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Democratic Capital: The Nexus of Political and Economic Change
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ABSTRACT

We study the joint dynamics of economic and political change. Predictions of the simple model that we formulate in the paper get considerable support in a panel of data on political regimes and GDP per capita for about 150 countries over 150 years. Democratic capital -- measured by a nation's historical experience with democracy and by the incidence of democracy in its neighborhood -- reduces the exit rate from democracy and raises the exit rate from autocracy. In democracies, a higher stock of democratic capital stimulates growth in an indirect way by decreasing the probability of a successful coup. Our results suggest a virtuous circle, where the accumulation of physical and democratic capital reinforce each other, promoting economic development jointly with the consolidation of democracy.

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1 Introduction

In the past two hundred years, the world has undergone a dramatic economic change. While a number of countries have seen unprecedented developments of their living standards, many countries in the third world remain poor. Among societies with sustained economic growth, takeoffs occur at very different points in time: while many European countries have been growing for 100-150 years, the experience with solid growth is much more recent in Asia or Latin America, and yet not widely experienced in Africa. Moreover, the within-country variation is typically large, with periods of fast growth often followed by periods of stagnation – the stable 2% growth of income per capita enjoyed by the US is more of an exception than a rule.

During the same time, we have seen equally dramatic political changes. Many countries have become more or less solid democracies, but close to a half of all independent states remain autocracies. Democratizations – like growth takeoffs – are dispersed over time. As observed by Huntington (1991), at least three clearly discernible waves of democratization have swept the world since the early 19th century, although the first wave almost spanss a 100 years, with democracy arriving early in the US and late in Sweden. Further, as in the case of economic development, political development in some countries has been volatile, with nations such as Argentina and Spain living through intermittent periods of democracy and autocracy.

At some level, these rich dynamics of economic and political change have to be connected. Both a priori reasoning and casual observation lead us to expect a two-way interaction, with stable democracy promoting the pace of economic development, and economic development promoting the consolidation of democracy. Yet, our theoretical and empirical understanding of such dynamic interactions is seriously incomplete. Research following Lipset (1959) indeed suggests a positive effect of the level of development on the maintenance of democracy. This evidence largely exploits the variation of income levels across countries at a given point in time, however. The within-country evidence that sustained growth promotes democracy is much weaker. Similarly, researchers seeking to establish a systematic link in the other direction – from democracy to income and growth – have come up with mixed results: some studies claim that democracy creates faster growth while others find no robust link. Some of the recent literature on these topics is briefly reviewed in Section 2 below.

This paper revisits the dynamic interaction between political and eco-

nomic change, building on two ideas. The first idea concerns the economic effects of democracy. If democracy influences economic performance, this must largely happen via investment decisions and hence through expectations. The prospects of future democracy then becomes a crucial determinant of current economic performance. This means that, to correctly assess the economic consequences of democracy, we must look beyond the current regime, to expectations about its stability. However simple, this insight is often overlooked in existing empirical studies. We show that omission is partly responsible for giving democracy a worse reputation than it deserves. When expectations of regime stability are taken into account, democracies – on average – grow faster than autocracies.

This provokes the question of what makes democracies more or less stable, which is where our second idea comes in. Consolidation of democracy requires that citizens learn to cherish and respect democracy as a method of government. A common perception of democracy as a valuable form of government will not pop up overnight, or in a vacuum. Rather, a gradual appreciation of democracy can be envisaged as an accumulation of a stock of civic and social assets that takes place through a country's learning from its own historical experience or from its neighboring countries. We refer to this consolidation process as the accumulation of "democratic capital".

A combination of these two ideas suggests rich dynamic interactions between economic and political change, including a positive feedback loop between democracy and economic development. As democracy consolidates and becomes more stable, income grows more rapidly. This feeds into more democratic stability, and yet more economic growth. At the same time, accumulation of democratic capital brings about yet more stability and further growth. Countries ruled by autocrats, instead, are more likely to stagnate because they do not have any chance of initiating this virtuous circle of consolidation and growth. If they happen to become democracies, they remain vulnerable and unstable until they have accumulated enough democratic capital. As instability hurts economic development, it feeds into itself.

The paper tries to take these ideas to the data, building on two methodological postulates. First, to interpret complicated two-way interactions between political and economic change, we need an explicit theoretical framework. To that end, Section 3 lays out an overlapping-generations model of economic and political change. Sustained economic growth is driven by investment, which depends on expected returns. If productivity is higher in democratic than autocratic regimes, growth in democracies is negatively

affected by the probability of regime change. The probability of a regime change is determined in a global game, where individual citizens decide whether to participate in defending democracy (or overthrowing a dictator). This decision reflects society's endowment of democratic capital. In equilibrium, higher democratic capital implies a lower probability of autocracy in the future. Therefore, more democratic capital has no direct effect on growth, only a positive *indirect* effect via higher expected returns (and investments). These predictions, as well as other implications of the model, suggest how to approach the data.

Our second methodological postulate is that understanding the rich dynamics of economic and political change requires a very long time horizon, even if that comes at the cost of data availability. To that end, we construct an unbalanced panel with annual data for about 150 countries and 150 years, exploiting the data sets on GDP per capita assembled by Angus Maddison and the data on political regimes assembled in the Polity IV project. These data are discussed in Section 4, where we also describe how to give operational contents to the concept of democratic capital. We postulate that democratic capital has two components: one domestic and one foreign. Domestic democratic capital depends on the country's own historical experience: it accumulates in periods of democracy and decumulates in periods of autocracy. Foreign democratic capital depends on current experience elsewhere: it accumulates with the incidence of democracy abroad and decumulates with the incidence of autocracy in other countries, with weights depending on geographic distance.

Many of the key predictions of our simple model hold up when confronted with the data. In Section 5, we present and discuss the empirical results on political transitions. Our maximum-likelihood estimates show that democratic capital indeed explains the probability of exit from democracy: the hazard rate out of democratic regimes goes down with both components of democratic capital, as well as with the level of real income. Similarly, the hazard rate out of autocracy increases in both components of democratic capital, but – interestingly – does not depend on income.

In Section 6, we proceed to economic growth. To isolate the effect of expected regime changes, we first consider each political regime in isolation and rely on the hazard rates estimated in Section 5. Exploiting only the within-country variation in the data, we find that the estimated hazard rate out of democracy indeed reduces economic growth, as predicted by our theory. The risk of exit from autocracies also appears to hurt economic growth, how-

ever, contrary to the predictions of the theory. This second empirical result is less robust, but suggests that economic growth may be hurt by political instability (rather than by the nature of the regime transition).

We then jointly consider actual and expected regime changes. Not only are more stable democracies associated with faster growth, but the estimated effect of actual democracy becomes stronger when we hold constant the probability of regime change. While these results can be given a structural interpretation in terms of our theory, they hinge on quite restrictive identifying assumptions. Therefore, we end with a less demanding exercise, namely to estimate the reduced-form growth equation suggested by our model. Although we cannot distinguish the effects running through actual vs. expected regime changes, we find that democratic capital is unambiguously good for growth. The results are not only statistically robust but also quantitatively important. Consistently with the within-regime estimates, the positive effect of democratic capital on growth is only present in democracies. A higher stock of democratic capital makes autocracies more likely to fall, but this effect is not conducive to faster growth as long as the regime remains autocratic.

2 Related literature

A vast empirical literature has studied the link between democracy and growth on the one hand, and the determinants of democracy on the other, although these two issues have often been studied separately. Przeworski et al. (2000) and De Mesquita et al. (2003) are among the few systematic studies that addresses both issues together. The comprehensive study by Przeworski et al is mainly confined to the postwar period, yet the main empirical results are largely consistent with the results presented in this paper, although the details of the analysis and the identifying assumptions differ from our own. In particular, they conclude that higher income increases the survival of democracy, but has no effect on the survival of autocracy, that a history of democratic instability helps predict regime transitions, and the international political climate has an impact on the stability of democracy. This is in line with our findings on the effect of domestic and foreign democratic capital on regime transitions. On the reverse link, from political regime to growth, the main conclusion of Przeworski et al is that political instability (i.e., by the prediction of regime change) hurts growth, particularly under autocracy.

How economic development and other variables determine the onset, or the survival of, democracy is the subject of many books and articles. Among the most recent contributions, Boix (2003) focuses on the redistributive consequences of alternative political regimes, while Barro (1999), Boix and Stokes (2003), Acemoglu, Johnson, Robinson and Yared (2005a and b) and Glaeser, Ponzetto and Shleifer (2005) discuss the effect of economic development and education on democracy, reaching different conclusions. These studies mainly focus on the postwar period and do not focus on variables similar to our notion of democratic capital (see Section 5 for more discussion and a comparison with our results).

We are not the first to stress the importance of civic engagement and cultural attitudes in shaping the functioning of political institutions, and how some kind of "social capital" can slowly be acquired over time under specific political institutions. Important precursors include Almond and Verba (1963), Lipset (1959) and more recently Putnam (1993), Inglehart and Welzel (2005) and Hadenius and Teorell (2005). But our empirical methodology is very different from these studies. In particular, our notion of democratic capital refers to variables that influence the stability of democratic regimes, but have no direct effects on economic outcomes. The importance of culture in economic (as opposed to political) development is discussed more at length and with a different methodology in Tabellini (2005).

Several political scientists have discussed the role of masses vs. elites in regime transitions – see, in particular, Collier (1999), Geddes (1999), and Bermeo (2003). Opp (1999) and Gibson (1997) rely on survey data to document how citizens' decisions to participate in the uprise against socialist autocracies at the turn of the 1990s was motivated by strategic and social considerations, similar to those discussed in our theoretical model in Section 3.

How democracy – or political regimes, more generally – shape economic development, is the subject of an equally large literature. Here, the findings are, essentially, all over the place. Barro (1996), Helliwell (1994), Londregan and Poole (1990), Przeworski and Limongi (1993), and Mulligan and Sala-I-Martin (2004) mainly exploit cross-country variation or pooled time-series and cross-country data for the post-war period, and find no robust effect of democracy on economic growth. On the other hand, Roll and Talbott (2003), Jones and Olken (2005), Papaioannou and Siourounis (2004), Giavazzi and Tabellini (2005) and Rodrik and Wacziarg (2005) focus on within-country variation and their findings are generally more supportive of a positive aver-

age effect of democracy on economic outcomes (with relevant heterogeneity amongst episodes of democratization, however).

These papers do not consider whether regime transitions were expected or unexpected, however. An exception is Londregan and Poole (1990), who attempt to estimate the effect of political instability and find no evidence that growth is affected by past coups or current coup propensity. Finally, and importantly, Gerring, Bond, Barndt and Moreno (2005) show that democratic history (besides the current regime) has an effect on economic performance. While these authors do not provide the same economic interpretation as we do, their empirical results are consistent with our reduced-form results.

3 A model of political and economic change

In this section, we formulate a model of political regime transitions and economic growth. At first sight, this model may appear simple, maybe even simplistic. But our goal is not theory for its own sake. We use the theory to guide our empirical investigation on historical panel data going back to the mid 1800s. Except for some fixed country characteristics, these data only include time-varying observations of income per capita, called y_t below, and the political regime, called a_t below. Such sparsity of data calls for a very parsimonious model. The role of this model is to formulate testable hypotheses to confront with the data, and derive a consistent set of identification and specification assumptions.

3.1 The economic model

Consider a standard overlapping generations economy with a continuum of members in each generation. Aggregate production per worker in period t is given by the neoclassical production function on intensive form:

$$y_t = A(a_t)f(k_t) \ , \tag{1}$$

where k_t is capital per worker, f is a concave function such that $f_k(0) \to \infty$, and A denotes total factor productivity (TFP). We allow the level of TFP to differ between democracy, denoted by $a_t = 0$, and autocracy, denoted by $a_t = 1$ (see further below). To simplify the algebra, we set $A(0) = 1 + \alpha$ and $A(1) = 1$. This gives gross factor rewards $r_t = A(a_t)f_k(k_t)$ and $w_t = A(a_t)(f(k_t) - f_k(k_t)k_t)$. We abstract from population growth. Note

that, conditional on the political regime, *TFP* remains constant over time. Differences in *TFP* across political regimes could reflect economic policy priorities which are left implicit here. Throughout most of the section, we let $\alpha \lesseqgtr 0$, leaving open which regime is associated with better economic policies in a particular country and time period.

The young in period $t-1$ have quasi-linear preferences over consumption when young and old. They choose their savings, in the form of capital k_t, so as to maximize their expected utility from economic outcomes:

$$E_{t-1}(v_t) = V(w_{t-1} - k_t) + E_{t-1}[r_t k_t] \ , \tag{2}$$

where V is a concave function and $V_c(0) \to \infty$.

3.2 Timing and behavior in each period

There are three state variables at the beginning of period t, namely (i) k_t, the per worker capital stock accumulated in period $t-1$, a_{t-1}, (ii) the political regime at the end of the previous period: 0 (1) if $t-1$ ended in democracy (autocracy), and (iii) d_{t-1}, democratic capital accumulated up to the previous period (see further below). In a given time period, which starts off in a democratic (autocratic) regime, the timing is as follows

(1) An attempted coup against democracy takes place with probability $\chi(0)$ (an uprise against autocracy happens with probability $\chi(1)$). If it does, each old makes an individual decision of whether to participate in the defense of (uprise against) the regime, given the perceived costs and benefits of participation. The young do not participate in the defense (uprise). In the event of a coup (uprise), the probability that the democratic regime survives (autocratic regime falls) is equal to s_t, the proportion of the old population who participate.

(2) If the coup (uprise) is successful, an autocracy (democracy) is installed, if not democracy (autocracy) remains. The regime in place cannot be changed until period $t+1$ and determines the current value of *TFP* ($A(a_t)$ takes the value $1+\alpha$ or 1).

(3) Investment decisions for next period, $t+1$, are made by each young individual, based on the returns expected in $t+1$.

3.3 Equilibrium political transitions

We now discuss the equilibrium of the game at stage (1), when the period starts out as a democracy. But the autocratic case is analogous. Let μ_t be the true individual cost of participating in the defense (or uprise). This cost is borne irrespective of whether the coup fails or not. Agent i observes a noisy signal of this cost:

$$m_t^i = \mu_t + \nu_t^i ,$$

where ν_t^i is drawn from a normal distribution. Each agent holds the (improper) prior that μ_t has a uniform distribution on the real line.

Each old individual perceives a personal "social" benefit, b_t, of participating in a defense of democracy (described below). This personal benefit is enjoyed only if the defense succeeds. Thus, the expected benefit from participation is $b_t s_t$, where s_t is the probability of success in this defense. Each individual old agent treats the probability of success as independent of her own participation. When individual i does not participate, she does not bear the cost and she gets no social benefit out of the defense. Thus, we normalize the utility from non-participation to 0.[1]

In this notation, the net gain from participation in defense of democracy for individual i as:

$$E(b_t - \mu_t) = b_t s_t - m_t^i .$$

As already assumed, the probability of a successful defense, s_t, equals the share of other old individuals participating in the defense. Then, we have a global game with incomplete information, which fulfills the conditions **A1-A5** in Morris and Shin (2002, Section 2.2.1). By their results, all individuals follow an identical strategy $\sigma(m_t^i)$ of participating ($\sigma = 1$), or not ($\sigma = 0$), based upon a unique cutoff value for their signal:

$$\sigma(m_t^i) = \begin{cases} 1 & \text{if} \quad m_t^i < \mu_t^* = \frac{b_t}{2} \\ 0 & \text{if} \quad m_t^i \geq \mu_t^* = \frac{b_t}{2} \end{cases} .$$

[1] An individual can gain (or lose) economically as an individual investor if the defense succeeds. But this individual gain does not determine the decision to participate, because atomistic individuals treat the probability of success as parametric. Thus, the benefit b is the preceived social benefit of participating in a successful defense of democracy, not to be confused with the material economic benefit of actually preventing the coup. This is an important difference between pariticipation in a political event and participation in, say, a speculative attack against a bank or a fixed exchange rate regime; in this latter situation, participation in a speculative attack also entails direct economic consequences for the individual investors (which differ depending on whether the attack fails or succeeds).

This strategy reflects a strategic complementarity, but the game nevertheless has a unique equilibrium. In this equilibrium, the fraction of old who participate in the defense of democracy is:

$$s_t^* = \text{Prob}(\nu < b_t/2 - \mu_t) \equiv \Phi(b_t/2 - \mu_t) \ , \tag{3}$$

where $\Phi(\cdot)$ is the c.d.f. of the normally distributed noise variable ν.

Our goal is to relate political transitions to past political history and the level of economic development. To achieve this ambitious goal in our simple model, we assume a benefit b_t of participating in a defense of democracy from two sources. First, the benefit is larger the greater is the perceived value of living in a democratic society when entering the period. We label this value "democratic capital", d_{t-1}, and assume that it develops over time in pace with democratic experience and is influenced by democratic experience abroad (this is made more precise when discussing the data in Section 3). Second, each old individual (altruistically) internalizes the true economic benefit of being in democracy rather than autocracy on behalf of her fellow group of old citizens. Given the economic model, this economic welfare difference is $\alpha f_k(k_t)k_t$. The total benefit from the defense of democracy (or the overthrow of a dictator) is thus:

$$b_t = B(d_{t-1}, k_t) = (1-\gamma)d_{t-1} + \gamma\alpha f_k(k_t)k_t \ , \tag{4}$$

where $(1-\gamma)$ is the relative weight on democratic values. This is the personal social benefit that, via (3), shapes the equilibrium probability of success in defending democracy.

We can then define state-dependent hazard rates, i.e., the equilibrium probability that the country exits from democracy (autocracy) in t, conditional on being a democracy (autocracy) in $t-1$, h_t^{a*}, as:

$$h_t^{a*} = \begin{cases} \chi_t(0)(1 - E_{t-1}[s_t^* \mid k_t^*, d_{t-1}, a_{t-1}] & \text{if} \quad a_{t-1} = 0 \\ \chi_t(1)E_{t-1}[s_t^* \mid k_t^*, d_{t-1}, a_{t-1}] & \text{if} \quad a_{t-1} = 1 \ , \end{cases} \tag{5}$$

where the expectations operator is taken over the random variable μ_t, conditional on the state variables d_{t-1} and a_{t-1} and k_t^*, the (perfectly foreseen) value of future capital. We then obtain the equilibrium probability of autocracy in period t

$$p_t^* = \begin{cases} h_t^{0*} \text{ if } \ a_{t-1} = 0 \\ 1 - h_t^{1*} \ \text{ if } \ a_{t-1} = 1 \ . \end{cases} \tag{6}$$

Exploiting equations (3)-(6), the equilibrium probability of autocracy in each period can be written as a function of the capital stock in place at the beginning of that same period, and of previous period democratic capital and political regime:

$$p_t^* = P(k_t^*, d_{t-1}, a_{t-1}) \tag{7}$$

The function $P(\cdot)$ is decreasing in democratic capital: $P_d < 0$. It is increasing or decreasing in the equilibrium capital stock, k_t^*, depending on whether *TFP* is higher or lower in democracy than in autocracy: $P_k \lesseqgtr 0$ as $\alpha \gtreqless 0$. Note that both results hinge on parameter γ being strictly between 0 and 1 in equation (4). If $\gamma = 1$, the perceived benefit of fighting for democracy only depends on economic well being, and democratic capital does not influence the transition probability. Conversely, if $\gamma = 0$, the benefit of fighting for democracy only depends on democratic capital and not on the state of the economy. The lagged regime enters the function P, to indicate the regime-dependence of the underlying hazard rates.

The results in this section imply that the equilibrium political regime in period t is a stochastic function of three state variables:

$$a_t^* = \begin{cases} 1 & \text{with Prob } P(k_t^*, d_{t-1}, a_{t-1}) \\ 0 & \text{with Prob } 1 - P(k_t^*, d_{t-1}, a_{t-1}) \end{cases} . \tag{8}$$

One of these states is the equilibrium capital stock, the determination of which is discussed next.

3.4 Equilibrium capital accumulation

Here, we discuss the last stage of the game, when investment decisions are made. Given the utility function (2), the first-order condition for optimal investment by the young in period $t-1$ is:

$$-V_c(w_{t-1} - k_t) + E_{t-1}[r_t] = 0 , \tag{9}$$

where the expectation refers to the uncertainty about the future political regime a_t. An individual investor takes the behavior of other individuals as given, but has perfect foresight about the equilibrium capital stock, k_t^*. By (8) and our earlier assumptions, the expected return for an individual investor among the young in period $t-1$ is:

$$E_{t-1}[r_t] = f_k(k_t^*)[1 + (1 - p_t^*)\alpha] . \tag{10}$$

Combining (9) and (10), and setting $k_t = k_t^*$, we can implicitly define the equilibrium capital stock in period t:

$$-V_c(w_{t-1} - k_t^*) + f_k(k_t^*)[1 + (1 - p_t^*)\alpha] = 0 \ . \tag{11}$$

At $k = 0$ the second term goes to $+\infty$ (since $1 > p_t^* > 0$, even if $k = 0$ and $f_k(0) = +\infty$). Hence, $k_t = 0$ cannot be an equilibrium. Moreover, under our assumption on preferences, the first term tends to $-\infty$ as k_t approaches $w_{t-1.}$ Hence, an equilibrium with positive capital exists.

By the implicit function theorem applied to (11) and the expression for equilibrium wages, the equilibrium capital stock in period t is a known function of the probability of autocracy and previous period capital and political regime:

$$k_t^* = K(p_t^*, k_{t-1}, a_{t-1}) \ . \tag{12}$$

To determine the properties of this "structural form", we assume that $V_{cc} + f_{kk}[(1 - p_t^*)\alpha + p_t^*] - f_k P_k(\alpha - 1) < 0$. Under this condition, the K function is always increasing in lagged capital, k_{t-1}. It is decreasing (increasing) in p_t^* if *TFP* is higher (lower) in democracy than in autocracy: $K_p \lesseqgtr 0$ as $\alpha \gtreqless 0$. Intuitively, if democracies have higher *TFP* ($\alpha > 0$), a higher probability of autocracy reduces the expected return of investment. Likewise, a switch from $a_{t-1} = 0$ to $a_{t-1} = 1$ raises k_t^* if $\alpha > 0$; if period $t-1$ wages are higher under democracy, this implies higher capital accumulation.

3.5 Political and economic equilibrium

The structural equations of the model (7) and (12) jointly determine equilibrium capital accumulation and, via (8), the (stochastic) equilibrium evolution of the political regime, as a function of the predetermined political and economic variables $(k_{t-1}, d_{t-1}, a_{t-1})$. Note that these equations imply an "exclusion restriction": democratic capital d_{t-1} influences capital accumulation only through the probability of autocracy, p_t^*. We rely on this exclusion restriction in the empirical analysis to follow.

Equations (7) and (12) can be solved jointly, to obtain the "recursive reduced form":

$$\begin{aligned} p_t^* &= \widetilde{F}(k_{t-1}, d_{t-1}, a_{t-1}) \\ k_t^* &= \widetilde{G}(k_{t-1}, d_{t-1}, a_{t-1}) \ . \end{aligned} \tag{13}$$

Under the additional assumption that $|K_p| > |P_k|$, we obtain the following reduced-form predictions: (i) Higher democratic capital always reduces the probability of autocracy: $\widetilde{F}_d < 0$. (ii) Higher lagged capital reduces (increases) the probability of autocracy if *TFP* is higher (lower) under democracy than under autocracy: $\widetilde{F}_k \gtreqless 0$ as $\alpha \gtreqless 0$. (iii) Higher democratic capital increases (decreases) the capital stock if *TFP* is higher (lower) under democracy than under autocracy: $\widetilde{G}_d \gtreqless 0$ as $\alpha \gtreqless 0$. (iv) Higher lagged capital always increases capital accumulation: $\widetilde{G}_k > 0$.

Associated with (13), we can also write the equilibrium hazard rates (5) on recursive reduced form:

$$h_t^{a*} = \begin{cases} \widetilde{H}^0(k_{t-1}, d_{t-1}) & \text{if} \quad a_{t-1} = 0 \\ \widetilde{H}^1(k_{t-1}, d_{t-1}) & \text{if} \quad a_{t-1} = 1 \ . \end{cases} \tag{14}$$

The regime dependent $\widetilde{H}^a$ functions have properties consistent with (i) and (ii) of the F function. Thus: (i) higher democratic capital raises the hazard rate out of democracy and decreases the hazard rate out of autocracy; (ii) higher lagged physical capital reduces the hazard rate out of democracy and increases the hazard rate out of autocracy if *TFP* is higher under democracy than under autocracy. As further discussed below, this reduced-form specification of the hazard rates is the basis for our empirical analysis of regime transitions.

In Section 3 below, we formulate a specific law of motion, assuming that democratic capital accumulates during democracy and depreciates under autocracy: i.e., as individuals live under democratic rule, they learn to love it. If democracy indeed yields higher productivity (if $\alpha > 0$), the dynamics of the model imply a self-sustaining virtuous circle. When a country becomes a democracy, it enjoys higher efficiency. This increases per capita income and the returns to investment. As a result of both forces, capital accumulation and hence per capita income go up. This, in turn, leads to the consolidation of democracy, which (if $\alpha > 0$), leads to even higher investment in physical capital. The stability of democracy and the positive effects on investment are further enhanced by the ongoing accumulation of democratic capital. In other words, democratic capital adds a multiplier effect to this self-sustaining virtuous circle. Conversely, autocracies remain trapped in a situation of low productivity, low investment and more instability. The model thus makes precise why younger democracies may be more unstable: the risk of overthrow is higher because they have accumulated less democratic capital as

well as less physical capital. naturally, this virtuous circle is only present for those countries where democracy indeed brings about higher productivity. If this premise is violated, democratic capital accumulation continues to promote democratic stability, but the positive feedback effect through physical capital accumulation is lost.

3.6 Predictions for observables

Two issues remain when formulating the testable predictions of the model. First, we only observe per capita income, y, and not the physical capital stock, k. However, using the production function $y_t = A(a_t)f(k_t)$, we can re-express the model predictions of interest in terms of observables. Second, we have left open the question whether *TFP* is indeed higher in democracies than in autocracies. However, we approach the data under this maintained assumption, so as to diminish the taxonomy of cases. Under this prior, we can summarize the theoretical predictions as follows

a. Political transitions Beginning with the reduced-form hazard rates, we can rewrite (14) as

$$h_t^{a*} = \begin{cases} H^0(y_{t-1}, d_{t-1}) & \text{if} \quad a_{t-1} = a_t = 0 \\ H^1(y_{t-1}, d_{t-1}) & \text{if} \quad a_{t-1} = a_t = 1 \ , \end{cases} \tag{15}$$

where the regime-dependent relation between y_{t-1} and k_{t-1}, due to $A(a_{t-1})$, is absorbed in the functional operators. According to this reduced form, the hazard rate out of democracy is decreasing in democratic capital and lagged income ($H_d^0 < 0$ and $H_y^0 < 0$), whereas the effects on the hazard rate out of autocracy are increasing in these variables ($H_d^1 > 0$ and $H_y^1 > 0$). In Section 5, we test these predictions while estimating a set of regime-specific hazard rates.

b. Income on structural form We can convert (12) into a structural form for income:

$$y_t = Y(p_t^*, y_{t-1}, a_{t-1}, a_t^*) \ , \tag{16}$$

where the inclusion of a_t^* and a_{t-1} reflects prospective breaks in the one-to-one relation between income and capital, due to regime-dependent *TFP*. Here, our goal is to test the prediction that current democracy has a positive effect

on current income: $Y(p_t^*, y_{t-1}, a_{t-1}, 1) < Y(p_t^*, y_{t-1}, a_{t-1}, 0)$. But the model also predicts that current income is decreasing in the probability of autocracy ($Y_p < 0$). Therefore, omitting regime expectations from the specification will bias downwards the estimated effect of democracy on income. An equation like (16) is hard to estimate, however, since both p_t^* and a_t^* are endogenous to y_{t-1} and a_{t-1}, as well as democratic capital, d_{t-1}.

Within a given political regime, a, capital and income remain one for one. Moreover, p_t^* – by the definition in (6) – can be replaced by the regime-specific hazard, h_t^{a*}. Therefore, we can express the within-regime development of income as:

$$y_t^{a*} = \begin{cases} Y^0(h_t^{0*}, y_{t-1}) & \text{if} \quad a_{t-1} = a_t = 0 \\ Y^1(h_t^{1*}, y_{t-1}) & \text{if} \quad a_{t-1} = a_t = 1 \ . \end{cases} \tag{17}$$

According to this structural form, income is decreasing in the hazard rate out of democracy ($Y_h^0 < 0$), and increasing in the hazard rate out of autocracy ($Y_h^1 > 0$). Using the hazard rates generated in Section 5, we can isolate these structural effects of regime expectations on growth by the exclusion restriction that democratic capital affects income only indirectly, through the hazard rate. In Section 6, we test these structural predictions. Because the identifying assumptions required for consistently estimating the parameters are less demanding for (17) than for (16), we begin by the within-regime specification.

c. Income on reduced form Whereas consistent estimation of the structural forms requires quite strong identifying assumptions, estimation of the reduced forms for income is more straightforward. Using (7) and (8) in (16), we can write

$$y_t = G(y_{t-1}, d_{t-1}, a_{t-1}) \ . \tag{18}$$

Combining the results above (and assuming $\alpha > 0$), we get the prediction that current income is increasing in democratic capital ($G_d > 0$), although we cannot separately identify the effect running through the actual current regime and the effect running through regime expectations. Further, income is increasing in lagged income ($G_y > 0$), whereas the effect of the past regime can have any sign. Section 6 tests these predictions as well, by estimating a set of reduced-form growth regressions.

The discussion in this subsection gives a crude roadmap to the empirical work to follow. The details of our econometric specification are best

discussed in context. Convincingly defending our identification strategy requires that the reader be knowledgeable about our data, however, including our measurement of democratic capital. The next section is devoted to these issues.

4 Data

We collect annual data on economic development and political regimes for as many countries and as far back as possible. The resulting panel is unbalanced, partly because of data availability and partly because countries do not enter the data set until their year of independence. The Data Appendix at the end of the paper provides more detailed definitions and sources of all variables used in the empirical analysis.

For each country i and year t in our data set, we observe output (GDP) per capita, $y_{i,t}$ in the data set compiled by Angus Maddison and his collaborators (see Maddison, 2001). Uninterrupted data are available from 2000 backwards for most countries, as far back as to 1870 for a number of countries, and to 1850 for some countries. Per capita output is always measured in natural logarithms.

The state of democracy of country i in year t, $a_{i,t}$ is defined in two alternative ways. As in the model, we treat the political regime as a binary variable. Our first definition of democracy is based on the Polity IV data set and is available for all countries above 1/2 million inhabitants from 1800 until 2000. Specifically, we set $a_{i,t} = 1$ if the *polity*2 variable takes a strictly positive value, and $a_{i,t} = 0$ otherwise. This variable has a maximum of 10 and a minimum of -10, depending on the status of six different aspects of political institutions, with a focus on executive powers, executive selection and the freedom of elections. The regime transitions implied by this definition are typically non-trivial and accord well with common interpretations of political history.

Our second definition of democracy is based on Boix and Rosato's (2001) extension of the measure constructed by Przeworski et al (2000). It is a more narrow measure than the Polity variable, which emphasizes the turnover of political power in free and fair elections. This binary variable is available from 1800 until 1994. In a few instances, the Boix and Rosato variable is missing while the Polity IV variable is not (for instance, Boix and Rosato do not attempt to code transition years, while *polity*2 interpolates such years).

In such cases, we supplement the Boix and Rosato definition with the Polity IV definition.

According to both measures, the historical development of democracy varies a great deal across countries. Some nations, such as Afghanistan, China, and Morocco, never experience a transition into democracy. Others, like Australia and Canada, start out as democracies right at independence and never experience an autocratic period. Yet others, such as Costa Rica and Denmark, start out autocratic and then make a single irreversible transition into democracy. A large number of countries have a more eventful history, however, with repeated, intermittent spells of democracy and autocracy. According to the Polity IV measure, Guatemala is the most extreme case, having gone through six periods of democracy and six periods of autocracy since reaching independence in 1839.

The intersection of the economic and political data defines an unbalanced panel, with annual data for about 150 countries over at most 150 years.

4.1 How to measure democratic capital?

To test the predictions discussed at the end of the model section, we need an operational definition of democratic capital, d_t. For a more narrow set of countries and a shorter time period, one could think of many imaginative ways of approaching this task. Keeping within the sparse data of our broad historical panel, however, we create two variables. The first is called *domestic* democratic capital, and is denoted by z_t. We assume that this component accumulates over time, when the members of society gradually gain experience with living in a democracy. This idea has intuitive appeal. A number of mechanisms could make a long-standing democracy more resilient to a coup than a short-standing one, including the build-up of formal and informal institutions from political parties to social norms. The same institutions would make the re-institution of democracy more likely in a nation lapsing into autocracy.

What we need to do here is to specify how a particular historical path in country i up to year t, $\{a_{i,t-\tau}\}_{\tau=0}^{\tau=t_0}$, maps into a value of $z_{i,t}$. We are very agnostic about functional form. The simplest assumption might be to assume that democratic capital accumulates in years of democracy, and depreciates geometrically, at the rate $(1-\delta)$, in years of autocracy:

$$z_{i,t} = (1 - a_{i,t}) + \delta z_{i,t-1} \ .$$

In this case, we can solve backwards to obtain (assuming that initial democratic capital is zero):

$$z(\delta)_{i,t} = (1-\delta)\sum_{\tau=0}^{\tau=t_0}(1-a_{i,t-\tau})\delta^{\tau} \ , \tag{19}$$

where t_0 is either the year of independence or the year of 1800, whichever comes last. Thus, democratic experience is more valuable the closer to the present it is. Note that uninterrupted democracy makes democratic capital eventually converge to a steady-state value. We use the notation $z(\delta)$ to emphasize that dependence on the depreciation rate, and multiply with $(1-\delta)$ such that the resulting expression is scaled to $[0,1]$. As further discussed further, δ is estimated from the data.

Figure 1 illustrates the time path of domestic democratic capital for two countries, namely Spain and Sweden, given two values for $\delta = 0.94$ (in part a) and 0.99 (in part b), which turn out to be the maximum and minimum values we estimate below.[2] As the data begin, in 1800, Spain starts out as an autocracy. A first brief two-year period of democracy in the early 1870s (the First Republic) leads to a marginal accumulation of democratic capital, followed by depreciation due to a six-year relapse of autocracy. Reforms in 1876 institute a constitutional monarchy, and Spain enters a period when the Liberal and Conservative parties alternate in power. This democratic period (according to the Polity IV criterion) entails considerable accumulation of democratic capital, until the coup of General Primo de Rivera in 1923. At a relatively high level of domestic democratic capital, democracy returns with the establishment of the Second Republic in 1931, only to be broken by the establishment of the Franco dictatorship. After Franco's death, democratic capital once more starts accumulating in 1976, to more or less reach the earlier 1930s level in the year 2000.

Sweden's history looks very different. After a series of small reforms in the late 19th century, the breakthrough of parliamentarism and the institution of universal male suffrage give Sweden democratic status in 1910 (by the Polity IV criterion). Uninterrupted democracy since that date brings continued accumulation until the year 2000.

Figures 1a and 1b illustrate the effects of the depreciation rate $1-\delta$. The higher depreciation rate (of 0.06) in Fig 1a makes the paths of domestic

[2]The definition of democracy used in Figure 1 is that by Polity 4.

democratic capital steeper – during democracy, as well as autocracy – than the paths with the lower depreciation rate (of 0.01) in Fig 1b. The higher depreciation rate makes the Spanish relapses into autocracy more costly and, as a result, Sweden's domestic democratic capital catches up with that of Spain around 1930, rather than around 1950. Moreover, in Figure 1a Sweden has more or less converged to the democratic steady state (of 1) by the year 2000, whereas it has 40% of the way to go in Figure 1b.

The second component of democratic capital is based on democratic conditions abroad. It is easily imagined how the experience with democracy in foreign, neighboring countries could spill over into greater domestic appreciation of democracy and greater willingness to defend these values. As we do not directly observe these spill-overs, however, we have to find a parsimoniously defined proxy given our data. Thus, we create the variable *foreign* democratic capital, labeled f_t, to measure a country's "closeness to democracy", given the incidence of democracy in neighboring countries. We have tried out different versions of this specification, with alternative sets of weights corresponding to closeness in terms of geography, history or culture. The results below are based on geography and the Polity IV democracy data. Specifically, for country i and year t, we define $f_{i,t}$ by

$$f(\rho)_{i,t} = \sum_{j \neq i} (1 - a_{j,t}) \varpi(\rho)_t^{i,j}, \tag{20}$$

where $a_{j,t}$ is a measure of how autocratic is the regime of country j in year t and the weight $\varpi(\rho)_t^{i,j}$ measures the distance between country i and country j. Specifically, let $D^{i,j}$ be the (time-invariant) great circle distance between the capitals in i and j, D be half the length of the equator, and N_t be the number of independent countries in the world with a polity2 score in year t. Then, we impose $\varpi(\rho)_t^{i,j} = (1 - \frac{D^{i,j}}{D})/N_t$ if $\frac{D^{i,j}}{D} \leq \rho$, and $\varpi(\rho)_t^{i,j} = 0$ if $\frac{D^{i,j}}{D} > \rho$. In words, the weight $\varpi(\rho)_t^{i,j}$ is a declining function of the standardized distance between i and j; if the relative distance $\frac{D^{i,j}}{D}$ is outside the radius ρ, the weight drops to zero. The dependence of our measure of foreign democratic capital on ρ is emphasized by the notation $f(\rho)$. Like δ, ρ is estimated from the data. Finally, we replace $(1 - a_{j,t})$ by country j's continuous polity2 score and divide by 10, such that the resulting expression is scaled to $[0, 1]$.

Figure 2 illustrates the time path of foreign democratic capital in two countries, namely Belgium and Chile, when $\rho = 1$, such that every country

j in the world is included in the neighborhood.[3] The two variables share a general time pattern, reflecting the gradual adoption of democracy throughout the 19th century and three waves of democratization in the 20th century. Why is Belgium's foreign democratic capital more variable than that of Chile? Because Belgium is closer to the coincident deteriorations – in the interwar period – and improvements – in the early 1900s and the 1990s – of democratic conditions across Europe, while Chile is closer to the more dispersed political transitions in Latin America.

Reassuringly, both components of democratic capital are strongly correlated with citizens' opinions about the value of democracy as a form of government in a large cross section of countries. In the late 1990s, the World Value Surveys asked individuals of about 60 developing and developed countries to rank (on a 1 to 4 scale) their agreement with the following statement: "Democracy may have problems but it's better than any other form of government". The average response in each country can be taken as a rough measure of how much democracy is appreciated.[4]

In column 1 of Table 1, we regress these average country responses against the two components (domestic and foreign) of democratic capital measured in 1999. Both components are strongly and significantly correlated with appreciation of democracy. The remaining columns of Table 1 show that the correlation persists and becomes even stronger as we control for economic development, for the current political regime and for human capital (gauged by average school attainment as in Barro and Lee, 2000), all measured in 1999. Figure 3 shows that the correlations behind the estimates in Table 1 (column 4) are not due to outliers. Interestingly, columns 3 and 4 of the table suggest that the appreciation of democracy as a form of government is higher in autocracies than in democracies, once we control for democratic capital. These correlations confirm that our measures of democratic capital are not empty. Individuals value democracy more if they live in a country with a long democratic tradition and if they are surrounded by other democracies, irrespective of economic development, average education and

[3]Since $f(\rho)_{i,t}$ is only defined by the neighbors of country i, we can draw the (hypothetical) foreign democractic capital of Belgium and Chile before the years in which they become independent nations (in 1830 and 1818, repectively).

[4]In the World Value Surveys, a value of 1 corresponds to strong agreement, while 4 corresponds to strong disagreement with the statement in the text. In Table 1 and Figure 3 below, we measure the appreciation of democracy as 4 minus the country average response (times a 100); thus, higher values correspond to more appreciation for democracy.

the current political regime.

But what about our identifying assumptions? As explained above, to identify the effect of the probability of democracy on growth, we have to assume that our measure of democratic capital influences the willingness of citizens to stand up for democracy, but has no direct effect on growth (after conditioning on other controls, including country fixed effects). Motivated by this concern, in columns 6 and 7 we also look at the correlation between democratic capital and a widely used measure of property right institutions, which is also based on perceptions data. The variable *Government Anti Diversion Policies* ($GADP$) is used by Hall and Jones (1999) and many others in the macroeconomic development literature to capture the effect of institutions on economic development. After controlling for per-capita income, current democracy, and (in column 7) human capital, no positive correlation is left between perceptions of property rights protection and democratic capital. If anything, foreign democratic capital appears to be negatively – not positively – correlated with $GADP$. This reassures us that the assumed exclusion restriction is not grossly inconsistent with the data.

We now turn to study the role of democratic capital in explaining political and economic development in our long historical panel.

5 Political transitions

In this section, we study transitions from democracy into autocracy and vice versa, using yearly data back to the mid 1800s.

5.1 Econometric specification

Our main goal is to test whether democratic capital indeed reduces the hazard out of democracy and increases the hazard out of autocracy, as predicted by the model. We also want to consider the impact of economic development on the hazard rate, expecting to find higher income being associated with more stability of democracy and more instability of autocracy. A rejection of this prediction could mean either that democracy does not have any higher productivity than autocracy (that $\alpha < 0$), or that economic well-being is not a determinant of the citizens' willingness to stand up for democracy (that $\gamma = 0$ in equation (4)). In addition to the substantive results, we obtain two sets of estimated hazard rates, one out of democracy and one out of

autocracy. As already mentioned, these will be used in Section 6 to test the prediction that a higher probability of autocracy reduces economic growth.

What is the specification that we take to the data? We start from the reduced-form hazard rates out of democracy and autocracy, equation (15). Drawing on the previous section, we replace d_{t-1} in the theory with domestic and foreign democratic capital, $z(\delta)_{i,t-1}$ and $f(\rho)_{i,t-1}$, as defined in the previous section. In addition to lagged income $y_{i,t-1}$, we also include a number of fixed and time varying controls $\mathbf{x}_{i,t}$ to reflect country-specific probabilities of a coup or an uprise, corresponding to $\chi(a)$ in the model. Thus, we want to estimate regime-specific hazard rates of the form:

$$h^a_{i,t} = H^a(z(\delta)_{i,t-1},\ f(\rho)_{i,t-1},\ y_{i,t-1},\ \mathbf{x}_{i,t}) + \mu_{i,t},\quad a = 0, 1\ , \tag{21}$$

where $\mu_{i,t}$ is an error term. Following the distributional assumption (about ν) in the model, and taking the right-censoring of our data on democracy into account, we specify each hazard rate as a probit.

How do we carry out the estimation? The two democratic-capital variables are only defined up to the parameters δ and ρ. These two parameters thus enter both hazard rates. Using the definitions in (19) and (20) and imposing the constraint that δ and ρ are equal across the two hazard rates, we obtain a well-defined likelihood function. With so many regime shifts for a number of countries and so many country pairs, however, this likelihood function is highly non-linear. To find the maximum likelihood values, we follow an incremental procedure. First, we fix values for δ and ρ; then we estimate all the other parameters and associated standard errors and compute the value of the likelihood function. We repeat this procedure for a large range of values of δ and ρ, always re-estimating all other parameters as we vary δ and ρ. This way we create an envelope to the likelihood function over δ and ρ. Finally, we select the values of δ and ρ (and all other parameters) corresponding to the maximum of the (envelope) likelihood function. This yields maximum likelihood estimates of all coefficients of interest, except that the estimated standard errors treat parameters δ and ρ as known (rather than estimated).

For ρ, this procedure always yields a unique maximum independently of the specification, namely $\rho = 1$, i.e., all countries in the world are included in the neighborhood. For δ, the maximum value depends on the specification of the underlying hazard rates, but always lies in the interval $[0.94, 0.99]$ – see further below.

Our basic hazard rates pool together all the data over countries and years. This raises an issue familiar from the labor literature: state dependence vs. unobserved heterogeneity. According to our theory, two countries at the same levels of income and other observables need not have the same hazard rate. Specifically, a democracy with longer and more recent experience of democratic regime in the past, or with more democratic neighbors, should have a higher democratic capital and a lower estimated probability of making a transition towards autocracy.[5] Still, such a country may be more stable not because of its democratic history and environment, but because of some other unobserved and slow-moving variable making it more stable. To cope with this omitted-variable problem, we re-estimate the hazard rates allowing for unobserved heterogeneity in the form of a random country effect. We then test (by a likelihood ratio test) whether the pooled specification can be rejected in favor of the random-effect specification (see further discussion below).

5.2 Basic results

We start with the most parsimonious specification, which only includes the variables of interest: domestic and foreign democratic capital and per capita income. With this specification, the maximum likelihood estimate of the depreciation rate of democratic capital is $\delta = 0.94$ (and the neighborhood radius is $\rho = 1$). Columns 1 and 2 of Table 2 report the hazard rate out of democracy and autocracy, respectively. The estimated coefficients on both components of democratic capital are highly statistically significant and have the expected sign: democratic capital reduces the probability of exit from democracy (column 1) and has the opposite effect on exit from autocracy (column 2).

A higher income level significantly decreases the risk of exit from democracy (column 1), but it has no significant effect on the probability of exit from autocracy (column 2). This asymmetric income effect on the two hazard rates reproduces earlier findings by Przeworski et al (2000) and (conditional on the specification) by Acemoglu et al (2005b). In terms of the theoretical model above, a negative income effect on exit from democracy is consistent with the average democracy being more productive than the average autocracy

[5] In analogy with labor economics, our procedure thus augments the information of the length of current unemployment spells with accounts of the full lifetime uneployment/employment history of each individual in the sample.

($\alpha > 0$ in the model), and with the assumption that citizens are more willing to fight for democracy if the economic stakes are higher ($\gamma > 0$ in (4)). But these assumptions also imply that the exit from autocracy should fall with income, and this is not what we find.

A possible interpretation of this asymmetric income effect is that political transitions differ, depending on the initial state. The social and political mechanisms that prevent a successful coup are different from those associated with the ousting of a dictator. In terms of our model, the perceived social benefit of defending democracy from a coup depends on the economic stakes and goes up with income ($\gamma > 0$ in democracy). But the social benefit of overthrowing a dictator is not affected by the state of the economy ($\gamma = 0$ in autocracy).

The regressions underlying columns 1 and 2 pool all countries together and thus exploit both within and across country variation. This raises an important concern. Domestic democratic capital summarizes the history of democracy in each country. Perhaps the significant coefficient of this variable is just hiding unobserved heterogeneity (i.e., some omitted variable that varies across countries but not over time). This suspicion is also supported by the significant p-value in the row labeled "LR-test". This statistic refers to a likelihood-ratio test for a specification with random country-specific effects against our basic pooled specification (i.e., a test of the null that the share of the variance explained by the random country effects is zero). A significant p-value means that the random country effects explain a significant fraction of the variance in the data.

In terms of our model, the specification in columns 1 and 2 really assumes the probability that a coup or uprise opportunity presents itself is the same across countries and time: i.e., that $\chi_{i,t}(a)$ is the same for all i and t. To relax this strong assumption in columns 3-6, we add a number of control variables to pick up country and time variation in this generic instability: indicators for years t in which country i was at war (contemporaneous and lagged once); several indicators for fixed country characteristics: legal and colonial history, geographic location, how democratic the country was when it first became independent (or when the score for polity2 first became available); an indicator for the few countries that switched regimes more than 5 times; a flexible polynomial in time to capture worldwide trends in the incidence of democracy and autocracy (the results are robust to replacing such polynomials with

indicators for 20-year periods).[6] While columns 3 and 4 use the Polity IV definition of democracy, columns 5 and 6 use the Boix and Rosato definition for an otherwise almost identical specification of the hazard rates (full details are provided in the note to Table 2 and the variables are defined in a data appendix). With this specification, the maximum likelihood value estimate of the depreciation rate of democratic capital is $\delta = 0.99$ (columns 3-4) and $\delta = 0.97$ (columns 5-6), respectively.

As is evident from Table 2, the results on democratic capital and income from the most parsimonious specifications hold up very well. Among the other results (not reported), the occurrence of wars is destabilizing both for democracies and autocracies, but the effect of war on autocracies manifests itself one year after the war, while it is contemporaneous in democracies. Countries starting out with stronger constraints on the executive turn out to be more stable as democracies, but no less stable as autocracies (given domestic democratic capital). Most of the other historical or geographic dummy variables have statistically significant coefficients, as do the first and second component of the polynomial in time. These results are robust to alternative specifications with similar controls.

With this specification, the likelihood-ratio test for random effects is never statistically significant, although the p-value is lower in column 4 (autocracy as defined by Polity IV) than in the other columns. This test relies on functional-form assumptions (about the hazard function and the influence of the random effects on the political transition). Nevertheless, the results are robust to alternative assumptions about the hazard function.[7]

Overall, exit from democracy is more successfully explained than exit from autocracy. The pseudo R-square (i.e., roughly the percent increment in the number of correctly predicted outcomes in the model at hand relative to a model with only a constant) is about 22% for exit out of democracy, and about half of that for exit out of autocracy. But the estimated annual prob-

[6] We cannot run the hazard rates with fixed year effects, becuse the onset of democracy and autocracy is rare enough that we would perfectly predict too many transitions.

[7] The LR tests in Table 2 are based on estimates of a random effects logit (vs. a pooled logit), which is consistent with a proportional hazard model with a logistic hazard and a normally distributed random country effect (see e.g., Jenkins, 2004). Similar results are obtained with a complementary loglog hazard model. In these random effects estimates, both components of democratic capital remain highly significant in the hazard functions out of democracy, while foreign (but not domestic) democratic capital remains significant in the hazard function out of autocracy.

abilities of transitions remain low. Figure 4 shows frequency distributions of the estimated probabilities of exit from democracy and autocracy, based on the specifications in columns 3 and 4 of Table 2. Although the probability of exit from democracy (autocracy) can be as high as 50% (30%) for some observations, most of the probability mass is concentrated between 0 and 10%, with average hazard rates around 2 -3%.

On average, political transitions are thus rare events, making both political regimes quite stable. Moreover, the determinants of interest have quite modest effects on the probability of transition, despite their high statistical significance. In particular, by the point estimates in columns 3 and 4, a one-time jump of domestic democratic capital from its minimum of 0 to its maximum of 1 would reduce the probability of exit from democracy by almost 2 percentage points and raise the probability of exit from autocracy by almost 5 percentage points for an average country-year in the sample. According to the same estimates, a hike in foreign democratic capital of about 0.4 – corresponding to the change in European countries from 1970 to 2000 (cf. Figure 2) – reduces the hazard rate out of democracy by almost 2 percentage points and raises the hazard rate out of autocracy by about 3.5 percentage points.

5.3 Robustness

The test for random effects checks for the presence of random omitted variables invariant over time and orthogonal to the other regressors. To allow for a country effect correlated with some of the regressors, we have also estimated the hazard rates by conditional logit, including country fixed effects. This way we estimate the coefficients of interest from the within-country variation only, exploiting the countries that have *completed* at least one spell in the relevant regime. Unfortunately, this dramatically restricts the sample. When estimating the risk of exit from democracy, we lose all long-lived democracies, which never leave their single democratic spell. Correspondingly, we lose all countries experiencing just one spell of autocracy without ever becoming democracies. Some, but not all, of the results reported in Table 2 are robust to this estimation method. Specifically: (i) The effect of foreign democratic capital on both hazard rates is very robust. (ii) The negative effect of per-capita income on the hazard rate out of democracy is very robust, and per-capita income now becomes significant, with the expected (positive) sign also under autocracy. These findings contradict those of Acemoglu, Robinson

and Yared (2005b), although these authors use as the dependent value the full discrete (21-step) polity2 score rather than a binary indicator. (iii) The effect of domestic democratic capital on both regimes is not robust, however (the estimated coefficient changes sign and is significant in both hazard rates). This lack of robustness seems to be due to the drastic selection (and reduction) of the sample. But the issue remains to be more carefully studied.

Table 3 further investigates the robustness of the results in Table 2. An important issue is whether democratic capital, as we measure it, really picks up the historical experience of (or the geographic proximity to) democracy as such, rather than some other factor that could be producing similar results. Already Lipset (1959) and Almond and Verba (1963) pointed to the correlation between education and attitudes towards democracy. Recently Glaeser, Ponzetto and Shleifer (2005) present additional evidence of such a correlation. They also present a formal (but static) model of the participation of citizens in support of democracy by political action, in analogy with the model presented in Section 2 above. The Glaeser et al model predicts that the likelihood of a successful coup against democracy is decreasing in the level of education, and that the likelihood of a successful uprise against autocracy is increasing in the level of education.

How are the hazard rates estimated in this section affected by the level of education? We do not have any wide ranging measure of education sampled far back in time for a large number of countries. From 1960, however, we can use an annual measure of the education level of the population above 25 years of age, constructed in Persson (2005) by interpolating the five-year observations from Barro and Lee (2000).[8] This measure of human capital is quite closely correlated with our variable domestic democratic capital, on the order of 0.6 in the full sample.

Columns 1 and 2 of Table 3 show the results for our most parsimonious specification of the hazard rates, identical to that in columns 1 and 2 of Table 2, except for the shorter sample period and the addition of human capital (we retain $\delta = 0.94$ as in Table 2). The estimate is indeed statistically significant with the expected sign: education reduces the risk of exit from democracy and increases the risk of exit from autocracy. Our two measures of democratic capital remain significant both under democracy and autocracy, however, and the point estimates are even higher in absolute value than in Table 2.

[8]The Barro and Lee variable is also one of the measaures used by Glaeser, Ponzetto and Shleifer (2005).

The effect of income on the probability of regime change also remains similar to that in Table 2.

To facilitate the interpretation of our results, the rest of Table 3 decomposes the effect of domestic democratic capital into one component corresponding to the current spell (under democracy or under autocracy), and another corresponding to more distant political history. Specifically, column 3 estimates the risk of exit from democracy by replacing domestic democratic capital with "current domestic democratic capital", the amount accumulated in the current democratic spell (i.e., this variable starts off at zero at the beginning of each new democratic spell) and "past democratic capital", the remaining component of democratic capital (i.e., total domestic democratic capital minus the current component). Only the current component turns out to be statistically significant, while more distant democratic history does not seem to matter. This finding is further confirmed in column 4, where current and past domestic democratic capital are constrained to have the same coefficient (as in Table 2). Instead, we add the duration of the current democratic spell as a further control. With $\delta = 0.99$, the duration of the current spell and our measure of current domestic democratic capital are almost collinear. Indeed, the estimated coefficient on these two variables is almost identical and the coefficient on current duration is more precisely estimated, although the high collinearity deprives both variables of statistical significance.

Finally, we ask the same question about the risk of exit from autocracy. Here, we cannot decompose democratic capital into current and past, because no democratic capital is accumulated under autocracy. Instead, following column 4, we add the duration of the current autocratic spell as a regressor to our basic specification in column 5. Here, the duration of the current spell is not statistically significant, while domestic democratic capital retains its sign and significance. Thus, the data suggest that distant democratic experience is relevant in explaining exit from autocracy, while what makes democracies stable is the duration of the current democratic regime. Together with the different effect of per capita income, this asymmetry underlines that regime transitions out of democracy are genuinely different than transitions out of autocracy.

6 Economic growth

In this section, we use our panel to estimate structural and reduced forms corresponding to the growth part of our theoretical model. The first subsection deals with democratic and autocratic regimes separately, looking at the effect of regime stability on growth. The remaining subsections consider the full sample also comparing growth across regimes.

6.1 Within regimes – structural form

6.1.1 Econometric specification

We start from the following basic specification estimated separately for each political regime:

$$y^a_{i,t} - y^a_{i,t-1} = \beta y^a_{i,t-1} + \lambda^a \widehat{h}^a_{i,t} + \boldsymbol{\gamma}\mathbf{x}_{i,t} + \alpha_i + \theta_t + \epsilon_{i,t} \ , \ a = 0, 1 \ . \qquad (22)$$

This equation can be derived from (17) by assuming log-linearity (y denotes the log of per capita income), subtracting $y_{i,t-1}$ from both sides, and assuming that the error term $\varepsilon_{i,t}$ has a specific country and year component in addition to white noise. The predicted hazard rate out of regime a, in country i during year t, $\widehat{h}^a_{i,t}$ is obtained from the estimates in Section 5, the vector $\mathbf{x}_{i,t}$ contains additional time-varying controls, as described below, while α_i and θ_t denote country and year fixed effects. Specifying an equation for growth rather than level of income makes the dependent variable more noisy, but differences out likely sources of unobserved heterogeneity in the level of income. We do not adjust our standard errors for the fact that $\widehat{h}^a_{i,t}$ is a generated regressor.[9]

Identification of the parameter λ^a requires that the hazard rate $\widehat{h}^a_{i,t}$ is uncorrelated with the error term, $\epsilon_{i,t}$. Note that the country fixed effect α_i in (22) picks up any growth effect of the country-average hazard rate $\widehat{h}^a_i$, including any fixed-country characteristics that enter the estimation of the hazard rate in the last section. Similarly, the year fixed effect θ_t picks up any effect on growth of common trends or fluctuations in the yearly average hazard rate $\widehat{h}^a_t$. Thus, λ^a is only identified from the country-specific time variation in the estimated hazard rate $(\widehat{h}^a_{i,t} - \widehat{h}^a_i - \widehat{h}^a_t)$.

This variation in our generated regressor is due to just four components: the indicators for wars and lagged wars, time variation in the domestic and

[9] Under the null hypothesis that $\lambda^a = 0$, the standard errors are still correctly estimated and thus, the t-statistics are still valid tests of the null.

foreign components of democratic capital, and lagged income. An independent effect of lagged income on growth already appears in (22). To take care of the likely direct effect of wars on the growth rate, we always include the two war indicators in $\mathbf{x}_{i,t}$. When it comes to the country-specific time variation in domestic and foreign democratic capital, we rely on the exclusion restriction implied by our model, namely that democratic capital does not have a direct effect on growth.

For foreign democratic capital, $f_{i,t}$, the exclusion restriction relies on the incidence of democracy in neighboring countries being uncorrelated with domestic current growth. This may pose a problem if (i) nearby democracies have higher incomes than nearby autocracies, and (ii) higher incomes abroad generate higher domestic growth (say trough international trade). To address this prospective problem, we define a new variable called foreign income, $y^f_{i,t}$. For country i in year t, we define foreign income by

$$y^f_{i,t} = \sum_{j \neq i} \varpi(\rho)^{i,j}_t y_{j,t} \ , \tag{23}$$

where the bilateral weights $\varpi(\rho)^{i,j}_t$ are *identical* to the weights used in the definition of foreign democratic capital (i.e., weights declining geometrically in geographic distance). To purge out any (spurious) relation between current domestic growth and foreign democratic capital, through foreign income, we always include $y^f_{i,t}$ in the vector of controls, $\mathbf{x}_{i,t}$.

Another possible concern is that during years of political transitions, the probability of a coup is high at the same time as growth suffers because of disruptions, political violence, and so on. It is not at all obvious why this should be a serious concern: by construction, our *estimated* hazard rates are just functions of the same variables as those in our growth regressions plus the two excluded components of democratic capital. Nevertheless, to ensure that our estimates are not driven by transition years, we also include an indicator for transition years (the year of entry in autocracy or democracy, as well as the preceding year).

Finally, in the 1990s many socialist regimes in Central and Eastern Europe did not only undergo political transformations, but also a deep change of their economic systems which also affected their growth process. To avoid confounding these economic and political transitions, we also include a dummy variable equal to unity after 1989 in the former socialist countries of Central and Eastern Europe, and in the Asian provinces of the former

Soviet Union (this variable only enters the regressions under autocracy, as it is collinear with other included regressors under democracy).

Below, we offer some suggestive evidence that our identifying assumption is fulfilled.

6.1.2 Results

Table 4 displays the estimation results. In parenthesis, we report Huber-White robust (i.e., allowing for heteroskadasticity) standard errors. Country and year fixed effects, foreign income, plus indicators for wars and lagged wars are always included in the specification, in addition to the variables indicated in the left-most column. Throughout the table, we use the hazard rates as predicted by columns 3 (for democracies) and 4 (for autocracies) of Table 2, i.e., with the parameter $\delta = 0.99$. We comment below on which results are robust to alternative values of δ.

Column 1 reports the basic regression for close to 3,800 democratic country-years in the panel. As expected, lagged income has a negative coefficient, indicating income convergence of about 4% per year, the coefficient on transition years is negative, and the coefficient of foreign income (not shown) is positive and significant. More importantly, the coefficient on the hazard rate out of democracy is highly significant with a negative sign, as predicted by the model in Section 2 under the assumption that democracies have higher TFP than autocracies ($\alpha > 0$).

The estimated coefficient on the probability of a transition out of democracy is -12. This looks like a large effect: if the probability were to jump from 0 to 1, the impact on growth would be a fall by 12 percentage points. As discussed in connection with Figure 4, however, the observed range of variation of the estimated hazard rates within regimes is small. Let us consider the experiments discussed in Section 4. Suppose that domestic democratic capital were hypothetically to increase from its minimum of 0 to its maximum of 1, cutting the hazard rate out of democracy by about 2 percentage points. Given the point estimates in column 1, this would raise yearly growth by over 0.2 percentage points, and – with a convergence rate of 0.04 – long-run income by about 6 percent. An increase in foreign democratic capital by 0.4 units, corresponding to the difference in Europe between the 1970s and the present time (cf. Figure 2), would also cut the hazard rate out of democracy by just below 2 percentage points and thus, have a similar effect on long-run income.

As already discussed, identification hinges on the exclusion restriction that the two components of democratic capital do not exercise a direct effect on growth (on top of the functional form assumption). How credible is this restriction? Section 4 presented some independent evidence in favor of the restriction. The statistical question is whether domestic and foreign democratic capital are correlated with the residuals from the regression underlying column 1. We approach this question in the spirit of an "overidentification test", i.e., we regress these residuals against all "instruments", i.e., all regressors included in the growth equation plus the two excluded components of democratic capital. The Sargan-Hansen statistic (the R-squared from the regression times the number of observations) displayed at the bottom of the table is very low. While this is not an appropriate test statistic in this context (as the full model we estimate is not linear), it indicates that the exclusion restriction is likely to hold. In column 2, we instead add domestic and foreign democratic capital directly in the regression of column 1. Note that we can include both components of democratic capital at the same time, because they enter the predicted hazard rate in a highly non-linear fashion. While the coefficients on the hazard rate and the other variables are basically unaltered, the two components of democratic capital are neither individually nor jointly significant (cf. the F-statistic in column 2).

These results are robust. They hold for a wide range of estimates for the value of δ in our definition of democratic capital (for δ between 0.94 and 0.99). They also hold if we add interaction terms between year indicators and continent indicators to the specification, to allow for omitted variables that might influence the time profile of growth in different ways across groups of countries.

Columns 3 and 4 of the table show corresponding estimates for close to 4300 autocratic country-years. Here, the fit is generally worse (the adjusted R-squared drops considerably), and the results are more disappointing from the viewpoint of the theoretical predictions. Specifically, the hazard rate out of autocracy has a negative – not a positive – and marginally significant coefficient, contradicting the prediction that the probability of exit from autocracy has a positive effect on growth, if TFP is higher under democracy ($\alpha > 0$). The estimates are less precise and less robust than those under democracy. Both components of democratic capital become insignificant (though still with a negative estimated coefficient) with a lower value of the parameter δ in our definition of democratic capital, or if we include interactions between year indicators and continent indicators. If anything, however, the risk of

exit from autocracy appears to hurt growth, suggesting that the negative effect of political instability dominates the expected benefit of becoming a democracy. This negative effect of political instability under autocracy is consistent with similar findings by Przeworski et al (2000)

Overall, these results suggest a puzzling asymmetry between democracies and autocracies. According to the theoretical model, the risk of exit from a political regime hurts growth, if *TFP* is higher under the regime that is abandoned, compared to the regime entered into. Thus, if democracy has higher *TFP* than autocracy on average, we should find that the risk of leaving democracy hurts growth, and the risk of leaving autocracy induces faster growth. The data support the first but not the second prediction. A possible interpretation of this puzzle is that the effect of democratic government on economic performance differs across countries. In the group of countries that are more often in the democratic state, democracy on average leads to a superior performance than autocracy; while in the group of countries that are more often under autocracy, the two forms of government do not significantly differ in terms of economic performance. Note that this interpretation is also consistent with the asymmetric effect of income on the hazard rate under the two political regimes discussed in Section 5.

Using the alternative definition of democracy by Boix and Rosato, yields similar results.[10] Both estimated hazard rates have a negative effect on growth. The effect in democracies is again more precisely estimated (and statistically significant) than that within autocracies.

6.2 Across regimes – structural form

6.2.1 Econometric specification

We now proceed to the full sample across political regimes. Specifically, we estimate an equation like:

$$y_{i,t} - y_{i,t-1} = \beta y_{i,t-1} + \phi(1 - a_{i,t}) + \lambda \widehat{p}_{i,t} + \boldsymbol{\gamma} \mathbf{x}_{i,t} + \alpha_i + \theta_t + \epsilon_{i,t} \qquad (24)$$

Following the discussion in Section 3, we also control for the *actual* political regime as measured by the binary variable $(1-a_{i,t})$ (i.e., an indicator variable for democracy). Further, we replace the within-regime hazard rate with the probability of autocracy, $\widehat{p}_{i,t}$, defined in accordance with (6) in Section 3 (by

[10] Here, we use the hazard rates estimated in columns 5 and 6 of Table 2.

that definition, the lagged regime $a_{i,t-1}$ also enters on the right-hand side). Our parameters of interest are thus ϕ and λ, capturing the growth effects of democracy (vs. autocracy) and of the probability of autocracy.

As the democracy variable is binary and we include fixed country and year effects, we estimate the parameter ϕ by a difference-in-difference methodology, where countries experiencing a regime change are "treated", and those not experiencing a regime change at that time are "controls".[11] Our identifying assumption is that the selection of countries into democracy or autocracy is uncorrelated with the country-specific and time-varying shock to growth, $\epsilon_{i,t}$. Note that this allows any kind of correlation between regime selection and the country-specific, but time-invariant, component of the error term in the growth equation, α_i. Thus, some fast (or low) growth countries could systematically be more likely to become democracies (or autocracies). What we must rule out, however, is that (after conditioning on all our controls), in the absence of the regime change, average growth in a "treated" country would have been the same as in the "control" countries. For instance, we must rule out that transitions into democracy are enacted by far-sighted leaders, who also have a lasting impact on economic growth, irrespective of the regime change. Or conversely, that lapses into dictatorships are systematically correlated with a lasting deterioration of economic performance that would have taken place even without the regime change.

In other words, identification relies on absence of correlation between the *change* in the unobserved determinants of growth before and after political transitions, and the occurrence of transitions. A concrete example where this could go wrong is the development in the former Communist regimes after the fall of the Berlin Wall, where many of these states did not only change their political regime, but also underwent a transformation towards a market economy. Hence, as before, we include in $\mathbf{x}_{i,t}$ the dummy variable for socialist transitions after 1989 defined in the previous subsection. We also continue to control for transition years (now defined as the year of transition plus the year before and after), to check for the presence of an "Ashenfelter's dip" where growth is systematically lower at the time of democratic transitions, because of the uncertainty and disruptions that surround regime changes.

The identifying assumption is made more credible by the presence in equation (24) of the probability of autocracy $\hat{p}_{i,t}$. To see this, consider a democracy that is widely (and correctly) expected to become an autocracy.

[11] See, for instance, Persson (2004), Giavazzi and Tabellini (2005)

This expectation leads to a deceleration of investment and growth well before the actual coup, so that very little happens to growth when the actual regime change takes place. If we do not control for the increasing probability of autocracy, we underestimate the benefit of democracy (a downwards bias in the estimate of ϕ). By the same argument in reverse, we would also underestimate the benefit of democracy if we failed to control for the expected regime change, because the expectation of an upcoming uprise against autocracy helps economic growth already before the fact. Hence, controlling for the probability of autocracy should make identification more credible, and lead us to find a stronger positive effect of democracy on growth.

Identification of parameter λ raises the same issues as in the prior subsection. Lack of time variation in the estimated hazard rates and hence, in $\hat{p}_{i,t}$, raises another issue. Regime changes are rare events and, as shown in Figure 4, the estimated hazard rates are generally small. This means that the probability of autocracy in period t, $\hat{p}_{i,t}$, is strongly collinear not only with lagged democracy, $1 - a_{i,t-1}$, but also with current democracy, $1 - a_{i,t}$. As a result, it is difficult to separately estimate the effect of actual and expected regime changes. Lack of time variation in the estimated hazard rates could also reflect measurement error in our estimate of $\hat{p}_{i,t}$. If so, the measurement error would end up in the residual of the growth equation (if λ is different from zero), aggravating to the identification problem discussed above. Thus, the problems of identification and multicollinearity are related.[12]

6.2.2 Results

Table 5 reports the estimates of (24) on more than 8000 country years, when we treat democracy as exogenous. Except for the displayed coefficients, we always include fixed country and year effects and control for foreign income, wars, lagged wars and the indicator for formerly socialist countries in the

[12] An alternative, and more structural, approach would be to exploit the identifying assumption that democratic capital determines growth only through actual $(1 - a_{i,t})$ and expected $(\widehat{p}_{i,t})$ regimes. This would mean estimating (24) by IV using both components of democratic capital as instruments for current democracy. Since democratic capital also enters the probability of autocracy through the hazard rates, we would achieve identification through an exclusion restriction (the effect of democratic capital on growth is only indirect, via actual and expected regimes), and a functional form restriction (the effect of democratic capital on expected regimes is fully captured by the non-linear function $\widehat{p}_{i,t}$). Given the strong correlation between $(1 - a_{i,t})$ and $\widehat{p}_{i,t}$ noted above, such identification would be quite fragile, however, and we do not pursue it here.

Soviet Union and Central and Eastern Europe after 1989. Aside from the dummy variable for formerly socialist countries, the control variables are thus identical to those in Table 3.

We start in column 1, by constraining λ to equal zero, thus omitting the effect of expectations of regime changes. The coefficient on lagged income is significant, as before, while the coefficient on transition years is negative, as expected, and quite precisely estimated. The point estimate of ϕ, the impact of democracy on growth, is positive and marginally significant. This specification resembles that of existing empirical studies. From the perspective of the model in this paper, however, such a specification is doubtful. Indeed, if expectations of regime changes also matter, omitting the probability of autocracy may lead us to under-estimate the positive impact of democracy on growth.

In columns 2 and 3, we drop democracy ($1 - a_{i,t}$ above) and instead include the probability of autocracy ($\widehat{p}_{i,t}$ above). As discussed in the previous section, the probability of autocracy was found to have different effects depending on the regime (democracy or autocracy). Thus, to allow the coefficient of $\widehat{p}$ to vary across regimes, we also interact $\widehat{p}_{i,t}$ with democracy in the previous period (i.e., we add the variable $\widehat{p}_{i,t} \cdot (1 - a_{i,t-1})$ to the regression), with and without controlling for transition years. The estimates confirm our previous findings. The probability of autocracy hurts growth, and the effect is significant in both regimes. But the risk of abandoning democracy has a much stronger negative effect on growth than the risk of remaining an autocracy (although it is less precisely estimated in column 3 where transition years are included)

The specification in columns 2 and 3 remains doubtful, however, because we have omitted the actual regime from the right-hand side. In columns 4 and 5 we thus report the results from a full specification, including both actual democracy ($1-a_{i,t}$) and the probability of autocracy $\widehat{p}_{i,t}$ (alone and interacted with lagged democracy),once more with and without transition years. The coefficient on democracy rises relative to columns 1 and 2, but is not quite statistically significant (p-value of 0.13 in column 5). The probability of autocracy continues to exercise a negative effect on growth, particularly in democratic regimes.

The results in Table 5 are robust to measuring domestic democratic capital with a lower value of the depreciation rate (i.e., letting δ vary between 0.94 and 0.99), and to defining democracy as in Boix and Rosato (2001). They are also robust to including non-parametric growth trends for different

continents by interaction of indicators for years and continents (to allow for geographic patterns of time variation in growth).

Altogether, the results in this and the previous subsection suggest that becoming a democracy is associated with an average improvement in economic performance. In terms of the model, the hypothesis that $\alpha > 0$ is supported by the within-country evidence. The results also suggest that allowing for the expectations of regime change is not only interesting in its own right, but could also play an important role in correctly assessing the economic effects of alternative regimes. The omission of these expectations may be one reason why previous studies failed to detect a significant growth effect from becoming a democracy.

6.3 Across regimes – reduced form

Drawing sharp inferences from Table 5 is difficult because of multicollinearity between actual and expected regimes, and the endogeneity of the actual regime. To cope with both problems, we estimate a reduced form.

6.3.1 Econometric specification

We start from the basic specification:

$$y_{i,t} - y_{i,t-1} = \beta y_{i,t-1} + \pi^z z_{i,t-1} + \pi^f f_{i,t-1} + \boldsymbol{\gamma}\mathbf{x}_{i,t} + \alpha_i + \theta_t + u_{i,t} \ . \qquad (25)$$

This equation can be derived from (18) in Section 3 by assuming log-linearity (y being the log of per capita income), subtracting $y_{i,t-1}$ from both sides, replacing democratic capital d_{t-1} with its domestic and foreign components, and allowing for an error term with specific country and year components (in addition to white noise). The vector $\mathbf{x}_{i,t}$ contains the same time-varying controls as in the previous subsection.

Based on the theory, we expect a negative value for β – so that income converges to a steady state ceteris paribus. The parameters of interest are the coefficients on democratic capital: π^z, π^f, which we expect to be positive. Under the exclusion restriction implied by the theory (that democratic capital does not directly affect investment) and the assumption that democracies are more productive ($\alpha > 0$), these coefficients capture the sum of two effects that cannot be separately identified. As discussed in Section 3, higher democratic capital increases the probability of democracy which raises the expected return for investors in $t-1$ which, in turn, leads to a higher

(physical) capital stock and faster growth in period t. Higher probability of democracy also raises y_t directly on average, as democracy (and the resulting higher *TFP)* occurs more often. Equation (25) can be consistently estimated even if the exclusion restriction is violated – i.e., if democratic capital has a direct effect on growth, say, through policy formation – although this would change the interpretation of the estimates.

The basic specification leaves out the past regime $a_{i,t-1}$, where theory does not have any clear prediction. The major reason why a_{t-1} enters (18) is the regime-dependence of p_t^* (the probability of autocracy at t held at $t-1$). Because democratic capital enters into p_t^*, we capture this non-linearity in the reduced form by augmenting (25) with interaction terms, $(1-a_{i,t-1})\cdot\pi^z z_{i,t-1}$ and $(1-a_{i,t-1})\cdot\pi^f f_{i,t-1}$, possibly with the addition of the lagged democracy indicator $(1-a_{i,t-1})$.

6.3.2 Results

The results are reported in Table 6. Except for the coefficients displayed in the two tables, the specification throughout Table 6 is identical to that in Table 5.

Columns 1 and 2 report the simplest reduced-form specification, with and without transition years, and constraining the coefficients of democratic capital to be the same under democracy and autocracy. Domestic democratic capital has a positive and significant estimated coefficient, as expected. Foreign democratic capital, on the other hand, has a negative estimated coefficient not significantly different from zero.

Motivated by the earlier findings that political instability has different implications under democracy and autocracy, columns 3 and 4 allow the coefficients of democratic capital to differ by lagged political regime (with and without controls for transition years). Consistent with the results in earlier tables, the positive effect of democratic capital is only present among those countries that were democracies in the previous period. Moreover, now both the domestic and foreign components of democratic capital have a positive and significant effect on growth, as expected (although controlling for transition years reduces the effect of the foreign component of democratic capital in column 4).

Finally, column 5 adds the lagged democracy indicator on its own. This is more demanding on the data, because of collinearity (the correlation coefficient between lagged democracy and domestic democratic capital is al-

most 0.8). Nevertheless, the results in previous columns hold up pretty well. Again, these findings support the hypothesis that becoming a democracy on average leads to an improvement in *TFP* (in terms of the model, $\alpha > 0$).

The point estimates imply powerful effects of democratic capital on growth and long-run income in democracy. Suppose we reconsider the experiments discussed in Sections 5.2 and 6.1 above. Given the estimated convergence rates and the estimated coefficients of democratic capital reported in columns 3 to 5, a switch from 0 to 1, from minimum to maximum domestic democratic capital, would raise long-run income in a democracy by more than 75%, and a boost of foreign democratic capital by 0.4 units would raise long-run income in a democracy by about 30%.

Once more, the results in Table 6 are robust to measuring democratic capital with lower values of the depreciation rate δ, or to the inclusion of non-parametric continental growth trends. Overall, these findings confirm that the positive effect of democratic capital within democracies is reasonably robust and quantitatively relevant. This in turn is evidence in favor of the hypothesis that, on average, democracy has higher *TFP* than autocracy, particularly in the group of countries that is more often under democratic government.

7 Conclusions

What determines the onset and consolidation of democracy? We have highlighted the role of *democratic capital*. Being surrounded by well-functioning democracies and having a long tradition of democratic rule is a major determinant of democratic stability. According to the historical data (and in line with earlier results by Przeworski et al, 2000), the risk to exit from democracy goes down with the level of economic development, while development does not seem to influence the probability of abandoning autocracy.

Does democracy influence the path of economic development? Our results suggest that the *expectations* about future political regimes play an important role. The risk of exit from democracy hurts economic growth. Taking the probability of regime transition into account makes the positive growth effect of democracy more forceful. Moreover, through its effect on the consolidation of democracy, democratic capital has a robust positive effect on growth. Altogether, these findings suggest that being a stable democracy is an important positive factor to achieve more rapid economic development.

These results point to a virtuous circle. Being a stable democracy favors economic development which helps further consolidate democracy; this, in turn, leads to the accumulation of more democratic capital, with additional positive effects on income and democratic stability. Getting into this virtuous circle is difficult, however, because democratic stability cannot be achieved instantaneously.

Our inference is conditional on our identification strategy, and hinges on two assumptions. Domestic democratic capital is essentially a function of the time spent under democracy in the (possibly distant) past. In attributing a causal effect to this component of democratic capital, we must assume that no unobserved variables make some democracies more stable than others. We have tested for specific random-effect forms of this problem, and could not reject absence of unobserved heterogeneity. A possible way of approaching this issue is to think more imaginatively about the initial conditions for domestic democratic capital in the year a country becomes independent.

The second important identifying assumption is that democratic capital (domestic and foreign) does not directly affect economic growth, conditional on the covariates in the regression. This is more credible because our estimates only exploit within country variation. Related to this, the effect of the expected probability of regime change on growth is identified only from the time variation in the estimated hazard rates; the identifying assumption is thus quite robust to prospective unobserved heterogeneity in the estimated hazard rates. Moreover, the independent evidence from surveys in Section 4 and the statistical diagnostics in Section 6 suggest the assumption to be valid.

Our empirical results point to a puzzling asymmetry between autocracies and democracies. While higher income makes democracies more stable, it does not make dictators more precarious. Moreover, while more instability of democracy hurts growth, more instability of autocracy has a similar negative effect on growth (or no effect in some specifications). A further asymmetry is our finding that the positive influence of democratic capital on growth is due to democracies, not to autocracies (even though the effect of democratic capital on political transitions is symmetric). One plausible interpretation is that the social and political mechanisms that saw the seeds for successful coups against democracies are different from those that bring about successful ousting of dictators. Another interpretation is that the average effects we have emphasized in this paper mask important differences between countries. If so, it is important to uncover these heterogenous treatment effects.

In the light of these final remarks, we see two prominent avenues for future research. One priority would be to allow for more heterogeneity between countries. The task is easier for democracies, because we can exploit a large literature in comparative politics that has studied a variety of democratic institutions, such as the electoral rule (majoritarian vs. proportional), the form of government (presidential vs. parliamentary), and the degree of centralization (federal vs. unitary). These forms of democracy may entail different degrees of political participation. If democratic capital accumulates through active participation, its accumulation and depreciation rates may systematically differ across different forms of democracy. But the empirical findings suggest that understanding the differences between various types of autocracies may be even more important.[13]

A related avenue for future research is to make more precise the notion of democratic capital. Can we better understand just which values and norms are essential and how these relate to cultural and sociological attitudes of the population at large? How important is the contribution of education in the accumulation of these values and norms? Does democratic consolidation require the rise of a middle class with democratic values? Just how essential are independent media in mobilizing support for democracy? Telling these forces apart and more precisely pinpointing their specific roles in the process of democratic capital accumulation is an important priority for further work.

[13] See here the analysis by Acemoglu and Robinson (2005) and the references they cite.

8 Data appendix

The following is a list of the variables we use and their sources:

Africa: Regional dummy variable, equal to 1 if a country is in Africa, 0 otherwise.

Asia_middle east: Regional dummy variable, equal to 1 if a country is in the Middle East, 0 otherwise.

Current domestic democratic capital: Domestic democratic capital accumulated during the current democratic spell. It equals 0 over autocratic spells. Over democratic spells, the variable is equal to the difference between the value of *Domestic democratic capital* in the current year and its value at the end of the previous spell. Source: authors' calculations on PolityIV Project.

Democracy: Binary variable that captures the state of democracy of country i in year t. This measure is defined in two ways. In columns 1 to 4 of Table 2 and in Tables 3 and 6, *Democracy* is equal to 1 if the variable *polity*2 in the PolityIV data set is strictly positive, and zero if *polity*2 is 0 or negative. In columns 5 and 6 of Table 2, the *Democracy* index is defined as in Boix and Rosato's (2001) extension of the index constructed by Przerwoski et al (2000). This definition emphasizes the turnover of political power in fair and free elections, and is available from 1800 until 1994. Sources: Boix and Rosato (2001); PolityIV Project.

Domestic democratic capital: Defined by expression (19) in the text, which ranges from 0 to 1. We calculated it for different values of the depreciation rate $(1-\delta)$. For each country, the initial value (at the year of independence or at the year 1800, whichever comes last) of domestic democratic capital is assumed to be zero. Domestic democratic capital then accumulates in years of democracy and depreciates geometrically, at a rate $(1-\delta)$, in years of autocracy. Source: authors' calculations on PolityIV Project.

Duration of current autocratic spell: defined as the difference between the current year and the starting year of the current spell. Source: authors' calculations on PolityIV Project.

Duration of current democratic spell: defined as the difference between the current year and the starting year of the current spell. Source: authors' calculations on PolityIV Project.

Esp_colony: Dummy variable equal to 1 if a country is a former Spanish colony, 0 otherwise. Source: Wacziarg (1996).

Foreign Democratic Capital: Defined by expression (20) in the text, divided by 10, such that its value ranges from 0 to 1. It is the weighted average of the continuous variable Polity2 in neighboring countries, taken from the PolityIV data set (see *Democracy*). The weights correspond to the distance between capitals. The index depends on the value of ρ, which identifies the boundaries of what is considered neighborhood. In the regressions showed in the text $\rho = 1$, i.e., all countries in the world are included in the neighborhood. Sources: authors' calculations on PolityIV Project.

Foreign income: Defined by expression (23) in the text. It is a weighted average of the log of real per capita output in the neighboring countries, with weights equal to the distance between capitals. Source: Maddison (2001)

Government Anti Diversion Policies: Index of government's anti-diversion policies, measured over the period 1986-95. It is an equal-weighted average of these five categories: i) law and order, ii) bureaucratic quality, iii) corruption, iv) risk of expropriation and v) government repudiation of contracts (each of these items has higher values for governments with more effective policies towards supporting production) and ranges from 0 to 1. Source: Hall and Jones (1999).

Human capital: Years of schooling of the population above 25 years of age. Annual measure constructed in Persson (2005) by interpolating the five-year observations from Barro and Lee. Sources: Persson, 2005; Barro and Lee, 2000

Initial constraints on the executive: Constraints in the executive in the year of independence (source: Polity IV)

*Initial democracy score: Polity*2 score in the year of independence, when democracy is defined as $polity2 > 0$ (source: Polity IV). Dummy variable equal to 1 if a democracy in the year of independence, when democracy is defined as in Boix and Rosato (2001).

More than five regime switches: Dummy variable equal to 1 for countries that had more than five regime switches between autocracy and demcoracy, or vice versa since independence.

Past domestic democratic capital: Democratic capital accumulated over previous spells. For autocratic spells, the index is equal to the corresponding value of *Domestic democratic capital*. For democratic spells, the index is equal to the value of *Domestic democratic capital* at the end of the previous spell, depreciating at a rate $(1 - \delta)$ over the current spell. Source: authors' calculations on PolityIV Project.

Per capita income: log of per real capita output adjusted for pur-

chasing power parity. Source: Maddison (2001).

Period: linear time trend

Period Squared: quadratic time trend

Socialist legal origin: Dummy variable equal to 1 if a country's legal system has socialist origin, 0 otherwise. Source: La Porta et al. (1999)

Socialist transition: Dummy variable equal to 1 after 1989 for former socialist countries in Central and Eastern Europe and the Asian provinces of the former Soviet Union

Thinks democracy is best: Index of individuals' opinions on democracy, defined as the country average of the opinions on the statement "Democracy may have problems but it's better than any other form of government", as expressed in the World Values Survey (WWS) data set on a 4 point scale, from 1=strongly agree to 4=strongly disagree (question v163 in wave 3 and 4 of the survey). Missing and don't know answers were dropped and the average normalized, so that its value ranges from 0 to 1. Most observations are from the fourth wave of the WWS, in 1999-2000. For a few countries, data refer to the third wave, in 1995. Source: World Values Survey dataset (http://www.worldvaluessurvey.org/services/index.html)

UK_colony: Dummy variable equal to 1 if a country is a former British colony, 0 otherwise. Source: Wacziarg (1996).

War Dummy variable equal to 1 if a country is at war over a certain year, 0 otherwise. A war is defined as any kind of war (internal or external). Source: Correlates of War: http://www.correlatesofwar.org/

References

[1] Acemoglu, Daron, Johnson, Simon, Robinson, James, and Yared, Pierre (2005a), "From Education to Democracy", *American Economic Review Papers and Proceedings* 95, 44-49.

[2] Acemoglu, Daron, Johnson, Simon, Robinson, James, and Yared, Pierre (2005b), "Income and Democracy", Mimeo, MIT.

[3] Acemoglu, Daron and Robinson, James (2005), *Economic Origins of Dictatorship and Democracy*, Cambridge University Press, forthcoming.

[4] Almond, Gabriel, and Verba, Sidney (1963), *The Civic Culture: Political Attitudes and Democracy in Five Nations*, Princeton University Press.

[5] Barro, Robert (1999), "The Determinants of Democracy", *Journal of Political Economy* 107, S158-S183.

[6] Barro, Robert (1996), "Democracy and Growth", *Journal of Economic Growth* 1, 1-27.

[7] Barro, Robert and Lee, Jong-Wha (2000), "International Data on Educational Attainment: Updates and Implications," CID Working Paper, No 42.

[8] Bermeo, Nancy (2003), *Ordinary Citizens in Extraordinary Times: The Citizenry and the Breakdown of Democracy,* Princeton University Press.

[9] Boix, Carles (2003), *Democracy and Redistribution*, Cambridge University Press.

[10] Boix, Carles, and Stokes, Susan (2002), "Endogenous Democratization : A Critique", Manuscript, University of Chicago.

[11] Boix, Carles, and Rosato, Sebastian (2001), "A Complete Data Set of Political Regimes, 1800-1999", Mimeo, University of Chicago.

[12] Bueno de Mesquita, Bruce, Smith, Alastair, Siverson, Randolph and Morrow, James (2003), *The Logic of Political Survival*, The MIT Press.

[13] Collier, Ruth Berins (1999), *Paths Toward Democracy: The Working Class and Elites in Western Europe and South America*, Cambridge University Press.

[14] Geddes, Barbara (1999), "What Do We Know about Democratization after Twenty Years?", *Annual Review of Political Science* 2, 115–144

[15] Gerring, John, Bond, Philip, Barndt, William T. and Moreno, Carola (2005), "Democracy and Economic Growth: A Historical Perspective", *World Politics* 57, 323-364.

[16] Giavazzi, Francesco and Tabellini, Guido (2005), "Economic and Political Liberalizations", *Journal of Monetary Economics* 52, 1297-1330.

[17] Gibson, James (1997), "Mass Opposition to the Soviet Putsch of August 1991: Collective Action, Rational Choice, and Democratic Values in the Former Soviet Union", *American Political Science Review* 91, 671-84.

[18] Glaeser, Edward., La Porta, Rafael, Lopez de Silanes, Florencio, and Shleifer, Andrei (2004) "Do Institutions Cause Growth", *Journal of Economic Growth* 9, 271-304.

[19] Glaeser, Edward, Ponzetto, Giacomo, and Shleifer, Andrei (2005), "Why Does Democracy Need Education?", Mimeo, Harvard University.

[20] Hadenius, Axel and Teorell, Jan (2005), "Cultural and Economic Prerequisites of Democracy: Reassessing Recent Evidence", *Studies in Comparative International Development* 39, 87-206.

[21] Helliwell, John. (1994). "Empirical Linkages Between Democracy and Economic Growth", *British Journal of Political Science* 24, 225–248.

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

[23] Inglehart, Ronald, and Welzel, Christian (2005), *Modernization, Cultural Change, and Democracy: The Human Development Sequence*, Cambridge University Press.

[24] Jenkins, Stephen (2004), *Survival Analysis*, Mimeo, University of Essex.

[25] Jones, Ben and Olken, Benjamin (2005), "Do Leaders Matter? National Leadership and Growth since World War II", *Quarterly Journal of Economics* 120, 835-864.

[26] La Porta, Raphael., Lopez-De-Silanes, Franscico, Shleifer, Andrei, and Vishny, Robert (1999). "The Quality of Government", *The Journal of Law, Economics and Organization* 15, 222-79.

[27] Lipset, Seymour Martin (1959), "Some Social Requisites of Democracy: Economic Development and Politcal Legitimacy", *American Political Science Review* 53, 69-105.

[28] Londregan, John, and Poole, Keith (1990), "Poverty, the Coup Trap, and the Seizure of Executive Power", *World Politics* 42, 151-183.

[29] Maddison, Angus (2001), *The World Economy: Historical Statistics*, OECD.

[30] Morris, Stephen and Shin, Hyun (2002), "Global Games: Theory and Applications", in Dewatripont, Mathias, Hansen, Lars and Turnovsky, Stephen (eds.), *Advances in Economics and Econometrics, The Eighth World Congress*, Cambridge University Press.

[31] Mulligan, Casey B., Sala-i-Martin, Xavier and Gil, Ricard (2004),"Do Democracies Have Different Public Policies than Nondemocracies?", *Journal of Economic Perspectives* 18, 51-74.

[32] Opp, Karl-Dieter (1999), "Contending Conceptions of the Theory of Rational Action", *Journal of Theoretical Politics* 11, 171-202.

[33] Papaioannou, Elias, and Siourounis, Gregorios (2004), "Democratization and Growth", Mimeo, LBS.

[34] Persson, Torsten (2004), "Consequences of Constitutions, 2003 Presidential Address", *Journal of the European Economic Association* 2, 139-161.

[35] Persson, Torsten (2005), "Forms of Democracy, Policy and Economic Development", NBER Working Paper, No. 11171.

[36] Przeworski, Adam, Alvarez, Michael, Cheibub, Jose, and Limongi, Fernando (2000), *Democracy and Development: Political Institutions and Well-Being in the World 1950-1900*, Cambridge University Press.

[37] Przeworski, Adam and Limongi, Fernando (1993), "Political Regimes and Economic Growth", *Journal of Economic Perspectives* 7, 51-69.

[38] Putnam, Robert (1993), *Making Democracy Work: Civic Traditions in Modern Italy*, Princeton University Press.

[39] Rodrik, Dani and Wacziarg, Romain (2005), "Do Democratic Transitions Produce Bad Economic Outcomes?", *American Economic Review Papers and Proceedings* 95, 50-56.

[40] Roll, Richard and Talbott, John (2003), "Political and Economic Freedoms and Prosperity", Mimeo, UCLA.

[41] Tabellini, Guido (2005), "Culture and Institutions: Economic Development in the Regions of Europe", Mimeo, Bocconi University.

Figure 1 Domestic democratic capital

Spain vs. Sweden

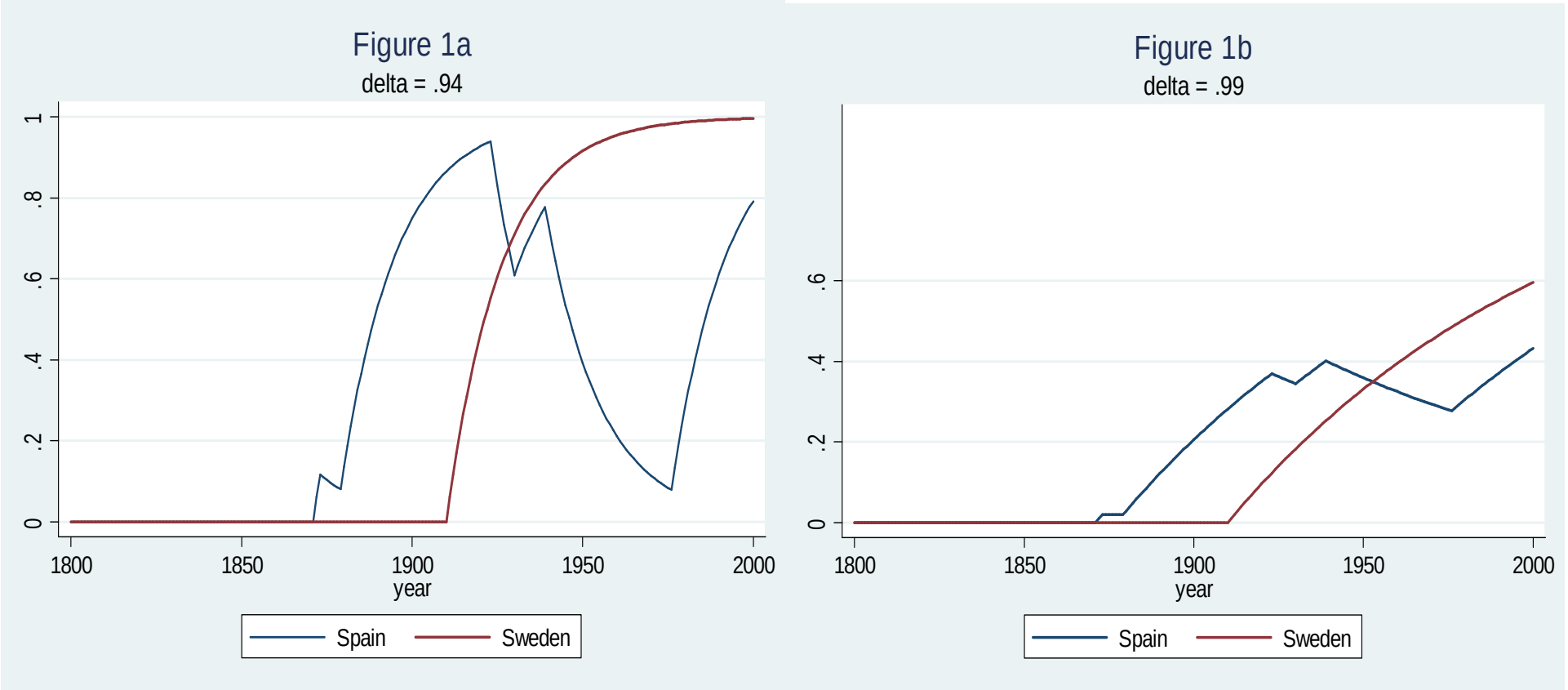

Figure 2 Foreign Democratic Capital

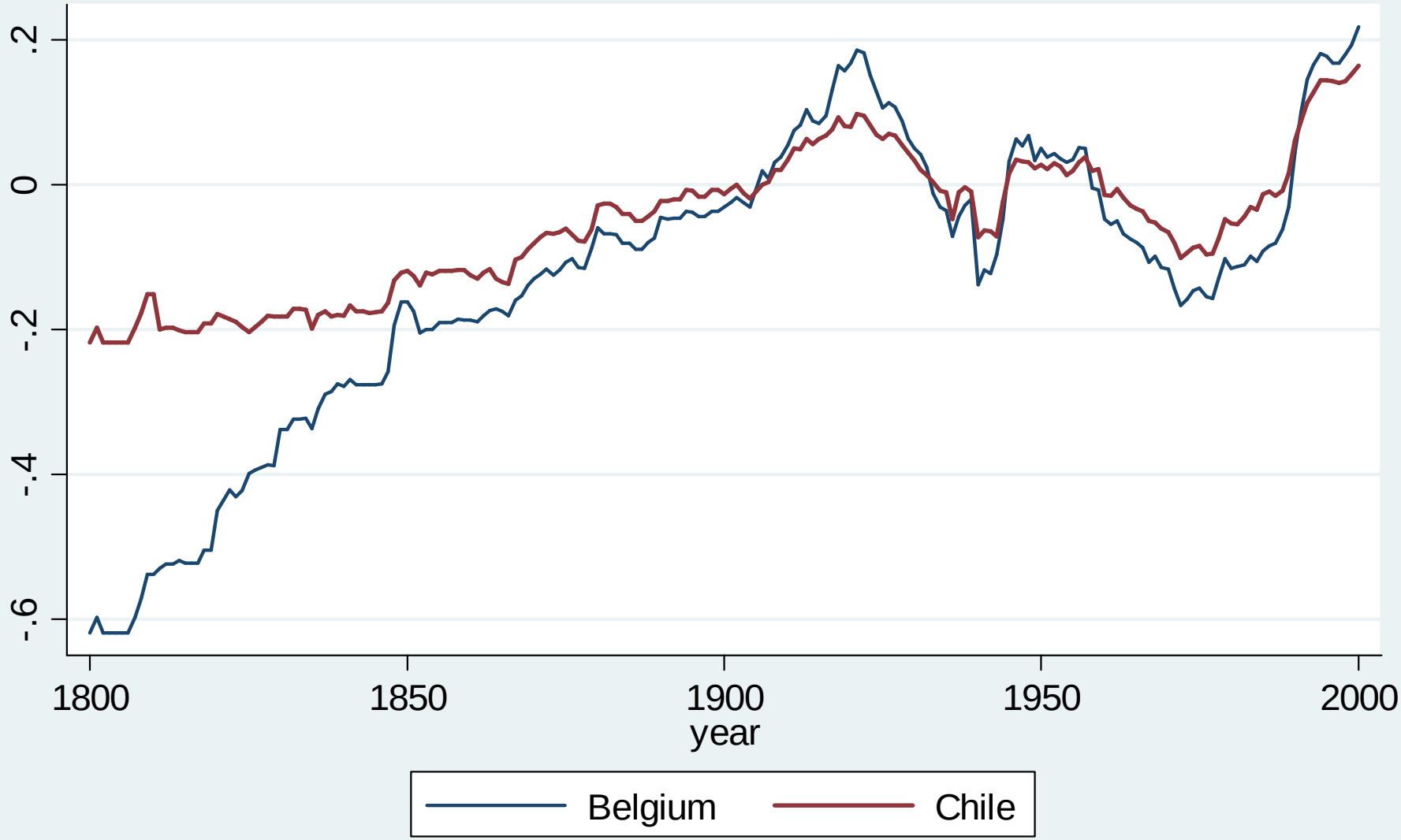

Figure 3 Democratic capital and opinions on democracy

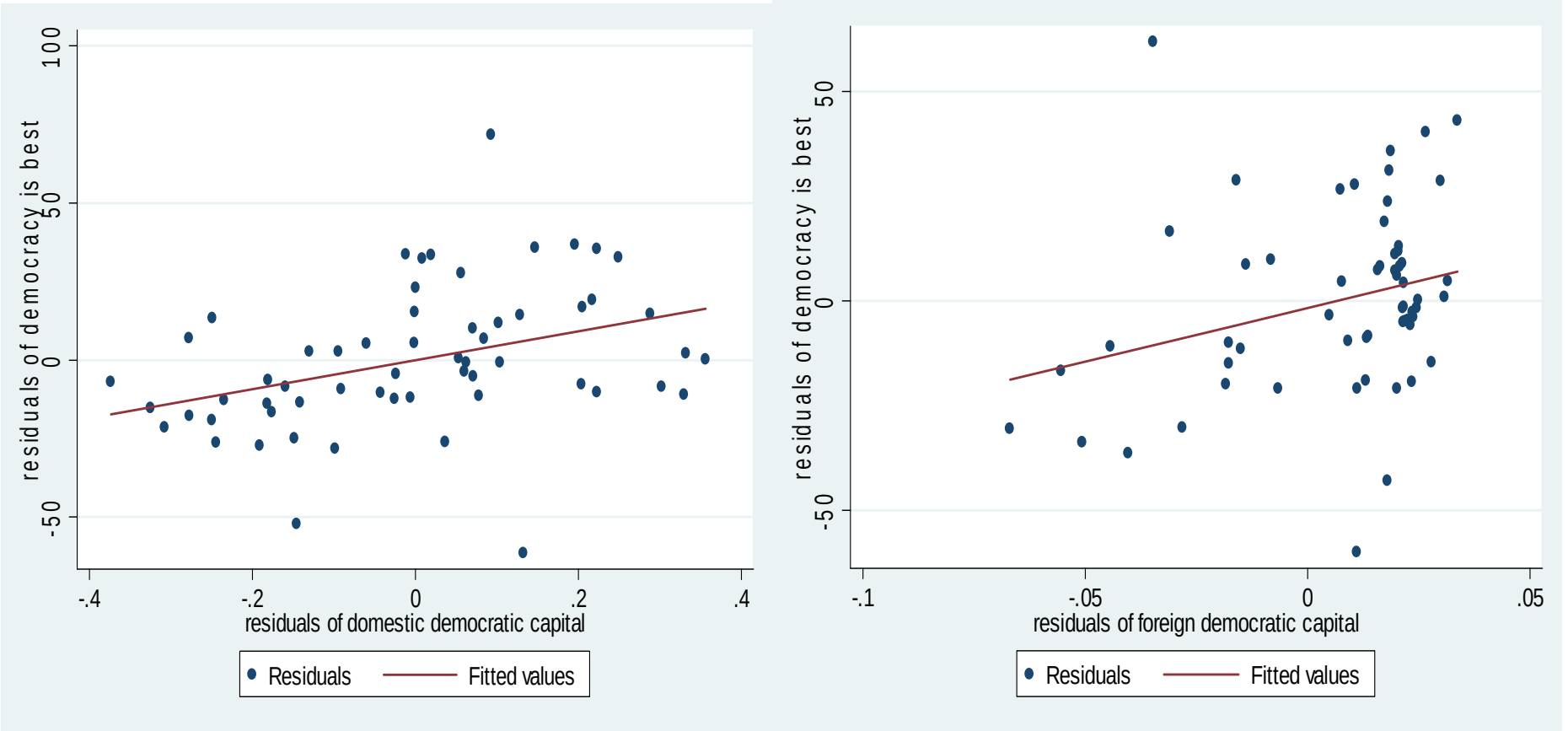

Figure 4 Estimated hazard rates

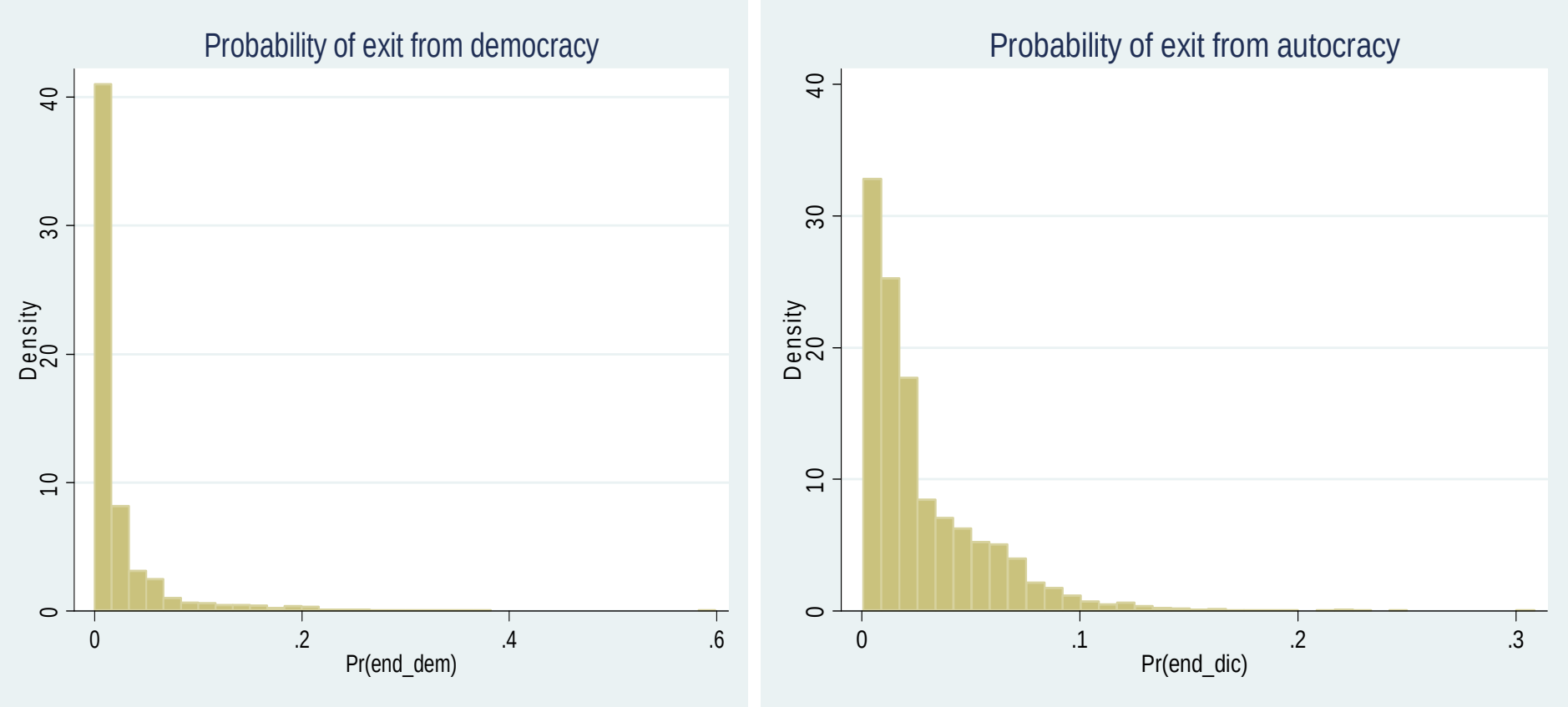

Table 1 Democratic capital and perceptions of democracy and of protection of property rights

	(1) Thinks democracy is best system	(2) Thinks democracy is best system	(3) Thinks democracy is best system	(4) Thinks democracy is best system	(5) Thinks democracy is best system	(6) Perception of government anti diversion policies	(7) Perception of government anti diversion policies
Domestic democratic capital	29.14***	42.93**	43.52***	46.22***	46.08***	4.35	2.79
	(10.93)	(16.10)	(11.58)	(15.51)	(13.98)	(5.44)	(5.22)
Foreign democratic capital	263.57**	345.63**	288.26	321.40**	396.89***	-61.76*	-49.29
	(114.77)	(136.94)	(110.58)**	(131.83)	(128.84)	(32.93)	(32.18)
Per capita income		-6.23		-2.29	-1.14	11.82***	9.36***
		(4.92)		(5.01)	(5.82)	(1.05)	(1.59)
Democracy			-20.92***	-19.90**	-3.50	-0.07	-0.12
			(7.77)	(8.34)	(9.42)	(2.30)	(2.50)
Human capital					-19.87**		7.22**
					(7.93)		(2.96)
Number of observations	62	59	61	59	46	113	90
Adj. R-squared	0.17	0.17	0.26	0.23	0.33	0.69	0.74

Notes: Variables explained in text. All specifications estimated by Ordinary Least Squares. Standard errors in brackets: * significant at 10%; ** significant at 5%; *** significant at 1%. All variables measured in 1999, except perception of government anti diversion policies, which is measured in 1997.

Table 2 Hazard rates out of political regimes

	(1) Exit from democracy	(2) Exit from autocracy	(3) Exit from democracy	(4) Exit from autocracy	(5) Exit from democracy	(6) Exit from autocracy
Domestic democratic capital	-0.486***	0.829***	-0.856**	1.058***	-0.829***	0.443*
	(0.187)	(0.175)	(0.371)	(0.387)	(0.265)	(0.268)
Foreign democratic capital	-1.104**	1.921***	-2.359***	1.836***	-3.289***	2.216***
	(0.473)	(0.371)	(0.702)	(0.384)	(0.827)	(0.433)
Lagged per capita income	-0.499***	0.054	-0.412***	-0.004	-0.362***	0.006
	(0.066)	(0.052)	(0.073)	(0.062)	(0.078)	(0.066)
$\delta,\ \rho$	0.94, 1	0.94, 1	0.99, 1	0.99, 1	0.97, 1	0.97, 1
Covariates	No	No	Yes	Yes	Yes	Yes
Def. of democracy	Polity4	Polity4	Polity4	Polity4	Boix-Rosato	Boix-Rosato
Method	ML Probit	ML Probit	ML Probit	ML Probit	ML Probit	ML Probit
LR-test (p-value)	0.00	0.11	0.37	0.14	1.00	0.44
Number of observations	3848	4420	3786	4349	3969	4115
Pseudo R-square	0.142	0.043	0.225	0.096	0.231	0.119

Notes: Variables explained in text. Robust standard errors in brackets: * denotes significant at 10%; ** significant at 5%; *** significant at 1%. Covariates are indicators for wartime (current year and lagged year), socialist legal origin, British colonial origin, Spanish colonial origin, African location, Middle-Eastern location; in cols 3-4 , scores of democracy and constraints on the executive (both from Polity IV) in first year of independence, in cols 5-6, indicator for democracy (by Boix and Rosato) in first year of independence. LR-test: random-effects panel specification (estimated by panel logit) against null of pooled specification (also estimated by logit) – a high p-value means we cannot reject that unobserved heterogeneity is absent.

Table 3 Hazard rates out of political regimes – auxiliary results

	(1) Exit from democracy	(2) Exit from autocracy	(3) Exit from democracy	(4) Exit from democracy	(5) Exit from autocracy
Domestic democratic capital	- 0.549*	1.091***		- 0.436	1.105**
	(0.303)	(0.272)		(0.560)	(0.467)
Foreign democratic capital	- 1.808**	2.137***	- 2.319***	- 2.299***	2.069***
	(0.750)	(0.492)	(0.700)	(0.701)	(0.455)
Lagged per capita income	- 0.343***	- 0.087	- 0.414***	- 0.412***	0.004
	(0.112)	(0.086)	(0.074)	(0.076)	(0.068)
Human capital	- 0.495*	0.338*			
	(0.261)	(0.187)			
Current democratic capital			-0.983**		
			(0.400)		
Past democratic capital			-0.539		
			(0.573)		
Duration of current spell				-0.432	0.000
				(0.368)	(0.001)
δ, ρ	0.94, 1	0.94, 1	0.99, 1	0.99, 1	0.99, 1
Covariates	No	No	Yes	Yes	Yes
Definition of democracy	Polity	Polity	Polity	Polity	Polity
Method	ML Probit	ML Probit	ML Probit	ML Probit	ML Probit
LR-test (p-value)	0.24	0.05	1.00	1.00	0.00
Number of observations	1947	1924	3786	3777	4329
Pseudo R-square	0.22	0.06	0.23	0.23	0.12

Notes: Variables explained in text. Robust standard errors in brackets: * denotes significant at 10%; ** significant at 5%; *** significant at 1%. Covariates are indicators for wartime (current and lagged year), socialist legal origin, British colonial origin, Spanish colonial origin, African location, Middle-Eastern location, a linear and a quadratic time trend, an indicator for countries that switched regime more than 5 times, polity2 scores of democracy and constraints on the executive in first year of independence. LR-test: random-effects panel specification (estimated by logit) against the null of pooled specification (also estimated by logit) – a high p-value means we cannot reject that unobserved heterogeneity is absent.

Table 4 Growth rates within political regimes – structural estimates

	(1) Growth in democracies	(2) Growth in democracies	(3) Growth in autocracies	(4) Growth in autocracies
Hazard rate	- 12.20***	-12.31***	- 25.87*	- 26.94*
	(4.56)	(4.55)	(15.32)	(15.77)
Lagged income per capita	- 4.32***	- 4.41***	- 2.79***	- 2.70***
	(0.61)	(0.62)	(0.55)	(0.57)
Transition years	- 0.81*	-0.80*	- 1.62***	- 1.59***
	(0.48)	(0.48)	(0.52)	(0.52)
Domestic democratic capital		1.75		0.16
		(1.62)		(3.64)
Foreign democratic capital		- 4.46		7.92
		(3.83)		(8.45)
Sargan-Hansen statistic	2.18		1.01	
F-statistic		1.15		0.44
Number of observations	3774	3774	4296	4296
(countries)	(111)	(111)	(117)	(117)
Adj. R-squared	0.20	0.20	0.12	0.12

Notes: Variables explained in text. Robust standard errors in brackets: * denotes significant at 10%; ** significant at 5%; *** significant at 1%. Democracy defined according to Polity IV. Hazard rates for democracies and autocracies computed from estimates in columns 3 and 4 of Table 2, respectively. All specifications include country and year fixed effects and indicators for war years and lagged war years. Columns 4 and 5 also include a dummy variable for years after 1989 in former socialist countries in Central and Eastern Europe and in the Asian provinces in the former Soviet Union. Sargan-Hansen statistic is computed as the number of observations times R-squared from regressing the residuals from the column on all included variables plus the excluded variables, namely domestic and foreign democratic capital. F-statistic is the test statistic for the joint significance of the latter two variables.

Table 5 Growth rates across political regimes – structural estimates

	(1) Growth	(2) Growth	(3) Growth	(4) Growth	(5) Growth
Democracy	0.40*			0.64	0.94
	(0.22)			(0.64)	(0.62)
Probability of autocracy		- 0.62**	- 0.49*	- 0.01	0.41
		(0.31)	(0.30)	(0.77)	(0.62)
Probability of autocracy in (lagged) democracy		- 5.92**	- 2.71	- 5.96**	- 2.61
		(2.63)	(2.66)	(2.61)	(2.65)
Lagged income per capita	- 2.88***	- 2.90***	- 2.91***	- 2.90***	- 2.91***
	(0.36)	(0.36)	(0.36)	(0.36)	(0.36)
Transition years	- 1.80***		- 1.53***		- 1.61***
	(0.37)		(0.35)		(0.35)
Number of observations	8288	8055	8055	8055	8055
(countries)	(149)	(148)	(148)	(148)	(148)
Adj. R-squared	0.14	0.14	0.14	0.14	0.14

Notes: Variables explained in text. Robust standard errors in brackets: * denotes significant at 10%; ** significant at 5%; *** significant at 1%. Democracy defined according to Polity 4. Probability of autocracy computed from hazard rates for democracies and autocracies as estimated in columns 3 and 4 of Table 2, respectively. All specifications include country and year fixed effects, indicators for war years and lagged war years, and an indicator for formerly socialist countries in Central and Eastern Europe and the Asian provinces of the former Soviet Union after 1989.

Table 6 Growth rates across political regimes – reduced-form estimates

	(1) Growth	(2) Growth	(3) Growth	(4) Growth	(5) Growth
Domestic democratic capital	3.34***	2.95***	- 0.24	-0.21	- 0.64
	(1.08)	(1.07)	(1.63)	(1.63)	(1.82)
Foreign democratic capital	- 2.93	- 2.79	- 2.22	- 1.92	- 2.58
	(3.36)	(3.36)	(3.55)	(3.54)	(3.60)
Domestic democratic capital in (lagged) democracy			2.68**	2.40*	3.16**
			(1.24)	(1.23)	(1.51)
Foreign democratic capital in (lagged) democracy			2.61*	1.84	2.53*
			(1.39)	(1.31)	(1.43)
Lagged democracy					-0.16
					(0.29)
Lagged income per capita	- 2.78***	- 2.81***	- 2.89***	- 2.90***	- 2.89***
	(0.36)	(0.36)	(0.37)	(0.37)	(0.37)
Transition years		-1.64***		- 1.47***	
		(0.37)		(0.35)	
Number of observations	8379	8379	8127	8127	8127
(countries)	(149)	(149)	(149)	(149)	(149)
Adj. R-squared	0.14	0.14	0.14	0.14	0.14

Notes: Variables explained in text. Robust standard errors in brackets: * denotes significant at 10%; ** significant at 5%; *** significant at 1%. Democracy defined according to Polity 4. Democratic capital variables computed with $\delta = 0.99$ and $\rho = 1.0$, in consistency with the estimates in columns 3 and 4 of Table 2. All specifications include country and year fixed effects, indicators for war years and lagged war years, and an indicator for formerly socialist countries in Central and Eastern Europe and the Asian provinces of the former Soviet Union after 1989.