mean GDP per capita countries are those with a sample average *t*-2 GDP per capita equal to the sample median (\$765.5, in 2000 US\$) or below; high mean GDP per capita countries are others. All samples exclude country-years in which the *t*-1 POLITY score exceeds 7. Reported Stock-Yogo critical values are the 5 percent significance level critical values for weak instruments tests based on, respectively, 30 percent and 5 percent maximal Fuller relative bias. The null of weak instruments is rejected in the case that the *F* statistic on the excluded instruments exceeds the Stock-Yogo critical value/s. Chow test *p* values are based on two-stage least squares estimates. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

Table A4-Testing for asymmetry in effect of growth

	(1)	(2)	(3)	(4)
Dependent variable	Democratic change events		Autocratic change events	
Estimation	LPM	IV (Fuller 1)	LPM	IV (Fuller 1)
Excluded instruments	None	All	None	All
(Above previous year) GDP per capita growth _{<i>t-1</i>}	-0.0010* (0.0005)	-0.0003 (0.0112)	-0.0003 (0.0005)	0.0215 (0.0655)
(Below previous year) GDP per capita growth _{<i>t-1</i>}	-0.0008 (0.0008)	-0.0242* (0.0125)	-0.0005 (0.0007)	0.0013 (0.0244)
Country-specific development level _{<i>t-2</i>}	-0.0156** (0.0075)	-0.0321** (0.0135)	-0.0039 (0.0050)	0.0116 (0.0290)
POLITY score _{<i>t-1</i>}	-0.0098*** (0.0015)	-0.0094*** (0.0016)	0.0087*** (0.0012)	0.0096*** (0.0029)
Tenure of regime _{<i>t-1</i>} (years)	0.0010* (0.0006)	0.0013 (0.0010)	0.0019*** (0.0005)	0.0026 (0.0026)
Democracy in region _{<i>t-1</i>} (percent of countries)	0.0005 (0.0006)	-0.0007 (0.0010)	-0.0008*** (0.0003)	-0.0007 (0.0005)
Country and year fixed effects	Yes	Yes	Yes	Yes
<i>p</i> -value on <i>t</i> -test of equality of “above” and “below” parameters	0.79	0.24	0.78	0.82
<i>F</i> statistic on excluded instruments	-	1.03	-	0.42
Stock-Yogo critical value	-	4.44/7.16	-	4.44/7.16
Partial <i>R</i> ² on excluded instruments	-	0.004, 0.009	-	0.001, 0.009
Observations	2,897	2,897	3,598	3,598
Number of events	118	118	63	63
Countries	121	121	141	141
Years: 1963-2001				

Notes: A democratic change event is the year-*t* commencement of a 3 or more point increase in POLITY score that occurs within 3 years, flagged by a positive REGTRANS score; an autocratic change event is the year-*t* commencement of a 3 or more point decrease in POLITY score that occurs within 3 years, flagged by a negative REGTRANS score. The set of all instruments includes the precipitation instrument_{*t-1*}, _{*t-2*}, the temperature instrument_{*t-1*}, _{*t-2*}, and the commodity price instrument_{*t-1*}. Robust standard errors clustered by country are in parentheses. GDP per capita growth is scaled so that one percentage point of additional growth is 1, not 0.01. The country-specific development level variable equals 0 when a country's *t-2* per capita GDP is within 30 log points of its sample average *t-2* per capita GDP, +1 (-1) when 30-60 log points above (below) its sample average, and +2 (-2) when 60 or more log points above (below) its sample average. Estimates control for the secondary school enrollment rate (percent gross) and the percent of the population aged 65 years and above in year *t-2*. The sample in columns 1 and 2 excludes country-years in which the *t-1* POLITY score exceeds 7. The sample in columns 3 and 4 excludes country-years in which the *t-1* POLITY score is less than -7. (Above previous year) GDP per capita growth_{*t-1*} equals GDP per capita growth_{*t-1*} if the latter exceeds GDP per capita growth in year *t-2*, and 0 otherwise. (Below previous year) GDP per capita growth_{*t-1*} equals GDP per capita growth_{*t-1*} if the latter is less than GDP per capita growth in year *t-2*, and 0 otherwise. The IV regressions in columns 2 and 4 each instrument for two endogenous variables (the two growth variables). Reported Stock-Yogo critical values are the 5 percent significance level critical values for weak instruments tests based on, respectively, 30 percent and 5 percent maximal Fuller relative bias. The null of weak instruments is rejected in the case that the *F* statistic on the excluded instruments exceeds the Stock-Yogo critical value/s. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

In Table A5, we interact the instruments with an instrument-specific variable equal to 1 for a positive shock and 0 for a negative shock (and vice-versa). A positive value for the precipitation and commodity price instruments is considered to be a positive shock, and a negative value a negative shock. A positive value for the temperature instrument is considered to be a negative shock, and a negative value a positive shock. The results indicate, firstly, that negative shocks are much more strongly correlated with economic growth than positive shocks (as evidenced by the larger F statistic and partial R -squared on the excluded instruments). But the estimated effect of growth on the likelihood of democratic change events is very similar using either positive or negative shocks. A Chow test of the hypothesis that the growth coefficients in columns 2 and 3 are equal does not reject the null hypothesis. This indicates that the relationship between economic shocks and democratic change events is not subject to asymmetry. The estimated effect of growth on the likelihood of autocratic change events is statistically insignificant when instrumenting with either positive or negative shocks to growth, although a Chow test indicates that the effects of positive and negative shocks on autocratic change events differ.

Table A5-Testing for asymmetry in effect of growth shocks

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	Democratic change events			Autocratic change events		
Excluded instruments	All	All (Positive shocks)	All (Negative shocks)	All	All (Positive shocks)	All (Negative shocks)
GDP per capita growth _{<i>t-1</i>}	-0.0140** (0.0063)	-0.0147* (0.0086)	-0.0148** (0.0066)	0.0079 (0.0079)	0.0211 (0.0187)	-0.0037 (0.0056)
Country-specific development level _{<i>t-2</i>}	-0.0370*** (0.0132)	-0.0382** (0.0174)	-0.0383*** (0.0129)	0.0077 (0.0132)	0.0260 (0.0291)	-0.0084 (0.0090)
POLITY score _{<i>t-1</i>}	-0.0099*** (0.0016)	-0.0099*** (0.0017)	-0.0099*** (0.0017)	0.0091*** (0.0013)	0.0097*** (0.0018)	0.0085*** (0.0012)
Tenure of regime _{<i>t-1</i>} (years)	0.0006 (0.0011)	0.0006 (0.0012)	0.0006 (0.0012)	0.0021*** (0.0005)	0.0024** (0.0011)	0.0018*** (0.0006)
Democracy in region _{<i>t-1</i>} (percent of countries)	-0.0003 (0.0008)	-0.0003 (0.0008)	-0.0003 (0.0008)	-0.0006* (0.0003)	-0.0003 (0.0006)	-0.0009*** (0.0003)
Country and year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
<i>F</i> statistic on excluded instruments	6.66	2.64	7.96	4.94	2.30	6.55
Partial <i>R</i> ² on excluded instruments	0.011	0.004	0.012	0.008	0.003	0.010
<i>p</i> -value from Chow test of equality of impact of GDP per capita growth _{<i>t-1</i>} using positive and negative shocks			0.95			0.04
Observations	2,897	2,897	2,897	3,598	3,598	3,598
Number of events	118	118	118	63	63	63
Countries	121	121	121	141	141	141
Estimation: IV (Fuller 1)						
Stock-Yogo critical values: 4.03/6.42						
Years: 1963-2001						

Notes: A democratic change event is the year-*t* commencement of a 3 or more point increase in POLITY score that occurs within 3 years, flagged by a positive REGTRANS score; an autocratic change event is the year-*t* commencement of a 3 or more point decrease in POLITY score that occurs within 3 years, flagged by a negative REGTRANS score. Robust standard errors clustered by country are in parentheses. GDP per capita growth is scaled so that one percentage point of additional growth is 1, not 0.01. The country-specific development level variable equals 0 when a country's *t-2* per capita GDP is within 30 log points of its sample average *t-2* per capita GDP, +1 (-1) when 30-60 log points above (below) its sample average, and +2 (-2) when 60 or more log points above (below) its sample average. Estimates control for the secondary school enrollment rate (percent gross) and the percent of the population aged 65 years and above in year *t-2*. Positive shocks include only positive values of the precipitation and commodity price instruments, and only negative values of the temperature instruments (0 otherwise). Negative shocks include only negative values of the precipitation and commodity price instruments, and only positive values of the temperature instruments (0 otherwise). The sample in columns 1-3 excludes country-years in which the *t-1* POLITY score exceeds 7. The sample in columns 4-6 excludes country-years in which the *t-1* POLITY score is less than -7. Reported Stock-Yogo critical values are the 5 percent significance level critical values for weak instruments tests based on, respectively, 30 percent and 5 percent maximal Fuller relative bias. The null of weak instruments is rejected in the case that the *F* statistic on the excluded instruments exceeds the Stock-Yogo critical value/s. Chow test *p* values are based on two-stage least squares estimates. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

Table A6-Specifications using alternative definitions of democratic change events

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent variable	All democratic change events	Democratic change events: Major or minor democratic transition (REGTRANS=2, 3)	Democratic change events: POLITY score increased by 4 or more points	Democratic change events: not reversed during subsequent 4 calendar years	Democratic change events: completed within 2 calendar years	Democratic change events: leader change in year t , $t+1$, or $t+2$	Democratic change events: no leader change in year t , $t+1$, or $t+2$
GDP per capita growth $_{t-1}$	-0.0140** (0.0063)	-0.0092* (0.0055)	-0.0099* (0.0053)	-0.0124** (0.0060)	-0.0130** (0.0061)	-0.0102* (0.0054)	-0.0037 (0.0039)
Country-specific development level $_{t-2}$	-0.0370*** (0.0132)	-0.0267** (0.0118)	-0.0325*** (0.0121)	-0.0343*** (0.0124)	-0.0330*** (0.0125)	-0.0198* (0.0108)	-0.0172** (0.0076)
POLITY score $_{t-1}$	-0.0099*** (0.0016)	-0.0080*** (0.0017)	-0.0090*** (0.0018)	-0.0090*** (0.0016)	-0.0087*** (0.0014)	-0.0072*** (0.0013)	-0.0028*** (0.0008)
Tenure of regime $_{t-1}$ (years)	0.0006 (0.0011)	0.0005 (0.0008)	0.0009 (0.0010)	0.0005 (0.0010)	0.0003 (0.0010)	0.0002 (0.0009)	0.0005 (0.0004)
Democracy in region $_{t-1}$ (percent of countries)	-0.0003 (0.0008)	0.0009 (0.0006)	0.0006 (0.0007)	-0.0002 (0.0007)	-0.0001 (0.0007)	0.0002 (0.0006)	-0.0004 (0.0004)
Country and year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F statistic on excluded instruments	6.66	8.74	8.74	6.66	6.66	6.66	6.66
Partial R^2 on excluded instruments	0.011	0.012	0.012	0.011	0.011	0.011	0.011
Observations	2,897	2,715	2,715	2,897	2,897	2,897	2,897
Share of democratic change events (percent)	100	71	82	86	86	72	28
Countries	121	117	117	121	121	121	121

Estimation: IV (Fuller 1)

Excluded instruments: All

Stock-Yogo critical values: 4.03/6.42

Years: 1963-2001

Notes: A democratic change event is the year- t commencement of a 3 or more point increase in POLITY score that occurs within 3 years, flagged by a positive REGTRANS score. The set of all instruments includes the precipitation instrument $_{t-1, t-2}$, the temperature instrument $_{t-1, t-2}$, and the commodity price instrument $_{t-1}$. Robust standard errors clustered by country are in parentheses. GDP per capita growth is scaled so that one percentage point of additional growth is 1, not 0.01. The country-specific development level variable equals 0 when a country's $t-2$ per capita GDP is within 30 log points of its sample average $t-2$ per capita GDP, +1 (-1) when 30-60 log points above (below) its sample average, and +2 (-2) when 60 or more log points above (below) its sample average. Estimates control for the secondary school enrollment rate (percent gross) and the percent of the population aged 65 years and above in year $t-2$. Results in column 1 are identical to those in column 2 of Table 4. The sample excludes country-years in which the $t-1$ POLITY score exceeds 7. The sample in columns 2 and 3 excludes country-years in which the lagged POLITY score is equal to 7. Reported Stock-Yogo critical values are the 5 percent significance level critical values for weak instruments tests based on, respectively, 30 percent and 5 percent maximal Fuller relative bias. The null of weak instruments is rejected in the case that the F statistic on the excluded instruments exceeds the Stock-Yogo critical value/s. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

Table A7-Democratic change events using Przeworski et al. (2000) and Freedom House dependent variables

	(1)	(2)	(3)	(4)	(5)	(6)
Data source	Polity IV		Przeworski et al.		Freedom House	
Estimation	LPM	IV (Fuller 1) LPM	IV (Fuller 1) LPM	IV (Fuller 1) LPM	IV (Fuller 1)	IV (Fuller 1)
Excluded instruments	None	All	None	All	None	All
GDP per capita growth _{<i>t-1</i>}	-0.0009* (0.0005)	-0.0144** (0.0068)	-0.0009* (0.0005)	0.0045 (0.0042)	-0.0024** (0.0010)	0.0007 (0.0078)
Country and year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
<i>F</i> statistic on excluded instruments	-	6.68	-	5.16	-	6.96
Stock-Yogo critical value	-	4.03/6.42	-	4.03/6.42	-	4.03/6.42
Partial <i>R</i> ² on excluded instruments	-	0.010	-	0.010	-	0.016
Observations	2,897	2,897	2,394	2,394	2,103	2,103
Number of democratic change events	118	118	42	42	212	209
Countries	121	121	107	107	120	120

Years: 1963-2001

Notes: The dependent variable is the commencement of a year-*t* democratic change event. A Polity IV democratic change event is the year-*t* commencement of a 3 or more point increase in POLITY score that occurs within 3 years, flagged by a positive REGTRANS score. A Przeworski et al. democratic change event is a change in regime from dictatorship to democracy in year *t*. A Freedom House democratic change event is defined as the year-*t* commencement of a reduction in the Political Rights Index of 1 point or more that occurs within 3 years. A 1 point reduction in the Political Rights Index is equivalent in relative magnitude to a 3-point increase in POLITY score. Democratic change events in the year of the natural death of the national leader are excluded. The set of all instruments includes the precipitation instrument_{*t-1, t-2*}, the temperature instrument_{*t-1, t-2*}, and the commodity price instrument_{*t-1*}. Robust standard errors clustered by country are in parentheses. GDP per capita growth is scaled so that one percentage point of additional growth is 1, not 0.01. The estimates control for the country-specific development level variable, the secondary school enrollment rate (percent gross), and the percent of the population aged 65 years and above in year *t-2*. The other controls are not included because they are not consistently defined across columns. The country-specific development level variable equals 0 when a country's *t-2* per capita GDP is within 30 log points of its sample average *t-2* per capita GDP, +1 (-1) when 30-60 log points above (below) its sample average, and +2 (-2) when 60 or more log points above (below) its sample average. The sample in columns 1-2 excludes country-years in which the *t-1* POLITY score exceeds 7. The sample in columns 3-4 is further restricted to only countries classified by Przeworski et al. as dictatorships in year *t-1*, while the sample in columns 5-6 is further restricted by data availability and to countries with a lagged Political Rights Index score of 2 or above. Reported Stock-Yogo critical values are the 5 percent significance level critical values for weak instruments tests based on, respectively, 30 percent and 5 percent maximal Fuller relative bias. The null of weak instruments is rejected in the case that the *F* statistic on the excluded instruments exceeds the Stock-Yogo critical value/s. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

Table A8-Autocratic change events using Przeworski et al. (2000) and Freedom House dependent variables

	(1)	(2)	(3)	(4)	(5)	(6)
Data source	Polity IV		Przeworski et al.		Freedom House	
Estimation	LPM	IV (Fuller 1) LPM	LPM	IV (Fuller 1) LPM	LPM	IV (Fuller 1)
Excluded instruments	None	All	None	All	None	All
GDP per capita growth _{<i>t-1</i>}	-0.0006 (0.0004)	0.0087 (0.0083)	-0.0022** (0.0010)	0.0093 (0.0197)	-0.0016 (0.0013)	-0.0047 (0.0167)
Country and year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
<i>F</i> statistic on excluded instruments	-	4.82	-	0.90	-	3.62
Stock-Yogo critical value	-	4.03/6.42	-	4.03/6.42	-	4.03/6.42
Partial <i>R</i> ² on excluded instruments	-	0.008	-	0.008	-	0.010
Observations	3,598	3,598	1,853	1,853	2,424	2,424
Number of autocratic change events	63	63	34	34	174	174
Countries	141	141	92	92	139	139

Years: 1963-2001

Notes: The dependent variable is the commencement of a year-*t* autocratic change event. A Polity IV autocratic change event is the year-*t* commencement of a 3 or more point decrease in POLITY score that occurs within 3 years, flagged by a negative REGTRANS score. A Przeworski et al. autocratic change event is a change in regime from democracy to dictatorship in year *t*. A Freedom House autocratic change event is defined as the year-*t* commencement of an increase in the Political Rights Index of 1 point or more that occurs within 3 years. A 1 point increase in the Political Rights Index is equivalent in relative magnitude to a 3-point decrease in POLITY score. Autocratic change events in the year of the natural death of the national leader are excluded. The set of all instruments includes the precipitation instrument_{*t-1, t-2*}, the temperature instrument_{*t-1, t-2*}, and the commodity price instrument_{*t-1*}. Robust standard errors clustered by country are in parentheses. GDP per capita growth is scaled so that one percentage point of additional growth is 1, not 0.01. The estimates control for the country-specific development level variable, the secondary school enrollment rate (percent gross), and the percent of the population aged 65 years and above in year *t-2*. The other controls are not included because they are not consistently defined across columns. The country-specific development level variable equals 0 when a country's *t-2* per capita GDP is within 30 log points of its sample average *t-2* per capita GDP, +1 (-1) when 30-60 log points above (below) its sample average, and +2 (-2) when 60 or more log points above (below) its sample average. The sample in columns 1-2 excludes country-years in which the *t-1* POLITY score is less than -7. The sample in columns 3-4 is further restricted to only countries classified by Przeworski et al. as democracies in year *t-1*, while the sample in columns 5-6 is further restricted by data availability and to countries with a lagged Political Rights Index score of 6 or below. Reported Stock-Yogo critical values are the 5 percent significance level critical values for weak instruments tests based on, respectively, 30 percent and 5 percent maximal Fuller relative bias. The null of weak instruments is rejected in the case that the *F* statistic on the excluded instruments exceeds the Stock-Yogo critical value/s. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

Table A9-Anti-government protests and democratic and autocratic change events

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	Democratic change events			Autocratic change events		
Estimation	LPM	LPM	IV	LPM	LPM	IV
GDP per capita growth _{<i>t-1</i>}		-0.0009*	-0.0134**		-0.0005	0.0064
		(0.0005)	(0.0060)		(0.0005)	(0.0072)
Anti-government protests _{<i>t</i>}	0.0153***	0.0154***	0.0162***	0.0014	0.0015	0.0010
	(0.0051)	(0.0051)	(0.0053)	(0.0012)	(0.0012)	(0.0013)
Anti-government protests _{<i>t-1</i>}	-0.0009	-0.0013	-0.0064	0.0003	0.0002	0.0013
	(0.0033)	(0.0033)	(0.0045)	(0.0012)	(0.0011)	(0.0020)
Country and year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
<i>F</i> statistic on excluded instruments	-	-	7.69	-	-	4.20
Stock-Yogo critical value	-	-	4.03/6.42	-	-	4.03/6.42
Partial <i>R</i> ² on excluded instruments	-	-	0.013	-	-	0.008
Observations	2,820	2,820	2,820	3,538	3,538	3,538
Number of events	116	116	116	60	60	60
Countries	120	120	120	140	140	140
IV estimation: Fuller 1						
Excluded instruments in IV regressions: All						
Years: 1963-2007						

Notes: A democratic change event is the year-*t* commencement of a 3 or more point increase in POLITY score that occurs within 3 years, flagged by a positive REGTRANS score; an autocratic change event is the year-*t* commencement of a 3 or more point decrease in POLITY score that occurs within 3 years, flagged by a negative REGTRANS score. The set of all instruments includes the precipitation instrument_{*t-1, t-2*}, the temperature instrument_{*t-1, t-2*}, and the commodity price instrument_{*t-1*}. Robust standard errors clustered by country are in parentheses. GDP per capita growth is scaled so that one percentage point of additional growth is 1, not 0.01. Estimates control for the country-specific development level in year *t-2*, the tenure of the regime in year *t-1* (years), the percent of countries in the region that are democracies in year *t-1*, the secondary school enrollment rate (percent gross) in year *t-2*, and the percent of the population aged 65 years and above in year *t-2*. The sample in columns 1-3 excludes country-years in which the *t-1* POLITY score exceeds 7. The sample in columns 4-6 excludes country-years in which the *t-1* POLITY score is less than -7. Estimates are for smaller samples than those used for the estimations in Table 2 due to missing anti-government protests data. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

Table A10-The determinants of anti-government protestsDependent variable: Number of anti-government protests in year $t-1$

	(1)	(2)	(3)	(4)	(5)
Estimation	LPM	IV (Fuller 1)	IV (Fuller 1)	IV (Fuller 1)	IV (Fuller 1)
Excluded instruments	None	All	Precipitation instrument $_{t-1, t-2}$	Temperature instrument $_{t-1, t-2}$	Commodity price instrument $_{t-1}$
GDP per capita growth $_{t-1}$	-0.0203*** (0.0061)	-0.0009 (0.0363)	0.0344 (0.0488)	-0.0258 (0.0489)	0.0206 (0.0424)
Country-specific development level $_{t-2}$	0.0719 (0.0978)	0.0974 (0.1107)	0.1436 (0.1282)	0.0647 (0.1158)	0.1256 (0.1107)
POLITY score $_{t-1}$	-0.0229 (0.0155)	-0.0217 (0.0154)	-0.0195 (0.0151)	-0.0232 (0.0158)	-0.0204 (0.0153)
Tenure of regime $_{t-1}$ (years)	-0.0103 (0.0109)	-0.0101 (0.0108)	-0.0096 (0.0110)	-0.0104 (0.0107)	-0.0098 (0.0110)
Democracy in region $_{t-1}$ (percent of countries)	0.0148** (0.0062)	0.0152** (0.0063)	0.0158** (0.0062)	0.0147** (0.0063)	0.0155** (0.0064)
Country and year fixed effects	Yes	Yes	Yes	Yes	Yes
F statistic on excluded instruments	-	7.86	3.81	15.59	5.47
Stock-Yogo critical value	-	4.03/6.42	7.49/13.46	7.49/13.46	12.71/24.09
Partial R^2 on excluded instruments	-	0.012	0.004	0.008	0.002
Observations	4,240	4,240	4,240	4,240	4,240
Countries	149	149	149	149	149
Years: 1963-2001					

Notes: Robust standard errors clustered by country are in parentheses. The sample is smaller than that for the main estimations due to missing anti-government protests data. GDP per capita growth is scaled so that one percentage point of additional growth is 1, not 0.01. Estimates control for the secondary school enrollment rate (percent gross) and the percent of the population aged 65 years and above in year $t-2$. Reported Stock-Yogo critical values are the 5 percent significance level critical values for weak instruments tests based on, respectively, 30 percent and 5 percent maximal Fuller relative bias. The null of weak instruments is rejected in the case that the F statistic on the excluded instruments exceeds the Stock-Yogo critical value/s. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

A-III. Przeworski et al. (2000), Freedom House, and Polity IV measures compared

We use the Polity IV REGTRANS score to flag the commencement of episodes of democratic/autocratic change. The dichotomous regime measure of Przeworski et al. (2000) is less suited for this purpose, because it flags the year in which regime transitions conclude i.e. the year in which new democratic regimes emerge – essentially defined as the point at which a competitive election is first held. Democratic transitions are messy, and often take more than one calendar year to conclude. This means that the Przeworski et al. measure tends to provide a late-moving measure of democratic transitions. The Przeworski et al. measure also allows less dependent variable variation than available in our primary specification using the Polity IV regime transition variable.

The Freedom House Political Rights Index measures political freedoms of individuals rather than regime transitions. Given its focus on outcomes affecting individuals, it often records improvements in political freedoms in years subsequent to the commencement of democratic transitions. It also reflects factors such as the treatment of minorities, corruption and transparency, which are less closely related to regime transitions, and for which the timing of instances of sharp change are more difficult to identify.

Examples to demonstrate that the Polity IV measure is a more appropriate measure of the commencement of episodes of institutional change toward democracy than the Przeworski et al. (2000) and Freedom House measures are provided here (only the Portugal example is provided in the main text).

1. Benin

Polity IV codes the year of the commencement of democratization in Benin as 1990, and that Benin completed its democratic transition in 1991. Przeworski et al. record that a new democratic regime emerged in 1991, the year in which multi-party elections were held (and the incumbent lost). We think that it is appropriate to code 1990 as the year of commencement of democratization, as it was in this year that a national conference was held and a referendum to install a new democratic constitution was called. (Freedom House records improvements in political rights in Benin in 1990 and 1991.)

2. Central African Republic

Polity IV codes the year of commencement of democratization in the Central African Republic as 1991, and that the Central African Republic completed its democratic transition in 1993. Przeworski et al. code the year of the emergence of a democratic regime as 1993, and Freedom House do not record an improvement in political rights until 1993. We agree with the Polity IV identification of 1991 as the first year of the democratization process in the Central African Republic. In this year, the President announced the movement toward a parliamentary democracy and a National Commission was set up to establish a democratic constitution. Multi-party presidential elections were held in 1992 and 1993.

3. Chile

Polity IV codes the year of commencement of democratization in Chile as 1988, and that Chile completed its democratic transition in 1989. The Przeworski et al. measure does not tick over to democracy until 1990. We think that 1988 really is the year of the start of democratization in Chile: in 1988, Pinochet was defeated in a plebiscite, and the

Constitution was amended to diminish the role of the military. The scene was set for a democratic election, which was held in 1989. (Freedom House records improvements in political rights in Chile in each year during the period 1988-1990.)

4. Guatemala

Polity IV codes the year of commencement of democratization in Guatemala as 1984, and that Guatemala completed its democratic transition in 1986. Przeworski et al. code the emergence of a new democratic regime as occurring in 1986. We think that, given our focus on the commencement of democratic change, it is more appropriate to use the Polity IV coding: in 1984, an election for a Constituent Assembly to draft a democratic constitution was held. January 1986 just turned out to be when the election was finally held. (Freedom House records improvements in political rights in Guatemala in 1984, 1985, and 1986.)

5. Hungary

Polity IV codes the year of commencement of democratization in Hungary as 1988, and that Hungary completed its transition to democracy in 1990 (the year in which elections were held). Przeworski et al. code 1990 as the transition year. Freedom House record improvements in political rights in 1989 and 1990. 1988 was the year in which the Hungarian Parliament adopted a “democracy package”, which included a new electoral law, a revision of the constitution, and increased democratic freedoms. These reforms set the scene for the 1990 election.

6. Indonesia

Polity IV codes the year of commencement of democratization in Indonesia as 1998, and that Indonesia completed its democratic transition in 1999. Przeworski et al. record 1999 as the year of the emergence of a new democratic regime (a year in which there was democratic elections in Indonesia). Freedom House codes an improvement in political freedoms in each of the years 1998, 1999 and 2000. We think that it is legitimate to code 1998 as the start of the democratization process rather than 1999, as this was the year in which President Suharto stepped down and constraints on executive authority began to be increased.

7. Malawi

Polity IV codes the year of commencement of democratization in Malawi as 1993, and that Malawi completed its democratic transition in 1994. Przeworski et al. code the year of regime transition as 1994. Freedom House also code 1994 as the primary year of realized improvements in political freedoms in Malawi during this period (and also code a 1-point improvement in 1992). We think it more appropriate to code democratization in Malawi as commencing in 1993 than 1994: this was the year in which a referendum was held and a vote in favor of multi-party democracy was recorded. Elections were held the following year.

8. Mongolia

Polity IV codes the year of commencement of democratization in Mongolia as 1990, which is the year widely cited as being the year of Mongolia's Democratic Revolution. 1990 saw the first free parliamentary elections in Mongolia after mass protests. Przeworski et al. do

not record a democratic regime in Mongolia until 1992 – the year in which a new constitution was introduced by the democratically elected government. (Freedom House records improvements in political rights in Mongolia in 1990 and 1991.)

9. Niger

Polity IV codes the year of democratization in Niger as 1999. This was a year in which there was a coup against the former dictator, the drafting of a new constitution, the approval of a democratic constitution by referendum, democratic elections for the legislature and president, and a transition to civilian rule. Przeworski et al. do not code the return to democracy until 2000. (Freedom House record improvements in political freedoms in both 1999 and 2000.)

10. Portugal

Polity IV codes the commencement of a “major democratic transition” in Portugal in 1974, and that the transition concluded in 1976. Przeworski et al. do not record the establishment of a new democratic regime until 1976. Freedom House also does not record an improvement in individuals’ political rights until 1976. We think that it is appropriate to code 1974, the year of the Carnation Revolution, as the year of the commencement of democratization in Portugal, despite the fact that it did not immediately herald the installment of a fully-functional democracy.

11. Romania

Polity IV codes the year of commencement of democratization in Romania as 1989 (the year of the Romanian Revolution), and codes Romania as completing its democratic

transition in 1990. Przeworski et al. record that the new democratic regime emerged in occurring in 1990. Similarly, Freedom House's political rights measure doesn't record an improvement in political rights until 1990. 1989 appears to be the correct year to flag the commencement of democratization in Romania: the election in 1990 was a consequence of the events of 1989.

12. South Korea

Significant amendments to South Korea's constitution, which heralded the commencement of the Sixth Republic, were made in 1987, and democratic elections were held. Polity IV accordingly codes a major democratic transition commencing in 1987 in South Korea. However, Przeworski et al. do not record a democratic transition until 1988. Freedom House similarly does not record democratic change in South Korea until the year ending November 1988. (Freedom House does not provide calendar year data for most of the 1980s.)

A-IV. Commodity export price index

The index was constructed for a commodity export bundle of 50 commodities – 35 agricultural commodities and 15 non-agricultural commodities. The commodities included in the bundle are listed in Table A11. This is the same export bundle of 50 commodities used in the construction of the commodity export price index in Paul Collier and Benedikt Goderis (2007).

Agricultural (35)	Non-agricultural (15)
Bananas, Barley, Butter, Cocoa beans, Coconut oil, Coffee, Copra, Cotton, Fish, Groundnut oil, Groundnuts, Hides, Jute, Maize, Olive oil, Oranges, Palm kernel oil, Palm oil, Pepper, Plywood, Poultry, Pulp, Rice, Rubber, Sisal, Sorghum, Soybean oil, Soybeans, Sugar, Sunflower oil, Swine meat, Tea, Tobacco, Wheat, Wool	Aluminium, Coal, Copper, Gasoline, Iron ore, Lead, Natural gas, Nickel, Oil, Phosphate rock, Silver, Tin, Uranium, Urea, Zinc

Commodity export values for 1995 were obtained from the United Nations Commodity Trade Statistics Database, the United Nations Conference on Trade and Development Commodity Yearbook (2003), and the International Trade Statistics Yearbook (United Nations Statistical Office 1996, 1999).⁵ 1995 was chosen as the year for which to construct country-specific commodity export weights because it allowed the inclusion of the former Soviet Union countries (Collier and Goderis (2007) used 1990). Annual world commodity price indices were obtained from the International Financial Statistics (IFS) database of the International Monetary Fund for all commodities except natural gas and gasoline.⁶ For these two commodities, prices were obtained from the Annual Energy Review 2007 (Energy Information Administration 2008).

⁵ Commodity Trade Statistics Database: <http://comtrade.un.org> (accessed 15 January 2009).

⁶ <http://www.imfstatistics.org/imf/> (accessed 20 January 2009).

Prices were deflated using the export unit value from IFS. 15 of the price series had gaps in the early periods. We filled these gaps by either linear interpolation of the deflated price series or by holding the deflated price constant at the first available level.

The price index was arithmetically weighted using the 1995 commodity export shares to construct the country-specific commodity export price index.⁷ The index equals 100 for all countries for the year 2000. The index was then logged and differenced, and interacted with the value of exports of commodities in the commodity bundle as a share of 1995 GDP (using GDP in current US dollars from the World Development Indicators (WDI) or, in the case of missing data, from the United Nations Statistics Division).⁸ The index does not reflect that countries may receive different prices for exports of the same commodity. In value terms, non-agricultural commodities account for 60 percent of the exports in the export bundles for countries in the sample. The most important of these commodities is oil. The correlation between the commodity price instrument and the deflated and differenced log oil price index is 0.29.

A common commodity price index was constructed for two groupings of countries: 1) the five members of the Southern African Customs Union (Botswana, Lesotho, Namibia, South Africa, and Swaziland), and 2) Belgium and Luxembourg. This was necessitated by the absence of export data at a country level for these two country groups. Results are similar if these seven countries are excluded from the estimation sample.

⁷ Collier and Goderis (2007) weighted their index geometrically. Given that many of the commodity shares were close to 0, we opted for an arithmetically weighted index.

⁸ World Development Indicators: <http://go.worldbank.org/6HAYAHG8H0> (accessed 10 July 2008). United Nations Statistics Division: <http://unstats.un.org/unsd/snaama/Introduction.asp> (accessed 2 February 2009).

We explore a number of alternatives in instrumenting economic growth with commodity price variation. A similar result in the main “democratic change event” specifications is obtained if the commodity price instrument is replaced by one that covers a commodity bundle of only the 15 non-agricultural commodities, or one that covers only the 35 agricultural commodities (although agricultural commodity export price fluctuations are an extremely weak instrument for economic growth in the global sample in the presence of year fixed effects). Results are similar if commodities for which price series are incomplete are dropped from the commodity bundle. Results are also similar if countries in the Middle East and North Africa (a region characterized by high levels of autocracy and high commodity dependence) are excluded from the sample. We also explore whether results are similar once exports of any commodity for which a country’s exports make up more than 15 percent of global exports are excluded from that country’s commodity bundle. (For instance, once oil is excluded from Saudi Arabia’s commodity bundle.) We do this given the possible concern that commodity export prices are endogenous to political change for price setters. We obtain similar results. Finally, we explore whether the results are similar if we remove the world’s largest economies from the estimation sample (as demand in these countries affects world commodity prices), and obtain similar results.

A-V. Definitions of variables

Variable name	Variable description	Source	Notes
Democratic change event	Binary variable, =1 if a 3-or-more point increase in the POLITY score over a period of 3 years or less commences in year t , as flagged by a positive REGTRANS score; 0 otherwise.	Polity IV, version 2007	Covers instances of major democratic transition (REGTRANS==3), minor democratic transition (REGTRANS==2), and positive regime change (REGTRANS==1). Only the first year of multi-year democratic change events is considered. Years in which democratic change events coincided with the natural death of the national leader are excluded from the estimation dataset. This affected 3 years: Spain 1975, Nigeria 1998, and Croatia 1999. Natural deaths of the national leader are identified using Goemans, Gleditsch, and Chiozza (2009). Polity IV: http://www.systemicpeace.org/polity/polity4.htm (accessed 15 July 2009)
Autocratic change event	Binary variable, =1 if a 3-or-more point decrease in the POLITY score over a period of 3 years or less commences in year t , as flagged by a negative REGTRANS score; 0 otherwise.	Polity IV, version 2007	Only the first year of multi-year autocratic change events is considered. In no years did autocratic change events coincide with the natural death of the national leader. Natural deaths of the national leader are identified using Goemans, Gleditsch, and Chiozza (2009). Autocratic change events cover the Polity IV categories of “negative regime change” and “adverse regime transition”, but exclude the commencement of interregal periods
POLITY2	POLITY score adjusted for use in time series studies	Polity IV, version 2007	
GDP per capita growth	Annual percentage growth rate of GDP per capita based on constant local currency	WDI	http://go.worldbank.org/6HAYAHG8H0 (accessed 25 August 2009)
GDP per capita growth, Penn World Table	Annual percentage growth rate of GDP per capita in 2005 constant prices I\$ (chain series)	Penn World Table 6.3	http://pwt.econ.upenn.edu/ (accessed 15 September 2009)
GDI per capita growth, Penn World Table	Annual percentage growth rate of gross domestic income per capita in 2005 constant prices I\$ terms of trade	Penn World Table 6.3	http://pwt.econ.upenn.edu/ (accessed 15 September 2009)
Country-specific development level $_{t,2}$	Equals 0 when a country's $t-2$ per capita GDP is within 30 log points of its sample average $t-2$ per capita GDP, +1 (-1) when 30-60 log points above (below) its sample average, and +2 (-2) when 60 or more log points above (below) its sample average	WDI	
Secondary enrollment rate (percent gross)	Number of pupils enrolled in secondary education, regardless of age, expressed as a percentage of the population in the theoretical age group for secondary education	World Bank Education Statistics, Development Research Institute	Data are interpolated (linear) and extrapolated (constant). World Bank Education Statistics: http://www.worldbank.org/education/edstats (accessed 1 June 2008). Development Research Institute: http://www.nyu.edu/fas/institute/dri/dataset/Social%20Indicators%20Fixed%20Factors_7_2005.xls (accessed 13 August 2008)
Population aged 65 years and above (percent)	Percentage of the total population aged 65 years or older	WDI	
Tenure of regime (years)	The number of years since the most recent regime change (defined by a 3-point change in the POLITY score over a period of 3 years or less), or the end of a transition period	Polity IV, version 2007	

Democracy in region (percent of countries)	Number of democracies in region divided by number of countries in the <i>Polity IV</i> dataset in region * 100. Countries with a positive POLITY2 score are classified as democracies	Polity IV, version 2007	8 regions are defined following the Development Research Institute: East Asia and Pacific, East Europe and Central Asia, Latin America and the Caribbean, Middle East and North Africa, North America, South Asia, sub-Saharan Africa, and West Europe.
Labor force in agriculture in 1961 (percent) [Φ]	Percentage of the total labor force economically active in agriculture, hunting, forestry, or fishing in the year 1961	World Resources Institute (WRI)	WRI: http://earthtrends.wri.org (accessed 15 June, 2008). Countries that were not independent in 1961 and for which data are not available: data for the former jurisdiction of which they were a part (e.g. Yugoslavia) were used
Non-irrigated cropland (percent) in 1961 [Ψ]	Share of arable land and permanent cropland that was not purposely provided with water in 1961	WDI, Food and Agriculture Organization	7 percent of observations are for the first available year post-1961 in WDI. 5 percent of observations are for 1961 data from the Food and Agriculture Organization (http://faostat.fao.org/site/377/default.aspx#anchor , accessed 3 March 2009)
Precipitation instrument	Change in precipitation from the previous year (percent) multiplied by Φ and Ψ	Mitchell et al. (2004)	Dataset available at http://www.cru.uea.ac.uk/~timm/cty/obs/TYN_CY_1_1.html (accessed 1 June 2008)
Temperature instrument	Change in temperature from previous year ($^{\circ}\text{C}$) (multiplied by -1 for countries where the average temperature from 1960-1970 was less than 12°C) multiplied by Φ	Mitchell et al. (2004)	Dataset available at http://www.cru.uea.ac.uk/~timm/cty/obs/TYN_CY_1_1.html (accessed 1 June 2008)
Commodity price instrument	See A-III	Authors' construction	
Anti-government protests	Any peaceful public gathering of at least 100 people for the primary purpose of displaying or voicing opposition to a government's policies or its authority	Databanks International	These data were constructed primarily from reports in the <i>New York Times</i> . Databanks International warns that they may be subject to geographic and other biases. http://databanksinternational.com (accessed 13 August 2008)

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