DEMOCRACY, VOLATILITY, AND ECONOMIC DEVELOPMENT

Ahmed Mushfiq Mobarak*

Abstract—Growth stability is an important objective—because development requires sustained increases in income, because volatility is costly for the poor, and because volatility deters growth. We study the determinants of average growth and its volatility as a two-equation system, and find that higher levels of democracy and diversification lower volatility, whereas volatility itself reduces growth. Muslim countries instrument for democracy, and measures of diversification identify volatility. In contrast to the lack of consensus on the democracy–growth relationship, the democracy–stability link is robust. Rather than focus on growth, this paper forges an alternative link between democracy and development through the volatility channel.

I. Introduction

ECONOMIC development requires *sustained* economic growth. The process of development allows a society to adapt to the uncertainties created by changing environmental circumstances in such a way as to continue to improve the standard of living of its members. By contrast, growth can be followed by long periods of stagnation or even downturns. Development is therefore not only a result of high or positive growth rates, but also of the stability of that growth. The development literature recognizes this definitional connection between growth stability and development (Betancourt, 1996). Unfortunately, the extensive economic-growth literature has focused on the determinants of mean growth, while ignoring these other characteristics of the growth process relevant to our understanding of development.

In the last forty years, many developing countries have enjoyed spurts of growth whose effects were neutralized during subsequent periods of decline. The coefficient of variation of growth among developing countries is on average over six times greater than among the set of developed nations, and Pritchett (2000) has shown that growth is both more volatile and more unstable in poorer countries. There is also evidence that volatility in growth diminishes average growth (Ramey & Ramey, 1995). Thus, even if low volatility is not deemed a worthy end, it is a crucial means to economic success and therefore worthy of our attention. Furthermore, it is likely that volatility disproportionately affects poor people, for consumption patterns are much more sensitive to variations in income at low levels of income. Consumption-smoothing opportunities are most limited among the poorest households (see, for example, Jalan & Ravallion 1999). These households resort to income smoothing, which has an average-income cost, as the most vulnerable shift production into more conservative but less profitable modes (Morduch, 1995). Although Lucas (1987) had argued that the welfare cost of consumption volatility is small in the United States, subsequent work has shown that these costs are far from negligible in developing countries, where fluctuations are stronger (Pallage & Robe, 2003); that macroeconomic volatility undermines subjective measures of well-being (Wolfers, 2003); and that the welfare losses even in the United States are substantial, if fluctuations affect the growth rate of consumption (Barlevy, 2002).

This paper estimates a two-equation model that jointly explains both mean growth and the volatility in growth using data for approximately 80 countries over the last three decades of the twentieth century. It extends the work of Ramey and Ramey (1995), who consider the effect of volatility on mean growth, but do not explain the determinants of volatility. It also extends a small literature in economics (Denizer, Iyigun, & Owen, 2002; Easterly, Islam, & Stiglitz, 2000) and in political economy (Quinn & Woolley, 2001; Nooruddin, 2003; Chandra, 1998; Rodrik, 2000) which focuses on the effects of financial depth and democracy on volatility without explaining mean growth. The political-economy papers uncover a strong negative correlation between democracy and volatility, and also build evidence on the mechanisms through which democracy relates to volatility (for example, voter preferences). However, this literature suffers from two major shortcomings, which we try to improve upon. First, each paper in this literature examines the partial relationship between democracy and volatility using OLS regressions, ignoring the simultaneity between volatility and growth, and the simultaneous effects of democracy on both of the economic outcomes. Average growth and its variability are two moments of the same underlying income process, and are likely to be jointly determined. Furthermore, because volatility deters growth and because mean growth and its variability have common underlying determinants, it is essential that one estimate a two-equation system. In the partial OLS setting, the effect of democracy on development outcomes can be misattributed.[1]

Second, although it is widely recognized that democracy is endogenous with respect to development (see, for example, Barro, 1999), the nascent democracy-volatility literature does not address this issue. This is especially problematic in the context of volatility regressions in that, apart from

[1] For example, this paper finds that democracy has a direct negative effect on average growth, but once an indirect effect through the volatility channel is allowed for (democracy lowers volatility, which in turn increases growth), the net effect of democracy on growth is negligible. The two-equation system will also take advantage of covariance in the errors of the equations that define the first and second moments of growth rates.

the standard arguments concerning the increased demand for democracy in more developed nations, there are other indirect sources of correlation between democracy and volatility which could lead to biased empirical inferences in an OLS regression. For example, Auty (1997) and others have argued that resource abundance breeds rent seekers and predatory governments, and simultaneously exposes economies to greater volatility. The relationship between democracy and volatility uncovered in these papers may therefore merely reflect an indirect spurious correlation through the economic diversification channel.[2] To take account of the endogeneity, we instrument out democracy and demonstrate that the quantitative effects are different once democracy is instrumented.

The current empirical literature on democracy and development largely focuses on the democracy-growth question, but fails to arrive at a clear answer (Brunetti, 1997).[3] This lack of consensus is not surprising, for the theoretical relationship between democracy and growth is itself ambiguous (Bardhan, 1993). In contrast to this literature, we present strong evidence that democracy (in addition to aggregate output and diversification of the economy) significantly reduces volatility in growth. Democracy can be linked to greater stability in many ways. For example, if political actors unilaterally set policies, the variance of policies and outcomes will generally be higher than if policies are chosen through consensus. Regardless of the measure of democracy or volatility used, or the economic specification under which these relationships are investigated, the empirical results remain both statistically and quantitatively significant. Democracy continues to have a strong negative effect on volatility even after it is instrumented, and after it is subjected to a variety of other sensitivity checks. We thus introduce a robust channel through which democracy improves economic performance.

The regressions also show that volatility itself deters growth. Democracy thus has a positive effects on growth through the volatility channel, but this is offset by a direct negative effect. Amartya Sen and Jean Dreze's research on the relative economic performance of India and China provides some theoretical backing for these empirical findings. These authors note that although China had consistently surpassed India in food production and output growth, India, unlike China, has not suffered from any

major famines since 1949.[4] They stress the role of democratic institutions and the media—institutions that are lacking China—in mobilizing a swift response to the threat of famines in India. The inefficiencies inherent in those same Indian institutions may in turn have contributed to their poorer average output performance. Sen and Dreze's argument suggests that even if democracies exhibit lower *average* growth, their growth performance is likely to be more stable. Results presented in this paper provide systematic empirical backing to this argument.

The paper proceeds as follows. The next section develops some stylized facts about output, capital, and consumption volatility along the path of economic development. Section III reviews the theoretical literature to identify potential determinants of volatility, which are then used an explanatory variables in the growth and volatility regressions presented in section IV. Section V concludes.

II. Patterns of Development

The growth of capital, output, and consumption in developing countries has historically been both lower and more volatile than in developed countries. Analysis of the first and second moments of GDP and capital stock data confirms that a number of stylized facts that supposedly typify the process of economic growth generally hold true only for the developed world, and not for developing countries. These stylized facts, also known as "Kaldor's facts," have inspired many modern growth models, and also serve as the metric against which the predictions of various models are tested. The two stylized facts examined here are summarized in Barro and Sala-I-Martin (1995):

1. Per capita output grows over time, and its growth rate does not tend to diminish.
2. Physical capital per worker grows over time.

Analyses of the intertemporal stabilities of output and capital per capita are performed using the GDP per capita and the nonresidential capital per worker series from the Summers-Heston Penn World Tables.[5] In order to examine these stylized facts, we compare the levels, stability, and volatility of GDP per capita growth and capital per worker growth across developed and developing countries (see table 1). Prichett (2000) examines instability and volatility of output per capita growth, and some of the results presented reproduce his analysis. The 24 pre-1990 members of the OECD, Malta, and Cyprus are considered to be the developed world; all other countries are developing. This definition is admittedly somewhat arbitrary, and the major

[2] Quinn and Woolley (2001) recognize the endogeneity problem (which they label "selection bias"), but write "We intend to pursue selection bias issues further in subsequent work" (footnote 5, p. 636) They also recognize the first problem outlined above (the simultaneity between growth and volatility), but again, they leave it up to future work: ". . . this new [democracy research] agenda would examine performance in terms of both growth and volatility. In particular, scholars should probe the relationships among democracy, volatility and growth, perhaps using, once the technology has developed, some version of pooled, Vector Autoregressive modeling" (p. 653).
[3] Of the seventeen papers reviewed in Brunetti (1997) that empirically examine the democracy-growth relationship, nine find no effect, four find positive effects, and the other four find negative effects.

[4] See Sen (1983), Sen and Dreze (1989).
[5] Data on GDP per capita are available for 148 countries. Following other researchers who have used this same series, we dropped data prior to 1960 in order to preserve cross-national comparability. The data on capital per worker were far more sparse, and our sample was effectively reduced to 64 countries for the period 1966–1992.

TABLE 1.—GDP PER CAPITA GROWTH AND CAPITAL PER WORKER GROWTH—LEVELS, VOLATILITY, AND INSTABILITY[a]

Region	Growth of GDP per Capita					
	Levels	Volatility			Instability (Shift in Growth)	
	Mean	Standard Deviation	Coefficient of Variation	Forecast Error[b]	1960–1972 to 1973–1982	1973–1982 to 1983–1992
Africa	1.1	7.2	11.87	12.2	2.9	3
Americas	2.1	5.5	4.59	11.5	2.2	3.2
Asia-Oceania	2.3	7.7	5.03	13.2	3.8	3.6
East Europe	3.3	4.9	1.97	10.9	2.1	2.2
Developing countries	1.8	6.8	7.42	12.2	2.9	3.2
Developed countries	3.1	3.5	1.19	6.8	2	1.1

Region	Growth of Capital per Worker			
	Levels	Volatility		Instability (Shift in Growth)
	Mean	Standard Deviation	Coefficient of Variation	1966–1979 to 1980–1992
Africa	3.3	5.8	2.19	6.9
Americas	2.7	4	1.7	5.2
Asia-Oceania	4.9	3.2	1.04	2.8
Developing countries	3.5	4.4	1.78	5
Developed countries	4	2.7	0.89	3.1

[a] All figures reported are in percent. Each figure is the average across countries in the group, where each country is treated as one observation.
[b] |(Actual growth rate) − (linear trend prediction)|.

point to note is that the definition does not correlate perfectly with an income ranking.[6]

To analyze per capita output growth instability, the break periods 1973 and 1982 were chosen, bearing in mind the timings of the OPEC oil shocks, which induced large shifts in economic performance worldwide. The "forecast error" measure of volatility is based on the intuitive notion that in a stable series, forecasting future values using lags will yield more accurate predictions than in a volatile series. An important drawback of these volatility measures is that they perform well only if growth of per capital output is represented well by a single trend.[7]

The data unambiguously affirm that GDP per capita exhibits greater instability and greater volatility in developing countries than in the developed world. Although developed countries experienced higher average growth during each of the three subperiods considered, the variability in growth rates around the mean was significantly higher (P-value <0.01) in developing nations. In spite of a worldwide growth deceleration after 1973, average output per capita growth in virtually every developed economy was positive during the entire sample period. In contrast, many African and Latin American nations experienced negative growth between 1983 and 1992. The negative shift in growth rates was most pronounced in Ivory Coast (where the average growth rate declined from +3.6% to −4.3% in

a decade), Peru (+2.9% to −3.1%), Yugoslavia, Brazil, Ecuador, Suriname, a large chunk of Africa, and some oil-exporting nations. A cursory glance through the country figures (not reported here) makes it obvious that patterns of growth observed in developing economics differ greatly from the steady, smooth growth experience of the OECD nations. The average growth rate declined by more than 4 percentage points after 1983 in 27 developing countries. The same volatility and instability conclusions apply for the growth-of-capital-per-worker series as well.[8] Analysis of consumption data indicates that correlation between the volatility of consumption-per-capita growth growth and that of output-per-capita growth is large and positive. This suggests that income volatility does not, in general, get smoothed out through consumption decisions and insurance mechanisms. Like output and capital volatility, consumption volatility is more prevalent in poorer countries.

These observations concerning greater volatility of output growth in poorer countries are not new. Given the evidence on growth volatility that has accumulated, and the important connections between volatility and development, studying the determinants of volatility seems like a useful extension to the empirical growth literature.

III. Determinants of Volatility

Given the lack of uniformity in the sets of explanatory variables used in different empirical growth papers and the

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[6] Many rich oil exporters are excluded from the developed category, partly because these countries were poor during the earlier sample years, and partly because they do not conform to a broader notion of "developed."

[7] For example, one country can have large volatility around a single trend while another has very stable output in each of two subperiods, but around two different trends, and the two countries could appear to have similar volatility based on these measures (Pritchett, 2000).

[8] These results are consistent with the observation that investment is strongly procyclical and volatile. The declines in output and capital growth were concurrent, and the magnitude of decline was larger for the capital series. Of the 17 OECD countries that had high (above 2%), steady growth of capital per worker in each subperiod, 16 experienced moderately high (above 1%), steady growth of output per capita as well.

criticism this subsequently generated (Levine & Renelt, 1992), we cast a wide net in search of potential determinants of growth volatility. One theoretical source for these determinants is the work of Rostow and Reynolds on long-term development patterns.[9] A theme common to these studies is the concept of a takeoff point, or turning point, beyond which an economy enjoys self-sustained positive, steady growth. Hence, the absence of growth volatility is a defining characteristic of takeoff. This implies that the fulfillment of the preconditions to takeoff should be included as explanatory variables in volatility regressions. The common preconditions for takeoff identified by these models include sectoral shifts from agriculture to industry and services, development of education, health, and commercial infrastructure, openness to international markets, and emergence of stable political institutions.

A few other recent theoretical papers are relevant to understanding the determinants of volatility. Acemoglu and Zilibotti (1997) note that in an economy with indivisible risky projects, diversification opportunities are limited in the early stages of development owing to the scarcity of capital. Growth is therefore random and subject to crises. Economies that receive "good draws" in early periods are able to accumulate capital, diversify risk, and achieve stable growth. Rodrik (1999) proposes a model in which external shocks (such as a shock to terms of trade) give rise to domestic social conflict, and countries with weak institutions of conflict management experience growth collapses as a result. The empirical section of the paper finds that the countries that experienced the sharpest drops in growth after 1975 were those with divided (for example, ethnically fragmented) societies and with weak institutions for conflict management (such as nondemocratic, poor-quality institutions).

Apart from its role as an institution of conflict management, democracy may reduce volatility in economic performance through other channels. First, choosing an autocratic regime over democracy is like undertaking a risky investment. If the society is lucky, it may end up with a benevolent dictator concerned only with the economic development of the nation. On the other hand, an unlucky society may find itself under a rule of a dictator who misuses discretionary powers for personal gain. Discretionary power is therefore risky, and in an autocratic regime, economic performance is likely to be more volatile than under a democratic system.[10] Second, democracies typically place constraints on political actors, so that no individual political entity may set policies unilaterally. Henisz (2000) shows that as the number of politicians with independent veto power over policy changes increases (which corresponds to

higher levels of democracy), the possibility of large shifts in policies that affect investment decisions decreases. Nooruddin (2003) shows that proxies for "credible constraints" on politicians, such as independence of the executive from the legislature, minority parliamentary government, and coalition government, are jointly negatively correlated with growth volatility. Mobarak (2001) shows that if politicians have imperfect information about the relative qualities of available policy alternatives, the variance of the random variable associated with good policy choice is a decreasing function of the extent of decentralization of power. Intuitively, if one political actor can set policies unilaterally, the variance of policies and outcomes will generally be higher than if policies are chosen through consensus, as long as individual preferences are not perfectly aligned. Similarly, Chandra (1998) argues that countries with more diversified institutional portfolios will experience more stable outcomes. Finally, Quinn and Woolley (2001) argue that voters are generally more risk-averse than the politicians who represent them, and democracy tends to constrain policy to the risk preferences of the median voter. Autocrats on average enact riskier policies, which increases growth volatility in those economies.

IV.   Volatility Regressions

A. Data Sources

The empirical estimations examine the determinants of both growth volatility and mean growth. The explanatory variables used can be grouped into four broad categories. First, the preconditions for high stable growth inferred from Rostow's and Reynolds's work include expanded trade, sectoral shifts in the economy, a stable political environment free of conflicts, and well-developed financial institutions. Second, because output volatility relates to shocks, we add measures of external shocks and policy variability. Third, we use a few proxies for the extent of diversification of the economy, because diversification reduces reliance on a single or limited group of products. Finally, existing empirical growth papers (such as Levine & Renelt, 1992) provide controls for the growth equations.

Table 2 details the variables used in the regressions, their summary statistics, expected coefficient signs, and data sources. Some major sources were the World Development Indicators (World Bank) for economic data, Banks (1981) for political stability data, Lundberg and Squire's (2003) income inequality database, Global Development Network data on diversification, and the IMF International Financial Statistics. Democracy and political rights indices were obtained from Gastil (1987), Henisz (2000), and the Polity IV database. The sample was a panel of 136 countries in the Barro-Lee database for our decade-specific time periods (1960s to 1990s). Missing data effectively reduced the sample to 77 countries for the last three decades in most regressions.

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[9] Rostow (1990), Reynolds (1983).
[10] This argument implies that variability of performance across the set of nondemocracies should be lower than across the set of democracies. However, the focus of this paper is on intertemporal variance within countries, not cross-sectional variance across countries.

TABLE 2.—VARIABLES—SUMMARY STATISTICS, EXPECTED SIGNS, AND SOURCES

Variables	Mean (Std. Dev.)	Source	Expected Effect on Volatility
Dependent Variables			
Mean growth rate (%)	3.44 (2.37)	World Bank World Development Indicators	
Standard deviation of growth rate	3.64 (2.62)	World Bank	
Interquartile range of growth rate	4.94 (3.20)	World Bank	
Does growth rate change sign during decade?	0.821 (0.384)	World Bank	
Frequency of sign changes (% of years during decade that growth changed sign)	0.29 (0.19)	World Bank	
Political Rights and Liberties			
Indicator of democracy (0–1)	0.62 (0.32)	Gastil	−
Index of civil liberties (1–7, 1 = more lib.)	3.95 (1.91)	Gastil	+
Openness of political institutions (0–10)	4.09 (3.96)	Polity IV Project	−
Competitiveness of political participation (0–5)	2.56 (1.55)	Polity IV	−
Political constraints (0–1)	0.30 (0.33)	Henisz	−
Trade and Shocks			
(Imports + exports)/GDP	36.05 (57.65)	World Bank	+ or −
Shock to merchandise terms of trade	−0.01 (0.04)	IMF-International Financial Statistics	+
Dummy for participation in external war between 1960 and 1985	0.72 (0.45)	Barro–Lee	+
Economic Diversification			
Fractionalization index of agriculture, industry, and services share of GDP	0.57 (0.07)	World Bank	−
Services share of GDP	0.48 (0.13)	World Bank	−
Indicator for exporters of diversified set of products (0–1)	0.22 (0.41)	Global Development Network Growth Database	−
Log of total population	16.36 (1.44)	World Bank	−
Indicator for fuel exporters	0.06 (0.23)	Global Dev. Network	+
Human Capital			
Years of education in male population aged 15+ (at start of decade)	5.03 (2.73)	Barro-Lee (2000)	
Years of education in female population aged 15+ (at start of decade)	4.16 (2.91)	Barro-Lee (2000)	
Other Controls			
Initial GDP per capita/$1,000	4.82 (5.24)	World Bank	−
Black-market premium in currency exchange	2.49 (1.46)	Barro-Lee	+
Antigovernment demonstrations per year	0.87 (1.37)	Banks	+
Inflation rate (%)	33.42 (161.96)	World Bank	+
Credit to private sector/GDP (%)	31.48 (27.29)	World Bank	−
Gini coefficient of income distribution	39.77 (10.52)	Lundberg & Squire (2000)	+
Gross domestic investment/GDP (%)	22.18 (6.33)	Barro-Lee	
Instruments			
Indicator for countries with Muslim majority populations (0–1)	0.19 (0.39)	Barro-Lee	
Estimate of settler mortality	104.6 (118.1)	Acemoglu, Robinson, & Johnson (2001)	
Indicator for countries that gained independence after 1945 (0–1)	0.42 (0.50)	Barro-Lee	

B. Measures of Volatility

The two base measures of volatility we use are the standard deviation of the growth rate during the decade, and an interquartile range (the range from the 20th percentile to the 80th percentile of growth).[11] Each measure has its limitations. The standard deviation is sensitive to outliers and noise in the data, whereas the interquartile range does not capture any volatility in between the two extreme points in the range. In practice, the two measures are highly correlated, and the results are not sensitive to the particular measure used.

[11] The coefficient of variation (CoV) is not used, because in many countries growth rates are negative during certain years, so that the mean growth rate is close to 0. The CoV would appear artificially high in those countries.

Volatility is of greatest concern when growth has the potential to become negative. In other words, variability of growth around 0% is more detrimental to development than variability around 4%. To take this into account, we create indicators for whether the growth rate changed sign (from positive to negative or vice versa) within the decade, and the frequency with which it changed sign, and interact these indicators with the standard deviation and interquartile range measures. These interacted variables depress volatility when growth stays positive through the decade, reflecting the assumption that volatility is more costly if growth becomes negative.

All volatility measures used are subject to the plausible critique that poorer countries where data collection tech-

DEMOCRACY, VOLATILITY, AND ECONOMIC DEVELOPMENT

niques are less well developed would mechanically look more volatile. If the data collected are of poorer quality, measurement error or the variance of the measured GDP growth is likely to be higher. To guard against this, weighted estimation was carried out, with GDP per capita serving as the weighting series. This weighting procedure assumes that the variance of the measured variables for each country is inversely related to the per capita income of the country. By comparing the weighted and unweighted estimates, we confirmed that weighting only increased the precision of the estimates without altering the coefficient signs (see table 6A).

C. Control Variables

Following the financial development literature [see Levine (1997) for a review], credit to the private sector as a fraction of GDP is used as a proxy for financial depth. The number of antigovernment demonstrations is used as a measure of political instability. Measures of shocks include the inflation rate, the shock to merchandise terms of trade,[12] and a dummy for countries that participated in an external war between 1960 and 1985. The degree of outward orientation of economies is captured through the trade share of GDP. Black-market premia in currency exchange proxies the extent of government intervention in the economy, and has been previously found to deter growth. Years of schooling among male and female adult populations measure the stock of human capital. For income inequality, we use the Gini coefficient and income shares of the poorest quintiles.

Democracy and political rights indices were collected from a variety of sources in order to check whether the coefficients are robust to changes in the measure of democracy used. We primarily rely on the Gastil–Freedom House index of electoral and political rights, which is the measure most commonly used in the cross-country growth literature. This index subjectively classifies countries into seven categories based on a concept of political rights, defined as "the rights to participate meaningfully in the political process . . . the right of all adults to vote and compete for public office, and for elected representatives to have a decisive vote on public policies." The indicator of civil liberties from this same source is meant to capture a slightly different set of rights (free expression, religious beliefs, organizing, and demonstrating), but in practice the two indices are highly correlated. We do sensitivity tests based on some alternative democracy indicators, including "openness of political institutions" and "competitiveness of political participation" from the Polity IV project, and a measure of "political constraints" from Henisz (2000) that incorporates information on the number of independent branches of government with veto power and party fractionalization across and within those branches. Bivariate correlations indicate that of

all the measures of democracy used here, the Henisz political constraint index is least correlated with the other indices.

A Herfindahl concentration index of the agriculture, industry, and services shares of GDP proxies the lack of diversification of the economy. Developed countries where services dominate (as a share of GDP) can look undiversified according to this measure, although the services sectors themselves are typically very diversified in these economies. The services share of GDP is therefore included as an additional explanatory variable. Other measures of diversification used include dummies for diversified exporters and fuel exporters. The Global Development Network database classifies countries as "diversified exporters" if one particular type of exports (be it fuel, primary products, agriculture, of manufactured products) does not dominate the export menu. Finally, the population or geographical area of the economy can provide a sense of the extent of diversification that is feasible. Larger countries have a potentially greater capacity to diversify in that the resource base is likely to be broader.

D. Specifications and Single-Equation Results

We first present single-equation estimates of volatility and growth separately, and build up to joint estimations of growth and its volatility using three-stage least squares. Table 3 reports the single-equation estimation results. The pooled OLS estimator for growth in the first column confirms some standard results from the literature. Investment, male education, and the East Asia dummy are positively related to growth, whereas black-market premia, female education, external war, and sub-Saharan Africa dummies all have a negative association. Initial GDP per capita, which is meant to capture the convergence effect, has a negative coefficient as expected, but it is not significantly different from 0. Most interestingly for our purposes, volatility has a negative and statistically significant effect on growth, whereas Gastil's democracy index has a negative but insignificant coefficient. In specification (2), volatility is instrumented, because many common underlying elements (some of which are unobserved) affect both growth and volatility. Democracy is also instrumented, because there may be reverse causation from growth to political freedoms. Measures of economic diversification are used as instruments for volatility, and indicators for Muslim countries and newly independent countries instrument democracy in a two-stage least squares specification. The validity of these instruments is discussed in more detail below. The volatility coefficient remains negative but becomes insignificant after it is instrumented; the democracy coefficient becomes even smaller in absolute value. These results confirm previous findings that there is no strong relationship between democracy and growth.

The argument for using diversification measures to instrument volatility is that though intertemporal variability in

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[12] Growth rate of merchandise export prices minus growth rate of merchandise import prices.

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TABLE 3.—SINGLE-EQUATION ESTIMATES OF GROWTH AND VOLATILITY

	Growth		Volatility			
	(1) OLS	(2) 2SLS	(3) OLS	(4) 2SLS, Muslim Dummy Instrument	(5) 2SLS, Settler Mortality Instrument	(6) Random Effects
Interquartile range of growth rate[a]	−0.146** (2.52)	−0.242 (1.43)				
Democracy index (0–1)[a]	−0.797 (1.22)	−0.201 (0.11)	−1.760*** (3.07)	−3.338** (2.45)	−4.619** (2.42)	−2.007** (2.42)
Initial GDP per capita (start of decade)/$1,000	−0.041 (1.10)	−0.057 (1.36)	−0.065*** (2.73)	−0.048* (1.89)	0.007 (0.11)	−0.084 (1.27)
Trade share of GDP	0.002 (0.62)	0.003 (0.71)	−0.005*** (2.88)	−0.008*** (2.73)	−0.011** (2.53)	−0.009 (1.17)
Inflation rate	−0.018* (1.72)	−0.013 (0.96)	0.022* (1.73)	0.024* (1.78)	0.011 (0.63)	0.008 (0.51)
Gini coefficient of income inequality	0.045** (2.57)	0.046** (2.52)	0.018 (1.24)	0.003 (0.17)	−0.018 (0.55)	0.012 (0.51)
Credit to private sector/GDP	−0.007 (1.11)	−0.007 (1.01)	−0.003 (0.75)	−0.005 (0.97)	−0.018 (1.34)	−0.013 (1.10)
Black-market premium in currency exchange	−0.395** (2.53)	−0.339** (2.12)	0.220* (1.76)	0.135 (0.88)	0.343 (1.53)	0.189 (1.07)
Indicator for countries involved in an external war	−0.505* (1.75)	−0.532* (1.78)	−0.214 (0.90)	−0.274 (1.06)	−0.274 (0.56)	0.383 (0.77)
Antigovernment demonstrations	0.060 (0.76)	0.065 (0.83)	0.085 (1.36)	0.052 (0.70)	0.067 (0.65)	0.060 (0.40)
Dummy for East Asian countries	1.890*** (2.91)	1.965** (2.48)				
Dummy for sub-Saharan African countries	−1.280*** (2.71)	−0.917 (1.60)				
Gross domestic investment (% of GDP)	0.112*** (3.91)	0.111*** (3.77)				
Average years of schooling in male population	0.365* (1.70)	0.308 (1.12)				
Average years of schooling in female population	−0.518** (2.56)	−0.485 (1.64)				
Indicator for diversified exporters			−0.604*** (3.04)	−0.553*** (2.66)	−0.171 (0.45)	−0.756 (1.53)
Index of sectoral diversification of the economy			−12.194** (2.06)	−12.950* (1.85)	−20.449** (2.34)	−16.265** (2.25)
Share of services sector in GNP			−3.290 (0.86)	−2.436 (0.56)	−3.839 (0.82)	−3.929 (1.05)
Indicator for oil-producing countries			0.336 (0.39)	0.300 (0.34)	−0.519 (0.52)	0.171 (0.17)
Log of total population			−0.239** (2.64)	−0.255*** (2.69)	−0.474** (2.41)	−0.266 (1.35)
Shock to merchandise terms of trade			0.825 (0.22)	0.457 (0.12)	3.195 (0.87)	−1.574 (0.35)
Constant	2.637* (1.97)	2.661 (1.31)	16.584*** (2.97)	18.796*** (2.65)	28.817*** (2.80)	20.665*** (3.36)
Observations	193	193	193	193	135	193
Adjusted R^2	0.49	0.47	0.41	0.38	0.23	

t-Statistics in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%.
Standard errors are heteroskedasticity-corrected and clustered by country.
[a] Instrumented in 2SLS models.

growth rates is lower in more diversified economies, diversification does not have a direct effect on the average value of growth, except perhaps through the volatility channel. This is admittedly a potentially problematic argument to make, for it is not impossible to conjure up scenarios in which diversification has a direct effect on growth. We do avoid using variables with obvious connections to growth (such as country size, which proxies the potential to diversify) as instruments. Even though country size is predetermined, it may be related to growth. Geographic area, for example, is plausibly associated with military spending,

which is turn may be related to tax rates, which affect growth.

The regressions of volatility presented in specifications three through five confirm a strong negative effect of democracy on volatility. The pooled OLS estimator indicates that countries that are richer, more diversified, democratic, outward oriented, and with low inflation are less volatile. All three measures of diversification used—the fractionalization index of sector shares, diversification of exports, and country size—have a significant negative effect on volatility. Because a primary focus of this empirical section is the

relationship between democracy and volatility, we instrument for democracy in specifications (4) and (5). Ken Sokoloff, Gustav Ranis, and Richard Auty have argued that nondemocratic forms of government are likely to develop in economies dependent on natural resources where rent extraction opportunities are plentiful (see Auty, 1997). These same economies may be prone to volatility due to their reliance on a single natural resource. The relationship between democracy and volatility uncovered in specification three may therefore not be a causal one. This suggests that including measures of diversification in the volatility regressions is particularly important, and it also calls for instrumenting democracy to explore causality.

E. Instruments for Democracy

The instrument for democracy we propose is a dummy for countries with Muslim majority populations.[13] There exist several possible conceptual links between Muslim countries and lower levels of democracy. First, most Muslim countries are former European colonies, and as a result, they are on average newer nation-states. If democracy is the end product of years or centuries of political evolution, it is not surprising that newer countries are on average less democratic. Electoral systems currently in place in most European nations were preceded by monarchic regimes. Newer nation-states such as Nepal (also a former de jure monarchy) only recently started riding the wave of democratization.[14] In the first-stage democracy regressions (table 4), the Muslim dummy remains highly significant even after controlling for an indicator for independence after 1945, which makes it unlikely that this is the only causal link between Muslim countries and democracy. Second, the Middle East (where most Muslim countries are located) has historically been populated by tribal cultures where forms of hereditary rule have dominated (see Lewis, 1996), and until today, countries in this region remain more monarchic than the rest of the world. Third, unlike the two other major world religions, Islam through its codebook of law—the Sharia—provides guidance for not just spiritual life, but also political life. Huntington (1991) states that it is unclear whether democracy and Islam are a contradiction in terms, and offers:

> Egalitarianism and voluntarism are central themes in Islam. . . . Islam, however, also rejects any distinction between the religious community and political community. . . . To the extent that government legitimacy and policy flow from religious doctrine and religious

TABLE 4.—FIRST-STAGE REGRESSION OF INSTRUMENTS FOR DEMOCRACY

	Democracy Index	
	(7) Muslim Dummy Instrument	(8) Settler Mortality Instrument
Indicator for countries with Muslim majority population	−0.280*** (3.12)	
Estimate of settler mortality (Acemoglu et al.)/100		−0.020 (1.19)
Indicator for countries that gained independence after 1945	−0.087 (1.65)	−0.231** (2.46)
Initial GDP per capita (start of decade)/$1,000	0.006 (1.37)	0.019** (2.36)
Trade share of GDP	−0.001** (2.58)	−0.001 (0.98)
Inflation rate	−0.000 (0.13)	−0.003 (1.28)
Gini coefficient of income inequality	−0.010*** (3.90)	−0.012*** (3.96)
Credit to private sector/GDP	−0.001 (0.71)	−0.003** (2.19)
Black-market premium in currency exchange	−0.035* (1.71)	0.013 (0.49)
Indicator for countries involved in an external war	−0.054 (1.38)	−0.037 (0.59)
Antigovernment demonstrations	−0.028** (2.18)	−0.002 (0.07)
Indicator for diversified exporters	0.057* (1.75)	0.082 (1.51)
Index of sectoral diversification of the economy	−0.159 (0.15)	−0.737 (0.59)
Share of services sector in GNP	0.547 (0.85)	−0.103 (0.15)
Indicator for oil-producing countries	0.056 (0.55)	−0.009 (0.07)
Log of total population	−0.005 (0.29)	−0.047* (1.77)
Shock to merchandise terms of trade	−0.034 (0.13)	0.369 (0.96)
Constant	1.183 (1.22)	2.524** (2.02)
Observations	193	135
Adjusted R^2	0.62	0.54
F-stat. for joint significance of instruments	8.48	5.76
Prob. > F	0.00	0.01

t-Statistics in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%. Standard errors are heteroskedasticity-corrected and clustered by country.

expertise, Islamic concepts of politics differ from and contradict the premises of democratic politics.

If the divine word governs politics, automatically less is left for the people to decide, which could explain why Muslim countries would score lower on indices of democracy.[15] The concentration of Muslim countries in the Middle East region makes this instrument vulnerable to the criticism that many of these countries are oil exporters and therefore bear a direct relationship to volatility. We therefore include a dummy for oil exporters in the volatility equation. Specification (7) in table 4 presents the first-stage regression

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[13] Of the 17 papers reviewed in Brunetti (1997) that investigate the relationship between democracy and growth, he notes that only one addresses the endogeneity problem, but using lagged democracy as the instrument. Barro (1999) studies the determinants of democracy and notes a negative relationship between Muslim majority populations and Gastil's democracy index, but offers no theoretical justification for this observed relationship.

[14] See Huntington (1991) for a discussion of democratizations in the late twentieth century.

[15] It is important to note that the Islam-democracy relationship is more complex than what the limited number of arguments presented here suggest. Many Islamic scholars would argue that Islam promotes democracy. Nevertheless, the direction of the relationship posited here seems to hold in the data.

of the democracy index where indicators for Muslim countries and for countries that gained independence after 1945 are used as instruments. The *F*-statistic for the joint significance of the two instruments is relatively high, with a *P*-value <0.001. The Muslim country indicator itself has a high *t*-statistic. In the second stage [specification (4)], democracy continues to have a negative effect after it is instrumented, and most other results remain unchanged. A 1-standard-deviation increase in democracy scores reduced the volatility measure by just less than ½ standard deviation.

Specification (5) in table 3 reports an alternative two-stage least squares regression where the historical European settler mortality estimate from Acemoglu et al. (2001) is used to instrument democracy instead. Between the eighteenth and twentieth centuries, Europeans pursued different colonization policies depending on the mortality rate the settlers faced in those colonies. When faced with high mortality, Europeans were more likely to set up extractive institutions, and it is possible that there differences in institutions have persisted to create differences in the extent of democracy across countries in the late twentieth century. In that the European settler mortality estimate is a purely historical number, it is superior to the Muslim country indicator as an instrument on some a priori theoretical grounds. However, the first-stage regressions (table 4) indicate that settler mortality does not identify democracy as well as the Muslim indicator. In the presence of such weak identification, the bias in the 2SLS estimate can be large even if only a weak relationship exists between the settler mortality instrument and the residuals of the volatility regression (Bound, Jaeger, & Baker, 1995). Additionally, the settler mortality instrument is only available for the subset of countries that were colonized, and this reduces our sample by over 30%. In spite of these issues, the main result of the paper—the significant negative effect of democracy on volatility—survives when settler mortality is used to instrument democracy.

Next, we experiment with some panel estimators for the volatility regression. A Hausman test between the fixed and random-effects specifications informs us that the two models are consistent, and only the random-effects results are reported in specification (6). Democracy and diversification measures continue to have significant negative coefficients. Measures of shocks, policy variability, and political violence by and large carry their expected signs in the panel regression, but their coefficients are not statistically different from 0.

F. Three-Stage Least Squares Joint Growth— Volatility Results

Table 5 investigates the joint determinants of growth and volatility using three-stage least squares. These system-of-equations estimations address the concern that volatility and growth are determined simultaneously, and share some common underlying determinants. Low volatility and high growth are two manifestations of the development process, and these estimates allow us to more accurately identify the relationships between the regressors and these two interrelated characteristics of development. Furthermore, the two dependent variables—average growth and its variability—represent two moments of the same income process, and the error terms in the two equations are therefore expected to have some nonzero covariance, which the 3SLS estimator allows for. Because volatility appears as a regressor in the growth equation, it has to be instrumented out using exclusion restrictions. The diversification measures, which affect volatility but do not have a direct, independent effect on growth, are excluded from the growth equation.

Only growth and volatility are considered endogenous in specification (9), whereas democracy is also instrumented using the Muslim country indicator in specification (10). Notable results from the single-equation specifications all remain unchanged in this setting. Volatility has a strong negative effect on growth; democracy, initial GDP per capita, and diversification have strong negative effects on volatility. This setup allows us to dissect the effect of democracy on growth into two distinct components: a direct effect, and an indirect one through the volatility channel (that is, democracy affects volatility, which affects growth). What we find is that after controlling for the volatility channel, democracy now has a direct negative effect on growth, which is statistically significant. This is counteracted by an indirect positive effect through the volatility channel. The net effect on growth is the sum of these two effects, and is small and statistically insignificant. Once democracy is instrumented in specification (10), the direct effect of democracy on growth becomes insignificant, but its effect on volatility remains significant. The net effect on growth now has a positive sign, but is still insignificant. This formulation allows us to understand better the complex relationship between democracy and development. Although democracy lessens average growth, it also makes economic performance more stable. This finding is consistent with the argument made earlier that the choice between regimes of autocracy and democracy is conceptually equivalent to a choice between high-risk–high-return and low-risk—low-return technologies. The price you pay for the improved average economic performance under less democratic systems is the uncertainty it induces.

Empirically, the relationship between democracy and volatility is much stronger than between growth and democracy. This accords with our theoretical understanding of these issues. Taken together, all the plausible theories linking democracy to growth imply an ambiguous relationship (Bardhan, 1993), whereas the negative link between democracy and volatility is much more clear-cut (Mobarak, 2001). Finally, the system estimations also allow us to compute a net effect of the other regressors on growth as the sum of a direct effect and an effect through the volatility channel. We

TABLE 5.—3SLS JOINT ESTIMATES OF GROWTH AND VOLATILITY

	Democracy Not Instrumented (9)		Democracy Instrumented (10)	
	Growth	Volatility	Growth	Volatility
Standard deviation of growth rate	−0.790***		−0.745***	
	(3.33)		(3.03)	
Democracy index (0–1)	−2.026***	−1.708***	−1.746	−2.528***
	(2.59)	(3.17)	(0.98)	(2.60)
Initial GDP per capita (start of decade)/$1,000	−0.097**	−0.072**	−0.093**	−0.063**
	(2.37)	(2.47)	(2.26)	(2.03)
Trade share of GDP	0.007*	−0.005*	0.006*	−0.007**
	(1.78)	(1.90)	(1.70)	(2.15)
Inflation rate	−0.013	0.021**	−0.013	0.022**
	(1.00)	(1.97)	(0.99)	(2.06)
Gini coefficient of income inequality	0.078***	0.020	0.077***	0.012
	(4.52)	(1.41)	(4.10)	(0.77)
Credit to private sector/GDP	−0.007	−0.003	−0.007	−0.004
	(1.03)	(0.57)	(1.00)	(0.68)
Black-market premium in currency exchange	−0.171	0.205	−0.177	0.160
	(1.12)	(1.64)	(1.09)	(1.19)
Indicator for countries involved in an external war	−0.785***	−0.147	−0.781***	−0.177
	(2.77)	(0.60)	(2.74)	(0.71)
Antigovernment demonstrations	0.070	0.062	0.070	0.046
	(0.78)	(0.75)	(0.75)	(0.54)
Dummy for East Asian countries	1.762***		1.922***	
	(3.43)		(2.98)	
Dummy for sub-Saharan African countries	−1.164**		−0.995*	
	(2.48)		(1.73)	
Gross domestic investment (% of GDP)	0.107***		0.105***	
	(4.25)		(4.20)	
Average years of schooling in male population	0.290*		0.328*	
	(1.68)		(1.76)	
Average years of schooling in female population	−0.282*		−0.331*	
	(1.72)		(1.72)	
Indicator for diversified exporters		−0.503***		−0.477**
		(2.60)		(2.46)
Index of sectoral diversification of the economy		−15.565***		−16.084***
		(3.57)		(3.64)
Share of services sector in GNP		−5.416**		−5.047**
		(2.14)		(1.96)
Indicator for oil-producing countries		0.800*		0.790
		(1.68)		(1.64)
Log of total population		−0.216***		−0.228***
		(2.60)		(2.69)
Shock to merchandise terms of trade		0.697		0.566
		(0.30)		(0.24)
Constant	3.164*	19.107***	2.880	20.425***
	(1.85)	(4.80)	(1.13)	(4.87)
Observations	193		193	

Absolute value of z-statistics in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%.
Standard errors are heteroskedasticity-corrected and clustered by country.

find that trade unambiguously increases growth through both channels whereas inflation and black-market premia decrease growth, but all these effects are only marginally significant.

G. Sensitivity Tests

To test the robustness of these results to alterations in the chosen measures, estimation procedures, and samples, we conduct a battery of sensitivity tests. We take the three-stage least squares with instrumented democracy [specification (10)] as our base model, and make incremental changes to it to examine the impact of that change on the coefficients of interest. Specification (11) in table 6A runs an unweighted regression to verify that weighting only increased the pre-

cision of the estimates without altering coefficient signs. Specification (12) uses per capita consumption growth and volatility in consumption growth as dependent variables, and demonstrates that consumption growth and volatility share similar structural features with output growth and volatility. This is important, for volatility in incomes is not very costly if capital markets are perfect and agents can ensure against income shocks. Consumption would then be smooth regardless of the variability in income. We find that democracy and diversification have just as large a negative effect on consumption volatility.

The next two specifications remove observations with the top ten and bottom ten percentiles of democracy scores, respectively, to ensure that the results on democracy are not

TABLE 6.—SENSITIVITY TESTS OF MODEL 10 (3SLS MODEL WITH INSTRUMENTED DEMOCRACY)

(A)

	Unweighted Regression (11)		Consumption Growth and Volatility (12)		Top 10% Democracy Values Excluded (13)		Bottom 10% Democracy Values Excluded (14)		Countries with Missing National Accounts for Any Year Excluded (15)	
	Growth	Volatility	Growth	Volatility	Growth	Volatility	Growth	Volatility	Growth	Volatility
Volatility measure[a]	−0.345 (1.47)		−0.021 (0.23)		−0.324 (1.19)		−0.691*** (2.88)		−0.518** (2.53)	
Democracy index (0–1)	0.592 (0.31)	−3.592*** (2.98)	2.463 (1.55)	−3.528** (2.25)	1.500 (0.58)	−3.599** (2.43)	−1.689 (0.92)	−2.607** (2.46)	−2.013 (1.17)	−2.516*** (2.69)
Initial GDP per capita (start of decade)/$1,000	−0.085 (1.54)	−0.039 (0.57)	−0.083** (2.05)	−0.063 (1.19)	−0.034 (0.43)	−0.086 (1.06)	−0.094** (2.33)	−0.061* (1.88)	−0.077* (1.95)	−0.059* (1.91)
Trade share of GDP	0.003 (0.53)	−0.009 (1.59)	0.002 (0.43)	−0.012** (2.24)	0.005 (1.10)	−0.007 (1.54)	0.006* (1.66)	−0.007** (2.15)	0.006* (1.84)	−0.008*** (2.67)
Inflation rate	−0.021* (1.79)	0.008 (0.54)	−0.022* (1.70)	0.025 (1.27)	−0.028** (2.08)	0.026** (2.10)	−0.014 (1.08)	0.022** (2.02)	−0.015 (1.21)	0.028** (2.58)
Gini coefficient of income inequality	0.046*** (2.69)	−0.005 (0.25)	0.023 (1.21)	0.045 (1.63)	0.064*** (3.34)	−0.003 (0.14)	0.071*** (3.77)	0.011 (0.67)	0.073*** (4.00)	0.018 (1.07)
Sectoral diversification of the economy		−17.572*** (2.84)		−24.170*** (2.82)		−17.456*** (2.75)		−15.693*** (3.34)		−19.134*** (3.51)
Indicator for diversified exporters		−0.487 (1.30)		−0.574 (1.60)		−0.737* (1.91)		−0.499** (2.43)		−0.531*** (2.64)
Log of Total Population		−0.323** (2.10)		−0.783*** (4.76)		−0.160 (1.04)		−0.244*** (2.71)		−0.324*** (3.30)
Observations	193		186		147		182		181	

(B)

	Upper- and Middle-Income Countries (16)		Low-Income Countries (17)		Volatility (Growth Changed Sign) (18)		Volatility × (Frequency of Sign Changes in Growth) (19)	
	Growth	Volatility	Growth	Volatility	Growth	Volatility	Growth	Volatility
Volatility measure[a]	−0.468 (1.64)		−0.130 (0.56)		−0.638*** (3.21)		−1.315*** (2.94)	
Democracy index (0–1)	0.411 (0.24)	1.114 (0.72)	3.160 (1.44)	−6.699*** (3.18)	−1.319 (0.78)	−2.722** (2.28)	−0.830 (0.54)	−1.553*** (2.82)
Initial GDP per capita (start of decade)/$1,000	−0.082 (1.53)	−0.077** (2.18)	−0.668** (2.39)	0.221 (0.65)	−0.092** (2.42)	−0.060 (1.58)	−0.079** (2.19)	−0.020 (1.11)
Trade share of GDP	0.006 (1.26)	−0.001 (0.21)	−0.012 (0.98)	0.015 (1.05)	0.004 (1.28)	−0.014*** (3.51)	0.004 (1.07)	−0.007*** (3.88)
Inflation rate	−0.023 (1.28)	0.039** (2.35)	−0.019 (1.31)	0.016 (0.92)	−0.016 (1.39)	0.022* (1.66)	−0.016 (1.32)	0.011* (1.81)
Gini coefficient of Income inequality	0.089*** (3.61)	0.043* (1.81)	0.018 (0.66)	0.019 (0.60)	0.073*** (4.07)	0.003 (0.18)	0.085*** (4.85)	0.005 (0.57)
Index of sectoral diversification of the economy		−15.156* (1.65)		−8.639 (0.95)		−19.454*** (3.54)		−7.894*** (3.04)
Indicator for diversified exporters		−0.859*** (3.29)		0.037 (0.06)		−0.371 (1.57)		−0.098 (0.87)
Log of total population		−0.249** (2.18)		−0.314 (1.36)		−0.306*** (2.85)		−0.122** (2.45)
Observations	83		110		193		193	

Absolute value of z-statistics in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%.
Standard errors are heteroskedasticity-corrected and clustered by country.
Not all coefficients reported. Explanatory variables included in the models are identical to model (10).
[a] Generally, standard deviation of growth rate. In model (12), it is the standard deviation of consumption growth. In models (18) and (19), the standard deviation is interacted with sign change measures.

being driven by its extreme values. The democracy coefficient remains statistically and quantitatively significant in both cases. In specification (15), we remove from the sample the five countries (twelve country-decade observations) which had missing national accounts information for at least one year over the period 1970–1999. We do this to address the concern that countries with poorer data collec-

tion capacities may have higher spurious volatility in reported numbers, and these same countries may also have nonzero correlations with some independent variables of interest. Thankfully, limiting our sample in this way does not affect the main results of the paper.

Specifications (16) and (17) in table 6B examine the results for upper/middle-income and low-income countries

(GDP per capita cutoff at $4,000) separately. This clarifies that as expected, the democracy-volatility results are being driven by low-income countries, where volatility is of greatest concern. In low-income countries, the democracy effect is twice as large as in the entire sample: a 1 standard deviation increase in democracy reduces volatility by close to 1 standard deviation. In upper/middle-income countries, this effect is not significantly different from 0.

Specifications (18) and (19) alter the measures of volatility used to reflect the notion that volatility is of greatest concern when growth has the potential to become negative. An indicator of countries that experienced negative growth within the decade is interacted with standard deviation of growth, and the resulting variables is used as the volatility measure in specification (18). In (19), the standard deviation of growth is interacted with a variable that measures how often growth changed sign within each decade. The signs and significance of the variables of interest remain unchanged in response to these changes. This implies that the determinants of volatility and its effect on growth are similar in countries that experienced negative growth to those in the entire sample.

We also examine the robustness of the democracy results against changes in the indicator of democracy used (results not reported in tables). Of the four alternative measures that we try (Gastil civil liberties, Polity IV political competition, political openness, and Henisz's political constraints), only Henisz's measure is statistically insignificant in the volatility equation.

H. Summary of results and Quantitative Effects

The regressions identify strong relationships between volatility, diversification, democracy, and average growth, which are robust to a number of sensitivity tests. These effects are both statistically and quantitatively significant. A 1 standard deviation increase in Gastil's democracy index (a movement from the level in Tanzania or Zaire to that in Sri Lanka or Pakistan) decreases the standard deviation of growth rates by approximately 1 percentage point (almost ½ standard deviation). This coefficient also stays quite stable across specifications. To put this number in perspective, it would imply an indirect effect of democracy on growth (through the volatility channel) of approximately 0.7 percentage points. The negative effect of volatility on growth itself is quite large. A 1 standard deviation increase in volatility decreases growth by approximately 2 percentage points, which is over 0.8 standard deviations. Thus, the significant effect of volatility on growth first noted by Ramey and Ramey (1995) continues to exist even after the simultaneity of growth and volatility is allowed for. Holding constant all other factors, countries classified as diversified exporters have approximately ½ percentage point lower standard deviation of growth than the rest of the sample. The effect of GDP per capita is small in comparison. Every $5,000 (1 standard deviation) increase in GDP per capita is

associated with only a 0.3 percentage point reduction in volatility.

We also find that greater trade, low inflation, and equitable distribution of income reduce volatility, but the results with respect to these variables are not as strong. The coefficient of trade in the volatility equations is always negative, but often only marginally significant. A priori, our expectations regarding the trade-share variable were mixed. Although Rostow and Reynolds both identify expanded trade as a defining characteristic of economies that have attained takeoff, trade can increase vulnerability to external shocks.

V. Conclusion

This paper tries to make two contributions. The first is to bring volatility to the forefront of discussions of growth and development by establishing a conceptual link between volatility in growth rates and levels of economic development. A developed country is not merely one with a high-growth economy, it is one in which increases in the standard of living are sustained over long periods. We then derive empirical results to give this conceptual distinction some practical significance.

The second contribution of this paper is to posit a relationship between democracy and development that does not depend on the ambiguous link between democracy and growth. Both theoretical and empirical political economy and growth literatures have yet to reach consensus on the exact nature of the growth-democracy relationship. Empirical studies have found positive, negative, and no effects, as well as evidence of nonlinearities, whereas the theory itself is inconclusive. This paper presents strong evidence that growth performance in democracies is more stable. Some empirical papers (Rodrik, 2000; Quinn & Woolley, 2001) have noticed a negative correlation between democracy and volatility, and this paper builds on that evidence and makes progress toward establishing a causal effect of democracy, accounting for the endogeneity of democracy and simultaneity of growth and volatility. The intuitively appealing link between democracy and development may therefore have less to do with growth rates—the focus of the current literature—than with the fact that democracy is a safer alternative that places countries on stable growth paths.

Although these results may extend the political economy of development literature in useful ways, it is important to come to terms with the limitations of this type of empirical work. It is difficult, to say the least, to generate credible policy-relevant conclusions within the confines of cross-country regressions. For example, although studying the determinants of growth and volatility simultaneously is the correct approach, it is difficult to even conceive of, let alone measure, factors that affect volatility without having any effect on growth. Though I rely on measures of diversification to identify volatility, these are imperfect instruments at best. Even though instruments are selected carefully so as to

avoid variables that may have obvious relationships to growth (country size, for example), the solutions are not always perfect. It is also difficult to control for all relevant characteristics of countries. The uncovered empirical relationship between democracy and volatility may reflect, for example, differences in the multilateral development institutions' implementation of stabilization programs in democracies versus nondemocracies, rather than some inherent characteristic of democracies per se. However, the main results of the paper concerning volatility, democracy, and growth continue to hold when panel estimators with country effects are used.

Cross-country data may also suffer from measurement and comparability problems. Given fundamental heterogeneities in political systems across countries, it is difficult to summarize relevant differences in the levels of political openness and competition using a single scalar measure of "democracy." In studying volatility, differences in the quality of data collected across countries is not merely a data problem; it may have implications for inference itself. For example, if democracies are more open societies that make data more readily available, we may observe a spurious correlation between democracy and lack of volatility in growth data. However, this argument assumes that greater uncertainty in the actual numbers on the part of the data collection agency leads to greater variance in the reported figures, and it is not so clear that this would always be the case. With greater uncertainty, the agency may, for example, be conservative in its estimates and err on the side of caution. Furthermore, resources available to the data agency (and therefore the accuracy of reported data) are plausibly correlated with the GDP per capita of the country, which is controlled for in the regressions. Our sensitivity results also indicate that limiting the sample to the set of countries whose national accounts information is not missing even for a single year does not change the main results of this paper.

Having mentioned these potential problems, it is still beneficial to generate some macro evidence on these important questions that are so crucial to our understanding of the development process. First, even without any of these empirical results, it is important for the development community to recognize volatility as an element that distinguishes growth spurts from the process of economic development. This is a distinction with some practical significance, for development policies may involve tradeoffs between growth and stability goals. Second, even those who are most skeptical of cross-country regressions would agree that the data indicate that volatility is not merely a random process—it varies systematically across countries that have certain identifiable characteristics. The large differences between rich and poor countries in volatility and instability of growth rates cannot be completely attributed differences in data collection techniques and measurement errors. Third, it is not too far-fetched to give these results *some* credence—if only to view them as an interesting set of

correlations that is suggestive of some underlying processes, which require further examination. In the very least, these results could provide motivation for a more careful study of, for example, the effects of within-country variations in political competition across small geographic units (counties or towns) on the variability of policies and outcomes.

REFERENCES

Acemoglu, Daron, and Fabrizio Zilibotti, "Was Prometheus Unbound by Chance? Risk, Diversification, and Growth," *Journal of Political Economy* 105:4 (1997), 709–751.

Acemoglu, Daron, James Robinson, and Simon Johnson, "The Colonial Origins of Comparative Development: An Empirical Investigation," *American Economic Review* 91 (2002), 1369–1401.

Auty, Richard, "Natural Resource Endowment, the State and Development Strategy," *Journal of International Development* 9:4 (1997), 651–663.

Banks, Arthur S., *Political Handbook of the World: 1981* (New York: McGraw-Hill, 1981).

Bardhan, Pranab, "Symposium on Democracy and Development," *Journal of Economic Perspectives* 7:3 (1993), 45–49.

Barlevy, Gadj, "The Cost of Business Cycles under Endogenous Growth," Northwestern University mimeograph (2002).

Barro, Robert, "Determinants of Democracy," *Journal of Political Economy* 107:6 (1999), S158–S183.

Barro, Robert, and Xavier Sala-I-Martin, *Economic Growth* (New York: McGraw-Hill, 1995).

Betancourt, Roger, "Growth Capabilities and Development: Implications for Transition Processes in Cuba," *Economic Development and Cultural Change* 44:2 (1996), 315–331.

Bound, John, David Jaeger, and Regina Baker, "Problems with Instrumental Variables Estimation When the Correlation between the Instruments and the Endogenous Explanatory Variable Is Weak," *Journal of the American Statistical Association* 90:430 (1995), 443–450.

Brunetti, Aymo, "Political Variables in Cross-Country Growth Analysis," *Journal of Economic Surveys* 11:2 (1997), 163–190.

Chandra, Siddartha, "Plurality of Institutions and Economic Growth," University of Pittsburgh mimeograph (1998).

Denizer, Cevdet, Murat Iyigun, and Ann Owen, "Finance and Macroeconomic Volatility," *Contributions to Macroeconomics* 2:1 (2002), article 7.

Easterly, William, Roumeen Islam, and Joseph Stiglitz, "Shaken and Stirred: Explaining Growth Volatility" (pp. 191–211), in B. Pleskovic and N. Stern (Eds.), *Proceeding of the Annual Bank Conference on Development Economics* (Washington, DC: World Bank, 2000).

Gastil, Raymond, *Freedom in the World: Political Rights and Civil Liberties 1986–1987* (Westport, CT: Greenwood, 1987).

Global Development Network Growth Database, http://www.worldbank.org/research/growth/GDNdata.htm.

Henisz, Witold, "The Institutional Environment for Economic Growth," *Economics and Politics* 12:1 (2000), 1–31.

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

Jalan, Jyotsna, and Martin Ravallion, "Are the Poor Less Well Insured? Evidence on Vulnerability to Income Risk in Rural China," *Journal of Development Economics* 58 (1999), 61–81.

Levine, Ross, "Financial Development and Economic Growth: Views and Agenda," *Journal of Economic Literature* 35:2 (1997), 688–726.

Levine, Ross, and David Renelt, "A Sensitivity Analysis of Cross-Country Growth Regressions," *American Economic Review* 82:4 (1992), 942–963.

Lewis, Bernard, *The Arabs in History,* 4th ed. (New York: Harper, 1966).

Lucas, Robert, *Models of Business Cycles* (Oxford: Basil Blackwell, 1987).

Lundberg, Mattias, and Lyn Squire, "The Simultaneous Evolution of Growth and Inequality," *Economic Journal* 113:487 (2003), 326–344.

Mobarak, Ahmed Mushfiq, "Why Democracies Are More Stable: Models of Policy Choice and Political Conflict," University of Colorado at Boulder mimeograph (2001).

Morduch, Jonathon, "Income Smoothing and Consumption Smoothing," *Journal of Economic Perspectives* 9:3 (1995), 103–114.

Nooruddin, Irfan, *Credible Constraints: Political Institutions and Growth Rate Volatility,* University of Michigan, Department of Political Science, doctoral dissertation (2003).

Pallage, Stephane, and Michel Robe, "On the Welfare Cost of Economic Fluctuations in Developing Countries," *International Economic Review* 44:2 (2003), 677–698.

Polity IV Project Description, http://www.bsos.umd.edu/cidcm/polity/.

Pritchett, Lant, "Understanding Patterns of Economic Growth: Searching for Hills among Plateaus, Mountains and Plains," *World Bank Economic Review* 14:2 (2000), 221–250.

Quinn, Dennis, and John Woolley, "Democracy and National Economic Performance: The Preference for Stability," *American Journal of Political Science* 45:3 (2001), 634–657.

Ramey, Garey, and Valerie Ramey, "Cross-Country Evidence on the Link between Volatility and Growth," *American Economic Review* 85:5 (1995), 1138–1151.

Reynolds, Lloyd, "The Spread of Economic Growth to the Third World: 1850–1980," *Journal of Economic Literature* 21 (September 1983), 941–980.

——— , "Participatory Politics, Social Cooperation, and Economic Stability," *American Economic Review, Papers and Proceedings* 90:2 (2000), 140–144.

Rodrik, Dani, "Where Did All the Growth Go? External Shocks, Social Conflict, and Growth Collapses," *Journal of Economic Growth* 4:4 (1999), 385–412.

Rostow, Walt, *The Stages of Economic Growth: A Non-Communist Manifesto,* 3rd ed. (Cambridge: Cambridge University Press, 1990).

Sen, Amartya, "Development: Which Way Now?" *Economic Journal* 93 (December 1983), 742–762.

Sen, Amartya and Jean Dreze, *Hunger and Public Action* (Oxford: Oxford University Press, 1989).

Wolfers, Justin, "Is Business Cycle Volatility Costly? Evidence from Surveys of Subjective Wellbeing," *International Finance* 6:1 (2003), 1–26.