

Economic growth and democratization*

Paul Burke

Research School of Pacific and Asian Studies

Australian National University

paul.j.burke@anu.edu.au

Andrew Leigh

Research School of Social Sciences

Australian National University

<http://econrsss.anu.edu.au/~aleigh/>

andrew.leigh@anu.edu.au

This version: 11 February 2008

Abstract

Using data on 106 countries that were autocracies at some point from 1963 to 2004, we test whether economic growth in a given year has an effect on the likelihood of a democratizing event in the following year. Fixed effects logit and linear probability model results indicate that autocracies are more likely to democratize following growth slowdowns. To address the potential endogeneity of economic growth, we use a dual instrumental variable approach in which both external economic growth and rainfall variation are used as instruments for income growth. Results using either of these instruments confirm that negative economic shocks increase the likelihood of democratization.

JEL codes: D72, O40

Keywords: economic growth; autocracy; democracy; transition; democratization

* Bruce Chapman, Raghendra Jha, Melissa Wells, Trang Nguyen and seminar participants at the Australian National University provided valuable feedback on earlier drafts.

1. Introduction

Is growth good or bad for a dictator's short-term prospects? While a sizeable literature in economics and political science has explored the relationship between a country's income level and its regime type, limited evidence exists on whether autocracies that experience more rapid growth in one year are more or less likely to democratize in the next year.

From a theoretical standpoint, the effect of growth on democratization could go in either direction. As in rational voter models, sluggish growth might lead to discontent with the status quo, increasing pressure for change. Conversely, stronger economic growth may lead to greater political instability, which would increase the likelihood of democratization.

Further complicating the puzzle, past growth may not necessarily be endogenous with respect to future economic transitions. As the probability of a regime change increases, autocratic leaders might allow growth to falter, as they expropriate as much of the country's economic resources as possible. Or autocrats might attempt to stave off revolutions by creating temporary economic booms. In either case, a relationship between growth in year t and regime transitions in year $t+1$ will not necessarily tell us about the causal impact of growth on transitions.

Our study addresses these empirical challenges by estimating country fixed effects logit and linear probability models, which allow us to account for country-specific, time-invariant effects that might affect both growth and democratization simultaneously. By using two instrumental variables – external growth and rainfall – we are able to account for the potential endogeneity of economic growth. Moreover, our instruments affect growth in different ways: while external growth will primarily affect the exporting sector, rainfall will predominantly affect the agricultural sector. Using these two instruments allows us to separately explore the effect of manufacturing growth and agricultural growth on democratization.

While many countries in the world have moved from autocracy to democracy over recent decades, the effect of economic growth on democracy remains of substantial policy importance. In 2004, 50 countries with a combined population of 2.2 billion, equal to 34 percent of the global population, were under autocratic rule (Polity IV Project 2005; World Bank 2008). Further research into the relationship between economic growth and democratic transitions can help predict the timing of future democratic transitions. Of most policy relevance is the effect of economic growth on the probability that China, the world's most populous nation, will transition from autocracy to democracy.

The remainder of this paper is organized as follows. In section 2, we review the literature on the determinants of democratization. In section 3, we outline the econometric model to be estimated. In section 4, we discuss the data, and in section 5, we present results. The final section concludes.

2. The literature on democratization and growth

2.1 The theory

Jagers and Gurr (1995, p. 479) have observed that “most shifts among regime types... have occurred quite abruptly”, but that “the causes and correlates of these different patterns of regime change remain to be established”. A number of theoretical papers in the literature identify economic crises as destabilizing events that increase the likelihood of regime change, including democratizing regime change. Haggard and Kaufman (1997) argued that “poor economic performance reduces the bargaining power of authoritarian incumbents and increases the strengths of oppositions”, exposes rulers to “defection from within the business sector” and “disrupts the political bargains rulers typically forge” (p. 267). Acemoglu and Robinson (2006, p. 31) and Robinson (2006, p. 509) contend that during crises, “the collective-action problem is easier to solve, opponents to the regime are easier to coordinate, and revolutions are easier and less costly to carry out”.

Zac and Feng (2003) developed a dynamic general equilibrium model in which democratic transition is driven by the economic position of the middle class and in which economic crises lead to democratic transitions because citizens have “nothing to lose” by demonstrating for a better government (p. 15). Geddes (1999, p. 138) argued that shocks that “prevent passable economic performance” undermine autocratic regimes. Strong growth, on the other hand, increases the legitimacy of autocratic regimes and reduces the likelihood of protests (Feng 1997, Haggard and Kaufman 1997, Tang and Yung 2006).

Counter arguments also exist. For example, Olson (1963) argued that stronger economic growth may lead to greater political instability, which would increase the likelihood of democratic transitions. Huntington (1968) argued that this is likely to be particularly the case at low development levels. Lipset’s (1959) modernization theory – the argument that democratization emerges with economic development – also implies that economic growth increases the likelihood of democratization, although not necessarily in the very short-run. In the end, the direction of the relationship between growth fluctuations and the likelihood of democratization is an empirical issue. It is to the prior empirical literature that we now turn.

2.2 Prior empirical studies

A sizable empirical literature exists on the determinants of regime type. The bulk of the literature has focused on the role of structural factors, such as levels of income, education and oil and mineral dependence, as well as culture, religion and colonial history, in explaining regime type (see, for example, Barro 1999). Modernization theory has generally been supported empirically (Burkhart and Lewis-Beck 1994, Helliwell 1994, Gasiorowski 1995, Feng 1996, 1997, Barro 1996, 1999, Boix and Stokes 2003, Epstein et al. 2006). There is some evidence that poorer countries are more likely to experience democratic transitions than richer autocracies. However, democracy is also less likely to be sustained in poorer countries (Hannon and Carroll 1981, Przeworski et al. 2000).

One of the most important empirical papers in the literature is Acemoglu et al. (2005), who highlighted the importance of country-specific effects, such as historical factors, in considering the income-democracy relationship. They found that once these country-specific effects are controlled for, income has no causal effect on democracy levels. The approach adopted in this paper, like that in Acemoglu et al. (2005), incorporates country-specific fixed effects to control for time-invariant omitted variables. In contrast to Acemoglu et al. (2005), this paper focuses on the short-run relationship between economic growth and discrete steps towards democracy rather than the long-run relationship between levels of income and democracy.

Several non-econometric studies have cited an empirical relationship between economic crises and democratization. Lee (2002, p. 825) argued that since the mid-1970s, “economic crises have ignited numerous democratic transitions”. Huntington (1991, p. 72) contended that during the ‘third wave of democratization’ (which commenced in 1974): “the combination of substantial levels of economic development and short-term economic crisis or failure was the economic formula most favourable to the transition from authoritarian to democratic government”. Rodrik and Wacziarg (2005) provided graphical evidence for a sample of 24 countries suggesting that democratization tends to follow periods of low domestic growth. Haggard and Kaufman (1995, p. 35) listed a number of examples of countries making democratic transitions in which “the years preceding the transition were marked by declining growth”. Democratic transitions following economic downturns include Argentina (1983), the Philippines (1986), Malawi (1993) and Indonesia (1998).

A number of econometric studies have looked at the relationship between economic growth and regime stability. There is evidence from democracies that leaders are much more likely to retain their positions in periods of strong economic growth (Leigh 2004, Wolfers 2007). The Political Instability Task Force (2003), Ulfelder and Lustik (2005), Epstein et al. (2006) and others have reported that higher economic growth reduces the chance of democratization in autocracies. These papers have not addressed the potential endogeneity of economic

growth or controlled for time-invariant omitted variables, however. They have also focused only on full democratic transitions instead of the wider definition of democratization employed here.

Using Freedom House data, Acemoglu et al. (2005) and Acemoglu and Robinson (2006) found that economic crises (measured using a crisis dummy variable) make transitions toward democracy more likely. Noland (2005, p. 13) similarly concluded that “the more rapid the growth of per capita income ... the longer the waiting time for transition”. Gasiorowski (1995) found, on the other hand, that a country’s rate of domestic economic growth was unrelated to the probability that it would make a democratic transition. Noland (2005) and Gasiorowski (1995), like others, did not address the simultaneity bias arising from including domestic growth as an explanatory variable or control for country-specific fixed effects. In addition, the growth variable in Gasiorowski (1995) was an average for the years t and $t-1$, which inappropriately includes the growth in year t that occurs after a democratic transition event.

Feng (1996), allowing for feedback between long-term economic growth averages and the duration of autocratic regimes, presented evidence that growth is negatively related to autocratic regime duration, but did not look at the short-run implications of growth shocks on democratization. Other studies into the determinants of democratization do not consider the role of short-term growth shocks (see, for instance, Feng and Zac 1999).

A related literature has looked at the effect of growth on conflicts. Collier et al. (2007) found that slower growth increases the likelihood of civil war, and concluded that this is because slow growth “makes rebellion more feasible” (p. 25). Miguel et al. (2004), in a study of 41 African countries, also found that negative growth shocks increase the likelihood of both the onset and the incidence of civil conflict in the next year. The primary methodological contribution in Miguel et al. (2004) was the use of rainfall variation as an instrument for economic growth.

The jury is still out on the factors that increase the likelihood of democratizing events, and over the reconciliation of modernization theory with the argument that democratization is more likely following economic crises. As Robinson (2006, p. 503) summed up, “there is still a lot to learn on this topic”. It appears that no prior paper in the literature on democratization has adequately addressed the issue of the potential endogeneity of economic growth. More is known about the determinants of levels of democracy (the focus in Acemoglu et al. 2006) than the conditions that induce discrete democratizing events. While discussion of the causes of specific episodes of democratization is often provided in the literature (see Lee 2002, for instance), in this paper we put specific case studies aside to investigate whether there is any systematic empirical relationship between fluctuations in economic growth and democratization.

3. Model specification

The model to be estimated here is of the form:

$$Demevent(0,1)_{c,t} = \alpha DY_{c,t-1} + \beta \mathbf{x}_{c,t-1} + \gamma I_c + \mu_t + \varepsilon_{c,t} \quad (1)$$

where the dependent variable is a binary variable equal to 1 if an autocracy experienced a democratizing event in period t and 0 if not, $DY_{c,t-1}$ is the domestic economic growth rate, $\mathbf{x}_{c,t-1}$ is a vector of time-varying control variables, I_c is a vector of country-specific variables, μ_t is a vector of time-specific effects and $\varepsilon_{c,t}$ is an error term, with $E(\varepsilon_{c,t}) = 0$. A number of country-specific explanatory variables often considered in the literature, including colonial ruler, the date of independence, institutions, geography, religion, ethnic fractionalization and cultural factors, are assumed not to vary over time and thus subsumed into the country fixed effects. The inclusion of these fixed effects, which differs from the approach often adopted in the literature (see, for instance, Ulfelder and Lustik 2005), takes account of the possibility that such time-invariant factors might affect both democracy and growth.

Equation (1) is estimated using both a fixed effects linear probability model (LPM) and a fixed effects logit model. A fixed effects probit model is not estimated because probit models are not suited to fixed effects estimation (Greene 2000). Fixed effects are used instead of random effects because the time-invariant country indicators may well be correlated with economic growth and the other explanatory variables. A number of time-varying control variables, including per capita GDP, education, and demographic structure¹, are included in the estimations. The control variables are each lagged one year². This approach ensures that these variables only reflect conditions prior to any democratizing event, in contrast to the approach taken in Gasiorowski (1995). We also experiment with adding further lags of *DY*.

Despite the lagging of the main explanatory variables, it is possible that economic growth is endogenous to the system. This potential endogeneity, ignored in many prior studies, may operate through a number of different mechanisms. For example, the mobilization of protestors in the build-up to a democratizing event may hurt economic growth. Alternatively, autocrats may increase public spending in the face of looming regime change and induce an artificial economic boom. To deal with the potential endogeneity of economic growth, and the fact that time-varying omitted factors may affect both lagged growth and the likelihood of democratization, a suitable instrument for domestic economic growth is required³.

We use two different strategies to instrument for the economic growth rates of the autocracies in the dataset. The first of these strategies is to use exogenous economic growth in the form of the real economic growth rate of the two largest economies: the United States (US) and Japan. The US and Japan, both democracies, together contributed 45% of global GDP over the period 1961-2004. (One would not want to use Germany, the world's third-largest economy, since it was strongly affected by East Germany's democratization in 1989.) The correlation between their combined growth rate and the world growth rate for the period

¹ Demographic factors have been argued to be important in political development. See Vasile (2002) for the case of Romania.

² Per capita GDP is lagged three years (ie. $t-3$) because the levels for $(t-1)$ and $(t-2)$ are used in the formula for the calculation of 'Per capita GDP growth $_{t-1}$ '.

³ Przeworski et al. (2000) resort to telling a descriptive story about the effects of growth on transitions because they could think of no "way to tell what causes what" (p. 115).

was 96%. The combined US-Japan growth rate (*BIG2*) can be considered to be exogenous for the autocracies considered here, given that most of the autocracies are small economies. *BIG2* appears to be a suitable instrument in that external economic growth has considerable explanatory power for income growth per capita in autocracies, but should not be correlated with the error term in (1). So far as we are aware, this is the first study in which *BIG2* has been used as an instrument for domestic growth. However, the approach adopted here is similar to one of the approaches in Acemoglu et al. (2005), who used changes in the incomes of trading partners as an instrument for income level, although *BIG2* is likely to be more exogenous than trading partners' growth.

One mechanism through which *BIG2* might plausibly be correlated with $\varepsilon_{c,t}$ in (1) is if the strength of the world economy leads to 'waves' of democratization. *BIG2* is likely to be correlated with domestic growth in any individual autocracy, but also with domestic growth in *other* autocracies. If so, *BIG2* fluctuations might affect the likelihood of democratization in these other autocracies and induce democratization 'demonstration effects' which in turn affect the likelihood of democratization in the autocracy under consideration. To account for this, we control for these demonstration effects by including the global number of democratizing events in the preceding year as a time-specific explanatory variable. It is assumed that, in the short-run, the size of democratization programs funded by the US and Japan is fixed and not correlated to economic growth in the US or Japan.

The second instrumental variables approach employed here follows Miguel et al. (2004), who used rainfall variation as an instrument for economic growth in an influential study on the causes of conflicts in sub-Saharan African countries. Rainfall variation is strongly correlated with output fluctuations in economies dependent on agriculture both in Africa and elsewhere, and is certainly exogenous to the system under consideration. The identification assumption is that rainfall variations are not correlated with the error term in (1): in other words, that rainfall does not have a direct effect on democratization except through its impact on growth. One can readily imagine ways in which this assumption might be violated – for example, if

high rainfall impedes street demonstrations, or affects the national psyche. However, we expect that these channels will be relatively trivial, a conclusion reached by Miguel et al. (2001) in their study of rainfall and conflict. To be precise, we instrument growth from $t-2$ to $t-1$ with the percentage change in rainfall ('rainfall variation') in years $t-2$ and $t-1$.

The use of these two very different instruments is appealing in that external growth rates and rainfall variation are likely to be correlated with economic growth in different ways. External growth is likely to be highly correlated with export income growth, while rainfall variation is likely to be highly correlated with rural income growth. It is hoped that this approach of instrumenting economic growth 'from two directions' will allow a better resolution of the potential endogeneity issue than otherwise possible. If our results do not differ greatly using the two instruments, then it suggests that 'export-led growth' and 'rural-led growth' have similar impacts on the transition from autocracy to democracy.

This study adopts a more flexible IV approach than in either Miguel et al. (2004) or Acemoglu et al. (2005) by interacting *BIG2* and rainfall variation with the country fixed effects in IV estimation. This technique allows external growth rates and rainfall to have differing impacts on economic growth in different countries.

4. Data

The main data source on democratizing events is the Polity IV dataset (2005). Polity IV provides data more relevant to a study on democratizing events, and a longer time series, than other potential sources such as Freedom House (2007). Polity IV classifies all nations with a 2002 population of more than 500,000 people according to the competitiveness and openness of executive recruitment, constraints on the chief executive, and the competitiveness of political participation. Autocracies are defined as those nations having a POLITY score of -10 to 0, with -10 indicating full autocracy⁴. In 2004, 50 countries were

⁴ Countries in 'transition' (in 2004: Burundi, Democratic Republic of the Congo, Haiti, Liberia), 'anarchy' (Ivory Coast, Somalia) or experiencing 'foreign interruption' (Afghanistan, Bosnia, Iraq, Lebanon), are not classified as autocracies.

classified as autocracies, equal to 31% of countries in Polity IV Project (2005) (see Table 1). This was down from a 1976 peak of 98 autocracies, or 70% of countries (Figure 1), reflecting the significant steps toward more democratic governance taken in many countries over the period.

Table 1: Autocracies, 2004

Polity Score	Country
-10	Qatar, Saudi Arabia
-9	North Korea, Swaziland, Turkmenistan, Uzbekistan
-8	Bhutan, Myanmar (Burma), Oman, UAE
-7	Azerbaijan, Bahrain, Belarus, China, Cuba, Eritrea, Kuwait, Laos, Libya, Syria, Vietnam, Zimbabwe
-6	Egypt, Iran, Kazakhstan, Mauritania, Morocco, Nepal, Sudan
-5	Equatorial Guinea, Gambia, Pakistan
-4	Cameroon, Republic of the Congo, Gabon, Tunisia, Uganda
-3	Kyrgyzstan, Rwanda, Tajikistan
-2	Angola, Chad, Jordan, Singapore, Togo, Yemen
-1	Central African Republic, Guinea, Guinea-Bissau
0	Burkina Faso

Source: Polity IV Project (2005)

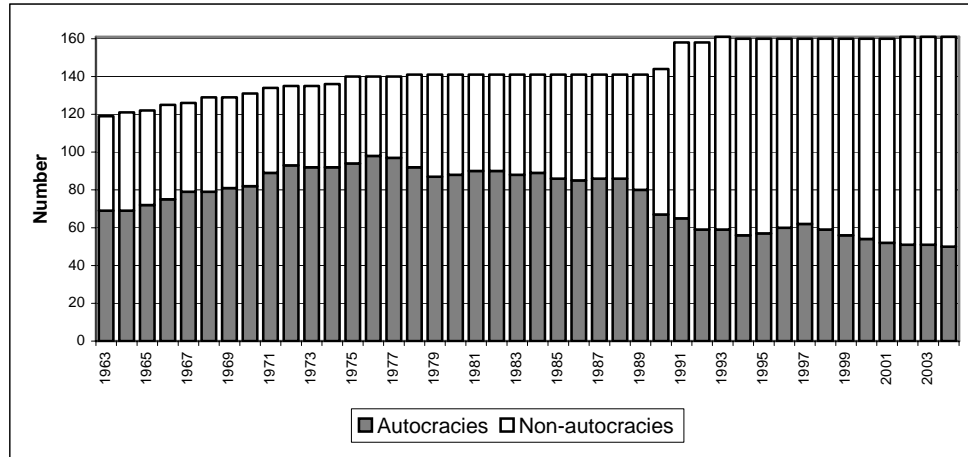
Polity IV provides data on three types of democratizing events: major democratic transitions, minor democratic transitions and non-transitioning positive regime changes⁵. We have generated a binary variable to indicate whether or not an autocracy experienced any of the three types of democratizing events in any given year. This definition allows for a broader definition of democratizing event than used previously in the literature. Only the first year of multi-year democratizing events is considered.⁶ Democratizing events following foreign interruptions (such as Uganda 1980, Cambodia 1988, Kuwait 1991) or periods of transition (Ethiopia 1994) are not considered. Three democratizing events coinciding with the natural

⁵ A major democratic transition (REGTRANS score of +3) is a six point or greater increase in POLITY score over a period of three years or less including a shift from an autocratic POLITY value (-10 to 0) to a democratic POLITY value (+1 to +10). A minor democratic transition (REGTRANS score of +2) is a 3-5 point increase in POLITY score over a period of three years or less including a shift from an autocratic to a partial democratic POLITY value (+1 to +6). Positive regime change (REGTRANS score of +1) is a 3 or more point increase in POLITY score over a period of 3 years or less without a shift in regime type. A list of events included in the study is provided in Appendix 2.

⁶ Autocracies are not included in the dataset for years in which they experienced major or minor democratic transitions, because either they are classified as democracies in those years or, in the case of multi-year transitions, they have been removed from the dataset for those years. The dataset includes democratizing events in the *next* year, indicated by a value of 1.

death of the national leader (Spain 1975, Pakistan 1988, Nigeria 1998) have been excluded from the dataset⁷.

Figure 1: Autocracies, 1963-2004



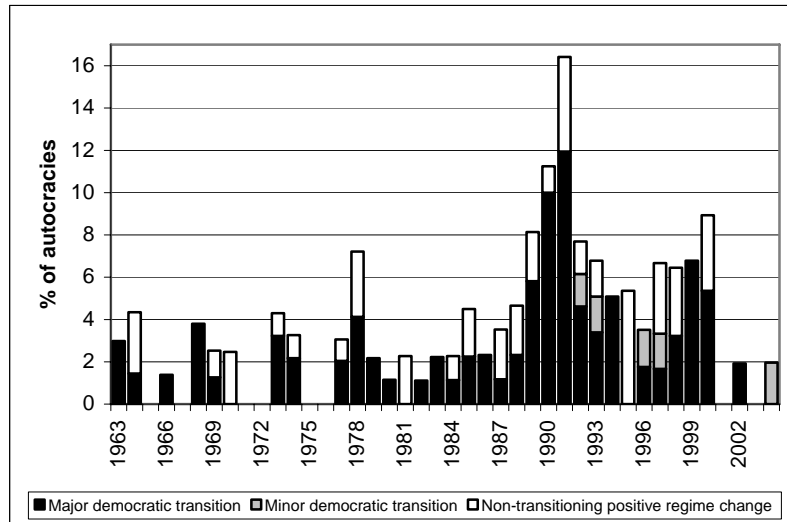
Non-autocracies include democracies as well as countries experiencing foreign interruptions, interregnum (or anarchy) and transitions. Data only for countries with a 2002 population greater than 500,000. Source: Polity IV Project (2005)

The constructed dataset consists of panel data for 42 years (1963-2004) and 120 autocracies. On average, each country was classified as an autocracy for 26 of the 42 years. 116 democratizing events are included in the dataset, including 74 major and 5 minor democratic transitions, and 37 instances of non-transitioning democratizing events⁸. The democratizing events included in this study are summarized in Figure 2 and listed in Appendix A. A strong ‘wave’ of democratization during the late 1980s and the 1990s can be observed.

⁷ Jones and Olken (2005) was used to identify deaths of national leaders due to natural causes. The failure to exclude such events in prior studies on democratization represents a potential source of bias.

⁸ Note that economic growth data limitations allow only 106 autocracies and 105 democratizing events to be considered in the model estimations. Data on per capita economic growth was only available for Cambodia for one year for which it was included in the database. As a result, Cambodia is not included in the analysis.

Figure 2: Democratizing events in autocracies, 1963-2004



Source: Polity IV Project (2005)

Economic growth and other data were obtained from the World Bank’s World Development Indicators (2007). Our measure of growth is real per capita GDP growth in constant 2000 US\$. Other data sources include Barro and Lee (2000) and the World Bank’s (2004) Database of Political Institutions. Linear interpolation of the Barro and Lee (2000) education data (variable ‘TYR’) was carried out to allow the use of education in the annual panel data setup. Rainfall data were sourced from the TYN CY 1.1 dataset (Mitchell et al. 2003). This data source provides rainfall data for all countries, and was assembled in a similar way to the Global Precipitation Climatology Project data used by Miguel et al. (2004)⁹. A full list of data sources and definitions for all variables used is provided in Appendix 2.

Selected descriptive statistics for the independent variables are presented in Table 2. The high standard deviations on the statistics reflect significant heterogeneity among countries classified as autocracies during the sample period, a club with members as diverse as Argentina and Zimbabwe, Singapore and Sierra Leone. The average per capita GDP growth rates indicate that countries that remained autocracies in 2004 tended to grow faster than other autocracies for the years for which they were included in the autocrat dataset.

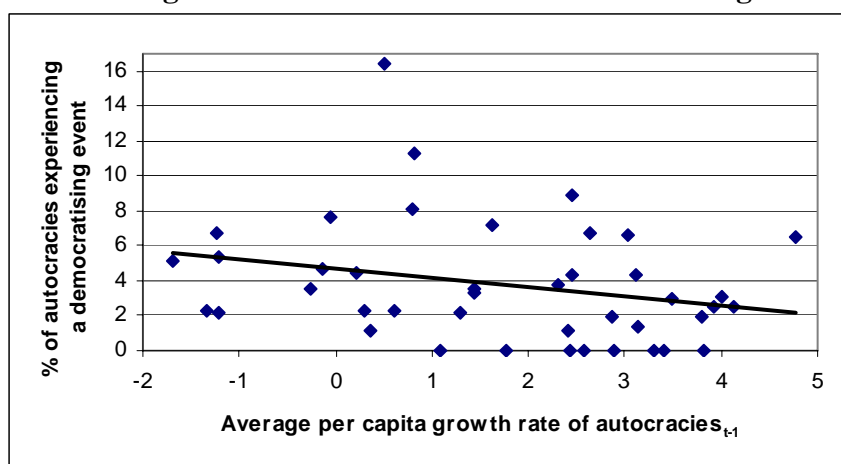
⁹ Similar IV results are obtained for sub-Saharan African autocracies using the rainfall variation data from Miguel (2007).

Table 2: Descriptive statistics, 1963-2004

	Full sample	Sub-sample: Countries that remained autocracies in 2004
Per capita GDP growth _{t-1} (% per annum)	1.61 (7.30)	1.92 (8.08)
Per capita GDP level _{t-3} (2000 US\$)	2,298 (5,644)	3,253 (7,492)
Education _{t-1} (average years of school for those >25 years)	2.91 (1.94)	2.71 (1.80)
% of population aged > 65 years _{t-1}	3.81 (1.93)	3.63 (1.51)
Number of democratizing events	105	22
Number of countries	106	50
Observations	2,398	1,293

Standard deviations are provided in parentheses. Sources: Polity IV Project (2005), World Bank (2008), Barro and Lee (2000). Countries are only included in the dataset for the years they were classified as an autocracy by Polity IV Project (2005)

A scatterplot of the share of autocracies experiencing a democratizing event against the average per capita GDP growth rate of all autocracies in the preceding year (Figure 3), suggests that the likelihood of autocracies experiencing moves toward democracy is higher after a year of comparatively sluggish economic growth. In the next section we estimate the empirical model presented in Section 3 to investigate whether this is indeed the case.

Figure 3: Economic growth and the likelihood of democratizing events, 1963-2004

Source: Polity IV Project (2005), World Bank (2008)

5. Results

5.1 Fixed effects LPM and fixed effects logit results

Fixed effects LPM results of the estimation of (1) for the dataset are presented in Table 3. Standard errors are robust for heteroscedasticity and allow for clustering at the country

level¹⁰. The LPM results indicate that the average likelihood of an autocracy experiencing a democratizing event increases following growth slowdowns. The results in column 1 indicate that a one percentage point increase in per capita GDP growth on average reduces the likelihood of a democratizing event in the next year by 0.1 percentage points, which amounts to a reduction in the likelihood of a democratizing event of 2.2%. This effect is not negligible in magnitude and is significant at the 5% significance level.

Table 3: Fixed effects linear probability model results

Dependent variable: Democratizing event in year t

	1	2	3	4	5	6	7
Per capita GDP growth _{$t-1$}	-0.0010 (0.0004)** <i>-2.2%</i>	-0.0010 (0.0005)** <i>-2.1%</i>	-0.0019 (0.0008)** <i>-3.4%</i>	-0.0014 (0.0007)* <i>-2.5%</i>	-0.0016 (0.0007)** <i>-2.7%</i>	-0.0016 (0.0007)** <i>-2.7%</i>	-0.0017 (0.0007)** <i>-3.0%</i>
Per capita GDP level _{$t-3$} (2000 US\$ '000)		0.0005 (0.0005) <i>1.1%</i>	0.0011 (0.0012) <i>1.9%</i>	0.0019 (0.0028) <i>3.4%</i>	0.0002 (0.0031) <i>0.3%</i>	0.0003 (0.0031) <i>0.5%</i>	-0.0011 (0.0022) <i>-1.9%</i>
Education _{$t-1$} (average years)				0.0411 (0.0094)*** <i>71.2%</i>	0.0262 (0.0103)** <i>45.4%</i>	0.0330 (0.0096)*** <i>57.1%</i>	-0.0274 (0.0161)* <i>-47.6%</i>
% of population aged > 65 years _{$t-1$}					0.0290 (0.0218) <i>50.3%</i>	0.0280 (0.0212) <i>48.4%</i>	0.0374 (0.0209)* <i>64.9%</i>
Global number of democratizing events _{$t-1$}					0.0103 (0.0040)** <i>17.8%</i>		
Regional number of democratizing events _{$t-1$}						0.0148 (0.0072)** <i>25.7%</i>	
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	No	No	No	No	No	No	Yes
R-squared	0.001	0.001	0.003	0.024	0.035	0.032	0.085
Fitted values in unit interval	99.8%	99.8%	99.8%	72.3%	69.0%	66.3%	72.0%
Observations	2,398	2,292	1,473	1,473	1,473	1,473	1,473
Democratizing events in sample	105	104	85	85	85	85	85
Years	1963-2004	1963-2004	1963-2004	1963-2004	1963-2004	1963-2004	1963-2004
Autocracies	106	101	71	71	71	71	71

***, ** and * indicate statistical significance at the 1, 5 and 10% significance levels respectively. Robust standard errors clustered by country are in parentheses. Numbers in italics are estimated percentage changes in the likelihood of a democratizing event for the sample due to a one-point increase in the explanatory variable, holding the other explanatory variables constant. Coefficients on constants not reported. The number of autocracies included in Column 2 is less than for Column 1 because the World Bank (2008) does not provide GDP per capita levels for some countries (eg. Somalia) but does provide per capita growth rates.

Column 2 controls for the level of per capita GDP. Controlling for the level of GDP per capita does not change the estimate of the impact of short-term growth shocks on the

¹⁰ Clustering the standard errors at the country level corrects the standard errors for potential correlation across observations both over time and within the same time period, and takes into account serial correlation on a country-by-country basis (Bertrand, Duflo and Mullainathan 2004, Acemoglu et al. 2005).

likelihood of democratization. Per capita income level is not a statistically significant determinant of democratization. This result provides support for the suggestion of Acemoglu et al. (2004): when one looks at within-country changes, a country's income level has no effect on the probability that it will experience a democratizing event. A similar result is presented in column 3 (for the smaller sample for which control variable data is available for the estimates in columns 4-7).

The estimations in columns 4-7 indicate that a one percentage point increase in economic growth on average reduces the likelihood of autocracies experiencing a democratizing event in the next year by around 2.7%. The results in columns 4-6 indicate that autocracies are more likely to democratize at higher education levels, although this result does not hold once year fixed effects are included (column 7). In results not reported, average years of higher education¹¹ emerges as a particularly important explanator of democratizing events. (Though this does not substantially affect the coefficient on economic growth.)

The results in column 7 provide some evidence that demographic factors are also important in explaining democratization: countries with a larger share of their population over the age of 65 are more likely to democratize, holding the other factors constant. Finally, columns 5 and 6 provide evidence that global and regional 'demonstration effects' exist – autocracies are more likely to democratize after years in which other autocracies have democratized¹². The estimated size of the demonstration effect is quite significant: for each additional democratizing event among other autocracies in the region in the previous year, it is estimated that autocracies are 26% more likely to themselves democratize, holding the other factors constant.

Fixed effects logit results are presented in Table 4. Logit estimation only considers autocracies that experienced variation in the dependent variable. This means both that the

¹¹ Barro and Lee's (2000) variable 'HYR'.

¹² Note that the number of global/regional democratizing events in the previous year is a year-specific effect, and so year fixed effects are not included in estimations in which these variables is included. The use of the number of democratizing events in the previous year allows the *a priori* that global democratization trends are what year fixed effects should capture.

sample sizes in the model estimates in Table 4 are smaller than those in Table 3 and that the fixed effects logit results can only be interpreted for autocracies that experienced a democratizing event during the sample period (and not for consistently stable autocratic regimes such as Saudi Arabia). The fixed effects logit results indicate that negative economic shocks increased the likelihood of democratization in the countries included in the estimation. They also support the hypothesis that significant regional and global demonstration effects exist, and provide evidence that autocracies that did experience democratizing events were more likely to do so at higher levels of education and older demographic structures. Again, the level of per capita GDP is not a significant explainer of democratization once education levels, demographic structure, country-specific and year-specific effects are controlled for. (Though per-capita GDP is positive and significant in a specification with only growth and country fixed effects.)

Table 4: Fixed effects logit results

Dependent variable: Democratizing event in period t					
	1	2	3	4	5
Per capita GDP growth _{$t-1$}	-0.0436 (0.0182)**	-0.0330 (0.0207)	-0.0642 (0.0240)***	-0.0636 (0.0254)**	-0.0749 (0.0304)**
Per capita GDP level _{$t-3$} (2000 US\$ '000)		0.8430 (0.4074)**	0.1898 (0.6639)	0.1585 (0.6618)	0.7537 (0.5837)
Education _{$t-1$} (average years)			1.0624 (0.3035)***	1.1859 (0.3177)***	-0.5530 (0.6170)
% of population aged > 65 years _{$t-1$}			1.0614 (0.4960)**	0.9664 (0.4852)**	1.3526 (0.6338)**
Global number of democratizing events _{$t-1$}			0.1788 (0.0646)***		
Regional number of democratizing events _{$t-1$}				0.1920 (0.0863)**	
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	No	No	No	No	Yes
Pseudo R-squared	0.078	0.091	0.185	0.175	0.249
Observations	1,519	1,494	1,122	1,122	914
Democratizing events in sample	105	104	85	85	84
Years	1963-2004	1963-2004	1963-2004	1963-2004	1963-2002
Autocracies	69	68	54	54	54

***, ** and * indicate statistical significance at the 1, 5 and 10% significance levels respectively. Robust standard errors clustered by country are in parentheses.

There are a number of other interesting issues to explore, for which estimation results are presented in Table 5¹³. Is there an interaction effect between growth and income? For example, are growth shocks more or less likely to induce democratizing events in poorer countries (a matter considered by Huntington 1968)? The results in Column 1 indicate that

¹³ Fixed effects LPM results are presented because they allow a larger sample. Fixed effects logit results are similar.

the impact of growth shocks on the likelihood of democratization does not appear to depend on per capita income. This finding supports Miguel et al.'s (2004) finding that the impact of growth shocks on conflicts does not differ for countries at different development levels. Interestingly, however, it appears that demonstration effects of democratizing events overseas have been of lesser importance in richer autocracies (Column 2)¹⁴. In columns 3 to 6, we include controls for oil-dependency, military regimes, a country's degree of autocracy, and the 1990s (a decade that saw a large number of democratizing events). None of these significantly changes the coefficient on economic growth.

¹⁴ Results are not sensitive to other interactions in the control variables, the use of higher-order polynomials or the use of logged explanatory variables.

Table 5: Fixed effects linear probability model results with interactions and dummy variables

Dependent variable: Democratizing event in year t.						
	1	2	3	4	5	6
Per capita GDP growth _{t-1}	-0.0014 (0.0008)* <i>-2.5%</i>	-0.0016 (0.0007)** <i>-2.7%</i>	-0.0016 (0.0007)** <i>-2.7%</i>	-0.0024 (0.0011)** <i>-3.5%</i>	-0.0014 (0.0007)* <i>-2.5%</i>	-0.0018 (0.0007)** <i>-3.1%</i>
Per capita GDP level _{t-3} (2000 US\$ '000)	-0.0002 (0.0035) <i>-0.3%</i>	0.0016 (0.0020) <i>2.8%</i>	0.0001 (0.0030) <i>0.2%</i>	-0.0057 (0.0087) <i>-8.1%</i>	0.0006 (0.0034) <i>1.0%</i>	-0.0005 (0.0029) <i>-0.9%</i>
Education _{t-1} (average years)	0.0265 (0.0102)** <i>45.9%</i>	0.0276 (0.0101)*** <i>47.8%</i>	0.0269 (0.0103)** <i>46.6%</i>	0.0340 (0.0141)** <i>48.8%</i>	0.0325 (0.0117)*** <i>56.4%</i>	0.0141 (0.0124) <i>24.4%</i>
% of population aged > 65 years _{t-1}	0.0297 (0.0216) <i>51.4%</i>	0.0327 (0.0210) <i>56.6%</i>	0.0283 (0.0218) <i>49.0%</i>	0.0424 (0.0451) <i>60.8%</i>	0.0258 (0.0214) <i>44.8%</i>	0.0295 (0.0220) <i>51.2%</i>
Global number of democratizing events _{t-1}	0.0103 (0.0040)** <i>17.8%</i>	0.0122 (0.0043)*** <i>21.1%</i>	0.0100 (0.0040)** <i>17.4%</i>	0.0099 (0.0046)** <i>14.3%</i>	0.0103 (0.0040)** <i>17.8%</i>	0.0083 (0.0037)** <i>14.4%</i>
Per capita GDP _{t-3} *Per capita GDP growth _{t-1}	0.0000 (0.0000) <i>0.0%</i>					
Per capita GDP _{t-3} *Global number of democratizing events _{t-1}		-0.0012 (0.0006)* <i>-2.0%</i>				
Oil dependency _{t-1}			-0.0298 (0.0140)** <i>-51.7%</i>			
Military _{t-1}				0.0407 (0.0343) <i>58.4%</i>		
More autocratic _{t-1}					0.0571 (0.0201)*** <i>98.9%</i>	
1990s						0.0574 (0.0283)** <i>99.5%</i>
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	No	No	No	No	No	No
R-squared	0.035	0.037	0.035	0.038	0.039	0.039
Fitted values in unit interval	68.8%	67.5%	68.4%	71.0%	66.2%	74.4%
Observations	1,473	1,473	1,473	990	1,473	1,473
Democratizing events in sample	85	85	85	69	85	85
Years	1963-2004	1963-2004	1963-2004	1976-2004	1963-2004	1963-2004
Autocracies	71	71	71	68	71	71

***, ** and * indicate statistical significance at the 1, 5 and 10% significance levels respectively. Robust standard errors clustered by country are in parentheses. Numbers in italics are estimated percentage changes in the likelihood of a democratizing event for the sample due to a one-point increase in the explanatory variable, holding the other explanatory variables constant. Coefficients on constants not reported.

Table 6 presents estimates for variants of the dependent variable. The dependent variable in Column 1 is whether or not an autocracy experienced a ‘lasting’ democratizing event. We have defined a lasting democratizing event as one for which there was not a significant deterioration in the nation’s POLITY score during the subsequent 5 years. The results are robust to this new dependent variable and indicate that a percentage point reduction in per

capita economic growth increased the likelihood of lasting democratization in the next year by 2.6%. Thus, the results hold for events of genuine progress toward democratization and do not just reflect the triggers of temporary swings in a nation's political cycle. The dependent variable in Column 2 is whether or not an autocracy experienced a full democratic transition. There is not sufficient evidence to conclude that per capita GDP growth is a statistically significant trigger for full democratic transitions at the normal significance levels here. The results thus appear to be driven by instances of non-transitioning democratic change. Given that this is the first study to consider a broad definition of democratizing events that includes non-transitioning democratic change, this finding is of significant interest.

Table 6: Lasting democratizing events and democratic transitions

Dependent variable: 1: Lasting democratizing event in year t . 2: Democratic transition in year t .

	1	2
Per capita GDP growth _{$t-1$}	-0.0011 (0.0006)* <i>-2.6%</i>	-0.0007 (0.0006) <i>-1.7%</i>
Per capita GDP level _{$t-3$} (2000 US\$ '000)	0.0003 (0.0029) <i>0.6%</i>	0.0003 (0.0026) <i>0.8%</i>
Education _{$t-1$} (average years)	0.0275 (0.0098)*** <i>64.2%</i>	0.0225 (0.0081)*** <i>53.5%</i>
% of population aged > 65 years _{$t-1$}	0.0351 (0.0222) <i>82.0%</i>	0.0246 (0.0198) <i>58.5%</i>
Global number of democratizing events _{$t-1$}	0.0108 (0.0033)*** <i>25.1%</i>	0.0090 (0.0034)*** <i>21.4%</i>
Country fixed effects	Yes	Yes
Year fixed effects	No	No
R-squared	0.047	0.034
Fitted values in unit interval	55.8%	63.2%
Observations	1,425	1,473
Democratizing events in sample	61	62
Years	1963-1999	1963-2004
Autocracies	71	71

***, ** and * indicate statistical significance at the 1, 5 and 10% significance levels respectively. Robust standard errors clustered by country are in parentheses. Numbers in italics are estimated percentage changes in the likelihood of a democratizing event for the sample due to a one-point increase in the explanatory variable, holding the other explanatory variables constant. Coefficients on constants not reported.

Kugler and Feng (1999, p. 140) noted that “few studies have effectively specified, formalized, and statistically analyzed the dynamics of democratic transitions”. In results not

reported here, additional lags of per capita economic growth were included to investigate the dynamics of the impact of growth on the likelihood of democratization. Additional lags were not statistically significant and the inclusion of additional lags was not supported by the Akaike or Bayesian information criteria.

A number of checks on the robustness of the results to different measures of economic growth were performed. Similar results were obtained for aggregate (rather than per capita) economic growth. Other explanatory variables, such as labor force participation and exports as a share of GDP, were not included because of substantial data gaps. However, for the sub-sample for which such data were available, the results were qualitatively similar.

5.2 Instrumental variable results

As discussed in Section 3, fixed effects LPM and logit estimation results may perhaps suffer from simultaneity bias due to the possible endogeneity of economic growth. Results from IV estimation of (1) using the exogenous growth rate of the *BIG2* economies (interacted with the country fixed effects) and rainfall variation (also interacted with the country fixed effects) as instruments are presented in Table 7. First stage IV results indicate that the instruments are indeed strongly correlated with per capita growth in the autocracies included in the dataset.

Table 7: Fixed effects IV resultsDependent variable: Democratizing event in period t

	1	2	3	4	5	6
Instrument/s	CFE*Big-2 GDP growth rate _{t-1}	CFE*Big-2 GDP growth rate _{t-1}	CFE*Big-2 GDP growth rate _{t-1}	CFE* Rainfall variation _{t-1}	CFE* Rainfall variation _{t-1}	CFE* Rainfall variation _{t-1}
				CFE* Rainfall variation _{t-2}	CFE* Rainfall variation _{t-2}	CFE* Rainfall variation _{t-2}
Per capita GDP growth _{t-1}	-0.0035 (0.0018)** <i>-8.0%</i>	-0.0035 (0.0026) <i>-6.1%</i>	-0.0051 (0.0025)** <i>-8.8%</i>	-0.0043 (0.0024)* <i>-9.5%</i>	-0.0031 (0.0034) <i>-5.5%</i>	-0.0023 (0.0033) <i>-4.0%</i>
Per capita GDP level _{t-3} (2000 US\$ '000)		-0.0004 (0.0033) <i>-0.7%</i>	-0.0022 (0.0023) <i>-3.7%</i>		-0.0005 (0.0030) <i>-0.8%</i>	-0.0013 (0.0024) <i>-2.2%</i>
Education _{t-1} (average years)		0.0244 (0.0101)** <i>42.3%</i>	-0.0322 (0.0151)** <i>-56%</i>		0.0190 (0.0091)** <i>34%</i>	-0.0258 (0.0159) <i>-46%</i>
% of population aged > 65 years _{t-1}		0.0310 (0.0225) <i>53.8%</i>	0.0400 (0.0212)* <i>69.4%</i>		0.0319 (0.0216) <i>56.4%</i>	0.0388 (0.0209)* <i>68.7%</i>
Global number of democratizing events _{t-1}		0.0104 (0.0039)*** <i>18.0%</i>			0.0118 (0.0037)*** <i>21.0%</i>	
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	No	No	Yes	No	No	Yes
Partial R ² on excluded instrument	0.055	0.069	0.069	0.084	0.093	0.101
Fitted values in unit interval	80.6%	79.6%	73.9%	80.7%	79.9%	73.7%
Observations	2,398	1,473	1,473	2,254	1,469	1,469
Democratizing events in sample	105	85	85	103	83	83
Years	1963-2004	1963-2004	1963-2004	1963-2001	1963-2001	1963-2001
Autocracies	106	71	71	105	71	71

***, ** and * indicate statistical significance at the 1, 5 and 10% significance levels respectively. Robust standard errors clustered by country are in parentheses. Numbers in italics are estimated percentage changes in the likelihood of a democratizing event for the sample due to a one-point increase in the explanatory variable, holding the other explanatory variables constant. Coefficients on constants not reported.

The IV results reaffirm the finding that autocracies are less likely to democratize following positive growth shocks. The IV coefficient estimates are actually larger in magnitude than the fixed effects LPM results reported earlier and indicate that a one percentage point increase in per capita growth on average lowers the likelihood of a democratizing event in the next year by 4-10%¹⁵.

Instrumenting with *BIG2*, negative growth shocks are estimated to have had a statistically significant impact on the likelihood of democratization once year fixed effects are allowed (column 3). Using rainfall variation as an instrument, the impact of growth shocks on the likelihood of democratization is statistically significant in the estimate reported in column 4

¹⁵ IV results are not sensitive to the interaction of control variables or the use of higher-order polynomials.

of Table 6 but is not statistically significant once other control variables are considered (columns 5-6).

In Table 8, IV estimation results for 40 sub-Saharan African autocracies using the dual-IV approach of instrumenting with both rainfall variation and *BIG2* (both interacted with the country fixed effects) are presented. The motivation for presenting the IV results for sub-Saharan Africa is that Miguel et al. (2004) focused solely on this region in what was the first cross-country study to use rainfall variation as an instrument for economic growth. The IV results provide evidence that sub-Saharan African autocracies have been significantly more likely to democratize (with point estimates in columns 2-8 of 9-20% for a one percentage point reduction in economic growth) following negative economic growth shocks.

Table 8: Fixed effects IV results for sub-Saharan African autocracies

Dependent variable: Democratizing event in period t

	1	2	3	4	5	6	7	8
Instrument/s	None (LPM)	CFE*Big-2 GDP growth rate _{t-1}	CFE*Big-2 GDP growth rate _{t-1}	CFE*Big-2 GDP growth rate _{t-1}	CFE* Rainfall variation _{t-1}	CFE* Rainfall variation _{t-1}	CFE* Rainfall variation _{t-1}	CFE*Big-2 GDP growth rate _{t-1}
					CFE* Rainfall variation _{t-2}	CFE* Rainfall variation _{t-2}	CFE* Rainfall variation _{t-2}	CFE* Rainfall variation _{t-1}
								CFE* Rainfall variation _{t-2}
Per capita GDP growth _{t-1}	-0.0012 (0.0005)** <i>-3.1%</i>	-0.0067 (0.0031)** <i>-17.5%</i>	-0.0055 (0.0028)* <i>-13.9%</i>	-0.0092 (0.0053)* <i>-20.4%</i>	-0.0042 (0.0021)** <i>-10.8%</i>	-0.0044 (0.0022)** <i>-10.8%</i>	-0.0040 (0.0027) <i>-9.2%</i>	-0.0050 (0.0027)* <i>-11.5%</i>
Per capita GDP level _{t-3} (2000 US\$ '000)			-0.0230 (0.0159) <i>-59%</i>	-0.2951 (0.1726)* <i>-655.7%</i>		-0.0265 (0.0121)** <i>-65.2%</i>	-0.1595 (0.0809)** <i>-367.6%</i>	-0.1829 (0.0880)** <i>-421.4%</i>
Education _{t-1} (average years)				0.0367 (0.0193)* <i>81.5%</i>			0.0253 (0.0122)** <i>58.3%</i>	0.0263 (0.0117)** <i>60.6%</i>
% of population aged > 65 years _{t-1}				0.0711 (0.0294)** <i>158.1%</i>			0.0705 (0.0315)** <i>162.3%</i>	0.0708 (0.0307)** <i>163.2%</i>
Global number of democratizing events _{t-1}				0.0108 (0.0069) <i>23.9%</i>			0.0130 (0.0060)** <i>29.9%</i>	0.0128 (0.0059)** <i>29.4%</i>
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	No	No	No	No	No	No	No	No
Partial R ² on excluded instrument	-	0.040	0.050	0.044	0.091	0.093	0.103	0.150
Fitted values in unit interval	99.4%	81.2%	83.7%	73.5%	84.9%	84.9%	75.1%	74.5%
Observations	1,073	1,073	1,041	600	1,017	985	599	599
Democratizing events in sample	41	41	41	27	40	40	26	26
Years	1963-2004	1963-2004	1963-2004	1963-2002	1963-2001	1963-2001	1963-2001	1963-2001
Autocracies	40	40	39	25	40	39	25	25

***, ** and * indicate statistical significance at the 1, 5 and 10% significance levels respectively. Robust standard errors clustered by country are in parentheses. Numbers in italics are estimated percentage changes in the likelihood of a democratizing event for the sample due to a one-unit increase in the explanatory variable, holding the other explanatory variables constant. Coefficients on constants not reported. CFE=country fixed effect.

This result holds instrumenting with the *BIG2* growth rate (columns 2-4), rainfall (columns 5-7), or both instruments together (column 8). Using the full set of instruments, a one percentage point rise in economic growth is estimated to have lowered the likelihood of a sub-Saharan African autocracy democratizing in the next year by around 11.5%, a stronger estimated impact than that found for the full sample of autocracies. Sub-Saharan African autocracies also appear to have been more likely to democratize at lower levels of GDP, providing support to a number of studies (such as Hannon and Carroll 1981) that have concluded that democratic transitions are more likely in poorer countries. Holding the other factors constant, sub-Saharan African autocracies have been more likely to democratize at higher education levels, with an older population structure, and subsequent to democratization in other autocracies.

Given the new approach that has been utilized here – in terms of using a binary dependent variable and a broad definition of democratizing events, using fixed effects and annual panel data, and attempting to disentangle causality by using instruments for economic growth – it is difficult to directly compare parameter estimates obtained here with those in prior studies. Generally, the findings here contrast to those of Gasiorowski (1995), who concluded that recessions have no impact on democratic transitions, but provide support for other studies (such as Acemoglu et al. 2005, Ulfelder and Lustik 2005) that have found that crises induce democratization. This is the first study on democratization to have instrumented for the potential endogeneity of economic growth (Acemoglu et al. 2005 used instruments for income *level*), and so the results presented here are hoped to be more reliable than those presented in previous studies. The finding that growth shocks have induced democratization in sub-Saharan Africa complements Miguel et al.'s (2004) finding that negative growth shocks have led to civil conflicts in that continent. The coefficient estimates presented in Table 8 are similar to those in Miguel et al. (2004), who found that “a negative growth shock of five percentage points increases the likelihood of conflict by one-half the following year” (p. 725). The evidence indicates that negative growth shocks trigger instability, including shifts toward greater levels of democracy.

6. Conclusion

This paper has provided new evidence on the determinants of democratization in autocratic countries. There appears to be a strong causal relationship between negative economic shocks and moves to democratize. This relationship holds even after the potential endogeneity of economic growth is addressed by using external economic growth and rainfall shocks as instruments for economic growth. The results suggest that democratizing events are more likely to occur following economic crises. In this sense, it appears that autocratic leaders, like democratic leaders, are more vulnerable if the economy falters. Economic slowdowns may be neither sufficient nor necessary to induce an autocratic country to democratize, but appear to have often been enough to induce a ‘tipping point’ that ‘sinks the boat’.

References

Acemoglu, D., Johnson, S., Robinson, J.A., Yared, P. (2005), 'Income and democracy', *NBER Working Paper* No. 11205, National Bureau of Economic Research, Cambridge.

Acemoglu, D. and Robinson, J.A. (2006), *Economic Origins of Dictatorship and Democracy*, Cambridge: Cambridge University Press.

Barro, R.J. (1996), 'Democracy and growth', *Journal of Economic Growth* 1(1), 1-27.

Barro, R.J. (1999), 'Determinants of democracy', *The Journal of Political Economy* 107(6), S158-S183.

Barro, R.J. and Lee, J-W. (2000), 'International data on educational attainment: updates and implications', *CID Working Paper No. 42I* (human capital updated files).

Boix, C. and Stokes, S.C. (2003), 'Endogenous democratisation', *World Politics* 55(3), 517-549.

Burkhart, R.E. and Lewis-Beck, M.S. (1994), 'Comparative democracy: the economic development thesis', *The American Political Science Review* 88(4), 903-910.

Collier, P., Hoeffler, A. and Rohner, D. (2007), 'Beyond greed and grievance: feasibility and civil war', *Working Paper*, <http://users.ox.ac.uk/~econpco/research/conflict.htm>.

Epstein, D.L., Bates, R., Goldstone, J., Kristensen, I. and O'Halloran, S. (2006), 'Democratic transitions', *American Journal of Political Science* 50(3), 551-569.

Feng, Y. (1996), 'Democracy and growth: the sub-Saharan African case, 1960-1992', *Review of Black Political Economy* 25(1), 95-126.

Feng, Y. (1997), 'Democracy, political stability and economic growth', *The British Journal of Political Science* 27(3), 391-418.

Feng, Y. and Zac, P.J. (1999), 'The determinants of democratic transitions', *Journal of Conflict Resolution* 43(2), 162-177.

Freedom House (2007), *Freedom in the World*, Washington, D.C.

Gasiorowski, M.J. (1995), 'Economic crisis and political regime change: an event history analysis', *The American Political Science Review* 89(4), 882-897.

Greene, W.H. (2000), *Econometric Analysis*, Fourth Edition, Prentice Hall: New Jersey.

Haggard, S. and Kaufman, R.R. (1995), *The Political Economy of Democratic Transitions*, Princeton University Press.

Haggard, S. and Kaufman, R.R. (1997), 'The political economy of democratic transitions', *Comparative Politics* 29(3), 263-283.

Hannan, M.T. and Carroll, G.R. (1981), 'Dynamics of formal political structure: an event-history analysis', *American Sociological Review* 46(1), 19-35.

Helliwell, J.F. (1994), 'Empirical linkages between democracy and economic growth', *NBER Working Paper* No. 4066, National Bureau of Economic Research, Cambridge.

Huntington, S.P. (1968), *Political Order in Changing Societies*, New Haven: Yale University Press.

Huntington, S. (1991), *The Third Wave: Democratization in the Late Twentieth Century*, Norman, Oklahoma: University of Oklahoma Press.

Jagers, K. and Gurr, T.R. (1995), 'Tracking democracy's third wave with the Polity III data', *Journal of Peace Research* 32(4), 469-482.

Jones, B.J. and Olken, B.A. (2005), 'Do leaders matter? National leadership and growth since World War II', *The Quarterly Journal of Economics* 120(3), 835-864.

Kugler, J. and Feng, Y. (1999), 'Explaining and modeling democratic transitions', *The Journal of Conflict Resolution* 43(2), 139-146.

Lee, J. (2002), 'Primary causes of Asian democratization: dispelling conventional myths', *Asian Survey* 42(6), 821-837.

Leigh, A. (2004), 'Does the world economy swing national elections?', *Centre for Economic Policy Research Discussion Paper* 485, Australian National University.

Lipset, S.M. (1959), 'Some social requisites of democracy: economic development and political legitimacy', *American Political Science Review* 53(1), 69-105.

Miguel, E., Satyanath, S. and Sergenti, E. (2004), 'Economic shocks and civil conflict: an instrumental variables approach', *The Journal of Political Economy* 112(4), 725-753.

Miguel, E. (2007), *Africa Rainfall Dataset*, <http://elsa.berkeley.edu/~emiguel/data.shtml>.

Mitchell, T.D., Carter, T.R., Jones, P.D., Hulme, M. and New, M. (2003), 'A comprehensive set of high-resolution grids of monthly climate for Europe and the globe: the observed record (1901-2000) and 16 scenarios (2001-2100)', *Working Paper*, submitted to the *Journal of Climate*.

Noland, M. (2005), 'Explaining Middle Eastern authoritarianism', *Institute for International Economics Working Paper* WP 05-5, Washington, D.C.

Olson, M. (1963), 'Rapid growth as a destabilizing force', *The Journal of Economic History* 23(4), 529-552.

Political Instability Task Force (2003), *Political Instability Task Force Report: Phase IV Findings*, November.

Polity IV Project (2005), *Political Regime Characteristics and Transitions, 1800-2004*, Centre for International Development and Conflict Management, University of Maryland.

Przeworski, A., Alvarez, M.E., Cheibub, J.A. and Limongi, F. (2000), *Democracy and Development*, Cambridge: Cambridge University Press.

Robinson, J.A. (2006), 'Economic development and democracy', *Annual Review of Political Science* 9, 503-527.

Rodrik, D. and Wacziarg, R. (2004), 'Do democratic transitions produce bad economic outcomes?', *The American Economic Review* 95(2), 50-55.

Tang, S.H.K. and Yung, L.C.W. (2006), 'Does rapid economic growth enhance democratization? Time-series evidence from high performing Asian economies', *Working Paper*.

Ulfelder, J. and Lustik, M. (2005), *Modeling Transitions to and from Democracy*, Science Applications International Corporation (SAIC).

Vasile, V. (2002), 'Demographic transition and economic transition, interlinking and parallelism: the case of Romania', *Working Paper*, Workshop on Population, Labour Market, Pension and Quality of Life in Transitional Countries, Bucharest.

Wolfers (2007), 'Are voters rational? Evidence from gubernatorial elections', *Working Paper*, The Wharton School, University of Pennsylvania.

World Bank (2004), *Database of Political Institutions*, Washington D.C.: World Bank.

World Bank (2008), *World Development Indicators Online*, Washington D.C.: World Bank.

Zac, P.J. and Feng, Y. (2003), 'A dynamic theory of the transition to democracy', *Journal of Economic Behavior & Organization* 52(1), 1-25.

Appendix 1: Democratizing events in autocracies, 1963-2004

Year	Major democratic transition		Minor democratic transition		Non-transitioning positive regime change		Total
	Number	Countries	Number	Countries	Number	Countries	
1963	2	Peru, South Korea	0	-	0	-	2
1964	1	Sudan	0	-	2	Afghanistan, El Salvador	3
1965	0	-	0	-	0	-	0
1966	1	Guatemala	0	-	0	-	1
1967	0	-	0	-	0	-	0
1968	3	Ecuador, Sierra Leone, Thailand	0	-	0	-	3
1969	1	Ghana	0	-	1	Burkina Faso	2
1970	0	-	0	-	2	Benin, Cambodia	2
1971	0	-	0	-	0	-	0
1972	0	-	0	-	0	-	0
1973	3	Argentina, Thailand, Turkey	0	-	1	Bahrain	4
1974	2	Greece, Portugal	0	-	1	Brazil	3
1975	0	-	0	-	0	-	0
1976	0	-	0	-	0	-	0
1977	2	Burkina Faso, Thailand	0	-	1	Mexico	3
1978	4	Dominican Republic, Ghana, Nigeria, Peru	0	-	3	Bangladesh, Bolivia, Senegal	7
1979	2	Ecuador, El Salvador	0	-	0	-	2
1980	1	Honduras	0	-	0	-	1
1981	0	-	0	-	2	Nepal, Philippines	2
1982	1	Bolivia	0	-	0	-	1
1983	2	Argentina, Turkey	0	-	0	-	2
1984	1	Guatemala	0	-	1	Nicaragua	2
1985	2	Brazil, Uruguay	0	-	2	Pakistan, Sudan	4
1986	2	Haiti, Philippines	0	-	0	-	2
1987	1	South Korea	0	-	2	Taiwan, Tunisia	3
1988	2	Chile, Hungary	0	-	2	Mexico, USSR	4
1989	5	Czechoslovakia, Panama, Paraguay, Poland, Romania	0	-	2	Algeria, Jordan	7
1990	8	Albania, Benin, Bulgaria, Comoros, Fiji, Mongolia, Nepal, Nicaragua	0	-	1	Gabon	9
1991	8	Bangladesh, Central African Republic, Republic of the Congo, Guinea-Bissau, Madagascar, Mali, Niger, Zambia	0	-	3	Chad, Ghana, Togo	11
1992	3	Guyana, Taiwan, Thailand	1	Azerbaijan	1	Cameroon	5
1993	2	Lesotho, Malawi	1	Peru	1	Uganda	4
1994	3	Haiti, Mexico, Mozambique	0	-	0	-	3
1995	0	-	0	-	3	Algeria, Guinea, Tanzania	3
1996	1	Sierra Leone	1	Ghana	0	-	2
1997	1	Iran	1	Albania	2	Kenya, Tajikistan	4
1998	2	Armenia, Indonesia	0	-	2	Burundi, Cambodia	4
1999	4	Croatia, Djibouti, Ivory Coast, Niger	0	-	0	-	4
2000	3	Comoros, Senegal, Yugoslavia	0	-	2	Burkina Faso, Tanzania	5
2001	0	-	0	-	0	-	0
2002	1	Kenya	0	-	0	-	1
2003	0	-	0	-	0	-	0
2004	0	-	1	Algeria	0	-	1
Total	74		5		37		116

Notes: Events are recorded only for countries defined as being autocratic in the prior year. Democratic transitions and instances of positive regime change arising out of a period of foreign interruption or a period of transition are not included. Democratizing events coinciding with the natural death of the national leader are also not included. Source: Polity IV Project (2005)

Appendix 2: Definitions of variables

Variable name	Variable description	Data source	Notes
Democratizing event	Binary variable, =1 if a major or minor democratic transition or positive regime change, as defined by Polity IV	Polity IV Project (2005)	Democratizing events following foreign interruptions (such as Uganda 1980, Cambodia 1988 and Kuwait 1991) or periods of transition (such as Ethiopia 1994) are not considered. Only the first year of multi-year democratizing events is considered. Events coinciding with the natural deaths of national leaders (as defined by Jones and Olken 2005) are not considered.
Lasting democratizing event	Binary variable, =1 if a 'major' or 'minor' democratic transition or 'positive regime change' and if there is no 'negative regime change', 'adverse regime transition' or 'interregnum' in the subsequent 5 years	Polity IV Project (2005)	As above.
Democratic transition	Binary variable, =1 if a major or minor democratic transition, as defined by Polity IV	Polity IV Project (2005)	As above.
Global number of democratizing events	Number of democratizing events by autocratic countries	Polity IV Project (2005)	Includes democratizing events in other autocracies coinciding with the natural deaths of leaders in those countries.
Regional number of democratizing events	Number of democratizing events by autocratic countries in the same region	Polity IV Project (2005)	Includes democratizing events in other autocracies coinciding with the natural deaths of leaders in those countries. Regions are defined following World Bank (2008) as: 1. East Asia, the Pacific and South Asia; 2. Latin America and the Caribbean; 3. Europe and Central Asia; 4. Sub-Saharan Africa; 5. Middle East and North Africa.
Per capita GDP growth	Per capita GDP growth based on constant 2000 US\$ GDP	World Bank (2008)	
Per capita GDP level	Per capita GDP based on constant 2000 US\$ GDP	World Bank (2008)	
<i>BIG2</i>	Combined real GDP growth rate of the USA and Japan based on constant 2000 US\$ GDP	World Bank (2008)	
Education	Average years of school (TYR) of those aged 25 years and over	Barro and Lee (2000)	Data were linearly interpolated. Linear extrapolations of no more than 3 years for Algeria, Benin and Kenya were performed. A linear extrapolation of 7 years for Burundi using the same rate of change as Benin's was performed*. Average years of higher education (HYR) was also used as an explanatory variable in unreported results.
% of population aged > 65 years	Percentage of the total population that is aged 65 years or older	World Bank (2008)	
Rainfall variation	Percentage change in rainfall from the previous year	TYN CY 1.1 dataset of Mitchell et al. (2003)	
Oil dependency	Dummy variable, =1 if fuel exports are greater than 50% of merchandise exports for that year, 0 otherwise	World Bank (2008)	
Military	Dummy variable, =1 if the Chief Executive is a military officer	World Bank (2004)	
More autocratic	Autocracies with a Polity score of less than or equal to -5	Polity IV Project (2005)	
1990s	Dummy variable, =1 if 1990s, 0 otherwise	-	

* Results are not sensitive to the inclusion of the extrapolated data, but the extrapolations allow a greater number of democratizing events to be included in regressions that include education as a control variable.