

Democratic capital: The nexus of political and economic change*

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Abstract

We study the joint dynamics of economic and political change. The predictions of the simple model we formulate in the paper gets 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 neighbourhood – 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 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, the timing of their takeoffs display a great deal of variation: 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 dramatic as well, 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 change. Many countries have become more or less solid democracies, but close to 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 democratizations have swept the world since the early 19th century, although the first wave is almost 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 very 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 maintenance of stable 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 faster 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 brings about faster

growth but others find no robust link.¹

This paper revisits the dynamic interaction between political and economic change, building on two ideas. The first idea concerns the economic effects of democracy. If democracy influences economic performance, to a large degree this must happen via investment decisions and hence through expectations. The prospects of future democracy are 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. The stability of democracy, and the expectations about stability, are key. This simple statement is often forgotten in existing empirical studies on the effects of democracy. In this paper we show that this omission is partly responsible for giving democracy a worse reputation than it deserves. When taking into account their perceived stability, democratic institutions are – on average – associated with superior economic performance.

But what is it that makes democracies more or less stable? The second idea in this paper is that the consolidation of democracy is a process operating over time and space. Citizens must learn to cherish and respect democracy as a method of government. On the one hand, policies that emanate from a democratically elected government must be perceived as legitimate and be accepted by the opposition. On the other hand, the majority must respect the rule of law and the rights of minorities. Enforcing these rules requires engaged citizens, careful media and the cooperation of powerful groups in societies. The value of democracy as a method of government will not pop up overnight, or in a vacuum.. Rather, the consolidation of democracy can be thought of as accumulation of a stock of civic and social capital, that takes place over time or through imitation of neighboring countries. We refer to this consolidation process as the accumulation of "democratic capital".²

¹On the causal effect from income to democracy, see the recent contributions by Acemoglu, Johnson, Robinson and Yared (2004, 2005), Glaser, Ponzetto and Shleifer (2005). On the opposite effect from democracy to income, see among others Roll and Talbott (2003), Papaioannou and Siourounis (2004), Giavazzi and Tabellini (2005). On both issues, see also Barro (1996), Przeworski and Limongi (1993), Przeworski et al (2000), Londregan and Poole (1990).

²Of course, we are not the first to stress the importance of civic engagement and of cultural attitudes in shaping the functioning of political institutions, and how this "social capital" can be slowly acquired over time by living under specific political institutions - see in particular Putnam (1993) - although our empirical methodology differs from these earlier studies. See also Tabellini (2005) for the importance of culture in economic (as opposed to political) development.

It is natural to think that the accumulation of democratic capital is also fostered by economic development. As emphasized by Lipset (1959) and more recently by Glaeser, La Porta, Lopez-de-Silanes and Shleifer (2005) and Glaeser, Ponzetto and Shleifer (2005), education is likely to increase the legitimacy and support for democracy. The rise of the middle class can be a second important supporting mechanism for democracy. The spread of the media and of efficient communication mechanisms is a third important factor. All these transformations of society are obviously facilitated by economic development.

The combination of these ideas suggests a rich dynamic interaction between economic and political change. There is a positive 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 growth. The accumulation of democratic capital is part of this process and reinforces the two-way link between economic and political development. Countries that are ruled by autocrats, instead, are more likely to stagnate because they don't have a chance to initiate this virtuous-circle of consolidation. And 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 develops these ideas in a simple theoretical model and by studying historical data. In our view, understanding the rich dynamics of political and economic change requires (i) data over a very long time span, (ii) a theory to guide the empirical investigation. To get such guidance, Section 2 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, then 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, which raises expected returns, investment, and growth.

These predictions, as well as other implications of the model, suggest how to approach the rich dynamics observed in historical data. We exploit the data sets on GDP per capita and political regimes assembled by Angus

Maddison and the Polity 4 project respectively. Thus, we construct an unbalanced panel with annual data for about 150 countries and 150 years. These data and our empirical strategy are discussed in Sections 3 and 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 the 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, or cultural, distance.

Most of the key predictions of the simple model hold up when confronted with the data. In Section 5, we 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 real income. Similarly, the hazard rate out of autocracy increases in both components of democratic capital, but – interestingly – does not depend on income.

Section 6 contains the empirical results on economic growth, focusing on the probability of regime changes and holding constant the actual regime. Exploiting only the within-country variation in the data, we find that within democracies instability is harmful: the predicted hazard rate out of democracy reduces economic growth. Within autocracies, however, we find no evidence of a systematic growth effect of the hazard rate. In Section 7 we take the last step and consider jointly the effects of actual and expected regime changes on growth. While this is econometrically challenging, the results are consistent with those found in earlier sections. Again exploiting only within-country variation, we find that stable democratic government is associated with faster growth. And higher democratic capital is beneficial for growth, particularly in democracies. The results are not only statistically robust but also quantitatively important.

Section 8 concludes.

2 A model of political and economic change

In this section, we formulate a model of political regime transitions and economic growth. Taken at face value, this model is very simple, maybe even simplistic. But our goal is not theory for its own sake. Instead, we seek help from the theory in guiding our empirical investigation on a historical panel data going back to the mid 1800s. Except for a number of fixed country characteristics, these data only includes time-varying observations of income per capita, called y_t below, and the political regime, called a_t below. Obviously, such sparsity of the data calls for a very parsimonious model. The role of this model is to formulate testable hypothesis with which to interpret the data, and to derive our identification and specification assumptions from a logically consistent analytical framework.

2.1 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:

$$y_t = A(a_t)f(k_t) , \quad (1)$$

where k_t is capital per worker, f is a concave function such that $f_k(0) \rightarrow \infty$, 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 $A(0) = \alpha$ 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 regimes could reflect different economic policy priorities, that here we leave implicit. No assumption is needed about which political regime is associated with better economic policies. Hence, throughout this section we let $\alpha \stackrel{\leq}{\geq} 1$.

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:

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

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

2.2 Timing and behavior in each period

The three state variables at the beginning of period t are k_t , the per worker capital stock accumulated in period $t - 1$, a_{t-1} , the political regime at the end of the previous period (equal to 0 if $t - 1$ ended in democracy and 1 if $t - 1$ ended in autocracy), and 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 uprising against autocracy happens with probability $\chi(1)$). If it does, each old makes an individual decision whether to participate in the defense of (uprising against) the regime, given the perceived costs and benefits of participation. The young do not participate in the defense (uprising). In the event of a coup (uprising), the probability that the democratic regime survives (autocratic regime falls) is equal to the proportion of the old population who participate, denoted by s_t .

(2) If the coup (uprising) 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 α or 1).

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

2.3 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 uprising). 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 over the entire 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 0.³

With this notation, we can write the net gain from participation in the defense of democracy for individual i as:

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

Finally, as stated above, we assume that the probability of success, s_t , equals the share of other old individuals participating in the defense. We then have a global game with incomplete information, which fulfills the conditions **A1-A5** in Morris and Shin (2002, Section 2.2.1). It follows from their results that this game has a unique equilibrium, where 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:

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

The fraction of the old who, in equilibrium, participates in the defense of democracy is thus:

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

where $\Phi(\cdot)$ is the cumulative normal distribution of the noise variable ν . Under our assumption this is also the equilibrium probability that the attempted coup fails.

Our goal is to relate political transitions to past political history and to the level of economic development. To achieve this ambitious goal in this simple model, we assume that the personal benefit b_t of participating in a defense of democracy derives from two sources. First, we assume that the

³Note that 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 perceived 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 participation 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 (that differ depending on whether the attack fails or succeeds).

benefit is larger the greater 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 (we make more precise assumptions when discussing the data in Section 4). Second, we assume that 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, the difference in the economic welfare of an old individual under democracy vs. autocracy is $(\alpha - 1)f_k(k_t)k_t$. We thus write the total personal benefit from the defense of democracy (or from an uprising against a dictator) as:

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

where $(1 - \gamma)$ is the relative weight on democratic values. This is the personal benefit that, through (3), contributes to determine the equilibrium probability of success in the defense of 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:

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

where the expectation operator is taken over the random variable μ_t , conditional on the state variables d_{t-1} and a_{t-1} and the expectation of future capital k_t . Note that these state variables are known when the young make their investment decisions in period $t - 1$. This also allows us to obtain the equilibrium probability of autocracy in period t , p_t^* :

$$p_t^* = \begin{cases} h_t^{0*} & \text{if } a_{t-1} = 0 \\ 1 - h_t^{1*} & \text{if } a_{t-1} = 1, \end{cases} \quad (6)$$

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:

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

The function $P(\cdot)$ is decreasing in democratic capital: $P_d < 0$. It is decreasing or increasing in the equilibrium capital stock, k_t^* , depending on whether TFP

in democracy is higher or lower than *TFP* in autocracy: $P_k \leq 0$ as $\alpha \geq 1$. Note that both results hinge on the parameter γ being strictly between 0 and 1 in equation (4). If $\gamma = 1$, the personal benefit of fighting for democracy only depends on economic well being, and democratic capital does not influence the transition probabilities in (5). Conversely, if $\gamma = 0$, the personal benefit of fighting for democracy depends only on democratic capital and the state of the economy does not determine political transitions. The lagged regime enters the function, to indicate the fact that the hazard rates are regime-dependent.

2.4 Equilibrium capital accumulation

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

$$-V_c(w_{t-1} - k_t) + E_{t-1}[r_t] = 0 , \quad (8)$$

where the expectations operator refers to the regime that will prevail in period t , a_t , conditional on what is known at $t - 1$, namely d_{t-1} and a_{t-1} . The individual investor takes the behavior of other investors as given, but has perfect foresight about the equilibrium capital stock k_t^* . Based on the notation in the previous subsection, the expected return for an individual investor among the young in period $t - 1$ is:

$$E_{t-1}[r_t] = f_k(k_t^*)[(1 - p_t^*)\alpha + p_t^*] . \quad (9)$$

Combining (8) and (9), and setting $k_t = k_t^*$, we can implicitly define the equilibrium capital stock in period t :

$$-V_c(w_{t-1} - k_t^*) + f_k(k_t^*)[(1 - p_t^*)\alpha + p_t^*] = 0 . \quad (10)$$

Note that 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. Note also that 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 (10) and the expression for equilibrium wages, the equilibrium capital stock in period t is a known function of the probability of autocracy and of previous period capital and political regime:

$$k_t^* = K(p_t^*, k_{t-1}, a_{t-1}) \quad (11)$$

To determine the properties of this "structural form", we assume that

$$V_{cc} + f_{kk}[(1 - p_t^*)\alpha + p_t^*] - f_k P_k(\alpha - 1) < 0 . \quad (12)$$

Under this condition, the K function is always increasing in lagged capital, k_{t-1} . It is decreasing (increasing) in p_t^* if TFP in democracy is higher (lower) than TFP in autocracy: $K_p \leq 0$ as $\alpha \geq 1$. Intuitively, if democracies have higher TFP than autocracies (if $\alpha > 1$), a higher probability of autocracy reduces the expected return of investment. Likewise a switch from $a_{t-1} = 0$ to $a_{t-1} = 1$ increases (decreases) k_t^* if $\alpha > 1$ (if $\alpha < 1$); if period $t - 1$ wages are lower (higher) under autocracy, this implies lower (higher) capital accumulation. As further discussed below, this structural form is the main basis for our empirical analysis of economic growth.

2.5 Political and economic equilibrium

Equations (7) and (11) are the structural equations implied by the model. They jointly determine the (stochastic) equilibrium evolution of the political regime and of capital accumulation, as a function of the political and economic state in the previous period, as captured by the state vector $(k_{t-1}, d_{t-1}, a_{t-1})$. Note the 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 below.

Equations (7) and (11) can be solved jointly, to obtain the recursive equilibrium in "reduced form":

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

Under the additional assumption that $|K_p| > |P_k|$, we obtain the following reduced-form predictions: (i) Higher democratic capital reduces the probability of autocracy: $F_d < 0$. (ii) Higher lagged capital reduces (increases) the probability of autocracy if TFP is higher (lower) under democracy than under autocracy: $F_k \begin{smallmatrix} \leq \\ \geq \end{smallmatrix} 0$ as $\alpha \begin{smallmatrix} \geq \\ \leq \end{smallmatrix} 1$. (iii) Higher democratic capital increases (decreases) the capital stock if TFP is higher (lower) under democracy than under autocracy: $\tilde{G}_d \begin{smallmatrix} \geq \\ \leq \end{smallmatrix} 0$ as $\alpha \begin{smallmatrix} \geq \\ \leq \end{smallmatrix} 1$. (iv) Higher lagged capital always increases capital accumulation: $\tilde{G}_k > 0$.

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

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

The regime dependent \tilde{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 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 5 below we formulate a specific law of motion for democratic capital, assuming that democratic capital accumulates during democracy and depreciates under autocracy. In other words, as individuals live under democratic rule, they learn to love it. If indeed democracy yields higher productivity (if $\alpha > 1$), then this gives rise to a self-sustaining virtuous circle. As 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 per capita income both go up. This in turn leads to the consolidation of democracy, which, if $\alpha > 1$, leads to even more investment of 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. Note also that there is a precise sense in which younger democracies are more unstable, both because they have accumulated less democratic capital, and because being poorer they are more at risk of being overthrown. Of course, this virtuous circle is present only for those countries in which indeed democracy brings about higher productivity. If this premise is violated, then democratic capital continues to have a positive effect on democratic stability, but the other positive feedback effect through per capita income and economic capital accumulation is lost.

2.6 Predictions for observables

A final issue remains when formulating the testable predictions of the model: we observe per capita income, y , not the stock of capital, k . However, using the production function $y_t = A(a_t)f(k_t)$, we can re-express the predictions of interest in terms of observables.

Beginning with the reduced-form hazard rates, we rewrite (14) as

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

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. Next, we convert (11) into a structural form for income:

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

where the inclusion of a_t and a_{t-1} reflect prospective breaks in the one-to-one relation between income and capital due to regime-dependent *TFP*. As long, as we consider income within a given political regime, however, capital and income stay one for one. Moreover, within regimes p_t^* – by the definition in (6) – can be replaced by the regime-specific hazards $h_t^{a^*}$. Therefore, we can express the within-regime development of income on structural form as:

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

The final prediction we will use concerns the growth equation on reduced form across regimes. Given (13) and (16), we can write it as:

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

Equations (15)-(18) and the definition of p_t^* in (6) form the basis for specifications we will take to the data. Above, we have left open the question of whether *TFP* is indeed higher in democracies than in autocracies (whether α is above unity). We approach the data under the maintained assumption that this is the case, so as to diminish the taxonomy of possible cases. Under this prior, we can summarize the theoretical predictions as follows

1. *Political transitions.* According to the 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 is increasing in these variables ($H_d^1 > 0$ and $H_y^0 > 0$).

2. *Income within regimes.* According to the 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 ($Y_h^1 > 0$). Democratic capital only affects income indirectly, through the hazard rate.
3. *Income across regimes.* According to the structural form, income is decreasing in the probability of autocracy ($Y_p < 0$). The introduction of democracy raises current income, ceteris paribus ($Y(p_t^*, y_{t-1}, 1, 0) > Y(p_t^*, y_{t-1}, 1, 1)$). The reduced-form has the same prediction for democratic reforms, but also predicts that income is increasing in democratic capital ($G_d > 0$).

3 Empirical Strategy

The empirical analysis focuses on predictions 1-3, in the same order as they appear at the end of the previous section. Details of our specification and specific econometric concerns are best discussed in context. But to see where we are going, it is worthwhile to sketch the main steps in our empirical strategy already here.

3.1 Political transitions

Our first step is to estimate the reduced-form hazard rates out of democracy and autocracy, equation (15). In addition to lagged income y_{t-1} and democratic capital d_{t-1} , we also include a number of fixed, or time varying, country characteristics \mathbf{x}_t to reflect country-specific probabilities of a coup or an uprising, corresponding to $\chi(a)$ in the model. Thus, we augment (15) with \mathbf{x}_t and estimate separate regime-specific hazard rates on the form:

$$h_t^a = H^a(y_{t-1}, d_{t-1}, \mathbf{x}_t) + \mu_t, \quad a = 0, 1, \quad (19)$$

where μ_t is an error term. Following the distributional assumption about μ in model – and taking the right-censoring of our data on democracy into account – we specify each hazard rate as a probit.

Our goal is to test whether democratic capital indeed reduces the hazard out of democracy and increases the hazard out of autocracy. We also estimate the impact of economic development (measured as last period’s per capita

income) 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 higher productivity than autocracy (that $\alpha < 1$), or that economic well-being is not a determinant of the citizens' willingness to fight for democracy (that $\gamma = 0$ in equation (4)). In addition to the substantive results, the first step generates two sets of estimated regime-specific hazard rates, \hat{h}_t^a , one out of democracy and one out of autocracy.

3.2 Economic growth within regimes

The second step is to estimate the structural form for growth within political regimes, equation (17). We augment this equation with a vector of controls \mathbf{x}_t and assume separability of the arguments, to get:

$$y_t^a = Y^a(y_{t-1}, \mathbf{x}_t) + \lambda \hat{h}_t^a + \varepsilon_t, \quad a = 0, 1, \quad (20)$$

where $Y^a(\cdot)$ is a linear function, and ε is an error term. The parameter of interest, λ , is identified mainly by the exclusion restriction implied by the theoretical model: d_{t-1} only affects y_t indirectly through the probability of regime change – i.e., it enters in \hat{h}_t^a but not in Y^a . If d_{t-1} would enter in Y^a , we could still identify λ by exploiting a functional-form restriction: Y^a is linear, while the predicted hazard rate is non-linear. Of course, d_{t-1} could potentially influence y_t through other channels such as policy formation, in democracies as well as autocracies. But having two restrictions, we can test either of them conditional on the validity of the other.

3.3 Economic growth across regimes

Our third and final step is to study growth across regimes. Here, we start by combining the estimated regime-specific hazard rates, \hat{h}_t^a , to predicted probabilities of autocracy, \hat{p}_t , using the definition (6) in the model. Given these generated probabilities of autocracy, we estimate an equation such as (16) for the whole sample, allowing not only not only the expectations of regime change, but also the regime itself, a_t , to vary. Thus, we use a specification like:

$$y_t = Y(y_{t-1}, \mathbf{x}_t) + \lambda \hat{p}_t + \phi a_t + \varepsilon_t. \quad (21)$$

In practice, however, this task requires quite strong identification assumptions that will be discussed in context. Moreover, the variables of interest, \hat{p} and a , are highly collinear, given that regime transitions are rare, and this makes it difficult to separately estimate the parameters λ and ϕ . As an alternative, we therefore estimate the reduced form for income, equation (18). Taking a log-linear approximation, we estimate an equation like:

$$y_t = G(y_{t-1}, \mathbf{x}_t) + \pi d_{t-1} + v_t \quad (22)$$

where G is a linear function and v is a reduced-form error term. As discussed above, a finding that democratic capital increases output ($\pi > 0$) can be interpreted as evidence that (actual or expected) democracy is associated with higher productivity ($\alpha > 1$ in terms of our model).

4 Data

We collect annual data on economic development and political regimes for as many countries and as far back in time as possible. The resulting panel data set is unbalanced, partly because of data availability and partly because countries do not enter the data set until their year of independence.

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 a few countries.⁴

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 Polity4 data set and is available for all countries above 1/2 million inhabitants from 1800 until 2000.⁵ Specifically, we set $a_{i,t} = 1$ if the *polity2* 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 with common interpretations of political history.

⁴See http://www.eco.rug.nl/~Maddison/Historical_Statistics/

⁵See <http://weber.ucsd.edu/~kgledits/Polity.html>

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, and 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 4 variable is not (for instance, Boix and Rosato do not attempt to code transition years, while *polity2* interpolates such years). In such cases, we supplement the Boix and Rosato definition with the Polity 4 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 Polity4 measure, Guatemala is the most extreme case having gone through six periods of democracy and six periods of autocracy since independence in 1839.

The union of the economic and political data defines an unbalanced panel, with 180 countries over 200 years. The intersection is smaller, however, such that we are left 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 theory 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 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 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 is perhaps to assume that democratic capital accumulates in years of democracy, and depreciates geometrically, at 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):

$$z_{i,t} = \sum_{\tau=0}^{\tau=t_0} (1 - a_{i,t-\tau}) \delta^\tau , \quad (23)$$

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 it is in time to the present. Note that uninterrupted democracy makes democratic capital eventually converge to a steady-state value. In the empirical work below, we use a depreciation rate $1 - \delta = 0.05$ (see further below). This implies that 50 years of uninterrupted democracy brings a country within 10% of the democratic steady-state value (of 20).

Figure 1 illustrates the time path of domestic democratic capital for two countries, namely Spain and Sweden, given $\delta = 0.95$.⁶ 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 4 criterion) leads to 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 starts accumulating again in 1976, to reach the earlier 1930s level in the year 2000.

⁶The definition of democracy used in Figure 1 is that by Polity 4.

Sweden's history looks very different. After a series of gradual reforms in the late 19th century, the breakthrough of parliamentarism and universal male suffrage give Sweden democratic status in 1910 (by the Polity 4 criterion). Uninterrupted democracy since that date makes Swedish domestic democratic capital catch up with that of Spain in 1931. Continued accumulation brings domestic democratic capital more or less to its maximum by the year 2000.

The second component of democratic capital is based on democratic conditions abroad. It is easy to imagine 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. Specifically, for country i and year t , we define $f_{i,t}$ by

$$f_{i,t} = \sum_{j \neq i} \varpi_t^{i,j} (1 - a_{j,t}) , \quad (24)$$

where $(\varpi_t^{i,j})$ is a matrix of weights measuring the distance between country i and all other countries j . 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 4 democracy data. For each country i and each year t , we compute a weighted average of the (continuous) variable *polity2* of all other independent countries in the world. In (24), we thus replace $(1 - a_{j,t})$ by country j 's *polity2* score, and let $\varpi_t^{i,j}$ reflect the standardized geographical distance between the capitals in countries i and j .⁷

Figure 2 illustrates the time path of foreign democratic capital in two countries, namely Belgium and Chile. The two variables share a general

⁷Specifically, the weight $\varpi_t^{i,j}$ is given by the formula

$$\varpi_t^{i,j} = (1 - \frac{D^{i,j}}{D})/N_t ,$$

where $D^{i,j}$ is the (time-invariant) great circle distance between the capitals in i and j , D is half the length of the equator, and N_t is the number of independent countries in the world with a *polity2* score in year t .

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 is more variable than Chile's? 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 1999-2000, 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 rough a measure of how much democracy is appreciated.⁸

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 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 the current political regime. We now study more formally the role of democratic capital in explaining political and economic development in our long historical panel.

⁸In 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 1 below, we measure appreciation of democracy as 4 minus the country average response (times a 100); thus, higher values correspond to more appreciation for democracy.

5 Political transitions

In this section we study the transitions from democracy into autocracy, and vice versa, using our yearly data going back to the mid 1800s. Following the discussion in the two previous sections, we specify each hazard rate as a probit over the domestic and foreign components of democratic capital, as well as lagged per capita income. We start out by estimating these probits by maximum likelihood, pooling together countries and years. Thus, we assume independence across multiple spells of democracy or autocracy, up to the historical record as measured by domestic democratic capital – see, however, the discussion below about unobserved heterogeneity. When computing domestic democratic capital by the expression in (23), we impose a value of δ given by 0.95. The qualitative results are highly robust to alternative values between 0.9 and 0.99.⁹

Columns 1 and 5 of Table 1 display the results for this most basic specification of the hazard rates. For the exit from democracies (column 1), we find that both components of democratic capital are highly significant with the expected (negative) sign. Likewise, both components of democratic capital significantly raise the probability of an exit from autocracy (column 5). These findings are in line with the predictions of the theory and suggest that indeed democratic capital is an important determinant of political transitions.

A higher income level significantly decreases the likelihood of exit from democracy (column 1), but it has no significant effect on the probability of exit from autocracy (column 5). 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 (2005). But the asymmetry is puzzling in light of the theoretical model presented above. A negative income effect on exit from democracy is consistent with the average democracy being more productive than the average autocracy ($\alpha > 1$ 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

⁹Note that δ enters in domestic democratic capital $z_{i,t}$, and the latter enters the hazard rates of democracies and autocracies. Thus, we should in principle be able to estimate δ by maximum likelihood, using the definition in (23) and imposing the constraint that δ is equal across the two hazard rates. With so many regime shifts for a number of countries, the likelihood functions become very highly non-linear, however, and we have not yet managed to find a meaningful maximum.

what we find.

A possible interpretation of this asymmetric income effect is that political transitions differ depend on the initial state. The social and political mechanisms that prevent a successful coup are different from those associated with 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 thus 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).

How robust are the results from this parsimonious specification? In the remaining columns of Table 1, we add indicators for war years (contemporaneous and lagged once) and a number of indicators for fixed country characteristics: legal, colonial and political history, and geographic location. Moreover, we add 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.¹⁰ While columns 2 and 6 use the Polity 4 definition of democracy, columns 3 and 7 use the Boix and Rosato definition for an otherwise identical specification of the hazard rates. As is evident from the table, 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 is delayed (i.e., it manifests itself one year after the war), while it is contemporaneous in democracies. Countries that start out as democracies turn out to be more stable as democracies, but no less stable as autocracies (given domestic democratic capital). Several of the other historical or geographic dummy variables have statistically significant coefficients, and so do the first and second component of the polynomial in time.

Exit from democracy is explained more successfully 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 probabilities of transitions remain quite low. Figure 4 illustrates the frequency distributions of the estimated probabilities of exit from democracy and autocracy, based

¹⁰We cannot run the hazard rates with fixed year effects, because the onset of democracy and autocracy is rare enough that we would perfectly predict too many transitions.

on the specifications in columns 2 and 6 of Table 1.¹¹ 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 political regimes (whether democracy or autocracy) very stable. Moreover, the determinants of interest tend to have relatively small effects on the probability of transition, despite their high statistical significance. For instance, according to the estimates in column 2, a one-time jump of domestic democratic capital from its minimum of 0 to its maximum of 20 would raise the probability of exit from democracy by about 2 percentage points for the average country-year in the sample.

When interpreting the effects of earlier democratic and autocratic spells on regime transitions, a natural concern – well-known from the labor literature – is the question of state-dependence vs. unobserved heterogeneity. Our concept of domestic democratic capital does address this concern to some extent. Thus, two countries equally far into a spell of autocracy, and at the same levels of income and other observables, need not have the same probability of turning democratic: a country with longer and more recent experience of democracy in the past will have a higher democratic capital and a higher estimated probability of making the transition.¹²

Nevertheless, countries with a longer history of democracy may be more stable democracies not because of this history, but because of some other unobserved and slow-moving variable that make them more stable. To cope with this omitted-variable problem, we have re-estimated the hazard rates allowing for unobserved heterogeneity in the form of a random country effect. The p -value in the row LR-test in Table 1 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). As the table shows, we never reject the absence of unobserved heterogeneity. For sure, this test relies on functional-form assumptions (about the hazard function and the influence of the random effects on the political transition) and hence is not fool proof. Nevertheless,

¹¹To obtain a comparable scale of the two graphs, we have truncated a few observations with hazard rates above 0.3 in Figure 4a.

¹²In an analog with labor economics, our procedure thus augments the information of the length of current unemployment spells with accounts of the full lifetime unemployment/employment history of each individual in the sample.

the results are robust to alternative assumptions about the hazard function.¹³

Despite these robustness checks, it is important to ask 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. Education is a case in point. Already Lipset (1959) pointed to the correlation between education and democracy. Recently Glaeser, Ponzetto and Shleifer (2005) present additional evidence of such a correlation, as well as a theory why it may arise. In fact, their model analyzes the participation of citizens in political transitions, as does the model presented in Section 2 above. Thus, the model of Glaeser et al predicts that the likelihood of a successful coup against democracy is decreasing in the level of education, and that the likelihood of a successful uprising 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 a wide ranging measure of education sampled far back in time for a large number of countries. From 1960, however, we have access to 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).¹⁴ 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 4 and 8 of Table 2 show the results for our most parsimonious specification of the hazard rates, identical to that in columns 1 and 5 – except for the shorter sample period and the addition of human capital. The hazard rate out of democracy (column 4) is indeed decreasing in human capital as expected. Both our measures of democratic capital (and income) remain significantly negative determinants of the hazard rate, however, with similar point estimates as in column 1. The autocracies, results are quite different. Although positive, the coefficient on human capital is not significantly differ-

¹³The LR tests in Table 1 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.

¹⁴The Barro and Lee variable is also one of the measures used by Glaeser, Ponzetto and Shleifer (2005).

ent from zero. But the effect of our two democratic capital variables remain precisely estimated with a higher coefficient than in column 5. The results are similar if we add more fixed country characteristics to the specification.

In summary then, the effect of democratic capital on both hazard rates is robust to controlling for education. While the idea that education may help consolidate democracy gets support in our data, the Glaeser et al prediction that education is a pre-requisite for the introduction of democracy gets little support.

6 Economic growth within political regimes

We now turn to the effects of transition probabilities on economic growth. In this section we study this issue within each political regime – i.e., separately within democracies ($a = 0$) and autocracies ($a = 1$). The next section takes up the more difficult task of including actual regime changes as well and estimating the model over the full sample.

6.1 Econometric specification

For each regime, we start from the basic specification:

$$y_{i,t}^a - y_{i,t-1}^a = \beta y_{i,t-1}^a + \lambda \widehat{h}_{i,t}^a + \gamma \mathbf{x}_{i,t} + \alpha_i + \theta_t + \epsilon_{i,t}, \quad a = 0, 1 \quad (25)$$

where $\widehat{h}_{i,t}^a$ is the predicted hazard rate out of regime a , in country i during year t , estimated 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. This equation can be derived from (20) by assuming log-linearity (with y being the log of per capita income), subtracting $y_{i,t-1}$ from both sides, and assuming that the error term $\epsilon_{i,t}$ has a specific country and year component in addition to white noise. 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. As the details of the growth process can differ across countries and time – due to different production structures and different income shocks – we want to allow for heteroskedasticity and/or country-specific autocorrelation in the error term $\epsilon_{i,t}$.

Identification of the parameter λ requires that the hazard rate $\widehat{h}_{i,t}^a$ is uncorrelated with the error term $\epsilon_{i,t}$. Note that the presence of the fixed

country effect α_i in (25) picks up any growth effect of the country-average hazard rate \widehat{h}_i^a including any effects of the 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}_t^a . Thus, λ is identified only from the country-specific, time variation in the estimated hazard rate $(\widehat{h}_{i,t}^a - \widehat{h}_i^a - \widehat{h}_t^a)$. This variation in our generated regressor is due to only three components: the indicators for wars and lagged wars, time variation in the domestic and foreign components of democratic capital, and lagged income. To take care of the likely 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 through international trade). To address this prospective problem, we define a new variable called foreign income, $y_{i,t}^f$. For country i in year t , we define foreign income by

$$y_{i,t}^f = \sum_{j \neq i} \varpi_t^{i,j} y_{j,t} ,$$

where the bilateral weights $\varpi_t^{i,j}$ are *identical* to the weights used in the definition of foreign democratic capital. To purge out any (spurious) relation between current domestic growth and foreign democratic capital, through foreign income, we always include $y_{i,t}^f$ in the vector of controls, $\mathbf{x}_{i,t}$.

For domestic democratic capital, $z_{i,t}$, we have no corresponding control to offer, given the sparsity of our data. But below we offer some evidence that our identifying assumption are fulfilled. Since two variables entering the (first-step) estimation of the hazard rate are excluded from the (second-step) growth equation, we have overidentification – and a testable restriction.

6.2 Results

Table 3 displays the estimation results. In accordance with the discussion above, we report two sets of standard errors: Huber-White robust (i.e., al-

lowing for heteroskedasticity) in the first bracket and clustered by country (i.e., also allowing for any pattern of country-specific autocorrelation) in the second bracket. Further, country and year fixed effects plus indicators for wars and lagged wars are always included in the specification, in addition to the variables indicated by the left-most column. Throughout the table, we use the hazard rates as predicted by columns 2 (for democracies) and 6 (for autocracies) of Table 2 .

Column 1 reports the basic regression for the more than 3800 democratic country-years in the panel. As expected, foreign income has a positive coefficient, while lagged income has a negative coefficient – indicating income convergence on the order of 4% per year. 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 ($\alpha > 1$). The estimated coefficient on the probability of a transition out of democracy is -17 . This looks like a very large effect: if the probability were to jump from 0 to 1, the impact on growth would be a fall by 17 percentage points. As discussed in connection with Figure 4, however, the observed range of variation of the estimated hazard rates within regimes is small. As mentioned in Section 5, a hypothetical increase in domestic democratic capital from its minimum of 0 to its maximum of 20 would cut the hazard rate out of democracy by about 2 percentage points. Given the point estimates in column 1, this would raise growth by 0.35 percentage points, and – with a convergence rate of 0.04 – long-run income by about 9 percent. An increase in foreign democratic capital by 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 about 2 percentage points and thus have a similar effect long-run income.

A possible concern is that our estimates are just picking up the effect of transition years: during political transitions, the probability of a coup is high and at the same time growth is likely to suffer 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 make sure that our estimates are not driven by transition years, column 2 shows the same growth regression excluding the year of entry in autocracy as well as the preceding year. The estimated effect of the hazard rate on growth is now stronger in absolute value (results are similar if we exclude the transition year and the

two preceding years).

As discussed earlier in this section, 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? One way to approach this question is to test whether domestic and foreign democratic capital are significantly correlated with the residuals from the regressions underlying columns 1 and 2. We do this by way of an “overidentification test”, running these residuals against all the “instruments”, i.e., all regressors included in the growth equation plus the two excluded components of democratic capital. The Sargan-Hansen statistics (the R-squared from the regression times the number of observations) displayed towards the bottom of the table are very low indicating that we cannot reject the exclusion restriction. In column 3, 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 two income variables are basically unaltered, the two components of democratic capital are neither individually nor jointly significant (see the F-statistic in column 3).

The second half of the table (columns 4-6) shows corresponding estimates for close to 4400 autocratic country-years. Here, the fit is generally worse (the within R-squared drops considerably), the standard errors are larger, and the results are more disappointing from the viewpoint of the predictions in Proposition 1. Specifically, the hazard rate out of autocracy is never a statistically significant predictor of growth, and its estimated coefficient is negative with a similar magnitude as in the sample of democracies. This contradicts the prediction that the probability of exit from autocracy should have a positive effect on growth if TFP is higher under democracy (if $\alpha > 1$). If anything, the risk of exit from autocracy appears to hurt growth, suggesting that the negative effect of political instability dominates the expected benefits from becoming a democracy.

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 that is entered into. Thus, if on average democracy has higher TFP than autocracy, 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 prediction, but not the second one. 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 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.¹⁵ Both estimated hazard rates have a negative effect on growth. The effect in democracies is again more precisely estimated (and statistically significant) than the one within autocracies. But now the estimated coefficient of the hazard rate on growth is higher (in absolute value) in autocracies than in democracies.

Finally, adding human capital (as defined above) to these regressions does not change the estimated coefficients reported in Table3 (neither for democracy nor for autocracy), while the human capital variable always turns out to be statistically insignificant.

7 Economic growth and political transitions

Finally, we take the third step discussed in Section 3, namely to estimate the effect of regimes and regime transitions on growth in the full sample exploiting variation both within and across political regimes.

7.1 Econometric specification

We now estimate an equation like:

$$y_{i,t} - y_{i,t-1} = \beta y_{i,t-1} + \phi(1 - a_{i,t}) + \lambda \widehat{p}_{i,t} + \boldsymbol{\rho} \mathbf{x}_{i,t} + \alpha_i + \theta_t + \epsilon_{i,t} . \quad (26)$$

Following the discussion about (21) in Section 3, we have added to the specification in (25) the effect on growth of the *actual* political regime. The latter is expressed by the binary variable $(1 - a_{i,t})$, which takes a value of 1 for democracies and 0 for autocracies. Further, we have replaced the within-regime hazard rate with the probability of autocracy, defined in accordance

¹⁵Here we use the hazard rates estimated in columns 3 and 7 of Table 2.

with (6) in the theory section. Our parameters of interest are thus ϕ and λ , capturing the growth effects of democracy (vs. autocracy) as such, and of the probability of autocracy.

One problem in estimating (26) concerns the identification of ϕ . 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 the countries that experience a regime change are "treated", and those not experiencing a regime change are "controls".¹⁶

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 be systematically more likely than others to become democracies (or autocracies). What we must rule out, however, is that (after conditioning for 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 not only changed their political regime, but also underwent a transformation towards a market economy. To avoid confounding the effects of political and economic transition, we therefore include in $\mathbf{x}_{i,t}$ a dummy variable taking a value of one for years after 1989 in the formerly socialist countries of Central and Eastern Europe and the countries formed out of the former Soviet Union.

The identifying assumption is made more credible by the presence in equation (26) of the probability of autocracy $\hat{p}_{i,t}$. To see this, consider a country widely (and correctly) expected to become a democracy. Suppose further that this expectation leads to an acceleration in investment and growth well

¹⁶See for instance Persson (2004), Giavazzi and Tabellini (2005)

before the fact, so that not much happens to growth when actual regime change takes place. If we do not control for the declining 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 the expectation of a relapse into autocracy hurts economic growth, and we fail to control for the increasing probability of autocracy. 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.

A second problem with the specification in (26) concerns the lack of time variation in the hazard rates, and hence in $\hat{p}_{i,t}$. Regime changes are rare events and, as shown in Figure 4, the estimated hazard rates are generally very 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.

Given the nature of our data, we deal with these problems in two basic ways. First, we estimate different versions of (26) by OLS, assuming that the identifying assumption ($a_{i,t}$ and $\epsilon_{i,t}$ uncorrelated) is valid. Second, we estimate the reduced form, namely equation (22) in section 3 above, rewritten in terms of growth rates:

$$y_{i,t} - y_{i,t-1} = \tilde{\beta}y_{i,t-1} + \pi d_{i,t-1} + \tilde{\rho}\mathbf{x}_{i,t} + \alpha_i + \theta_t + u_{i,t} . \quad (27)$$

The parameter of interest is the coefficient on democratic capital, π . When estimating (27), we include both measures of democratic capital, domestic and foreign. Note that this equation (27) can be consistently estimated even if the identifying assumption discussed in Section 6 is violated, namely if democratic capital has a direct effect on growth through policy formation (although this would obviously affect the interpretation of the estimate).¹⁷

¹⁷Because of the indirect effect on growth of lagged income y_{t-1} and the variables in \mathbf{x}_t through the hazard rates, the coefficients $\tilde{\beta}$ and $\tilde{\rho}$ in (27) do not have the same interpretation as their counterparts in (26).

An alternative more structural approach would be to exploit the identifying assumption that democratic capital determines growth only through actual $(1 - a_{i,t})$ and expected $(\hat{p}_{i,t})$ regimes. This would mean to estimate (26) by IV using democratic capital as an instrument 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 the non-linear function $\hat{p}_{i,t}$). Given the strong correlation between $(1 - a_{i,t})$ and $\hat{p}_{i,t}$ noted above, such identification would be quite fragile, however, and we do not pursue it here.

7.2 Results

Table 4 reports the estimates of (26) 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 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. While the point estimate is marginally positive, the impact of democracy on growth is not statistically significant. This specification resembles that of other existing empirical studies.¹⁸ 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. This bias could be aggravated by a so-called "Ashenfelter dip". If growth is systematically lower at the time of democratic transitions, because of the uncertainty and disruptions that surround regime changes, we may under-estimate the growth improvements associated with democracy simply because they take time to show up. Column 2-5 shows that both concerns could be relevant.

In column 2, we now control for transition years, defined as the year of regime change plus the year before and after this year. This variable has the

¹⁸See Przeworski and Limongi (1993) for a survey.

expected negative sign and is quite precisely estimated. The coefficient on democracy increases and becomes marginally significant. In column 3, we drop democracy, and instead we include the probability of autocracy ($\hat{p}_{i,t}$ above). While the point estimate is negative, as expected, the effect is not significantly different from zero. In column 4, we allow the growth effect of the probability of autocracy to differ depending on the political regime: we add an interaction term between the probability of autocracy and democracy in the previous period (i.e., we add the variable $\hat{p}_{i,t} \cdot (1 - a_{i,t-1})$ to the regression). As discussed in the previous section, the probability of autocracy was found to have different effects depending on the regime (democracy or autocracy) and constraining the estimated coefficient on \hat{p} to be the same in both regimes could lead to biased estimates. The estimates displayed in column 4 of Table 4 confirm our previous findings. The probability of autocracy hurts growth, and the effect is now (at least marginally) significant in both regimes; but the risk of abandoning democracy has a much stronger negative effect on growth compared to the risk of remaining an autocracy.

The specification in columns 3 and 4 remains doubtful, however, because we have omitted the actual regime from the right hand side. In column 5 we report the results from a full specification, including both actual democracy ($1 - a_{i,t}$) and the probability of autocracy $\hat{p}_{i,t}$. In column 6 we also add transition years. The coefficient on democracy rises relative to columns 1 and 2, and becomes statistically significant and quantitatively relevant when also controlling for transition years – becoming a democracy is associated with a growth acceleration of about 1%. The probability of autocracy within democracies continues to exercise a negative effect on growth. But this effect is only statistically significant when we omit transition years from the specification (column 5).

Altogether, these results suggest that on average becoming a democracy is associated with an improvement in economic performance: in terms of the model, the hypothesis that $\alpha > 1$ is supported by the within-country evidence. They 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 could be one reason why previous studies failed to detect a robust and significant growth effect from becoming a democracy.

It is difficult to draw sharp inferences from Table 4, however, because of the above-mentioned problems of multicollinearity between actual and expected regimes, and endogeneity of the actual regime. To cope with both

problems, we now turn to the estimates of reduced forms like (27). They are reported in Table 5. Except for the coefficients displayed in the two tables, the specification throughout Table 5 is identical to that in Table 4.

Column 1 reports the simplest reduced form specification, with domestic and foreign democratic capital. The coefficients on both components are positive and significant. The point estimates suggest quite powerful effects of democratic capital on growth and long-run income, if we reconsider the experiments discussed in Section 6. Thus, a switch by 20 units, from minimum to maximum domestic democratic capital, would raise long-run income by about 40 percent, while a boost of foreign democratic capital by 4 units would more than double long-run income. Given the fragility of the results in Table 4 to the inclusion of the transition years variable, column 2 adds this variable to the specification. While the transition years have a precisely estimated negative effect as before, the results for democratic capital are identical to those in column 1. Again, these findings support the hypothesis that becoming a democracy on average leads to an improvement in *TFP* (in terms of the model, $\alpha > 1$).

Columns 3 and 4 allow the effect of democratic capital to differ by political regime. Consistently with the results in earlier tables, the positive effect of democratic capital shows up only among those countries that were democracies in the previous period. Adding transition years makes the estimates more noisy but does not alter the general picture.

Finally, columns 5 and 6 show that these results are similar when we add lagged democracy, with and without transition years, to the controls. These specifications are more demanding, because of possible multicollinearity (the correlation coefficient between lagged democracy and domestic democratic capital is almost 0.8). But the results in columns 3 and 4 hold up pretty well, particularly when we omit transition years (column 5).

Overall, the findings in Table 5 confirm that the positive effect of democratic capital – and in particular domestic democratic capital within democracies – on growth 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.

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

As always, the inferences we have drawn from the data are conditional on specific identifying assumptions. In particular, our results hinge on two assumptions. What we have called 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 in the consolidation of democracy, we have to assume that there are no unobserved variables that make some democracies more stable than others. Such unobserved heterogeneity would be picked up by our measure of domestic democratic capital and bias our estimates. We have tested for specific parametric forms of this problem, and could not reject absence of unobserved heterogeneity. But the power of these tests remains to be assessed.

The second important identifying assumption is that democratic capital (domestic and foreign) does not directly affect on economic growth, conditional on the other variables included in the regression. The fact that our growth estimates only exploit within country variation makes this assump-

tion more credible. Moreover, the (over)identifying assumption could not be rejected, although one may once again question the power of the orthogonality tests.

Our empirical results point to a puzzling asymmetry. Autocracies differ systematically from democracies in two important ways. First, the probability of exit from autocracy does not depend on the level of economic development. While higher income makes democracies more stable, it does not make dictators more precarious. Second, while more instability of democracy hurts growth, more instability of autocracy has no effect on growth. A further sign of this 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 of the asymmetry is that the social and political mechanisms that bring about successful coups against democracies are different from those that bring about successful ousting of dictators. Another interpretation is that the average we have emphasized in this paper masks important differences between countries. If so, it is important to uncover these differences, and be sure that they do not invalidate our identifying assumptions.

In light of these final remarks, we see two prominent avenues for future research. A first priority would be to allow for more heterogeneity between countries. The task is easier for democracies, because here we can exploit a large literature in comparative politics that has already 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). But the empirical findings described above suggest that understanding the differences between various types of autocracies may be even more important.¹⁹

A second avenue for future research is to gain a better understanding of the notion of democratic capital. How important is the contribution of education in the accumulation of democratic capital? Does the rise of a large and influential middle class play a critical role in the process of democratic consolidation? Just how important are independent media in mobilizing support for democracy? How crucial are the cultural and sociological attitudes of the population at large? Probably all these forces are at work and hidden

¹⁹See here the analysis by Acemoglu and Robinson (2005) and the references that they cite.

behind what we call democratic capital. Telling them apart and identifying more precisely their specific role in the process of democratic consolidation is an important priority for future research.

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Figure 1 Domestic Democratic Capital

Spain vs. Sweden

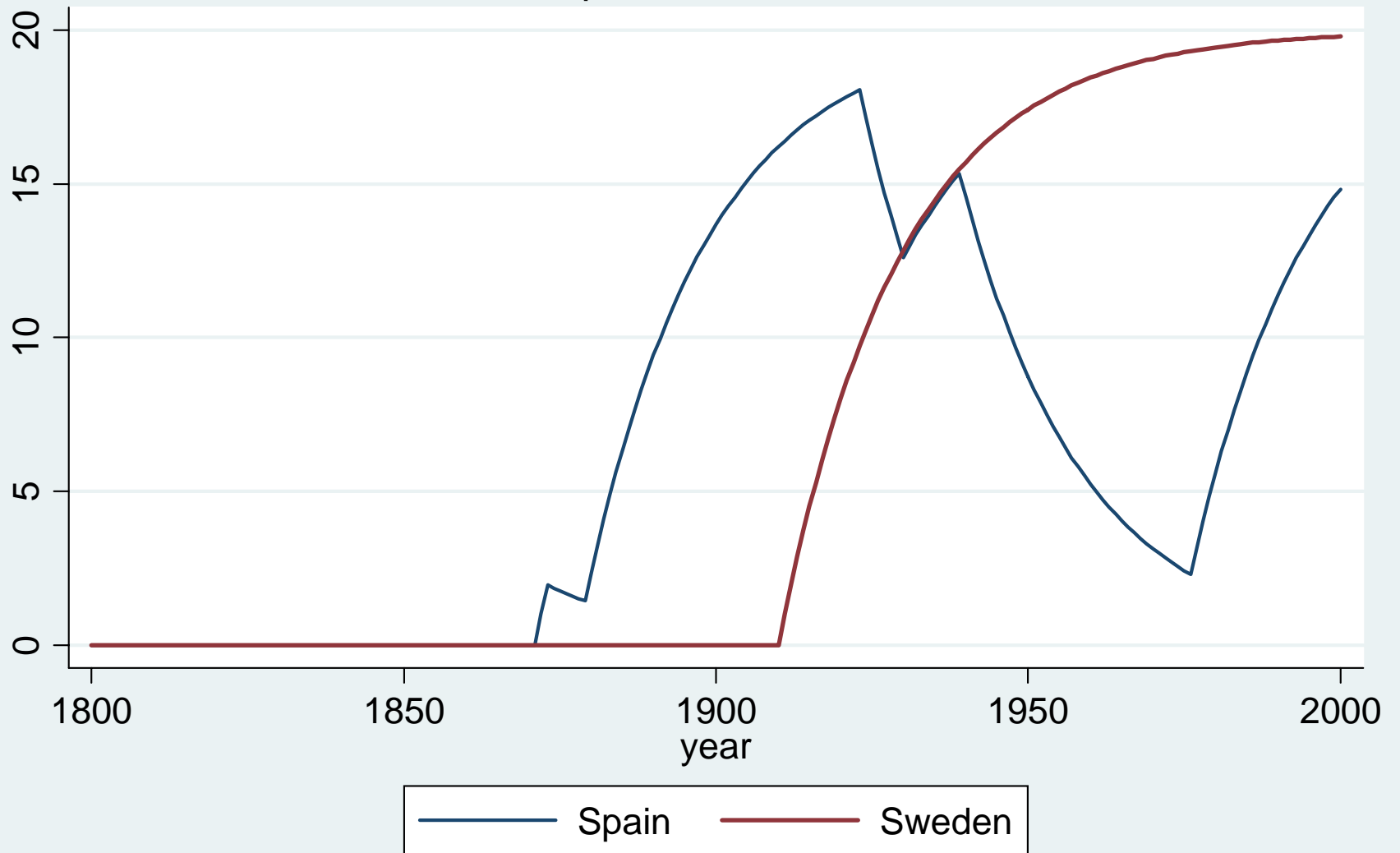


Figure 2 Foreign democratic capital
Belgium vs. Chile

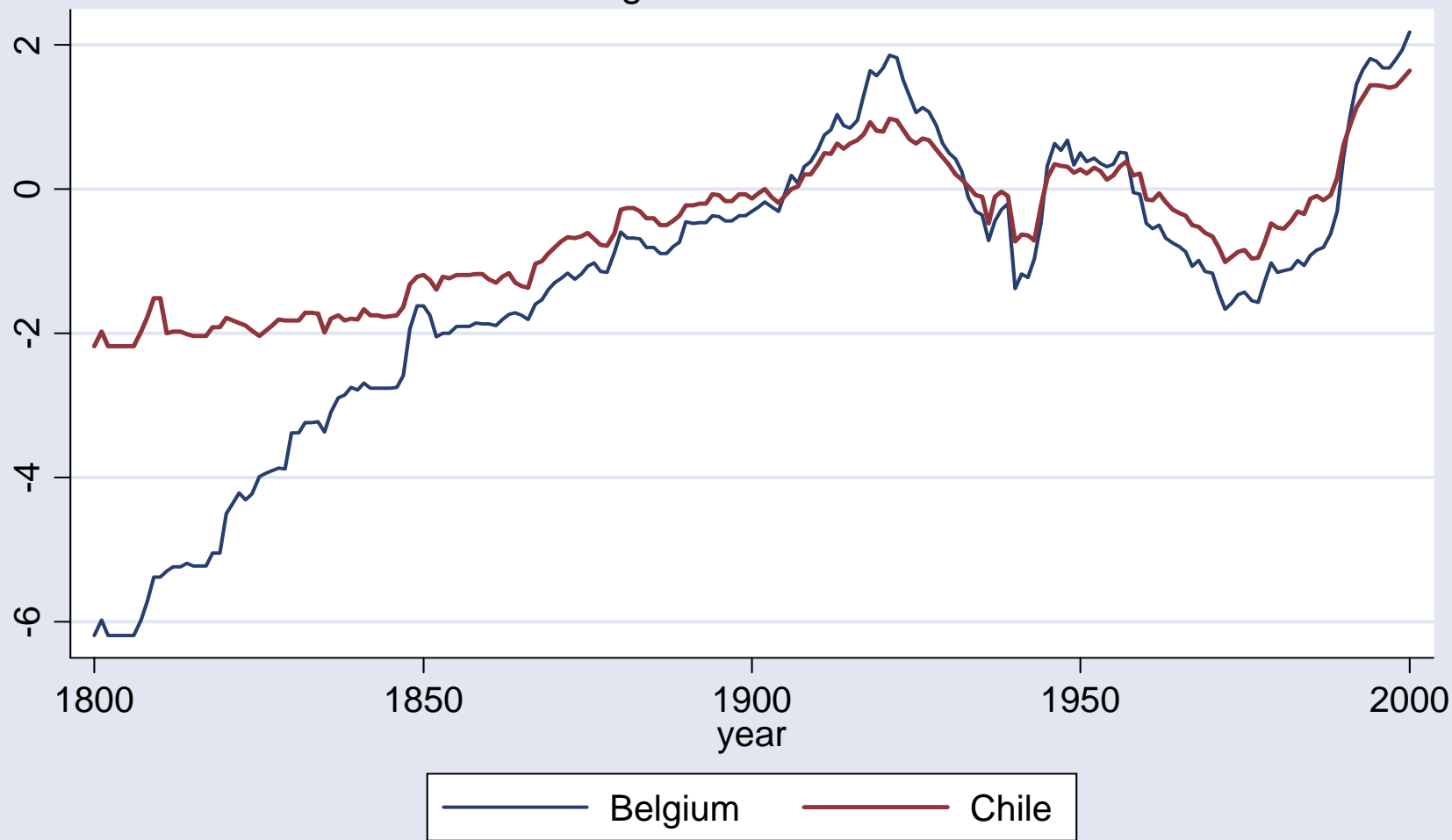
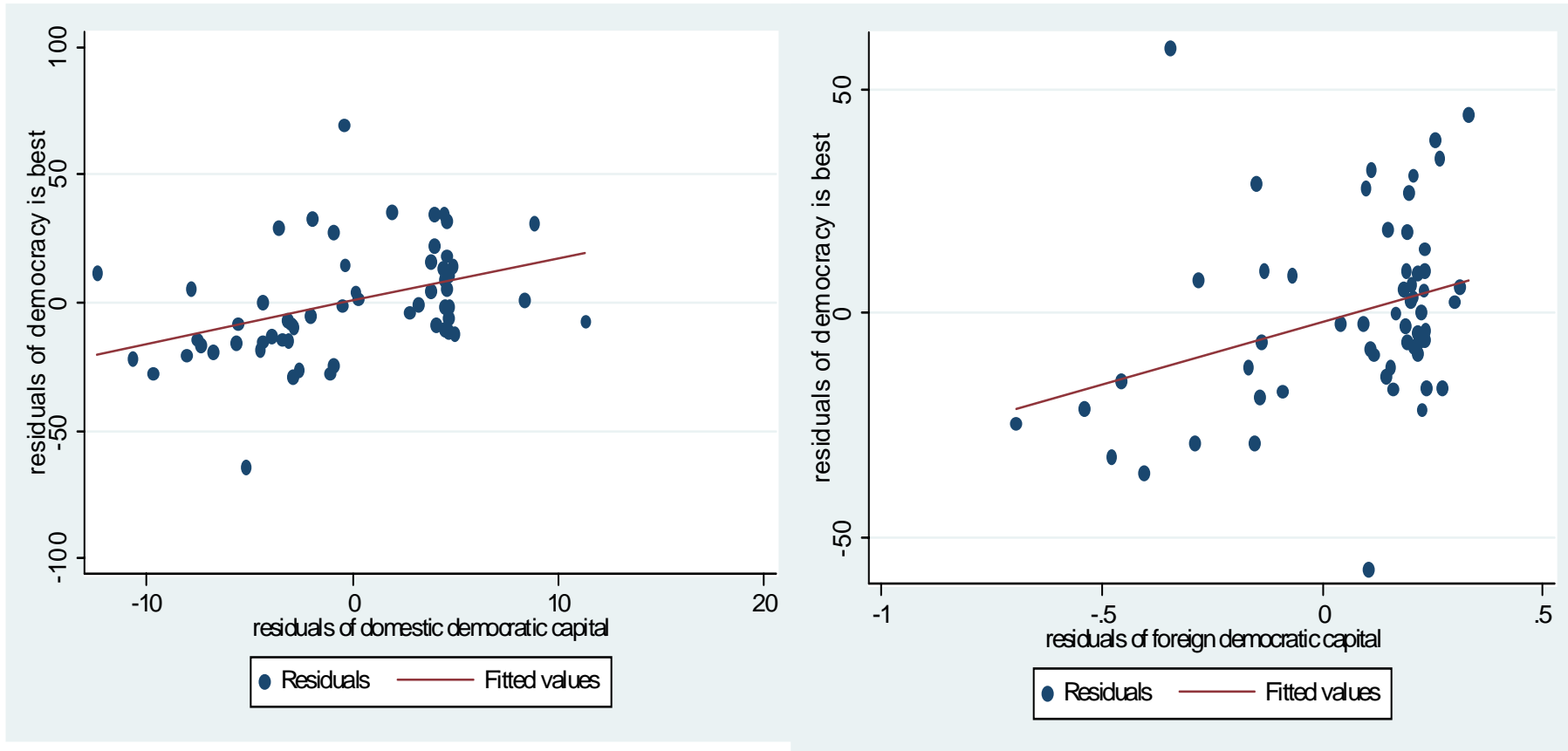


Figure 3 Democratic capital and opinions on democracy



The residuals are obtained from a regression that always include democracy and per capita income. On the left hand side panel, the regression also includes foreign democratic capital; on the right hand side panel, it also includes domestic democratic capital. The slope of each line corresponds to the estimated coefficients in column 4 of Table 1.

Figure 4a

Hazard rate out of democracy

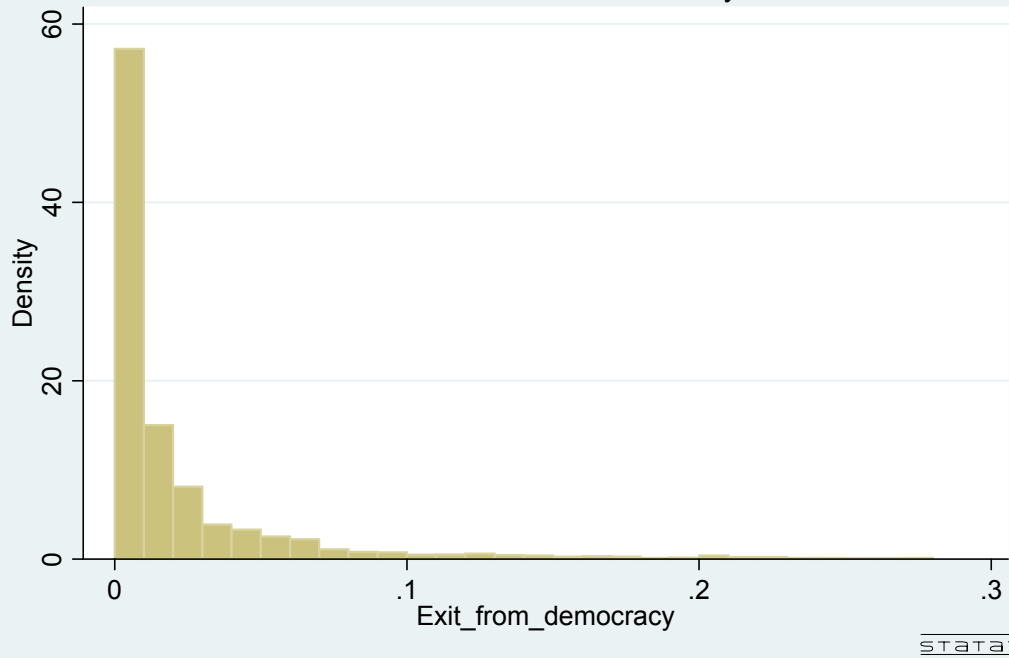
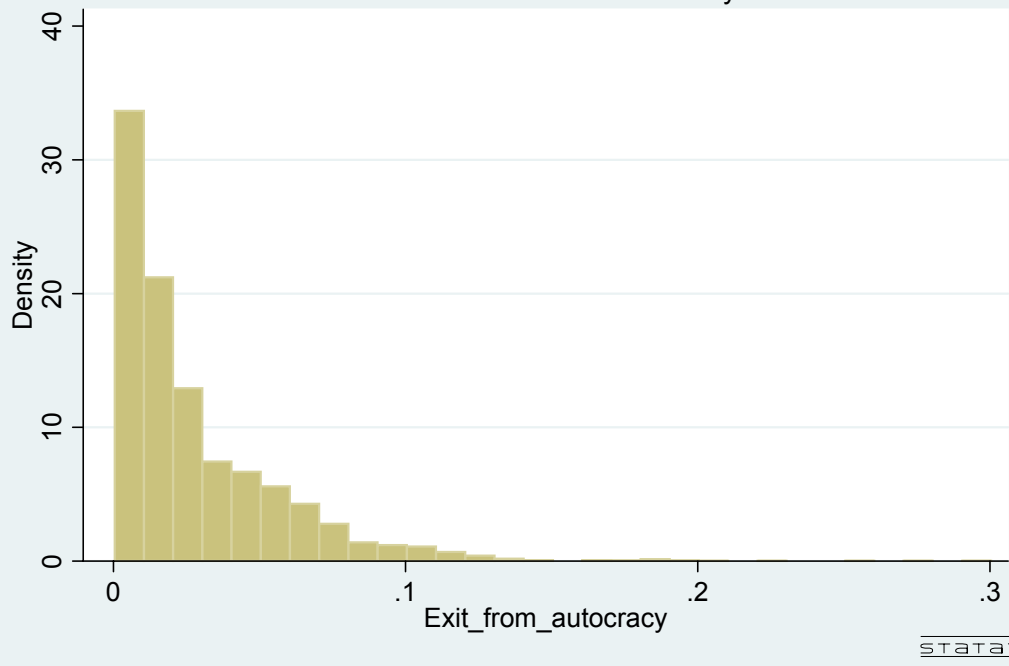


Figure 4b

Hazard rates out of autocracy



STATA™

Table 1 Democratic capital and opinions on democracy

	(1) Thinks democracy is the best system	(2) Thinks democracy is the best system	(3) Thinks democracy is the best system	(4) Thinks democracy is the best system	(5) Thinks democracy is the best system
Domestic democratic capital	0.91** (0.38)	1.31** (0.55)	1.78*** (0.43)	1.87*** (0.55)	1.59*** (0.48)
Foreign democratic capital	27.90** (11.08)	34.07** (13.13)	29.60*** (10.35)	33.01*** (12.24)	40.41*** (11.94)
Per capita income		- 5.13 (4.68)		-2.48 (4.45)	- 3.01 (5.37)
Democracy			- 26.48*** (8.04)	-25.22*** (8.34)	- 8.67 (9.12)
Human capital					-11.65 (7.75)
Number of observations	61	58	60	58	45
Adjusted R-square	0.17	0.16	0.30	0.27	0.33

All specifications estimated by Ordinary Least Squares. Standard errors in parentheses: * significant at 10%; ** significant at 5%; *** significant at 1%. Variables explained in text. All variables measured in 1999.

Table 2 Hazard rates out of political regimes

	(1) Exit from democracy	(2) Exit from democracy	(3) Exit from democracy	(4) Exit from democracy	(5) Exit from autocracy	(6) Exit from autocracy	(7) Exit from autocracy	(8) Exit from autocracy
Domestic democratic capital	- 0.024** (0.010)	- 0.020* (0.011)	- 0.035*** (0.012)	-0.028* (0.015)	0.042*** (0.009)	0.034*** (0.012)	0.029*** (0.011)	0.056*** (0.014)
Foreign democratic capital	- 0.108** (0.047)	- 0.226*** (0.069)	- 0.329*** (0.083)	- 0.179** (0.075)	0.189*** (0.037)	0.175*** (0.039)	0.221*** (0.044)	0.209*** (0.050)
Lagged per capita income	- 0.496*** (0.067)	- 0.468*** (0.076)	- 0.350*** (0.083)	- 0.342*** (0.067)	0.047 (0.052)	0.005 (0.059)	0.013 (0.065)	- 0.077 (0.085)
Human capital				-0.486* (0.266)				0.268 (0.178)
Covariates	No	Yes	Yes	No	No	Yes	Yes	No
Definition of democracy	Polity	Polity	Boix	Polity	Polity	Polity	Boix	Polity
Method	ML Probit	ML Probit	ML Probit	ML Probit	ML Probit	ML Probit	ML Probit	ML Probit
LR-test (p-value)		0.20	1.0			0.16	0.14	
Number of observations	3839	3839	3969	1938	4429	4429	4115	1933
Pseudo R-square	0.141	0.221	0.230	0.222	0.045	0.095	0.112	0.059

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, first year of independence democratic, British colonial origin, Spanish or Portuguese colonial origin, ever a colony, African location, Middle-Eastern location, and Latin-American location. LR test: random-effects panel specification (estimated by panel logit) against the null of pooled specification (also by logit) – a high p-value means we cannot reject that unobserved heterogeneity is absent.

Table 3 Growth rates within political regimes

	(1) Growth in democracies		(2) Growth in democracies		(3) Growth in democracies		(4) Growth in autocracies		(5) Growth in autocracies		(6) Growth in autocracies	
Hazard rate	-17.42		-20.05		-17.61		-17.07		-17.85		-16.30	
	(4.44) ^{***}	(7.45) ^{**}	(5.51) ^{***}	(9.78) ^{**}	(4.48) ^{***}	(7.68) ^{**}	(13.72)	(16.36)	(11.93)	(16.88)	(16.13)	(20.06)
Lagged income per capita	-4.30		-4.66		-4.31		-2.75		-2.74		-2.64	
	(0.62) ^{***}	(0.91) ^{***}	(0.63) ^{***}	(0.96) ^{***}	(0.62) ^{***}	(0.93) ^{***}	(0.55) ^{***}	(0.69) ^{***}	(0.56) ^{***}	(0.69) ^{***}	(0.56) ^{***}	(0.75) ^{***}
Foreign income	5.69		5.81		5.64		3.85		0.17		6.31	
	(2.20) ^{***}	(3.63)	(2.28) ^{**}	(3.83)	(2.26) ^{**}	(3.64)	(3.15)	(3.50)	(2.99)	(3.79)	(3.69) [*]	(3.70) [*]
Domestic democratic capital					-0.01						-0.03	
					(0.03)	(0.04)					(0.07)	(0.10)
Foreign democratic capital					-0.18						1.07	
					(0.39)	(0.40)					(0.83)	(1.29)
Sample	All years		No transition years		All years		All years		No transition years		All years	
Sargan-Hansen statistic	0.25		0.03				1.97		3.31 [*]			
F-statistic					0.15						0.95	
Number of observations (countries)	3827 (110)		3656 (107)		3827 (110)		4366 (118)		4130 (117)		4366 (118)	
R-squared (within)	0.178		0.185		0.178		0.117		0.116		0.117	

Notes: Variables explained in text. In first brackets robust standard errors, in second brackets standard errors clustered by country: * denotes significant at 10%; ** significant at 5%; *** significant at 1%. Democracy defined according to Polity 4. Hazard rates for democracies and autocracies computed from specifications in columns 2 and 5 of Table 1, respectively. All specifications include country and year fixed effects, indicators for war years and lagged war years. 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 domestic and foreign democratic capital (critical value of chi-2(1 d.f.) is 3.84). F-statistic is the test statistic for the joint significance of these two variables.

Table 4 Growth rates across political regimes

	(1) Growth	(2) Growth	(3) Growth	(4) Growth	(5) Growth	(6) Growth
Democracy	0.26 (0.22) (0.28)	0.40 (0.22)* (0.28)			0.76 (0.63) (0.63)	1.04 (0.62)* (0.62)*
Probability of autocracy			-0.25 (0.28) (0.34)	-0.66 (0.30)** (0.42)	0.06 (0.75) (0.80)	0.47 (0.73) (0.78)
Probability of autocracy in (lagged) democracy				-6.68 (2.52)*** (3.79)*	-6.78 (2.50)*** (3.78)*	-3.42 (2.52) (3.96)
Lagged income per capita	-2.80 (0.36)*** (0.48)***	-2.87 (0.36)*** (0.49)***	-2.77 (0.36)*** (0.48)***	-2.81 (0.36)*** (0.47)***	-2.81 (0.36)*** (0.47)***	-2.81 (0.36)*** (0.47)***
Transition years		-1.80 (0.37)*** (0.43)***				-1.65 (0.35)*** (0.42)***
Number of observations (countries)	8279 (148)	8279 (148)	8193 (148)	8135 (148)	8135 (148)	8135 (148)
R-square (within)	0.09	0.10	0.09	0.10	0.10	0.10

Notes: All variables explained in text. In first brackets robust standard errors, in second brackets standard errors clustered by country: * denotes significant at 10%; ** significant at 5%; *** significant at 1%. Democracy defined according to Polity 4. Probability of autocracy constructed from hazard rates for democracies and autocracies computed from specifications in columns 2 and 5 of Table 1, respectively. All specifications include country and year fixed effects, foreign income, 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 5 Growth rates and democratic capital across political regimes

	(1) Growth	(2) Growth	(3) Growth	(4) Growth	(5) Growth	(6) Growth
Domestic democratic capital	0.04 (0.02)** (0.03)	0.04 (0.02)** (0.03)	-0.03 (0.04) (0.05)	-0.02 (0.04) (0.05)	-0.04 (0.04) (0.05)	-0.03 (0.04) (0.05)
Foreign democratic capital	0.65 (0.30)** (0.41)	0.64 (0.30)** (0.42)	-0.03 (0.35) (0.48)	-0.01 (0.35) (0.48)	-0.09 (0.36) (0.48)	-0.04 (0.36) (0.49)
Domestic democratic capital in (lagged) democracy			0.07 (0.04)* (0.04)*	0.06 (0.04) (0.04)	0.10 (0.05)** (0.05)*	0.07 (0.05) (0.05)
Foreign democratic capital in (lagged) democracy			0.32 (0.14)** (0.21)	0.24 (0.14)* (0.21)	0.31 (0.14)** (0.21)	0.23 (0.14) (0.21)
Lagged democracy					-0.42 (0.33) (0.44)	-0.15 (0.33) (0.45)
Lagged income	-1.88 (0.27)** (0.38)**	-1.95 (0.27)** (0.39)**	-2.87 (0.37)** (0.53)**	-2.87 (0.37)** (0.53)**	-2.88 (0.37)** (0.53)**	-2.88 (0.37)** (0.53)**
Transition years		-1.70 (0.37)** (0.44)**		-1.54 (0.34)** (0.41)**		-1.52 (0.35)** (0.42)**
Number of observations (countries)	10040 (154)	10040 (154)	8137 (148)	8137 (148)	8137 (148)	8137 (148)
R-square (within)	0.09	0.09	0.10	0.10	0.10	0.10

Notes: All variables explained in text. In first brackets robust standard errors, in second brackets standard errors clustered by country: * denotes significant at 10%; ** significant at 5%; *** significant at 1%. Democracy defined according to Polity 4. All specifications include country and year fixed effects, foreign income, 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.