The Determinants of Democracy: A Sensitivity Analysis

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Abstract

Few issues in comparative politics have received as much attention as the possible determinants of democracy. Different studies have identified a set of economic, social, cultural, demographic, political-historical, institutional, and spatio-temporal factors as important causes. However, these studies often operate with diverse model assumptions, data samples and measures of democracy. In this paper we apply a methodology for organizing specification tests to check the robustness of empirical determinants of democracy, similar to that used in Sala-i Martin (1997) on growth and Hegre and Sambanis (2006) on civil war. This enables the isolation of causes of variation in empirical results by using the same definition of democracy and analyzing the same time period while systematically exploring the sensitivity of 85 explanatory variables from the literature. Using dynamic logit models, we identify several interesting results. For example, there is no robust effect of income inequality, ethnic fractionalization or British colonial heritage, neither on democratization nor on democratic stability. Furthermore, GDP per capita enhances democratic stability, but not democratization. Abundance of natural resources and high economic growth enhances democratic stability but reduces probability of democratization. We also find that multi-party authoritarian regimes are associated with high probabilities of democratization.

1 Introduction

The recent wave of revolutions and revolutionary attempts in North Africa and the Middle East have not only been important political events, they have also re-sparked old academic debates. The calls for democracy in these countries have made some authors declare Huntington's argument on the incompatibility of Islam and democracy for dead. Others have, particularly in relation with the Tunisian revolution, brushed off Lipset's classic modernization argument, pointing to the relatively high income level and the size of the middle class in that country. Many observers and political scientists have, however, expressed their surprise at calls for democracy in countries such as Yemen and Libya, and questioned the sincerity of such calls and scepticism regarding the future prospects of democratization efforts.

This situation is not dissimilar from the surprise and scepticism raised about 20 years earlier when old dictatorships where challenged in Sub-Saharan Africa (e.g. Bratton and van de Walle 1997). African countries were, according to prevalent political science theories, never supposed to democratize and particularly not experience consolidation of their democracies, with their low income and education levels, their resource-based economies, their deep ethnic cleavages, their problematic political history with colonial rule, and other characteristics supposedly hostile to democracy. Nevertheless, electoral democracy has survived in many countries on that continent, and there are even signs of gradually improving democratic quality and improved protection of civil liberties (Lindberg 2006). Hence, the political developments in Sub-Saharan Africa, and later in North Africa, have challenged political scientists and their theories of democratization and democratic consolidation.

Indeed, this discrepancy between the empirical implications from prominent political science theories and empirical events should not be surprising to those having scrutinized the statistical literature on the determinants of democracy. The lack of robust results is perhaps the most notable characteristic of this relatively large literature. Strong theoretical claims have been made on the importance of various factors, from income level and income inequality to religion. However, empirical studies often find only weak results that are not robust to changes in model specifications. This paper attempts to clarify and establish how robust the various determinants of democracy are, and thus contribute to mitigate the existing confusion at the center of the democratization literature.

2 Literature review

As noted above, the literature on determinants of democracy is large, and points to a vast set of quite different potential explanatory factors. We do not take aim to review the entire literature, but rather focus on some particularly important proposed explanatory factors and debates from the literature.

Economic factors are among the most studied potential determinants of democracy, and a country's level of GDP per capita has received particular focus. Lipset (1959) famously argued that a high GDP per capita increased the probability of a country being democratic, and several later studies corroborated this result (e.g. Diamond 1992; Arat 1991; Hadenius 1992; Przeworski and Limongi 1997; Przeworski et al. 2000; Boix and Stokes 2003; Hadenius and Teorell 2005; Inglehart and Welzel 2006). Hence, the notion that "the richer a country is, the more likely it is to be democratic" was for a long time considered relatively well established. However, a possible relationship between democracy and income level may be due to richer countries having a higher probability of democratizing, but also to democracies becoming increasingly more stable than dictatorships as countries get richer. If only the latter effect is present, the relationship between income and probability of being a democracy is only due to the fact that rich democracies survive longer than rich dictatorships. Indeed, Przeworski and Limongi (1997) find that democracy is not related with income because of rich countries being more prone to democratization, but rather because rich democracies are exceptionally stable.[1] This result has been contested by later studies. For example, Hadenius and Teorell (2005) show that the relationship between income and democratization changes when one substitutes the dichotomous ACLP measure, used by Przeworski and Limongi (1997), with other measures, and Boix and Stokes (2003) find that probability of democratization increases with income, when the sample is extended back into the 19th century, and when one accounts for oil-rich countries.

When it comes oil income and income from other natural resources, there is a large theoretical and empirical literature on how such income may affect political institutions differently than income stemming from other sources (e.g. Bueno de Mesquita et al. 2003; Bueno de Mesquita and Smith 2009; Ross 2001). More specifically, the literature has highlighted the potential existence of a "political resource curse", particularly focusing on the stabilizing effects on dictatorship, and hence reduced probability of democratization, resulting from high natural resource income. This further points to a more nuanced understanding of the roles of high income levels and sustained income growth for democracy.

Indeed, the modernization literature and other contributions point to a set of variables related to economic development (or modernization), other than income level, that may be of particular relevance for democracy. First, as noted by Lipset (1959) a high level of education in the population may increase both citizens' desire and capacity to establish democracy and participate in democratic processes (see also Almond and Verba 1963; Diamond 1992). Second, industrialization, with the

[1] See also Przeworski et al. (2000). Furthermore, the positive effect of income on level of democracy may very well be due to misspecification bias in the statistical models used, more particularly omitted variable bias: Acemoglu et al. (2008) find no effect of income on democracy when using fixed-effects models (see also Robinson 2006). The correlation between income and democracy is according to this analysis most likely due to prior variables that are country- or history specific. However, later statistical studies incorporating country-fixed effects have questioned this result, "re-establishing" a positive effect of income on level of democracy (Moral-Benito and Bartolucci 2011; Benhabib, Corvalan and M. 2011).

complementary transformation of a society from an agrarian to a manufacturing and trading one, generates social differentiation. Lipset (1959) highlighted the important role of the middle class for establishing and stabilizing a democracy. Moore Jr (1966), with a somewhat different argument, also points to the importance of the bourgeoisie dominating society, economy and politics for the probability of democratization. Rueschemeyer, Stephens and Stephens (1992), on the other hand, argues that industrialization is conducive to democratization, but that this is rather due to the emergence of an organized industrial working-class. O'Donnell (1973) even argues that the middle class can be detrimental to democratization, drawing on evidence from Latin America. Nevertheless, many contributions to the literature argue that rural, agrarian societies are not as conducive to democracy urban, industrializing ones. Other potentially important 'modernization variables' are related to communications infrastructure, which allows for rapid diffusion of ideas and information across and within borders, perhaps enhancing the prospects democratization (see, e.g. Diamond 2008)

Also short-term economic developments may impact on a country's regime type. Przeworski and Limongi (1997) find that economic *crises* increase the probability of regime breakdown in general. Regimes that experienced a decreasing GDP per capita in the previous year were much more likely to fall than those experiencing positive economic growth. This was true for both democracies and dictatorships. However, especially poor democracies were vulnerable to economic crises. Richer democracies, however, are extremely resistant to crises. When it comes to poor and rich dictatorships, there were smaller differences in regime life expectancy; both rich and poor dictatorships are threatened by economic crises. Also other measures of economic performance, and even particular economic policies, may impact on the stability of democratic and autocratic regimes, for example because they may impact on popular grievances directed towards the regime (e.g. Gurr 1970; Ponticelli and Voth 2011)

Income inequality may also affect regime change and stability. Lipset (1959) argued that democracy was less tenable in societies with high levels of social conflict, and economic inequality is widely assumed to increase social conflict. Inequality-induced social grievances may lead to demands for revolution and left-wing dictatorship (Boix 2003; Acemoglu and Robinson 2006). Also, the well-off in unequal societies may particularly fear democracy because of high redistributive costs, and rather favor an elite-controlled authoritarian regime. Boix (2003) argues that a decrease in economic inequality leads to a higher probability of democratization, since the rich will have less to lose from taxation in relatively equal societies. They will thus more easily agree to the poor's demands without risking a fight. However, a low degree of inequality may also reduce the likelihood of democratization, as the poor are less eager to fight for democracy if they are already relatively well-off and therefore have little to gain economically from democratization. In unequal societies, on the other hand, the poor have much to gain from democratization, and the rich are not able to credibly commit to redistribution in the future under dictatorship (Acemoglu and Robinson 2000).

Indeed, empirical studies on income inequality and democracy have produced quite mixed results (e.g. Muller 1988; Bollen and Jackman 1995). The relatively recent study by Houle (2009) finds no clear effect of inequality on the probability of democratization, but does find evidence indicating that low inequality stabilizes existing democracies.

Also different types of non-economic factors have been put forth as important determinants of democracy. One group of explanations are related to particular values, or other cultural traits, having important impact on democratization and democratic consolidation (e.g. Almond and Verba 1963; Inglehart and Welzel 2006). Furthermore, values, attitudes and other cultural variables with proposed implications for the sustainability of democracy are often been linked to factors such as religion and geographic region. Huntington (1996), for example, argues that Islamic countries are less susceptible to democracy. Some decades ago, Catholicism was argued to reduce the probability of having a democratic regime, especially when compared with the effect of Protestantism (see, e.g. Lipset and Lakin 2004). Furthermore, several academics and politicians have argued that so-called "Asian Values", often linked to Confucianism, promotes hierarchical and authoritarian government, and provides bad conditions for democracy (see the discussion in Sen 1999). Lipset (1959) also discusses how particular values are conducive to democracy, but this argument points out that values and attitudes are endogenous, and that they are systematically changed by economic development processes. Inglehart (1997) and Inglehart and Welzel (2006) find that liberal, freedom-oriented values become more preponderant in richer and more developed societies, and that these values in turn are important determinants of democracy.

The ethnic fractionalization structure of a country may also impact on the country's regime type. Theoretical and empirical studies indicate that a heterogenous population may make it more difficult to solve various coordination problems that are vital for ensuring efficiency-enhancing public goods provision (Alesina, Baquir and Easterly 1999; Baldwin and Huber 2010). Furthermore, various types of heterogeneity in the population, among them ethnic, lingustic and religious heterogeneity, may impact on the design of political institutions and regime type (see, e.g. Lijphart 1999). For example, there may be stronger incentives for various groups of citizens to capture and monopolize power if there is a high degree of ethnic heterogeneity (e.g. Miquel 2007). The size of the population could also affect the probability of democratization and democratic stability. However, although some arguments point out that democracy could operate more smoothly in smaller communities (e.g. Dahl and Tufte 1973), the net effect of population size is quite unclear.

Particular variables related to historical experiences have also been identified as potential determinants of democracy. For example, it has been argued that former British colonies are more likely to be democratic than other former colonies (see e.g. Lipset and Lakin 2004, 173–178). Legal structures are strongly correlated with former colonial power, as the type of legal structure in a country often stems from a particular inherited legal tradition, like British Common Law or French Civil Law (Djankov et al. 2003), and legal origin may impact on various institutional aspects (La Porta

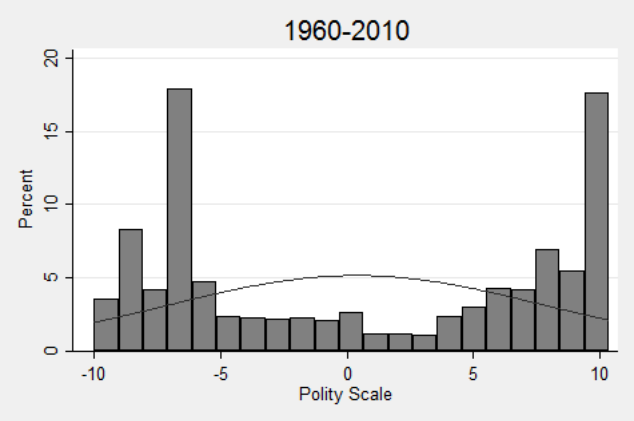
et al. 1999). The more general point is that political-historical variables are often correlated with present institutional characteristics. Institutions were often formed in a particular historic context, for example the under influence of a colonizing power with particular institutional preferences, and institutions show a great deal of inertia. This implies that the institutional structure of the past often strongly resembles that of the present (e.g. North 1990; Acemoglu, Johnson and Robinson 2001). Hence, one of the potentially most important historical variable when it comes to explaining democracy is a country's past experiences with democracy (see, e.g. Helliwell 1994).

However, also other political-institutional variables, for example related to type of dictatorship that has ruled historically or current constitutional characteristics may impact on probability of democratization or democratic stability (e.g. Linz 1990; Cheibub and Limongi 2002; Cheibub 2007; Hadenius and Teorell 2007). Furthermore, economic-institutional aspects related to property rights systems and other market-regulating institutions and institutions those affect the control of corruption may impact on probability of transitions to and from democracy (see, e.g. Feng 2005; North, Wallis and Weingast 2009). Also more spontaneous, non-institutionalized political processes may impact on regime transitions. Although regime type may also influence various measures of political stability (Feng 2005), various such measures, like revolutions and politically motivated assassinations, are likely to negatively affect the survival of both democracies and dictatorships quite directly. There is also evidence indicating that the probability of regime survival increases quite a lot as a regime ages (Clague et al. 2003).

The list of factors above does not exhaust the potential factors those may determine democratization and democratic stability. For example, spill-over effects from neighbors and the specific identity and strength of regional or global powers in a particular region may be relevant for regime stability and change (e.g. Starr 1991; Gleditsch 1996; Gleditsch and Ward 2006). More generally, the probability of democratization and the stability of democratic regimes is likely correlated with spatial and temporal factors because of various reasons (e.g. Huntington 1991).

For the empirical analysis below, we have gathered and classified proposed explanatory variables from the literature on the determinants of democracy. We operate with 15 "concepts" that are identifiable from the review in this section, and each concept includes a set of indicators (85 in total). In accordance with the discussion on structural economic factors, we include *Resource curse*, *Industrialization and Urbanization*, *Modernization indicators*, *Health*, *Education* and *Income Inequality* among our concepts. Also in accordance with the discussion above, we include *Economic performance and policy*. In order to investigate the discussed cultural and demographic factors, we also include *Ethnicity and religion* and *Population*. Furthermore, the review indicated the importance of historical, institutional and political factors. This leads us to include *Colonial heritage*, *Regime type*, *Institutional characteristics* and *Political Stability*. Finally, we add *Region* and *Time* to address spatial and temporal factors potentially affecting regime type.

Figure 1: Polity Score Histogram



3 Classifying regimes

As noted above, important contributions to the literature have provided strong indications that the factors affecting democratization may not be the same as those affecting democratic stability (e.g. Przeworski and Limongi 1997; Houle 2009); a dichotomous measure conveniently allows us to take this into account through simultaneously investigate the robustness of the determinants of democratization and democratic stability by using dynamic probit or logit models. More specifically, to perform the analysis we utilize a dichotomous measure of democracy constructed from the PolityIV index. As illustrated by Figure 1, showing that the majority of polities are clearly concentrated at the ends of the Polity scale. The bimodal nature of the distribution combined with clear endpoints (-10/10) violates basic assumptions for OLS regression, and provides another justification for dichotomizing the Polity variable and subsequently using probit or logit models. In accordance with other scholars (e.g. Milner and Kubota 2005; Li 2005; Hadenius and Teorell 2007), we set the bar for being classified as a democracy at a relatively high level, requiring a Polity score of 6 or higher to be considered a democracy. Although the cutoff point is arbitrary and therefore may be critique-worthy (Cheibub, Gandhi and Vreeland 2010; Bogaards 2011), the dichotomization has two notable advantages in addition to those mentioned above. First off, it classifies the more ambiguous and often controversial cases in the middle of the scale as autocracies. Secondly, by dichotomizing the Polity scale as opposed to utilizing the classification provided by Przeworski et al. (2000), we can stick to a measure of regimes that incorporates other vital aspects in addition to whether elite selection is contested, such as participation aspects (see, e.g. Munck and Verkuilen 2002).

4 Methodology of sensitivity analysis

[2] Leamer (1985) referred to the largest possible set of inferences that can be drawn from a given data set as 'extreme bounds.' The size of these 'extreme bounds' depends on the number of models that can be estimated (i.e., variations in model specifications) within the limits of the data set. These variations must be theoretically consistent and aim to show how minor changes in the list of variables alter the conclusions of estimation. In Bayesian terms, the extreme bounds approach (EBA) suggests that the analyst explores the range of posterior distributions that result from specification changes to the prior distribution of a variable. To credibly identify the range of inferences that may be drawn from a model, a 'global sensitivity analysis' should be applied, 'large numbers of variables should be included, as should different functional forms, different distributions, different serial correlation assumptions, different measurement error processes, etcetera, etcetera' (Leamer 1985, 311). Given the severe computational burden of such an approach, a reasonable compromise is to focus on selected dimensions of the model and regression coefficients in particular.

Levine and Renelt (1992) used a variant of Leamer (1985)'s EBA to check the sensitivity of cross-country regression estimates on the determinants of economic growth. They were motivated by what they perceived as frequently contradicting empirical linkages between long-run growth rates and a wide array of explanatory variables. The EBA used by Levine and Renelt specifies equations of the following form:

$$Y = \beta_\iota I + \beta_\mu M + \beta_\zeta Z + u$$

where Y is the dependent variable, I is a set of variables always included in the regression, M is the 'focus' variable (i.e., the one whose behavior we are interested in observing as we change the model specification), and Z is a subset of control variables selected among several potentially significant explanatory variables. They first estimate a model that includes only the I-variables and the focus variable and then estimate regressions for 'all possible combinations of up to three Z-variables and identify the highest and lowest values for the coefficient on the variable of interest, β_μ, that cannot be rejected at the 0.05 significance level' (Levine and Renelt 1992, 944). The design tries to reduce multicollinearity problems by restricting the total number of explanatory variables to 'eight or fewer,' choosing a 'small pool of variables from which the extreme bounds procedure selected Z-variables,' and 'excluding variables that, a priori, might measure the same phenomenon' (Levine and Renelt 1992, 944–5). This specification design minimizes the risk of underspecified models while also minimizing the computer power needed to estimate the models, as well as problems associated with multicollinearity. The extreme bounds on the coefficient β_μ denote the confidence that we can have in the partial correlation between Y and M. The upper extreme bound is defined as the maximum value of β_μ plus two standard deviations, and the lower extreme bound is β_μ

[2] This section draws heavily on text in Hegre and Sambanis (2006).

minus two standard deviations of the estimate. Coefficient β_μ is considered robust if it 'remains significant and of the same sign at the extreme bounds' (Levine and Renelt 1992, 944).

Levine and Renelt (1992, 959)'s analysis leads them to conclude that 'very few economic variables are robustly correlated with cross-country growth rates.' But this extreme result may suggest that their analysis sets too high a hurdle for robustness. According to Sala-i Martin (1997, 179), 'If the distribution of the estimators of β_μ has some positive and some negative support, then one is bound to find one regression for which the estimated coefficient changes signs if enough regressions are run. Thus, giving the label of nonrobust to all variables is all but guaranteed.' This argument is reasonable, so to assess the robustness of empirical results in the literature on democratization, we apply Sala-i-Martin's less stringent test, which involves looking at the entire distribution of parameter estimates to determine the level of confidence in each of the explanatory variables.

Sala-i Martin (1997) estimates M models of the following form:

$$\gamma_j = \alpha_j + \boldsymbol{\beta}_{yj}\mathbf{y} + \beta_{zj}z_j + \boldsymbol{\beta}_{xj}\mathbf{x}_j + \epsilon$$

where γ is the dependent variable and the subscript j refers to the model or specification, y is a vector of three variables that always appear in the regressions, z is the variable of interest, and x is a vector of up to three variables taken from a pool χ of available variables. He then uses these estimates of the β_{zj} to compute the cumulative distribution function – CDF(0) – the proportion of estimates that are larger or smaller than zero, selecting the largest of the two. The distribution function is computed under two different assumptions: the first aggregation assumes that their distribution across models is normal. The average estimate is computed as

$$\hat{\beta}_z = \sum_{j=1}^{M} \omega_{zj}\beta_{zj}$$

where the weights ω_{zj} are proportional to the integrated likelihoods $\omega_{zj} = \frac{L_{zj}}{\sum_{i=1}^{M} L_{zi}}$ (Sala-i Martin 1997, 179). The weights ensure that models with better fit contribute more to the estimate, and the fact that the same number of variables is always included in the regression implies that we do not get 'artificially' better fit by increasing the number of variables. Similarly, Sala-i Martin (1997) computes the average variance of the estimates as

$$\hat{\sigma}_z^2 = \sum_{j=1}^{M} \omega_{zj}\sigma_{zj}^2$$

If the assumption that the β_{zj} are normally distributed holds, the probabilities that $\beta < 0$ and $\beta > 0$ can be computed from $\hat{\beta}_{zj}$ and $\hat{\sigma}_z^2$ as functions of the average t-ratio $\frac{\hat{\beta}_{zj}}{\hat{\sigma}_z^2}$ as in standard statistical inference. We will refer to the smallest of these two probabilities as the 'average p-value.' If the assumption of normality does not hold, then Sala-i-Martin computes the aggregate CDF(0)

from the individual CDF(0)s as their weighted average,

$$CDF(0)_z = \hat{\phi}_z(0) = \sum_{j=1}^{M} \omega_{zj}\phi_{zj}(0|\hat{\beta}_{zj}, \hat{\sigma}^2_{zj})$$

We make a number of adaptations to Sala-i Martin (1997)'s procedure to fit our purpose. First, an obvious difference is that, while Sala-i-Martin applied the method to cross-sectional data with a continuous dependent variable, we follow Hegre and Sambanis (2006) and model the relationship between predictors and the dichotomous dependent variable using the logit-link function of the probability of democracy or non-democracy. We are also using time-series cross-sectional data. Many papers in the quantitative democratization literature treat the data as cross-sectional since they use pooled logit or pooled probit estimators. Thus, we can apply Sala-i-Martin's method directly. Yet the time series in our data may create temporal dependence, which we account for by adding the lagged dependent variable, D_{t-1} – democracy level the year before t – as one of our y variables.

Another departure from Sala-i Martin (1997) and from Hegre and Sambanis (2006) is that we investigate simultaneously transitions from autocracy to democracy and transitions from democracy to autocracy. This is achieved by means of a 'dynamic logit' model (Przeworski et al. 2000).[3] This model has democracy/non-democracy as the dependent variable, includes the lagged dependent variable D_{t-1}, and interaction terms between D_{t-1} and all explanatory variables. This means that the $\mathbf{x}$ variables in equation (4) are pairs of variables – a main term modeling the log odds of democracy at t and an interaction term modeling the log odds of democracy at t given the democracy state at $t-1$.

Following Sala-i-Martin, we include the same three y variables in all regressions and refer to them as our 'core' variables. One of these is D_{t-1}. The two others are the GDP per capita variable and its interaction with D_{t-1}. As indicated in Section 2, average income, or GDP per capita, has been the most commonly used predictor of democracy since Lipset (1959). Keeping these three core variables always in the model, we estimate many other models for each of the variables that we include in the pool χ of relevant variables (we explain how we selected variables in the next section).

Sala-i Martin (1997) estimates each possible combination of three x-variables for each z-variable. We deviate somewhat from this in our treatment of the x-variables. Our data contain several different measures for the same concept variable (the theoretically significant variable). For instance, we can measure education using the illiteracy rate using data from the World Bank, or using secondary school attainment from Barro and Lee (2000). To avoid including variables that measure the same thing in the same model, we restrict the combination of x-variables to those that measure three different concept variables – not simply different operationalizations of the same *concept*. If a

[3] In the current version of the paper, we use the logit link rather than the probit link because it is easier to estimate.

control is an alternative operationalization of the same concept as the focus variable, this is likely to diminish the effect of the focus variable. This might not be an insurmountable problem if all concepts had the same number of alternative operationalizations since any bias would be roughly equal for each focus variable. However, the number of alternative operationalizations for each concept varies (see next section). Allowing more than one operationalization for each concept then would tend to hurt variables belonging to concepts with many operationalizations.[4]

Another difference from Sala-i Martin (1997) procedure is that we have to allow for the fact that several variables in our data set have missing data, and the number of missing observations is different for different variables. In Sala-i-Martin's model, parameter estimates are weighted by the model's log-likelihood to ensure that models with better fit to the data are given greater weight. The log-likelihood, however, is dependent on the number of observations that are included in the estimation. Hence, we calculate weights based on the likelihood ratio index (LRI), which is analogous to the R^2. It is given as

$$1 - \frac{LL_m}{LL_0}$$

, where LL_0 is the log-likelihood with only the constant term, and LL_m is the log-likelihood of the model having just been estimated. This statistic has the advantage that it is less dependent on sample size, and this is important for us as some of our variables are missing observations and sample size varies across models.

The fact that we perform extensive specification tests implies that we do not know the true model.[5] We only know that three variables should be in the model: D_{t-1}, GDP per capita, and the interaction between GDP per capita and D_{t-1} . While most scholars would agree that such a model is underspecified, they would disagree over which other variables to add.[6] This is clearly illustrated by the fact that very few existing studies on determinants of democracy utilize similar sets of independent variables. The method that we apply here could help provide some information on what is a better specified regression equation for democratization by testing the fit of several theoretically relevant variables. But it certainly does not replace the need for theorizing about democratization and democratic stability, and the main usefulness of our approach is to give us a

[4]These could be concept variables of great interest in the literature, such as ethnic heterogeneity, which explains why we have many different ways of measuring them. For example, ethnic heterogeneity is measured by Vanhanen (1999)'s racial, linguistic, and religious heterogeneity index, or ehet; Fearon (2003)'s ef index; and the widely used ethnolinguistic fractionalization index, elfo.

[5]In the presence of theoretical ambiguity, others have proposed a very different approach, which prefers parsimony to empirical exploration. Achen (2002), for example, proposes using no more than three independent variables in regression analyses in the absence of a formal model that justifies the inclusion of more controls. We do not share this view and agree more with much of the literature in development and labor economics, which is now moving away from an emphasis on formal models as a motivation for empirical analysis. While we certainly see the value of mathematical models in political science, we do not think they represent the only way to theorize about politics or to identify hypotheses for empirical testing. For a related, useful methodological and applied discussion of this point, see Oneal and Russett (2005).

[6]Scholars often add controls to avoid the risk of omitted variable bias, even though their theory does not call for additional variables. For a useful methodological perspective on this issue, see Clarke (2005).

sense of the distribution of empirical estimates for all potentially relevant variables.

A concern with our approach is that some of the variables included may be endogenous. We cannot deal with this problem while trying to explore empirically the robustness of different model specifications here, and we assume exogeneity for all variables. To deal with endogeneity, we would have to switch estimators for those models where we suspected endogeneity as a result of the variable combinations in the model. We could not simply use instrumental variables estimation for all models since, if exogeneity cannot be rejected, this would reduce the efficiency of the estimates. And we could not hope to identify valid instrumental variables for all model specifications. Since quite few of the papers in the literature on democratization deal with endogeneity, we also ignore it and simply try to reduce the risk by lagging independent variables.[7]

Finally, there is some concern with how missing data could influence the results of this exercise. Many of the variables in our data set have missing observations. Some of the variables of interest, such as most income inequality measures, have very limited coverage. Faced with such problems, we have three alternatives. One, we could have added all variables independent of their number of missing observations to the pool of variables used in the analysis. One serious problem with this approach is that we aim to isolate the degree to which individual parameter estimates are sensitive to changes in the model specification. Varying the model specification, however, leads to changes in the sample when variables are missing data for different observations. Two, we could have left out variables with many missing observations, but this has the obvious drawback of excluding substantially interesting explanatory variables. Furthermore, these variables may also be systematically correlated with particular sets of other variables, and leaving some variables out may thus affect the results for the variables included. We opted for the third alternative, namely to utilize multiple imputation in order to generate predictions for missing values. In addition to expanding the number of variables that may be included in the analysis, this procedure mitigates selection biases that could otherwise have been generated if characteristics that affect the probability of missing data are correlated with the dependent variable.

More specifically, we use the multiple imputation techniques for cross sectional – time series data incorporated in the AMELIA II software (see Honaker and King 2010; Honaker, King and Blackwell 2011). Indeed, Honaker and King (2010) convincingly argue that listwise deletion of cases is preferable to using the imputation procedure only under a very stringent set of assumptions. Therefore, generating imputed data sets to mitigate various biases is an important operation. The imputation procedure generates predicted values for all missing values on the variables included

[7]Endogeneity may result in artificially good fit between models; hence, weighting by log-likelihood or the LRI could result in weighting the wrong models more. This problem is limited in magnitude, however. Ninety percent of the LRIs fall between .XXX and .XX, and the largest weight given is .XX. In addition, some combinations of variables may present more problems than others. For example, the inclusion of both economic growth and trade may violate the exogeneity assumption since both trade and growth are affected by conflict or the expectation of conflict. Variables that measure the degree of militarization (e.g., military expenditures; size of the government army) may also be endogenous to the expectation of political violence or, certainly, to ongoing war.

in the imputation model, and are based on algorithms that take into account the cross sectional – time series structure of the data. We added all the 85 variables used in the analysis below to the imputation model. Following the advice of Honaker and King (2010), we also incorporated 41 additional variables to increase the predictive power of the imputation model. We set the minimum and maximum values as bounds for indexes with a specified range and for other restricted variables such as fractions. Furthermore, to increase the precision of the predictions, we set the empirically observed minimum and maximum as bounds for all other variables. The imputation models are computed using a second-order polynomial of time, and the time trends are interacted with the cross section units in order to allow for country-specific trends (see Honaker, King and Blackwell 2011).

5 Data

In order to investigate the determinants of democracy, and how robust these are, we draw on data used in a set of important empirical contributions to the literature. As indicated by the literature review various indicators related to structural economic factors, economic performance, distributional and class-structure indicators, cultural indicators, political-historical indicators, and spatio-temporal transmission indicators are among those that often appear in the literature. As noted in Section 2, we further subdivide the indicators into 15 concept categories. All indicators are listed in Table 1, sorted according to the concept they belong to, and data sources for the various indicators are also listed.

6 Results of sensitivity analysis

As noted above, empirical studies have indicated that there may be large differences in the effect of a variable on democratization on the one hand and democratic consolidation on the other. This applies, for instance, to income level (Przeworski and Limongi 1997), and to income inequality (Houle 2009). Hence, we will present results simultaneously for the main term for each variable and its interaction with lagged democracy.

We analyse the sensitivity to changes in control variable specifications for the 85 variables included in Table 1, organized by concept category. We cover most countries over the 1960–2008 period. We standardized all variables to make estimates easily comparable, and log-transformed many variables to minimize the effect of extreme values. The combinations of 85 variables, following the method presented in Section 4, total about 3.6 million logistic regressions.

Table 1: Concept Categories and Variable Names

		Variable Name	*Description*	*Source*
Dependent variable		*leaddi_po*	Democracy	Authors' coding
Core variables		*wdi_lngdpc*	GDP per capita, log-transformed; WDI	World Bank (2011)
		demlag	Democracy lagged	Authors's coding
		wdi_lngdpc_dl	GDP per capita, log-transformed * Democracy lagged	
Concept Label	*Concept No.*	*Variable Name*	*Description*	*Source*
Education	1	*wdi_shcprim*	School enrollment, primary, percentage gross; WDI	World Bank (2011)
	1	*wdi_schsec*	School enrollment, secondary, percentage gross; WDI	World Bank (2011)
	1	*school02*	Primary School Enrollment Per Capita	Banks (2008)
	1	*school04*	Secondary School Enrollment Per Capita	Banks (2008)
	1	*school09*	University Enrollment Per Capita	Banks (2008)
	1	*school12*	Percent Literate	Banks (2008)
	1	*edu*	Fraction of population attained secondary education	Prediction (2009)
Population	2	*wdi_lnpop*	Population, log-transformed; WDI	World Bank (2009)
	2	*lpop*	Population, log-transformed	Prediction (2009)
Resource curse	3	*fl_oil*	Dummy oil-exporting countries	Fearon and Laitin (2003)
	3	*wdi_oil*	Oil rents (% of GDP); WDI	World Bank 2011
	3	*wdi_mineral*	Mineral rents (% of GDP); WDI	World Bank 2011
	3	*wdi_resource*	Resource rents (% of GDP); WDI	World Bank 2011
	3	*lnoilgasv2000*	Per capita value of gas and oil, log transformed	Ross (2009)
Industrialization and Urbanization	4	*wdi_ase*	Agriculture's share of economy, % of GDP; WDI	World Bank (2009)
	4	*agr_totl_zs*	Employment in agriculture, % of total	
	4	*wdi_ise*	Industry's share of economy, % of GDP; WDI	World Bank (2009)
	4	*wdi_lneu*	Energy consumption per capita, log-transformed; WDI	World Bank (2009)
	4	*wdi_urban*	Urbanization rate; WDI	World Bank (2009)
Health	5	*lnlifeexpm*	Life expectancy male, log-transformed	
	5	*lnlifeexpm*	Life expectancy female, log-transformed	
	5	*limr*	Infant mortality rate, log-transformed	Prediction (2009)
Economic performance/policy	6	*wdi_gdpgr*	Annual growth in GDP, percent; WDI	World Bank (2009)
	6	*wdi_infl*	Inflation (%); WDI	World Bank (2009)
	6	*wdi_tot*	Terms of trade; WDI	World Bank (2009)
	6	*wdi_ttr*	Total trade % of GDP; WDI	World Bank (2009)
	6	*pwt_lnki*	Investment share of GDP (%)	PWT (2011)
Income inequality	7	*uw_gini*	Gini Index	UNU-WIDER; World Income Inequality Database (2008)
	7	*wageshare*	Indstat2	UNIDO (2011) - Author's coding
Ethnicity and Religion	8	*fl_relfrac*	Religious fractionalization	Fearon and Laitin (2000)
	8	*fl_ef*	Ethnic fractionalization	Fearon (2002)
	8	*etdo4590*	Ethnic dominance	Collier and Hoeffler
	8	*van_ehet*	Ethnic heterogeneity	Vanhanen (1999)
	8	*al_ethnic*	Ethnic Fractionalization	Alesina et al. (2003)
	8	*al_language*	Linguistic fractionalization	Alesina et al. (2003)
	8	*fl_plural*	Share of largest ethnic group	Fearon (2002)
	8	*fl_second*	Share of second largest ethnic group	Fearon (2002)
	8	*fl_plurrel*	Size of largest confession	Fearon and Laitin (2000)
	8	*fl_minrelpc*	Size of second largest confession	Fearon and Laitin (2000)
	8	*fl_muslim*	% muslim	Fearon and Laitin (2000)
Colonial heritage	9	*formerc*	Dummy former colony	(Barro)
	9	*britishameric*	Dummy British colony	Barro
	9	*french*	Dummy French colony	Barro
	9	*spanish*	Dummy Spanish colony	Barro
	9	*portugese*	Dummy Portuguese colony	Barro
	9	*otherc*	Dummy other colony	Barro

Table 1: Concept Categories and Variable Names

		Variable Name	*Description*	*Source*
Dependent variable		*leaddi_po*	Democracy	Authors' coding
Core variables		*wdi_lngdpc*	GDP per capita, log-transformed; WDI	World Bank (2011)
		demlag	Democracy lagged	Authors's coding
		wdi_lngdpc_dl	GDP per capita, log-transformed * Democracy lagged	
Concept Label	*Concept No.*	*Variable Name*	*Description*	*Source*
Institutional characteristics	10	*icrg_qog*	Rule-of-law-index	ICRG (2010)
	10	*icrgBQ*	Bureaucratic quality	ICRG (2010)
	10	*icrgCorruption*	Corruption	ICRG (2010)
	10	*ajr_setmort*	Settler mortality, log-transformed	Acemoglu et al. (2001)
	10	*latitude*	Latitude from the equator	Hall and Jones (1999)
	10	*sch_fed*	Federal democracy	Schjølset (2008)
	10	*sch_unit*	Unitary democracy	Schjølset (2008)
Political stability	11	*durable*	Regime durability	Marshall, Gurr & Jaggers (2010)
	11	*agereg*	Age of regime	Cheibub et al (2010)
	11	*tenure*	Length of current executive's tenure	Authors' coding based on Cheibub et al (2010)
	11	*fl_war*	War ongoing	Fearon and Laitin (2000)
	11	*domestic1*	Assassinations	Banks (2008)
	11	*domestic2*	General Strikes	Banks (2008)
	11	*domestic3*	Guerilla Warfare	Banks (2008)
	11	*domestic4*	Government Crises	Banks (2008)
	11	*domestic5*	Purges	Banks (2008)
	11	*domestic6*	Riots	Banks (2008)
	11	*domestic7*	Revolutions	Banks (2008)
	11	*domestic8*	Anti-Government Demonstrations	Banks (2008)
Indicators of modernization	12	*media2*	Radios per capita	Banks (2008)
	12	*media4*	Televisions per capita	Banks (2008)
	12	*media5*	Daily newspaper circulation per capita	Banks (2008)
	12	*phone4*	Telephones (excl. cell phones) per capita	Banks (2008)
	12	*phone5*	Cell phones per capita	Banks (2008)
	12	*phone6*	All telephones per capita	Banks (2008)
	12	*vehicle2*	Passenger cars per capita	Banks (2008)
Regime type	13	*DDregime4*	Civilian dictatorship	Cheibub et al (2010)
	13	*DDregime5*	Military dictatorship	Cheibub et al (2010)
	13	*DDregime6*	Monarchic dictatorship	Cheibub et al (2010)
	13	*multilim*	Limited multiparty regime	Hadenius and Teorell (2006)
	13	*prevmil*	Previous regime was military	Cheibub (2007)
	13	*HTreg1*	Monarchy	Hadenius and Teorell (2006)
	13	*HTreg2*	Military autocracy	Hadenius and Teorell (2006)
	13	*HTreg3*	One-party autocracy	Hadenius and Teorell (2006)
	13	*HTreg4*	Multi-party autocracy	Hadenius and Teorell (2006)
	13	*DDregime3*	Presidentialism	Cheibub et al (2010)
	13	*DDregime2*	Mixed democracies	Cheibub et al (2010)
Region	14	*r2*	Region dummy: S. and C. America and the Carribean	Prediction2009
	14	*r3*	Region dummy: W. Europe, N. America and Oceania	Prediction2009
	14	*r4*	Region dummy: Eastern Europe	Prediction2009
	14	*r5*	Region dummy: W. Asia and N. Africa	Prediction2009
	14	*r6*	Region dummy: West Africa	Prediction2009
	14	*r7*	Region dummy: E. and central Africa	Prediction2009
	14	*r8*	Region dummy: Southern Africa	Prediction2009
	14	*r9*	Region dummy: South and central Asia	Prediction2009
Time	15	*decade1*	Dummy 1960s	Authors' coding

Table 1: Concept Categories and Variable Names

		Variable Name	*Description*	*Source*
Dependent variable		*leaddi_po*	Democracy	Authors' coding
Core variables		*wdi_lngdpc*	GDP per capita, log-transformed; WDI	World Bank (2011)
		demlag	Democracy lagged	Authors's coding
		wdi_lngdpc_dl	GDP per capita, log-transformed * Democracy lagged	
Concept Label	*Concept No.*	*Variable Name*	*Description*	*Source*
	15	*decade2*	Dummy 1970s	Authors' coding
	15	*decade3*	Dummy 1980s	Authors' coding
	15	*decade4*	Dummy 1990s	Authors' coding
	15	*decade5*	Dummy 2000s	Authors' coding
	15	*coldwar*	Code 1 for cold war year–before 1990	Authors' coding

6.1 Core variables

Table 2: Results for core variables

Variable	Mean	Std. Dev.
GDP per capita: Beta	-0.015	0.222
GDP per capita: Standard error	0.131	0.026
GDP per capita: t-value	-0.026	1.662
GDP per capita: maximum beta	0.841	0
GDP per capita: minimum beta	-0.807	0
GDP per capita: CDF(0), normal	0.484	0
GDP per capita: CDF(0), generalized	0.158	0
Lagged democracy: Beta	1.043	1.968
Lagged democracy: Standard error	1.873	0.498
Lagged democracy: t-value	0.615	1.105
Lagged democracy: maximum beta	9.917	0
Lagged democracy: minimum beta	-5.618	0
Lagged democracy: CDF(0), normal	0.222	0
Lagged democracy: CDF(0), generalized	0.219	0
Interaction: Beta	0.828	0.23
Interaction: Standard error	0.232	0.059
Interaction: t-value	3.766	1.306
Interaction: maximum beta	1.636	0
Interaction: minimum beta	-0.157	0
Interaction: CDF(0), normal	0.043	0
Interaction: CDF(0), generalized	0.007	0
N	3574786	

Table 2 shows the results for the three core variables: GDP per capita, lagged democracy, and their multiplicative interaction.

Over the 3.6 million specifications, the average estimate for β for GDP per capita is –0.015. These estimates vary considerably, indicating that the estimated effect of average income on probability of democratization is highly contingent on model specification. The largest estimate is 0.841 and the smallest –0.807. The standard deviation of $\hat{\beta}$ is 0.222. On average, the estimated standard error for $\hat{\beta}$ is 0.131. The standard deviation of the standard error estimates is 0.026. The CDF(0) statistic shows that the estimate is larger than 0 in 48.4% of the specifications, assuming normal distribution of the estimates. The left-most plot in Figure 2 shows the distribution over specifications for the CDF(0) statistic for the GDP per capita variable.

To assess the variable's robustness in terms of statistical significance, the distribution of estimated t-values is instructive. On average, t-values for GDP per capita are [0.091], with a standard deviation of 1.623. Corresponding t-values for the lagged democracy variable are [0.609] on average with a standard deviation of [1.118], and for the interaction term, [3.878] on average with a

Figure 2: Distribution of CDF(0) across all specifications for the three core variables: GDP per capita (left), lagged democracy (middle), GDP per capita – lagged democracy interaction (right)

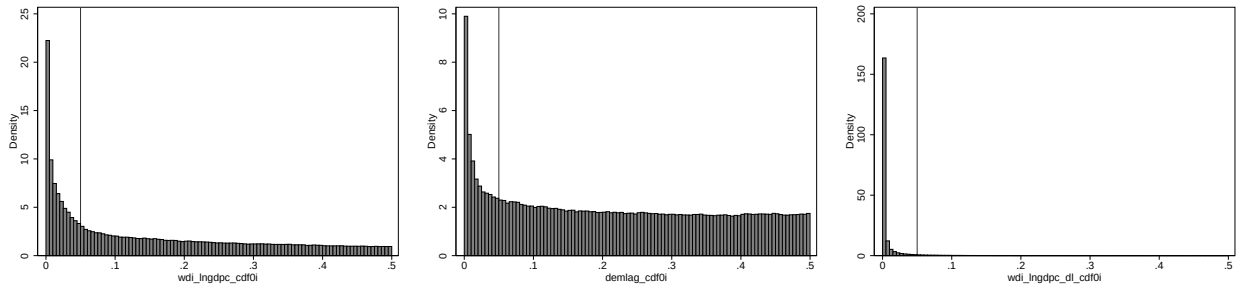
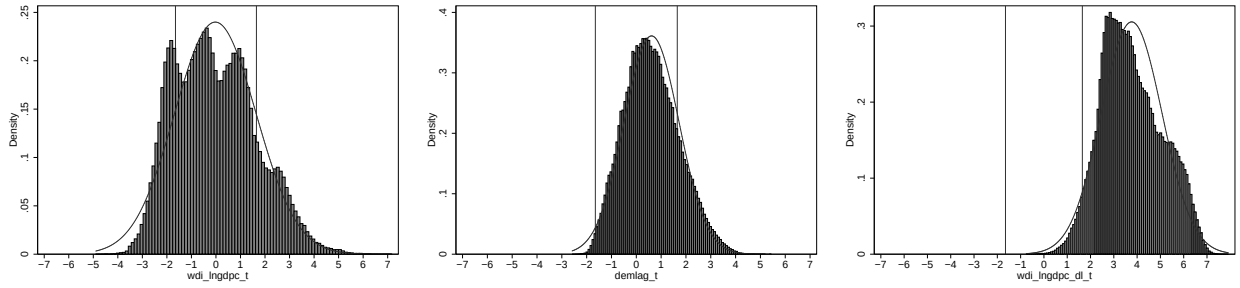


Figure 3: Distribution of t-values across all specifications for the three core variables: GDP per capita (left), lagged democracy (middle), GDP per capita – lagged democracy interaction (right)



standard deviation of [1.315].

Figure 3 shows the distribution over specifications of these t-values for the three core variables in the form of histograms. The values (–1.65, 1.65) has been marked with lines – outside the range between these two lines, specifications yield statistically significant results for the variable. The plot for the GDP per capita variable shows that the t-value is between the lines in most specifications, but a sizeable number of specifications yield negative or positive significant results. The distribution for the lagged democracy variable is roughly similar, although a larger proportion of specifications yield t-values larger than 1.65.

The bottom row of Figure 3 shows the distribution of specifications for the GDP per capita–lagged democracy interaction. In most of the specifications, the t-values are larger than 1.65. Table 2 shows that the average t-value is 3.756. Hence, we find relatively robust support for the hypothesis that income level enhances democratic stability.

The results for the three core variables shows that the interaction between lagged democracy and GDP per capita is positive and significant, whereas the estimates for the main terms are not clearly different from 0. These results are in line with Przeworski and Limongi (1997) and Przeworski et al. (2000) who found that GDP per capita increases the probability of *sustaining* democracy, but not of transition into democracy.

6.2 Other variables

Table 3 summarizes the average statistics for the main terms for the 85 variables in the study. Main term coefficients are interpreted as the change in log odds of democracy at t for observations that were non-democratic at $t-1$, i.e. log odds of democratization.

More than half of the variables included in our analysis are robustly associated with a change in log odds of democratization. Quite a few of the political and institutional explanatory variables are for example robust: Most of the 'regime type' variables (concept 13) are robust (perhaps reflecting a certain degree of tautology in this context). In general, regime types that are partly democratic are more likely to democratize than regime types that are more consistent. This is seen in the finding that limited multi-party and multi-party autocratic regimes (multilim and HTreg4) are robustly positive, as are the presidential and mixed system variables (DDregime3 and DDregime2)[8]. This fits nicely with the results in Hadenius and Teorell (2007), who found that "the majority of transitions from nondominant-party (that is, more competitive) limited multiparty regimes result in democracy" (p. 152). Civilian, one-party, and monarchic autocracies (DDregime4, HTreg3, DDregime6, HTreg1) are robustly negatively associated with democratization, on the other hand (compared to all other regime types). In contrast, only the unitary democracy (sch_unit) and corruption (icrgCorruption) indicators are robust, both negative, among the 'institutional characteristics' indicators (concept 10).

As expected, our measures of 'political stability' (concept 11) – or rather of instability – are robustly associated with democratization. Anti-government demonstrations (domestic8), government crises (domestic4), riots (domestic6), assassinations (domestic1), revolutions (domestic7), general strikes (domestic2), and civil wars (fl_war) are robustly positive, increasing the risk of democratization, whereas the length of the current executive's tenure (tenure), and the age of the regime (agereg, durable) are robustly negative.

Despite the non-robust result for GDP per capita and democratization, several other economic factors are quite robust determinants of democratization probability. The resource curse variables (concept 3) are for example robust. The resource rent (wdi_resource), oil exporter (wdi_oil, fl_oil) are negative and robust. The minerals variable (wdi_mineral) is not robust, however.[9] Hence, these results corroborate the much-discussed stabilizing effects of natural resources on authoritarian regimes (e.g. Bueno de Mesquita et al. 2003; Bueno de Mesquita and Smith 2009; Ross 2001), at least when considering threats to such regimes emanating from democratization. Among the indicators of 'economic performance' included in the analysis, the annual GDP growth variable is negative and robust (wdi_gdpgr), whereas the inflation and trade indicators (wdi_tot, wdi_ttr, wdi_inf) are not robust.

[8]Note that discrepancies in the operationalization of democracy between Hadenius and Teorell (2007), Cheibub et al (2010) and the authors may distort the results of the regime typologies. The results may also indicate a high correlation between the ACLP classification and that of the authors.

[9]The two remaining resource variables were omitted from this version of the analysis.

Table 3: Summary, main terms

	Mean(beta)	Mean(sd)	Mean(t)	CDF(0)normal	CDF(0)gen	Concept
multilim	0.578	0.074	7.814	0.000	0.000	13
domestic8	0.378	0.060	6.325	0.000	0.000	11
DDregime3	0.532	0.092	5.871	0.000	0.000	13
domestic4	0.294	0.053	5.552	0.000	0.000	11
HTreg4	0.500	0.092	5.434	0.000	0.000	13
wdi resource	-1.336	0.259	-5.156	0.000	0.000	3
school12	0.766	0.161	4.830	0.000	0.000	1
sch unit	-0.504	0.107	-4.725	0.000	0.000	10
DDregime2	0.508	0.109	4.701	0.000	0.000	13
wdi oil	-1.795	0.428	-4.198	0.000	0.000	3
phone4	0.955	0.233	4.162	0.000	0.002	12
wdi gdpgr	-0.325	0.079	-4.104	0.000	0.000	6
school09	0.645	0.162	4.021	0.000	0.001	1
domestic6	0.304	0.077	3.945	0.000	0.000	11
tenure	-0.793	0.205	-3.863	0.000	0.000	11
school04	0.434	0.115	3.825	0.000	0.003	1
DDregime4	-0.410	0.111	-3.704	0.000	0.000	13
HTreg3	-0.576	0.161	-3.579	0.000	0.000	13
spanish	0.318	0.090	3.558	0.000	0.005	9
limr	-0.770	0.234	-3.342	0.001	0.015	5
agereg	-0.925	0.280	-3.301	0.000	0.001	11
fl oil	-0.537	0.162	-3.323	0.000	0.001	3
lnlifeexpf	0.624	0.194	3.274	0.001	0.013	5
wdi schsec	0.520	0.164	3.240	0.001	0.013	1
coldwar	-0.381	0.121	-3.197	0.001	0.010	15
domestic1	0.127	0.041	3.129	0.001	0.007	11
durable	-1.918	0.634	-3.025	0.001	0.002	11
lnlifeexpm	0.570	0.197	2.970	0.002	0.027	5
decade4	0.292	0.100	2.945	0.002	0.011	15
phone6	0.691	0.241	2.900	0.002	0.010	12
decade1	-0.487	0.170	-2.874	0.002	0.004	15
fl muslim	-0.402	0.147	-2.733	0.003	0.015	8
wdi schprim	0.356	0.136	2.653	0.005	0.014	1
DDregime6	-0.665	0.260	-2.554	0.005	0.007	13
domestic7	0.127	0.052	2.464	0.007	0.020	11
icrgCorruption	-0.323	0.132	-2.458	0.007	0.019	10
edu	0.323	0.139	2.370	0.011	0.046	1
domestic2	0.179	0.077	2.348	0.011	0.014	11
wdi ise	-0.322	0.142	-2.308	0.012	0.034	4
decade2	-0.269	0.120	-2.258	0.012	0.021	15
fl war	0.211	0.095	2.240	0.013	0.023	11
prevmil	0.220	0.107	2.063	0.020	0.028	13
french	-0.273	0.135	-2.031	0.022	0.031	9
vehicle2	0.537	0.271	2.005	0.024	0.046	12
decade5	0.217	0.109	1.990	0.024	0.053	15
HTreg1	-0.841	0.431	-1.961	0.026	0.028	13
otherc	-0.274	0.175	-1.587	0.059	0.065	9
fl minrelpc	-0.179	0.117	-1.529	0.063	0.081	8
media4	0.253	0.176	1.487	0.076	0.111	12
media2	0.099	0.067	1.482	0.070	0.103	12
al language	-0.173	0.118	-1.481	0.070	0.098	8
al ethnic	-0.163	0.112	-1.478	0.073	0.109	8
fl plurrel	0.173	0.122	1.416	0.078	0.098	8
fl relfrac	-0.169	0.122	-1.385	0.083	0.101	8
wdi lnpop	0.168	0.128	1.339	0.095	0.125	2
lnpop	0.163	0.125	1.336	0.096	0.127	2
agr totl zs	-0.237	0.187	-1.270	0.102	0.119	4
HTreg2	-0.116	0.115	-1.011	0.157	0.170	13
wdi ase	-0.193	0.194	-0.995	0.160	0.176	4
fl ef	-0.102	0.106	-0.979	0.170	0.180	8
ajr settmort	-0.130	0.150	-0.889	0.194	0.201	10
icrg qog	-0.125	0.148	-0.843	0.199	0.226	10
etdo4590	0.093	0.117	0.796	0.213	0.221	8
wdi urban	0.163	0.215	0.777	0.224	0.236	4
wdi ttr	-0.108	0.136	-0.774	0.215	0.231	6
fl plural	0.081	0.108	0.769	0.226	0.200	8
wdi tot	-0.076	0.098	-0.753	0.222	0.243	6
fl second	0.077	0.104	0.749	0.229	0.242	8
media5	0.119	0.192	0.649	0.268	0.210	12
britishameric	0.075	0.117	0.647	0.262	0.268	9
van ehet	-0.062	0.117	-0.499	0.298	0.258	8
phone5	-0.081	0.169	-0.467	0.317	0.298	12
sch fed	0.045	0.103	0.442	0.332	0.312	10
school02	0.055	0.136	0.420	0.344	0.289	1
domestic5	-0.039	0.088	-0.398	0.334	0.336	11
icrgBQ	-0.052	0.154	-0.334	0.368	0.304	10
pwt lnki	0.034	0.111	0.300	0.381	0.358	8
portugese	-0.025	0.094	-0.258	0.397	0.382	9
wdi mineral	-0.044	0.167	-0.253	0.396	0.388	3
DDregime5	-0.020	0.093	-0.216	0.416	0.371	13
wdi inf	-0.034	0.157	-0.160	0.420	0.406	6
domestic3	-0.011	0.051	-0.148	0.413	0.368	11
decade3	0.014	0.103	0.128	0.447	0.391	15
wageshare	0.015	0.156	0.104	0.462	0.388	8
formerc	0.011	0.122	0.063	0.466	0.313	9

Another concept with robust estimates is that of education (concept 1). Five of the six education measures are robustly positive – education has a positive effect on the probability of democratization over and beyond that of GDP per capita (which, as a core variable, is controlled for in all specifications). Only Banks' primary school indicator (school02) is not robust despite the fact that the WDI indicator for the same is (wdi_schprim). All three 'health' variables (concept 5) are also robust. Controlling for GDP per capita, low infant mortality rates (limr) and high life expectancy (lnlifeexpf, lnlifeexpm) have clear positive association with the probability of democratization. Furthermore, the 'modernization indicators' (concept 12) are all positive (controlling for GDP per capita), and in particular the telephone indicators are robust. Interestingly, some of the modernization theory literature has argued that a set of variables, other than income level per se, those accompany broader socioeconomic transformation and development, were vital for democratization. The combination of a non-robust effect of GDP per capita and relatively robust effects of the education and modernization concepts provide further indications that the *type* of economic transformation processes, rather than whether income increases on aggregate or not, is what matters for democratization. Further indications of this proposition were of course given above, where it was noted that increased income from natural resources deter rather than spur democratization.

Furthermore, two of the 'colonial heritage' variables (concept 9) are robust – spanish ex-colonies are robustly positive and french robustly negative. The others (british, portuguese, others) are not robust. Several of the time dummies (concept 15) are robust. The 1960s, 1970s, and cold war period dummies (decade1, decade2, coldwar) are robustly negative, and the 1990s and 2000s (decade4, decade5) robustly positive, with the 1980s in between. Among the 'ethnicity and religion' variables (concept 8), only the percentage muslim variable (muslim) is robust, with a negative sign.

Table 4 summarizes the average statistics for the interaction terms between the 85 variables and the lagged democracy variable. These coefficients are interpreted as the change in log odds of democracy at t for observations that were *democratic* at $t-1$, i.e. log odds of continued democracy or democratic stability.

Considerably fewer of the interaction coefficients are robust. However, several regime type indicators are robust also when it comes to affecting democratic stability, e.g. those indicating 'limited multi-party regimes' or 'multiparty autocracies' (multilim, HTreg4). Furthermore, we find that presidential, and mixed democracies (DDregime2, DDregime3) have consistent negative signs. The latter results provide support for the hypothesis proposed by Linz (1990) that parliamentary regimes are generally more stable than presidential. Additionally, the results are also barely negatively robust for regimes that succeeded military autocracies (prevmil), indicating the destabilizing effect of military intervention in politics (see Cheibub 2007). Moreover, the 'political stability' indicators are robust (concept 11). As for autocracies, government crises, riots, and anti-government demonstrations (domestic4, domestic6, domestic8) increase the risk of regime type change – they are robustly

Table 4: Summary, interaction

	Mean(beta)	Mean(sd)	Mean(t)	CDF(0)normal	CDF(0)gen	Concept
multilim	-0.967	0.125	-7.737	0.000	0.000	13
HTreg4	-1.141	0.149	-7.657	0.000	0.000	13
domestic4	-0.676	0.105	-6.444	0.000	0.000	11
domestic8	-0.432	0.100	-4.443	0.000	0.000	11
agereg	1.637	0.480	3.418	0.000	0.001	11
sch unit	0.591	0.186	3.180	0.001	0.001	10
wdi gdpgr	0.556	0.179	3.114	0.001	0.002	6
school12	-0.802	0.287	-2.800	0.003	0.006	1
domestic6	-0.344	0.126	-2.756	0.003	0.004	11
wdi oil	1.254	0.498	2.520	0.006	0.007	3
DDregime2	-0.410	0.165	-2.491	0.007	0.012	13
DDregime3	-0.378	0.162	-2.468	0.012	0.026	13
durable	2.341	0.976	2.402	0.008	0.009	11
wdi resource	0.856	0.394	2.173	0.015	0.018	3
media2	0.719	0.336	2.145	0.016	0.020	12
otherc	0.344	0.163	2.137	0.018	0.023	9
school04	-0.602	0.285	-2.127	0.018	0.027	1
icrgCorruption	0.450	0.215	2.110	0.018	0.031	10
tenure	0.566	0.271	2.090	0.018	0.025	11
decade4	-0.343	0.165	-2.088	0.019	0.032	15
fl oil	0.620	0.322	1.926	0.027	0.031	3
prevmil	-0.338	0.183	-1.851	0.033	0.039	13
icrg qog	0.490	0.277	1.775	0.038	0.058	10
decade1	0.413	0.234	1.771	0.039	0.047	15
HTreg1	0.706	0.446	1.595	0.057	0.060	13
lnlifeexpf	-0.512	0.324	-1.591	0.057	0.083	5
ajr settmort	0.467	0.296	1.585	0.058	0.069	10
school09	-0.484	0.309	-1.571	0.059	0.077	1
media5	0.625	0.408	1.525	0.063	0.080	12
spanish	-0.304	0.204	-1.509	0.070	0.086	9
wdi ttr	0.398	0.265	1.501	0.067	0.076	6
fl second	-0.316	0.214	-1.479	0.070	0.082	8
fl plural	-0.309	0.217	-1.434	0.077	0.092	8
icrgBQ	0.389	0.274	1.422	0.078	0.097	10
fl ef	0.296	0.212	1.407	0.082	0.098	8
DDregime6	0.715	0.512	1.401	0.082	0.085	13
wageshare	0.331	0.245	1.348	0.089	0.097	8
wdi lnpop	-0.295	0.227	-1.320	0.097	0.118	2
domestic1	-0.170	0.133	-1.301	0.101	0.106	11
lnpop	-0.288	0.225	-1.297	0.101	0.122	2
edu	-0.433	0.349	-1.244	0.108	0.126	1
etdo4590	-0.267	0.215	-1.242	0.108	0.113	8
wdi ase	0.397	0.321	1.235	0.109	0.116	4
phone5	0.333	0.288	1.157	0.123	0.129	12
phone6	0.563	0.491	1.138	0.127	0.140	12
coldwar	0.237	0.212	1.122	0.133	0.147	15
wdi schprim	-0.239	0.221	-1.090	0.140	0.151	1
media4	0.465	0.437	1.055	0.144	0.162	12
wdi schsec	-0.419	0.402	-1.045	0.149	0.166	1
britishameric	-0.203	0.204	-1.008	0.160	0.174	9
fl muslim	0.246	0.246	1.003	0.158	0.174	8
french	0.329	0.333	0.993	0.161	0.165	9
lnlifeexpm	-0.311	0.328	-0.966	0.172	0.164	5
wdi ise	-0.261	0.270	-0.962	0.166	0.191	4
phone4	0.621	0.651	0.952	0.171	0.181	12
al ethnic	0.198	0.226	0.891	0.190	0.199	8
pwt lnki	0.187	0.216	0.868	0.193	0.205	8
HTreg3	0.314	0.363	0.863	0.194	0.199	13
sch fed	-0.152	0.179	-0.853	0.199	0.209	10
wdi tot	0.097	0.119	0.811	0.208	0.226	6
fl war	-0.151	0.203	-0.756	0.228	0.232	11
domestic7	-0.130	0.180	-0.733	0.235	0.232	11
decade2	0.169	0.238	0.709	0.240	0.245	15
wdi inf	-0.110	0.180	-0.705	0.276	0.258	6
agr totl zs	0.211	0.322	0.655	0.256	0.263	4
fl plurrel	-0.140	0.218	-0.641	0.260	0.267	8
domestic2	-0.062	0.105	-0.599	0.278	0.280	11
al language	0.122	0.221	0.554	0.291	0.291	8
fl relfrac	0.111	0.208	0.533	0.296	0.299	8
domestic3	-0.116	0.220	-0.532	0.299	0.299	11
limr	0.320	0.620	0.516	0.304	0.288	5
fl minrelpc	0.108	0.219	0.488	0.311	0.314	8
DDregime5	-0.236	0.558	-0.423	0.337	0.337	13
school02	-0.081	0.202	-0.409	0.344	0.331	1
DDregime4	-0.079	0.201	-0.407	0.347	0.335	13
vehicle2	0.151	0.429	0.352	0.362	0.334	12
van ehet	-0.051	0.243	-0.218	0.417	0.388	8
domestic5	0.061	0.314	0.194	0.422	0.420	11
wdi urban	0.076	0.425	0.174	0.429	0.395	4
wdi mineral	0.040	0.250	0.152	0.437	0.415	3
formerc	-0.031	0.212	-0.143	0.443	0.364	9
decade3	-0.025	0.201	-0.127	0.451	0.410	15
decade5	-0.023	0.196	-0.117	0.454	0.341	15
portugese	-0.017	0.171	-0.106	0.461	0.418	9
HTreg2	0.005	0.317	0.014	0.494	0.440	13

negative. Also as for autocracies, stability indicators such as the age of the regime (agereg, durable) and the tenure of the current executive (tenure) increase the probability of continued democracy (see also, e.g. Clague et al. 2003). Among the 'institutional characteristics' indicators (concept 10), the 'unitary democracy' (sch_unit) and corruption (icrgCorruption) indicators are robust, and the rule-of-law indicator (icrg_qoc) borderline so, all with positive signs.

As for autocratic stability, GDP growth increases the probability of democratic continuation (wdi_gdpgr) (see also, e.g. Przeworski and Limongi 1997). However, none of the other 'economic performance' indicators (concept 6) are robust. In contrast with the results in Houle (2009), we do not income inequality, as measured by wageshare, to be a robust determinant of democratic stability. Two of the education variables (concept 1) are robust: percentage literate and secondary school enrollment (school12, school04). Puzzlingly, however, they have robustly negative estimates, indicating that education reduces the stability of democracy. Above, we found that most education indicators were robust determinants for democratization. When combined with the latter result, this may provide an additional "explanation", in addition to those of country-specific effects, for the lacking effect of education on level of democracy found in Acemoglu et al. (2005). Three 'resource curse' variables (concept 3) are robust, but with a sign that questions the cursed nature of rent-generating resources. All three robust variables (wdi_oil, wdi_resource, fl_oil) have positive signs. Hence, natural-resource income stabilizes not only dictatorships, but also democracies. In contrast with the results for democratization only one of the 'modernization' indicators are robust determinants of democratic stability, namely the radios per capita indicator (media2), with a positive sign.

One of the 'colonial heritage' indicators (concept 9) is robust – the residual category 'other colonial powers', i.e. those that are neither French, Spanish, Portuguese or British/American, with a positive sign. Hence, our analysis indicates that British colonial history is neither a robust determinant of democratization, nor of democratic stability. This is perhaps surprising, given that much of the political science literature has attributed a democracy-enhancing role to inheriting British institutions and political culture (see e.g. Lipset and Lakin 2004). Furthermore, only one of the time dummy variables (concept 15) is robust: Ceteris paribus, democratic stability was lower in the 1990s than in other periods.

In Figures 4–6 we plot the distribution of t-statistics over specifications for each of the 85 variables. The plots are sorted by concept and show estimates for main terms ("type a") to the left and estimates for interaction terms ("type d") to the right. These figures display visually the same information as in Table 3 and 4.

In Figure 4, it is clear that most operationalizations of education are robustly positive as main terms (most of the distribution lies to the right of the (–1.65, 1.65) interval), but that they are much closer to zero as interaction terms. Our operationalization of country size (concept 2) is not clearly distinguishable from 0 in either form. The figures for concept 3 – the resource curse – show how

Figure 4: Focus variables by concept

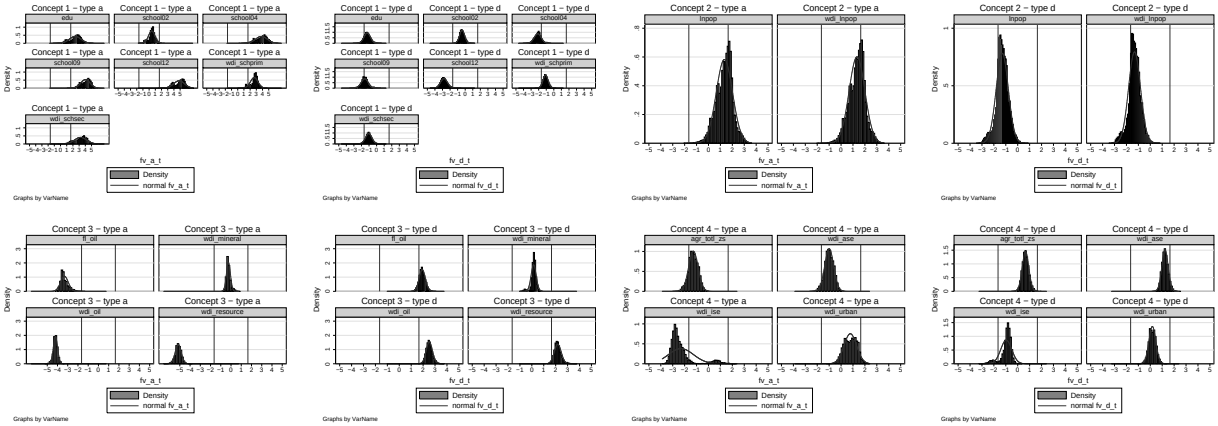
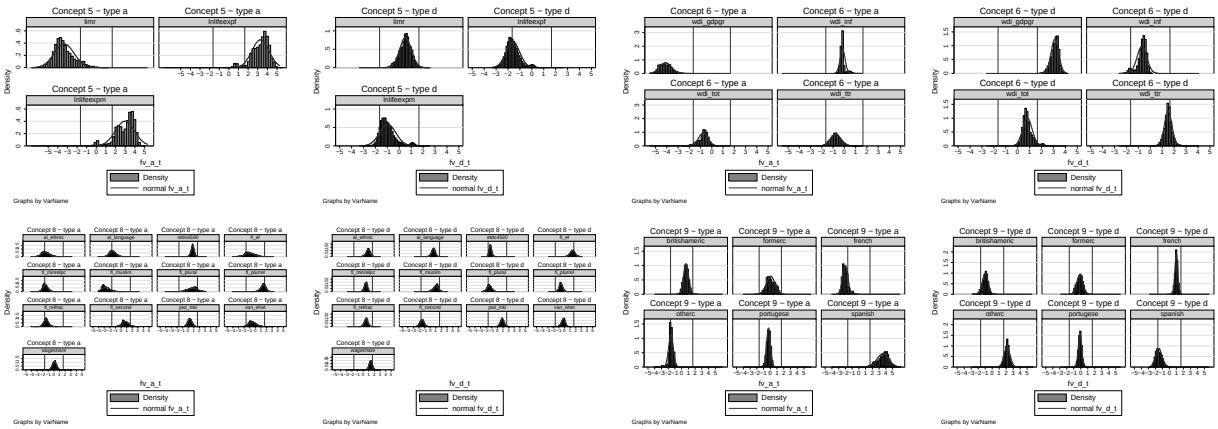


Figure 5: Focus variables by concept



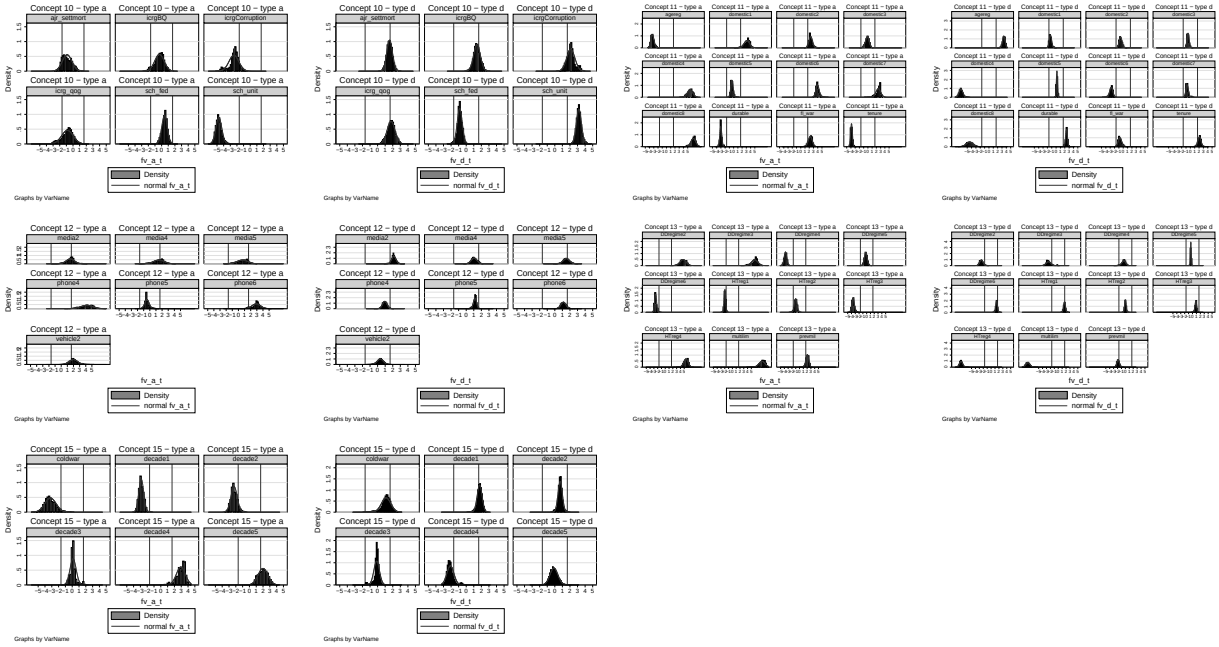
robust these variables are, and those for concept 4 – modernization – that these variables are rarely very different from zero. Most distributions are quite close to normal distributions. The estimates for the industrialization variable (wdi_ise) variable is an exception. It is clearly bimodal.[10]

In Figure 5, we see that the health indicators (concept 5) are robustly associated with democratization but not with the stability of democracy, and that growth in GDP per capita is the only economic performance variable that is robustly different from zero. Among the 'ethnicity and religion' variables, only the muslim share is robustly different from zero as main terms, and none are as interaction terms. The figure shows clearly how robust the 'former spanish colony' is as a main term in the models.

Figure 6 shows that icrgCorruption and sch_unit are the only robust variables among the 'institutional characteristics' indicators (concept 10), and how the estimates for the 'political stability',

[10] In future versions of the paper we will look into conditions under which such bimodalities occur. High correlations with other variables is a likely reason.

Figure 6: Focus variables by concept



'modernization', 'regime type', and 'time' indicators are distributed.

7 Conclusion

The determinants of democracy are among the most studied topics in comparative politics, and there is no lack of hypotheses on what factors impact on a country's regime type. However, the results from the empirical literature are messy; there are few established robust determinants of democracy. Results vary quite much with the model specifications made, and thus contrast starkly with the clear-cut arguments on the importance of particular factors made in several important theoretical contributions.

In this paper, we have conducted a thorough investigation of the robustness of the proposed determinants of democracy from the literature. More specifically, we investigated whether the effects of various modernization and economic development indicators, indicators of short-term economic performance and policy, distributional indicators, cultural indicators, demographic indicators, and political-historical indicators are dependent on particular model specifications, or whether they are robust explanatory variables for democratization or democratic stability.

Several interesting results emerge from the sensitivity analysis. For example on the much debated relationship between GDP per capita and democracy, we corroborate the results in Przeworski and Limongi (1997) and Przeworski et al. (2000) that GDP per capita reduces the probability of transition from democracy to non-democracy, but does not clearly affect the probability of de-

mocratization. Furthermore, we find that various health and education indicators have a robust relationship with probability of democratization, but surprisingly do not seem to contribute to democratic stability.

We also find robust relationships between several concept operationalizations and the probability of transition between democracy and non-democracy, in both directions. As in Gates et al. (2006), indicators that identify institutions that fall between consistent democracy or consistent autocracy are associated with a high probability of democratization and of autocratization. Several measures of political stability are also robustly associated with both types of transition – stabilities predicts non-transition well, as one would expect. Economic growth also stabilizes both regime types. We also find 'resource curse' variables, and oil in particular, to reduce the risk of transitions in both directions.

Several variables have no robust relationship with either democratization nor autocratization. For example, we do not find any robust relationship with British colonial history. Neither do we find any significant relationship with income inequality. Furthermore, only one of our ethnicity and religion variable is robust: The share of the population that is muslim is a robust negative predictor of democratization. It is not a robust predictor of change from democracy toward non-democracy, however, and this result may be more due to historical contingencies than to a real effect of a particular religion.

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