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## Democracy and institutional quality: Theory and Evidence

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# Democracy and Institutional Quality: Theory and Evidence

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## Abstract

We present a simple model that illustrates how democracy may improve the quality of economic institutions. The model further suggests that institutional quality varies more across autocracies than across democracy and that the positive effect of democracy on institutional quality is increasing in people's human capital. Using a new panel data set, covering 140 countries and the period from 1920 to 2015, and different measures of institutional quality, we present results from fixed effect and two-stage least squares regressions that confirm the predictions of our model.

**Keywords:** *Democracy, Development, Economic Institutions, Human Capital, Institutional Quality, Political Economy, Political Transitions, Private Property Rights*

**JEL No.:** *D73, H11, O43, P14, P48*

# 1 Introduction

It is widely acknowledged that institutions play an important role in explaining cross-country differences in economic development.<sup>1</sup> A pending question is, however, which factors promote the emergence of growth-enhancing institutions. We address this issue and examine whether transitions from autocracy to democracy cause improvements in institutional quality.

We start from the observation that the level of democracy positively correlates with institutional quality. Figure 1 illustrates this stylized fact for four years (1920, 1950, 1980, 2010), using a continuous index of democracy and an expert-based indicator of private property protection. Economic theory provides two explanations for the positive correlation between democracy and institutional quality: the first is that a democratic transition requires well-developed economic institutions (Friedman, 1962, Hayek, 1944), while the second suggests that democratic governments have a greater interest in good institutions than autocratic governments (Olson, 1993, Przeworski and Limongi, 1993).

This study elaborates on the latter argument and presents a simple theoretical model to explain why an increase in the degree of democratization can lead to an increase in institutional quality. The model considers a society that consists of two groups: the elite and the people. Agents belong to either of the two groups and the elite constitutes the minority of the population. The elite derives utility from consumption which is financed through expropriations, whereas the people enjoy consumption and leisure, engage in commercial activities, and face an expropriation risk. The people and the elite send a signal to the government that indicates the desired level of institutional quality. The elite wants some room for expropriation, whereas the people prefer institutions that fully protect them against expropriation. In our model, democracy has a positive effect on institutional quality because democratic governments are more likely to take people's preferences into account

Figure 1 also shows that cross-country differences in institutional quality are larger between autocracies than between democracies. Our model explains this pattern and suggests in particular that autocratic governments implement weaker institutions when the people command a high level of human capital.

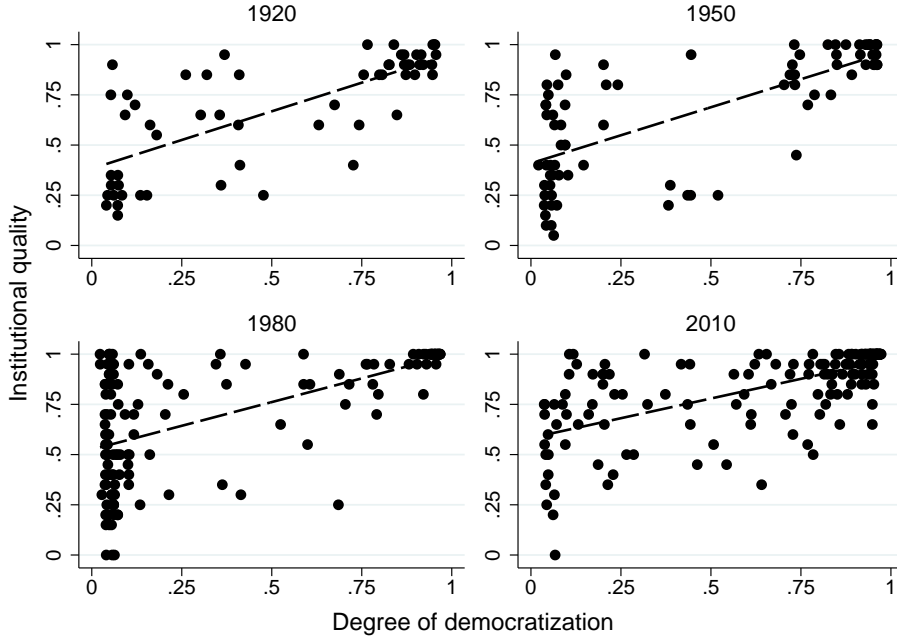
We use a novel panel data set, covering 140 countries and the 1920 – 2015 period, and different measures of institutional quality—provided by the Varieties of Democracy Database—to study the accuracy of our model. We emphasize two predictions: first, the quality of the economic institutions improves after a transition from autocracy to democracy, and second, the effect of democracy on institutional quality increases in the level of human capital. Our estimation results confirm both predictions.

We contribute to the literature that studies the relationship between democracy and

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<sup>1</sup>For studies that confirm this view, see Acemoglu et al. (2001, 2002, 2005a,b), Acemoglu and Robinson (2013), De Long and Shleifer (1993), Hall and Jones (1999), Knack and Keefer (1995), North (1991), North and Weingast (1989), Pinkovskiy (2017), Rodrik et al. (2004), Rodrik (2008), and Sokoloff and Engerman (2000).

**Figure 1** Democracy and institutional quality — Scatter plots



**Notes:** The figures show the correlation between democracy and institutional quality for the years 1920, 1950, 1980, and 2010. We use an expert-based index on private property protection—provided by the Varieties of Democracy Database—to measure institutional quality and the machine learning democracy index of Gründler and Krieger (2019). For details on the data, see Section 3.1.

institutional quality.<sup>2</sup> A major difference between previous empirical studies and our analysis is the length of the examination period: while previous studies use data from 1970/80 onward, our examination period starts in 1920. Another difference concerns the identification strategy: we apply a two-stage least squares approach to confirm that democracy positively affects institutional quality, whereas previous studies rely on OLS and GMM methods.

Only a few studies examine whether the effect of democracy on institutional quality depends on other socioeconomic factors. Acemoglu (2008), Acemoglu and Robinson (2006) develop a model suggesting that a high level of income inequality erodes the positive effect of democracy on institutional quality. Sunde et al. (2008), Krieger and Meierrieks (2016), and Kotschy and Sunde (2017) report empirical results that confirm this prediction.

Fortunato and Panizza (2015) suggest that the effect of democracy on institutional quality depends positively on human capital. Their study differs from our analysis for three reasons: first, we use a much more comprehensive dataset; second, we address endogeneity issues with an instrumental variable approach; and finally, we explain the positive effect of the interaction between democracy and human capital on institutional

<sup>2</sup>For empirical studies that examine this relationship, see Adsera et al. (2003), Assiotis and Sylwester (2015), De Haan and Sturm (2003), Knutsen (2011), Leblang (1996), Lundström (2005), Méon and Sekkat (2016), Pitlik (2008), and Rode and Gwartney (2012). The dominant view is that democratic regimes have better economic institutions than autocratic regimes. Another but somehow related strand of research investigates the effect of democracy on economic liberalization (Giavazzi and Tabellini, 2005, Giuliano et al., 2013, Grosjean and Senik, 2011).

quality with differences between autocratic regimes rather than with differences between democratic regimes. Fortunato and Panizza (2015) assume in particular that education improves voters' ability to select competent leaders and that these competent leaders implement better economic institutions. We update Besley and Reynal-Querol's (2011) database to study whether the mechanism suggested by Fortunato and Panizza (2015) applies. Our results do not support the view that higher ability of politicians explains why the positive effect of democracy on institutional quality depends positively on the level of human capital.

The remainder of the paper is structured as follows. Section 2 presents the theoretical model. Section 3 presents the empirical model, the identification strategy, and the empirical results. Section 4 concludes.

## 2 Theory

### 2.1 Basic model

We consider a society consisting of two groups of citizens: the people (P) and the elite (E). Agents belong to one of the groups and the people constitute the majority of the population. Since the members of a specific group are identical, we can interchangeably speak about the entire group or a representative group member. All citizens are risk neutral and population size is normalized to 1.

#### 2.1.1 The government

The elite and the people send a signal to the government that indicates their preferred level of institutional quality. The government uses these two preferences to specify the actual level of institutional quality ( $\rho$ ):

$$\rho = (1 - \delta) \cdot \rho^E + \delta \cdot \rho^P \quad (1)$$

where  $\rho^E \in [0, 1]$  reflects the level of institutional quality signaled by the elite and  $\rho^P \in [0, 1]$  the level of institutional quality signaled by the people. The exogenously given parameter  $\delta \in [0, 1]$  indicates the extent to which the government takes people's preferences into account when determining the quality of the institutions. Below, we interpret  $\delta$  as the level of democracy since the people constitute the majority of the population. We refer to a regime as democratic when  $\delta$  is close to 1 and as autocratic when  $\delta$  is close to 0.

#### 2.1.2 The people

The people use a fraction of their time  $z^P \in [0, 1]$  for commercial activities and the fraction of time  $l^P = 1 - z^P$  for leisure. Income from commercial activities ( $y^P$ ) is uncertain since the people face an expropriation risk. Expropriation takes place with

probability  $\lambda = 1 - \rho$ .

The people consume all their income and choose  $z^P$  to maximize their expected utility

$$u^P = \mathbb{E}[y^P] + \beta \cdot u(l^P) = (1 - \lambda) \cdot (z^P \cdot h)^{0.5} + \beta \cdot (1 - z^P)^{0.5} \quad (2)$$

where  $h > 0$  denotes the level of human capital,  $(z^P \cdot h)^{0.5}$  the production function of the gross income  $y^P$ , and  $u(l^P) = (1 - z^P)^{0.5}$  the utility that the people derive from leisure.  $\beta > 0$  is the intensity of leisure preferences relative to consumption.

The first-order condition implies

$$z^P = \frac{h \cdot (1 - \lambda)^2}{\beta^2 + h \cdot (1 - \lambda)^2} = \left(1 + \frac{\beta^2}{h \cdot (1 - \lambda)^2}\right)^{-1}. \quad (3)$$

From (2) and (3), we obtain the following results.

**Proposition 1.** (a) *The expected utility of the people is given by:*

$$u^P = (1 + h \cdot (1 - \lambda)^2)^{0.5}. \quad (4)$$

(b) *Institutional quality ( $\rho = 1 - \lambda$ ) positively affects people's expected utility ( $u^P$ ) and engagement in commercial activities ( $z^P$ ):*

$$\frac{\partial u^P}{\partial \rho} > 0 \quad \text{and} \quad \frac{\partial z^P}{\partial \rho} > 0. \quad (5)$$

(c) *Human capital ( $h$ ) positively affects people's expected utility ( $u^P$ ) and engagement in commercial activities ( $z^P$ ):*

$$\frac{\partial u^P}{\partial h} > 0 \quad \text{and} \quad \frac{\partial z^P}{\partial h} > 0. \quad (6)$$

(d) *People's expected utility is maximized when the expropriation risk is zero:*

$$\rho^{P*} = \arg \max_{\rho} u^P = 1. \quad (7)$$

### 2.1.3 The elite

The elite derives utility from consumption which is financed through expropriation and faces a revolution constraint. We assume that the elite loses its income if a revolution takes place. The probability of revolution ( $\alpha$ ) depends on the quality of the economic institutions ( $\rho$ ):

$$\alpha = 1 - \rho^\theta = 1 - (1 - \lambda)^\theta \quad (8)$$

where  $\theta \geq 0$  captures cultural and environmental factors affecting the likelihood of a revolution.

The expected utility of the elite is thus given by:

$$u^E = (1 - \alpha) \cdot \lambda \cdot (z^P \cdot h)^{0.5} \quad (9)$$

$$= (1 - \lambda)^{\theta+1} \cdot \lambda \cdot h \cdot [\beta^2 + (1 - \lambda)^2 \cdot h]^{-0.5}. \quad (10)$$

We obtain from (10) the following results.

**Proposition 2.** (a) *The expected utility of the elite is maximized for an intermediate level of institutional quality ( $\rho = 1 - \lambda$ ):*

$$\rho^{E*} = \arg \max_{\rho} u^E < 1. \quad (11)$$

(b) *The signal that the elite sends to the government to indicate its preferred level of institutional quality ( $\rho^E$ ) depends on the degree of democratization ( $\delta$ ) with:*

$$\frac{\partial \rho^E}{\partial \delta} \begin{cases} < 0, & \text{if } \delta < \bar{\delta} = \rho^{E*} \\ = 0, & \text{if } \delta \geq \bar{\delta} = \rho^{E*} \end{cases} \quad (12)$$

(c) *The level of institutional quality maximizing the expected utility of the elite ( $\rho^{E*}$ ) decreases in the human capital of the people.*

$$\frac{\partial \rho^{E*}}{\partial h} < 0. \quad (13)$$

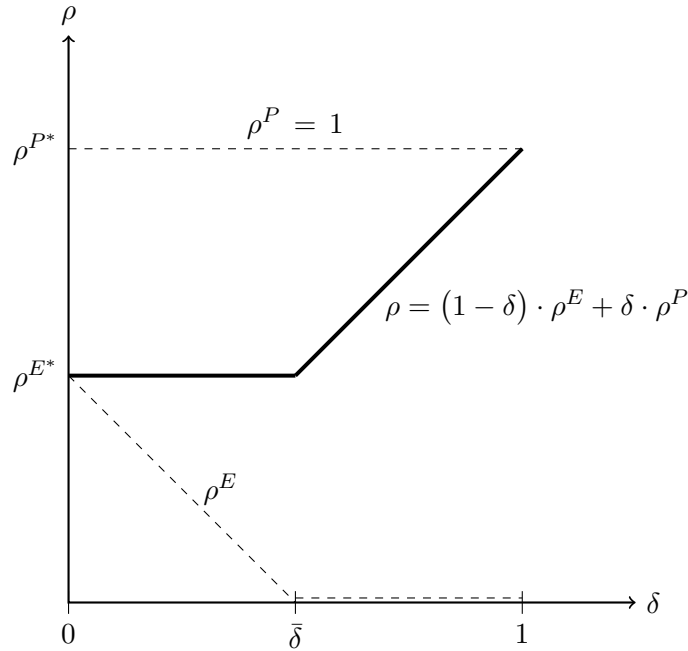
## 2.2 Theoretical results

Figures 2 – 3 illustrate the model predictions. The solid line indicates the institutional quality ( $\rho$ ) that the government chooses, depending on the level of democracy ( $\delta$ ). The lower (upper) dashed line indicates the level of institutional quality that the elite (the people) signals to the government.

The people wish economic institutions that fully protect them against expropriation, while the elite prefers economic institutions that give room for expropriation. The logic behind these results is simple. The elite wants to expropriate because it finances its consumption through expropriation and loses its income source when the government prohibits expropriation. The people, by contrast, engage in commercial activities to finance their consumption and the greater the expropriation risk, the lower is the prospect of earning an income.

The signal ( $\rho^E$ ) that the elite sends to the government depends on the degree of democratization. In an autocratic regime, the government only gives attention to the signal of the elite. The elite exploits its influence and signals the level of institutional quality that maximizes its expected utility. If the people have some influence on the government decision ( $\delta > 0$ ), the elite adjusts its signal to offset people's demand for better economic institutions.

**Figure 2** The effect of democracy on institutional quality



A transition from a fully autocratic regimes to a fully democratic regimes increases institutional quality. This key result applies because the elite prefer better economic institutions than the elite, and because the influence of the people on the government increases in the process of democratization. However, a partial democratization is not necessarily associated with increasing institutional quality. The reason is that the elite adjusts its behavior, preventing thus changes in the quality of the economic institutions as long as the degree of democratization is relatively low ( $\delta < \bar{\delta}$ ).

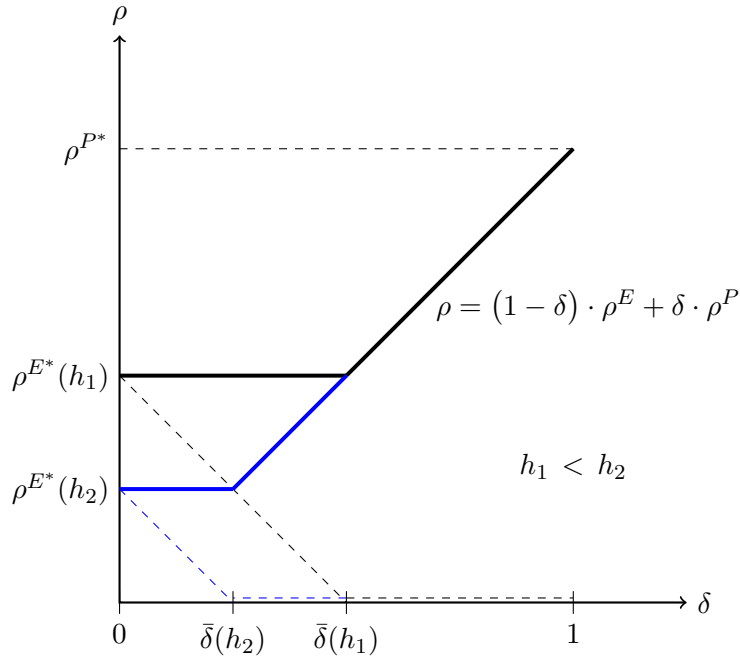
Finally, our model predicts that the elite prefers weaker economic institutions if the people command a high level of human capital. The explanation is simple. The elite wishes that the people engage in commercial activities: the more commercial activities, the greater are the possibilities for expropriation. Since the productivity of the people increases in their human capital, well educated people engage in commercial activities even when the institutions protecting them against expropriation are rather weak. Low educated people, by contrast, are rather unproductive and thus must be incentivized through institutions that protect them relatively well against expropriation.

### 2.3 Discussion

Our model predicts that a transition from autocracy towards democracy improves the quality of the economic institutions (Figure 2) and suggests that the positive effect of democracy on institutional quality increases with increasing human capital (Figure 3). Section 3 presents empirical results that confirm these two key predictions. Before we turn to the empirical analysis, we comment, however, some aspects of our model.



**Figure 3** The effect of democracy on institutional quality — The role of human capital



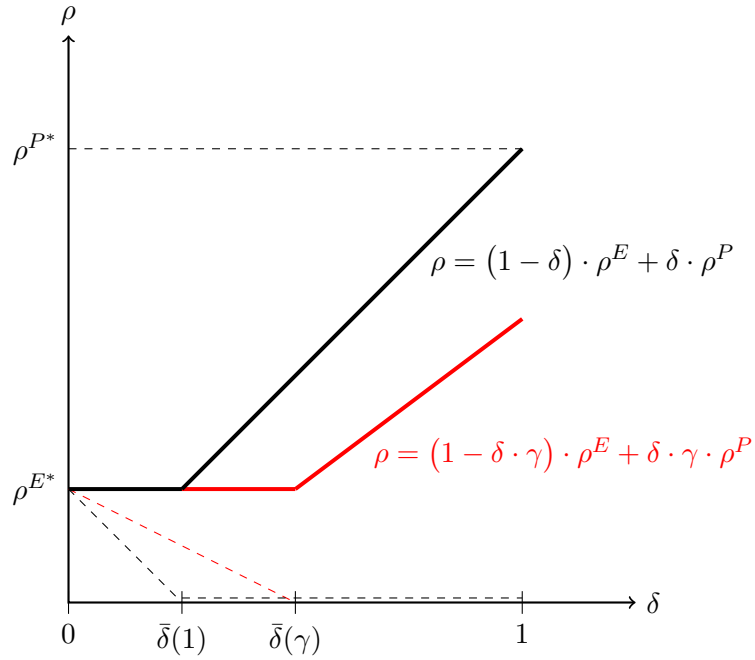
### 2.3.1 Effect heterogeneity

Our strong focus on the role of human capital may give rise to the impression that we downplay other factors that may also cause heterogeneity in the effect of democracy on institutional quality. We argue that this concern is unfounded because the basic model suggests other sources of effect heterogeneity. In particular, the model predicts that the elite makes more concessions to the people when the threat of revolution is high. We can also invoke cultural effects by assuming that the leisure preference ( $\beta$ ) depends on cultural traits. We move these factors to the background to focus on the predictions that are subject to the empirical testing.

### 2.3.2 Differences in institutional quality in democracies

Figure 1 shows that the citizens of some democratic countries are not fully protected against expropriation. Our model does not explain this fact. Acemoglu and Robinson (2006, 2008) present a model that suggests conditions under which a transition from autocracy to democracy does not improve institutional quality. A key feature of their model is that political power has a *de facto* and a *de jure* component. Acemoglu and Robinson (2008) argue that the degree of democratization is the *de facto* component, whereas cultural, economic, and geographical factors determine the *de jure* component. We can incorporate this distinction in our model by assuming that the government uses

**Figure 4** The effect of democracy on institutional quality — De facto and de jure power.



the following rule to set the quality of the economic institutions:

$$\rho = (1 - \gamma \cdot \delta) \cdot \rho^E + \gamma \cdot \delta \cdot \rho^P$$

where  $\gamma \in (0, 1)$  reflects the de facto power of the people. Figure 4 shows that this extension suffices to predict institutional differences between democracies.

### 2.3.3 Institutional persistence

Our model predicts that a partial democratization does not necessarily induce a change in institutional quality. Acemoglu and Robinson (2006, 2008) reach the same conclusion, using a model of endogenous political transitions. Our explanation for the institutional persistence differs to some extent from the explanation given by Acemoglu and Robinson (2006, 2008). In our model, the elite adjusts the policy preference that it signals to the government and can thereby fully offset people's demand for better institutions if the degree of democratization is low. Acemoglu and Robinson (2006, 2008) suggest, by contrast, that the elite sticks to its political views but increases its lobbying effort to compensate the loss in political influence caused by the democratization.<sup>3</sup>

<sup>3</sup>Studying whether our explanation or the explanation given by Acemoglu and Robinson (2006, 2008) applies may be an interesting question for future research. In this project, we do not address this issue, but focus primarily on the role of human capital for the effect of democracy on institutional quality.

### 2.3.4 Human capital as exogenous factor

Another concern may be that the level of human capital is an exogenous factor in our model. This objection is not far-fetched given that various empirical studies report a positive effect of democracy on human capital (Baum and Lake, 2003, Fujiwara, 2015, Stasavage, 2005). We still think that the model assumption is plausible in our context since the purpose of our model is to illustrate the short-run consequences of political transitions for institutional quality and a potential source of effect heterogeneity. We argue that focusing on immediate effects is adequate since Méon and Sekkat (2016) and Rode and Gwartney (2012) suggest that most of the changes in economic institutions occur within the first few years after a political transition. Since the level of human capital changes relatively slowly, we can treat it as exogenous factor in our model.

### 2.3.5 Human capital and the threat of revolution

In our model, the level of human capital only affects the productivity of the people. Another factor that may depend on human capital is the probability of revolution. An argument might be that educated people can better organize a revolt and that thus the probability of revolution increases in the level of human capital. When extending the model in this direction, the result that the positive effect of democracy on institutional quality increases in the human capital of the people does no long hold because human capital then affects the preferences of the elite in two opposing ways. For reasons of convenience, the basic model focus one channel. Our empirical findings (see Section 3) imply that the channel suggested by the basic model (see Section 2.2) clearly dominates the opposing channel explained in this section.

## 3 Empirical analysis

### 3.1 Data

#### 3.1.1 Institutional quality

The literature offers different definitions of “institutional quality”. Gutmann and Voigt (2018) and Voigt (2012) distinguish between thin (narrow) and thick (broad) definitions and explain why a thin definition is more suitable for empirical purposes. We share this view and use a narrow definition.<sup>4</sup>

From the *Varieties of Democracy (V-Dem) Database*, we obtain four subjective measures of institutional quality.<sup>5</sup> These measures indicate whether (i) citizens enjoy

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<sup>4</sup>Narrow concepts include legal aspects, such as private property rights and judiciary independence, but do not require specific economic policies, such as low tax burden, budgetary discipline, or central bank independence. We use a thin definition for three reasons: (i) better data availability, (ii) the empirical results are easier to interpret, and (iii) consistency with our theoretical model.

<sup>5</sup>V-Dem is one of the largest social science databases and includes rich data on political regimes and institutions (180 countries, 1900 – 2017). The V-Dem project is supervised by leading social scientists and more than 2,500 local experts are involved in the data collection process. V-Dem is an open source

private property rights, (ii) citizens have secure and effective access to justice, (iii) law enforcement is transparent, and (iv) public officials are impartial. All indices have an ordinal scale and reach from 0 to 1 (for details, see Appendix A).

### 3.1.2 Democracy

We use the machine learning index developed by Gründler and Krieger (2016, 2019) to measure democracy. This new index has a continuous scale, reaches from 0 to 1, and includes three core aspects of democracy: political participation, political competition, and the freedom of speech.<sup>6</sup> We choose this index for conceptual and methodological reasons.

A generally acknowledged definition of “democracy” does not exist: narrow concepts only consider political participation and political competition, while broad concepts also consider press freedom, judiciary independence, and specific civil liberties (Dahl, 1971, Merkel, 2004, O’Donnell, 2001). A narrow concept is better suited for examining the effect of democratization on institutional quality since a broad concept would overlap with our concept of institutional quality.<sup>7</sup>

All democracy indices consist of several sub-indices. Combining these sub-indices to arrive at a single index requires the selection of an aggregation procedure. The standard approach is to weight the sub-indices and then to apply an additive or multiplicative aggregation rule. Gründler and Krieger (2016, 2019) show that this approach creates implausible regime classifications and argue that implausible classifications become less likely when a machine learning technique is used for aggregation.

### 3.1.3 Human capital

We use the Barro and Lee (2013) data on years of schooling to measure population’s human capital. The data is available in five-year intervals and for 145 countries.<sup>8</sup>

## 3.2 Instrumental variables

Three endogeneity problems complicate the empirical examination of our model. First, autocracies may differ from democracies in unobserved characteristics that also affect institutional quality. Second, the causality may run from institutional quality to human capital and democracy. Finally, errors in the index of democracy and the measure of human capital may cause an attenuation bias.

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database and attracts great attention among political scientists. For details, see Coppedge et al. (2018) and <https://www.v-dem.net/en/>.

<sup>6</sup>The most recent version of the index is available for 186 countries and the period from 1919 to 2016.

<sup>7</sup>The Polity IV index, for example, defines that a democracy must have an independent judiciary. A conceptual overlap would also exist when we use the Freedom House index, the index developed by Acemoglu et al. (2018), or the Unified Democracy Score (Pemstein et al., 2010).

<sup>8</sup>We use the Cohen and Soto (2007) database to increase our sample by five countries (Angola, Burkina Faso, Ethiopia, Mozambique, Nigeria). For data availability reasons, we cannot apply a measure of education quality as proposed by Hanushek and Woessmann (2012).

We use established instruments for democracy and human capital to address these endogeneity issues. We exploit two facts: first, differences in human capital are often historically rooted and persist over time (Gallego, 2010, Huillery, 2009, Rocha et al., 2017), and second, changes from autocracy to democracy (or vice versa) often occur in regional waves (Huntington, 1993, Teorell, 2010).<sup>9</sup> We therefore instrument the stock of human capital with a lagged value (Acemoglu et al., 2014, Becker et al., 2011, Madsen and Murtin, 2017)<sup>10</sup> and use the average level of democracy in nearby countries as an instrumental variable for the domestic level of democracy (Acemoglu et al., 2018, Aidt and Jensen, 2014, Dorsch and Maarek, 2018, Persson and Tabellini, 2009):

$$Z_{i,t}^{(r_i)} = \frac{1}{|\mathcal{R}|} \sum_{j \in \mathcal{R}} D_{j,t}^{(r_j)} \quad \text{with} \quad \mathcal{R} = \{j : j \neq i, r_j = r_i\}, \quad (14)$$

where  $r_i$  denotes the region in which country  $i$  is located,  $D$  the domestic degree of democratization, and  $Z$  the regional (jack-knifed) degree of democratization.<sup>11</sup>

### 3.3 Baseline results

To examine the explanatory power of our theoretical model, we estimate the regression model

$$P_{i,t}^{(r_i)} = \beta_1 D_{i,t}^{(r_i)} + \beta_2 H_{i,t}^{(r_i)} + \beta_3 D_{i,t}^{(r_i)} H_{i,t}^{(r_i)} + \alpha_1 P_{i,t-1}^{(r_i)} + \alpha_2 Y_{i,t-1}^{(r_i)} + \xi_i + \theta_t + \varepsilon_{i,t} \quad (15)$$

with the first-stage equations:

$$D_{i,t}^{(r_i)} = \delta_1 Z_{i,t}^{(r_i)} + \delta_2 H_{i,t-8}^{(r_i)} + \delta_3 Z_{i,t}^{(r_i)} H_{i,t-8}^{(r_i)} + \eta_1 P_{i,t-1}^{(r_i)} + \eta_2 Y_{i,t-1}^{(r_i)} + \mu_i + \kappa_t + \nu_{i,t} \quad (16)$$

$$H_{i,t}^{(r_i)} = \lambda_1 Z_{i,t}^{(r_i)} + \lambda_2 H_{i,t-8}^{(r_i)} + \lambda_3 Z_{i,t}^{(r_i)} H_{i,t-8}^{(r_i)} + \gamma_1 P_{i,t-1}^{(r_i)} + \gamma_2 Y_{i,t-1}^{(r_i)} + \sigma_i + \tau_t + \iota_{i,t} \quad (17)$$

$$D_{i,t}^{(r_i)} H_{i,t}^{(r_i)} = \pi_1 Z_{i,t}^{(r_i)} + \pi_2 H_{i,t-8}^{(r_i)} + \pi_3 Z_{i,t}^{(r_i)} H_{i,t-8}^{(r_i)} + \rho_1 P_{i,t-1}^{(r_i)} + \rho_2 Y_{i,t-1}^{(r_i)} + \zeta_i + \psi_t + \omega_{i,t} \quad (18)$$

where  $t$  is a five-year period (1920–24, 1925–29, ...) and  $r_i$  the region in which country  $i$  is located.  $P$  measures institutional quality,  $D$  democracy, and  $H$  human capital.  $Y$  is the log of GDP per capita. The instrumental variable  $Z$  is the regional (jack-knifed) degree of democratization. All equations include country ( $\xi$ ,  $\mu$ ,  $\sigma$ ,  $\zeta$ ) and period ( $\theta$ ,  $\kappa$ ,  $\tau$ ,  $\psi$ ) fixed effects, and error terms ( $\varepsilon$ ,  $\nu$ ,  $\iota$ ,  $\omega$ ).<sup>12</sup>

Our theoretical model implies that a complete transition from a pure autocracy to a pure democracy improves the quality of economic institutions, regardless of the level of human capital. We thus expect a positive estimate for  $\beta_1$ . Our model also predicts that

<sup>9</sup>Popular examples of regional waves are the political transitions in the Mediterranean area in the 1970s, in South America in the 1980s, and in East Europe in the 1990s.

<sup>10</sup>We tried different lags and observed that the estimation results are fairly robust to changes in the lag structure. Below, we use the stock of human capital 40 years ago (8th lag) as an instrument for the current stock of human capital. Results for other lags are available upon request.

<sup>11</sup>In our baseline analysis, we use the classification of the United Nations to divide the world into 19 regions. Estimation results for other classifications look similar and are available upon request.

<sup>12</sup>We use the income data from the Maddison Project Database 2018 since it is the only database that provides systematic cross-country information on GDP per capita for the period before 1950. Note that excluding  $Y$  from the regression model does not significantly change the estimation results.

**Table 1** Democracy, human capital, and institutional quality

	<i>Private property protection</i>	<i>Effective access to justice</i>	<i>Transparent law enforcement</i>	<i>Impartial administration</i>
	(1)	(2)	(3)	(4)
Democracy	0.169*** (0.0407)	0.123*** (0.0391)	0.176*** (0.0399)	0.091*** (0.0310)
Democracy $\times$ Human Capital	0.012** (0.0054)	0.024*** (0.0067)	0.010* (0.0057)	0.013** (0.0055)
Observations	1,802	1,802	1,802	1,802
Countries	140	140	140	140
SaWi (F-stat.) – Democracy	101.09	104.57	126.66	141.05
SaWi (F-stat.) – Human Cap	44.17	32.43	42.07	33.67
SaWi (F-stat.) – Interaction	48.73	26.16	45.84	33.38
CD (F-stat.)	68.75	59.06	72.00	72.01
AR (p-value)	0.000	0.000	0.000	0.000
StWr (p-value)	0.000	0.000	0.000	0.000
KP (p-value)	0.000	0.000	0.000	0.000

**Notes:** The table presents second-stage estimates. The dependent variables are expert-based indices of institutional quality, ranging from 0 to 1. All regressions include the first lag of the dependent variable, the first lag of the log of GDP per capita, country and year fixed effects. The democracy index is continuous and ranges from 0 to 1. Data on years of schooling is used to measure human capital. The instruments are: (i) the regional (jack-knifed) degree of democratization, (ii) the level of human capital 40 years ago, and (iii) the interaction of the first two instruments. We report different first-stage diagnostics to indicate the strength and validity of our instrumental variables. Standard errors clustered by country are reported in parenthesis. The following notation is used to highlight coefficients that are significantly different from zero: \* $p < .10$ , \*\* $p < .05$ , \*\*\* $p < .01$ .

the effect of democracy on institutional quality increases with increasing human capital. We therefore expect  $\beta_3$  to be positive as well.

Column 1 of Table 1 shows results from estimating (15) – (18) when using an index of private property protection as measure for the quality of economic institutions. Our unbalanced sample includes 140 countries and covers the period from 1920 to 2015. We observe that the estimates of the coefficients  $\beta_1$  and  $\beta_3$  are positive and statistically significant at conventional levels. Columns 2 – 4 show that the results do not change when we use other measures of institutional quality.

Standard first-stage diagnostics are also reported in Table 1. These statistics confirm that the instrumental variables are sufficiently correlated with the included endogenous variables. We show first-stage F-statistics as suggested by Sanderson and Windmeijer (2016) and Cragg and Donald (1993) and find that they exceed the relevant Stock and Yogo (2005) critical values.<sup>13</sup> We also report the p-values of the Anderson and Rubin (1949) test and the Stock and Wright (2000) test. None of these tests indicate a weak instrument problem. The strength of our instrumental variables is not surprising given that several studies document the persistence of human capital through time (Huillery, 2009, Rocha et al., 2017) and the existence of regional spillovers during transitions from autocracy to democracy (Teorell, 2010).<sup>14</sup>

<sup>13</sup>The Stock and Yogo (2005) critical values are 22.3 for 10% maximal IV size and 13.9 for 5% maximal IV relative bias.

<sup>14</sup>Because of space reasons, the main text only presents the second-stage estimates and the standard first-stage diagnostics. The first-stage estimates are reported in Appendix Table B.1.

### 3.4 Robustness checks

The appendix presents the results of several robustness checks. Appendix Table B.2 presents the OLS estimates of (15). The estimates of the coefficient  $\beta_1$  are positive and statistically significant at the 1 percent level. The estimates of the coefficient  $\beta_3$  remain positive as well, but their size and statistical significance decrease slightly. The changes are plausible since the historical human capital data is subject to considerable measurement errors and thus likely to cause an attenuation bias.

Appendix Table B.3 reports the results of various subsample analyses. Panels A – D exclude all countries from Asia, Africa, America, and Europe. Panels E – G limit the analysis to specific periods (1970 – 2015, 1950 – 2015, 1920 – 1990). We find that the estimates of the coefficients  $\beta_1$  and  $\beta_3$  are always positive and often statistically significant. The robustness is reassuring because it allays the concern that the results presented in Table 1 are driven by a particular group of countries.

We use the Lexical Index of Electoral Democracy of Skaaning et al. (2015) and the binary index of Boix et al. (2013) to examine whether the baseline results are robust to changes in the measure of democracy. We choose these alternative measures because of their data coverage and their concept of democracy.<sup>15</sup> Appendix Tables B.4 and B.5 report that the estimates of  $\beta_1$  and  $\beta_3$  remain positive and statistically significant at conventional levels when we use our alternative measures of democracy.

The baseline analysis uses five-year data averages to study the relationship between democracy, human capital, and institutional quality because data on human capital is available in five-year intervals. Appendix Tables B.6 shows that our baseline results are robust to the use of ten-year data averages.

We add time-varying control variables to the empirical model to block off alternative channels through which the instrumental variables may affect institutional quality. We control for civil conflict, population growth, investment, government consumption, trade openness, and the regional (jack-knifed) level of institutional quality. The estimation results are reported Appendix Table B.7 and suggest that the estimates of  $\beta_1$  and  $\beta_3$  are robust to the inclusion of additional variables.

### 3.5 Discussion

We have found only one empirical analysis that investigates the relationship between democracy, human capital, and institutional quality. Fortunato and Panizza (2015) use data from the International Country Risk Guide to show that the interaction between democracy and human capital positively correlates with institutional quality. Fortunato and Panizza (2015) explain their finding with differences between democratic regimes. They argue that highly educated voters elect more competent political leaders and that competent leaders implement better economic institutions. Fortunato and Panizza (2015)

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<sup>15</sup>Both indices are available for all independent countries since 1800 and assume a minimal concept of democracy, requiring political participation and political competition.

**Table 2** Democracy, human capital, and the competence of political leaders

	(1)	(2)	(3)	(4)
Democracy	0.157*** (0.0443)	0.168** (0.0746)	0.155*** (0.0519)	0.234** (0.1041)
Democracy × Human Capital	-0.006 (0.0080)	0.004 (0.0135)	-0.002 (0.0092)	0.021 (0.0174)
Observations	2,024	1,893	1,848	1,731
Countries	147	147	140	140
R <sup>2</sup>	0.582		0.543	
SaWi (F-stat.) – Democracy		230.99		87.00
SaWi (F-stat.) – Human Cap.		34.64		42.01
SaWi (F-stat.) – Interaction		89.33		42.14
CD (F-stat.)		117.61		59.77
AR (p-value)		0.000		0.044
StWr (p-value)		0.000		0.049
KP (p-value)		0.000		0.000
Estimation technique	OLS	2SLS	OLS	2SLS

**Notes:** The dependent variable indicates whether the political leader of a country has a university degree or not. All regressions include the first lag of the dependent variable, country fixed effects, and year fixed effect. The first lag of the log of GDP per capita and the first lag of an expert-based index of private property protection are included in Columns 3 and 4. The democracy index is continuous and ranges from 0 to 1. Data on years of schooling is used to measure human capital. The instruments are: (i) the regional (jack-knifed) degree of democratization, (ii) the level of human capital 40 years ago, and (iii) the interaction of the first two instruments. We report different first-stage diagnostics to indicate the strength and validity of our instrumental variables. Standard errors clustered by country are reported in parenthesis. Standard errors clustered by country are reported in parenthesis. The following notation is used to highlight coefficients that are significantly different from zero: \* $p < .10$ , \*\* $p < .05$ , \*\*\* $p < .01$ .

provide, however, no empirical evidence confirming their argument.

Our theoretical model suggests that differences between autocracies explain why the effect of democracy on institutional quality increases in human capital (see Section 2). Our explanation therefore differs considerably from the explanation given by Fortunato and Panizza (2015). Below, we present regression results that contradict Fortunato and Panizza’s (2015) presumption of a mechanism running from the interaction of human capital and democracy to the competence of political leaders.

Our analysis includes two parts. First, we examine whether democracies have more competent political leaders than autocracies and whether the effect of democracy on the competence of political leaders depends on the education level of the population. We follow the related literature and use education to measure the competence of the political leaders (Besley et al., 2011, Galasso and Nannicini, 2011). We label a political leader as competent if he (or she) has a college degree. Data on leaders’ education mainly comes from Besley and Reynal-Querol (2011).<sup>16</sup>

Column 1 of Table 2 presents results from estimating the regression model:

$$L_{i,t} = \psi_1 D_{i,t} + \psi_2 H_{i,t} + \psi_3 D_{i,t} H_{i,t} + \alpha L_{i,t-1} + \xi_i + \theta_t + \varepsilon_{i,t} \quad (19)$$

where  $t$  denotes a five-year period and  $i$  a country.  $L$  measures the competence of the political leader,  $D$  democracy, and  $H$  the education of the population. The regression model also includes country fixed effects  $\zeta$ , year fixed effects  $\theta$ , and error terms  $\varepsilon$ .

We observe a positive estimate of the coefficient  $\psi_1$  suggesting that democracies have

<sup>16</sup>The database of Besley and Reynal-Querol (2011) ends in 2004, while we need data until 2016. We collect the missing information from Wikipedia and other internet sources.



**Table 3** Democracy, human capital, leaders' competence, and institutional quality

	<i>Private property protection</i>	<i>Effective access to justice</i>	<i>Transparent law enforcement</i>	<i>Impartial administration</i>
	(1)	(2)	(3)	(4)
Competent Leader	-0.007 (0.0104)	0.006 (0.0107)	0.020* (0.0115)	0.020 (0.0129)
Democracy	0.179*** (0.0427)	0.129*** (0.0417)	0.172*** (0.0415)	0.087*** (0.0336)
Democracy × Human Capital	0.012** (0.0055)	0.024*** (0.0107)	0.009 (0.0057)	0.012** (0.0055)
Observations	1,770	1,770	1,770	1,770
Countries	140	140	140	140
SaWi (F-stat.) – Democracy	84.31	87.32	105.20	117.88
SaWi (F-stat.) – Human Cap.	43.42	32.18	41.78	33.80
SaWi (F-stat.) – Interaction	46.67	25.74	45.44	33.05
CD (F-stat.)	60.46	52.19	64.63	65.83
AR (p-value)	0.000	0.000	0.000	0.000
StWr (p-value)	0.000	0.000	0.000	0.000
KP (p-value)	0.000	0.000	0.000	0.000

**Notes:** The table presents second-stage estimates. The dependent variables are expert-based indices of institutional quality, ranging from 0 to 1. All regressions include the first lag of the dependent variable, the first lag of the log of GDP per capita, country and year fixed effects. The democracy index is continuous and ranges from 0 to 1. Data on years of schooling is used to measure human capital. The instruments are: (i) the regional (jack-knifed) degree of democratization, (ii) the level of human capital 40 years ago, and (iii) the interaction of the first two instruments. We report different first-stage diagnostics to indicate the strength and validity of our instrumental variables. A leader is classified as competent when he (or she) holds a university degree. Standard errors clustered by country are reported in parenthesis. The following notation is used to highlight coefficients that are significantly different from zero: \* $p < .10$ , \*\* $p < .05$ , \*\*\* $p < .01$ .

more competent leaders than autocracies.<sup>17</sup> If the channel suggested by Fortunato and Panizza (2015) applies, the estimate of the coefficient  $\psi_3$  should also be positive and statistically significant. The results shown in Column 1 do not confirm this prediction.

Columns 2 – 4 of Table 2 report the results from our robustness checks. Column 2 instruments the degree of democratization, the level of education, and their interaction using the approach described in Section 3.2. Columns 3 and 4 control for the level of economic development and institutional quality. The estimate of the coefficient  $\psi_3$  is statistically insignificant in all cases.

In the second part of our analysis, we examine how the results reported in Table 1 change if we control for the competence of political leaders. If Fortunato and Panizza (2015) were right, we should find that the positive effect of the interaction of human capital and democracy on institutional quality disappears. Table 3 shows, however, that the estimates change little when we add our measure of leaders' competence to the regression model.<sup>18</sup>

Taken together, the estimation results reported in Tables 2 and 3 speak against the hypothesis that the effect of the interaction between democracy and human capital on institutional quality derives from better educated voters electing more able politicians.

<sup>17</sup>Besley and Reynal-Querol (2011) examine the effect of democracy on leader's competence in greater detail. The estimate of the coefficient  $\psi_1$  reported in Table 2 and its level of statistical significance closely resemble the figures reported by Besley and Reynal-Querol (2011).

<sup>18</sup>In Appendix Table B.8 (B.9), we define a leader as competent when he or she holds a law (doctoral) degree. Results remain virtually unchanged when we use these alternative definitions of "competent leader".

## 4 Conclusion

This paper presents a theoretical model that predicts a positive relationship between democratization and institutional quality. Our model also predicts that the effect of democratic governance on institutional quality varies positively with the education level of the citizens.

Using a large panel data set (140 countries, 1920 – 2015) and different measures of institutional quality, we confirm the predictions of our theoretical model. We address potential endogeneity issues with an instrumental variable approach and show that our estimation results are robust to various sub-sample analysis.

Future research may focus on other factors that cause heterogeneity in the effect of democracy on institutional quality. Cultural traits or geographical conditions may serve as promising candidates. Another research topic may be to examine how the leaders of democratic countries can effectively promote the emergence and survival of democracy in transition countries. Finally, we think that it is important to analyze the heterogeneity between autocratic regimes in more detail.

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## Appendix — For online publication

### A Data on institutional quality

We exploit the Varieties of Democracy (V-Dem) database to obtain four measures of institutional quality. The measures indicate whether (i) citizens enjoy private property rights, (ii) citizens have secure and effective access to justice, (iii) law enforcement is transparent, and (iv) public officials are impartial. All measures are based on subjective evaluations of country expert. Below, we list the related questionnaires (for additional information, see Coppedge et al. (2018)).<sup>19</sup>

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<sup>19</sup>Note that we use italic font when we quote from Coppedge et al. (2018). Note also that we standardize all four measures to have a minimum of 0 and a maximum of 1 in our empirical analysis.

## Private property protection

Country experts were asked to provide a gender-specific evaluation. Our indicator of private property protection is the mean of the gender-specific indices.

**Question.** *Do men (women) enjoy the right to private property?*

**Clarification.** *Private property includes the right to acquire, possess, inherit, and sell private property, including land. Limits on property rights may come from the state (which may legally limit rights or fail to enforce them); customary laws and practices; or religious or social norms. This question concerns the right to private property, not actual ownership of property. This question does not ask you to assess the relative rights of men and women. Thus, it is possible to assign the lowest possible score to a country even if men and women enjoy equal—and very minimal—property rights.*

### **Responses.**

- 0: Virtually no men (women) enjoy private property rights of any kind*
- 1: Some men (women) enjoy some private property rights, but most have none*
- 2: Many men (women) enjoy many private property rights, but a smaller proportion enjoys few or none.*
- 3: More than half of men (women) enjoy most private property rights, yet a smaller share of men (women) have much more restricted rights.*
- 4: Most men (women) enjoy most private property rights but a small minority does not.*
- 5: Virtually all men (women) enjoy all, or almost all property rights.*

## Effective access to justice

Country experts were asked to provide a gender-specific evaluation. Our indicator of effective access to justice is the mean of the gender-specific indices.

**Question.** *Do men (women) enjoy secure and effective access to justice?*

**Clarification.** *This question specifies the extent to which men (women) can bring cases before the courts without risk to their personal safety, trials are fair, and men (women) have effective ability to seek redress if public authorities violate their rights, including the rights to counsel, defense, and appeal. This question does not ask you to assess the relative access to justice men and women. Thus, it is possible to assign the lowest possible score to a country even if men and women enjoy equal—and extremely limited—access to justice.*

### **Responses.**

- 0: Secure and effective access to justice for men (women) is non-existent.*
- 1: Secure and effective access to justice for men is usually not established or widely.*

2: *Secure and effective access to justice for men (women) is inconsistently observed. Minor problems characterize most cases or occur rather unevenly across different parts of the country.*

3: *Secure and effective access to justice for men (women) is usually observed.*

4: *Virtually all men (women) enjoy all, or almost all property rights.*

### **Transparent laws with predictable enforcement**

**Question.** *Are the laws of the land clear, well publicized, coherent (consistent with each other), relatively stable from year to year, and enforced in a predictable manner?*

**Clarification.** *This question focuses on the transparency and predictability of the laws of the land.*

#### **Responses.**

0: *Transparency and predictability are almost non-existent. The laws of the land are created and/ or enforced in completely arbitrary fashion.*

1: *Transparency and predictability are severely limited. The laws of the land are more often than not created and/ or enforced in arbitrary fashion.*

2: *Transparency and predictability are somewhat limited. The laws of the land are mostly created in a non-arbitrary fashion but enforcement is rather arbitrary in some parts of the country.*

3: *Transparency and predictability are fairly strong. The laws of the land are usually created and enforced in a non-arbitrary fashion.*

4: *Transparency and predictability are very strong. The laws of the land are created and enforced in a non-arbitrary fashion.*

### **Rigorous and impartial public administration**

**Question.** *Are public officials rigorous and impartial in the performance of their duties?*

**Clarification.** *This question focuses on the extent to which public officials generally abide by the law and treat like cases alike, or conversely, the extent to which public administration is characterized by arbitrariness and biases (i.e., nepotism, cronyism, or discrimination). The question covers the public officials that handle the cases of ordinary people. If no functioning public administration exists, the lowest score (0) applies.*

#### **Responses.**

0: *The law is not respected by public officials. Arbitrary or biased administration of the law is rampant.*

- 1: *The law is weakly respected by public officials. Arbitrary or biased administration of the law is widespread.*
- 2: *The law is modestly respected by public officials. Arbitrary or biased administration of the law is moderate.*
- 3: *The law is mostly respected by public officials. Arbitrary or biased administration of the law is limited.*
- 4: *The law is generally fully respected by the public officials. Arbitrary or biased administration of the law is very limited.*



## B Additional tables

**Table B.1** Democracy, human capital, and institutional quality — First-stage estimates

	Panel A — Specification (1)			Panel B — Specification (2)		
	Democracy	Human Cap	Interaction	Democracy	Human Cap	Interaction
Democracy (Reg.)	0.663*** (0.0827)	3.712*** (0.3488)	2.396*** (0.5282)	0.721*** (0.0717)	3.980*** (0.3419)	2.803*** (0.4880)
Human capital ( $t - 8$ )	-0.015 (0.0230)	1.075*** (0.1263)	0.017 (0.1888)	0.008 (0.0227)	1.087*** (0.1272)	0.158 (0.1846)
Democracy (Reg.) $\times$ Human capital ( $t - 8$ )	-0.026 (0.0206)	-0.507*** (0.1161)	0.699*** (0.1968)	-0.056*** (0.0207)	-0.516*** (0.1195)	0.518*** (0.2014)
Observations	1,802	1,802	1,802	1,802	1,802	1,802
Countries	140	140	140	140	140	140
SaWi (F-stat.)	101.09	44.17	48.73	104.57	32.43	26.16
	Panel C — Specification (3)			Panel D — Specification (4)		
	Democracy	Human Cap	Interaction	Democracy	Human Cap	Interaction
Democracy (Reg.)	0.722*** (0.0733)	3.961*** (0.3432)	2.864*** (0.5011)	0.837*** (0.0770)	4.018*** (0.3439)	3.521*** (0.5134)
Human capital ( $t - 8$ )	-0.003 (0.0233)	1.086*** (0.1261)	0.091 (0.1930)	0.013 (0.0261)	1.075*** (0.1259)	0.183 (0.2039)
Democracy (Reg.) $\times$ Human capital ( $t - 8$ )	-0.033 (0.0221)	-0.511*** (0.1172)	0.660*** (0.2092)	-0.053** (0.0237)	-0.500*** (0.1188)	0.538*** (0.2186)
Observations	1,802	1,802	1,802	1,802	1,802	1,802
Countries	140	140	140	140	140	140
SaWi (F-stat.)	126.66	42.07	45.84	141.05	33.67	33.38

**Notes:** The table presents first-stage estimates. For the corresponding second-stage estimates, see Table 1. Standard errors clustered by country are reported in parenthesis. The following notation is used to highlight coefficients that are significantly different from zero: \* $p < .10$ , \*\* $p < .05$ , \*\*\* $p < .01$ .

**Table B.2** Democracy, human capital, and institutional quality — OLS estimates

	<i>Private property protection</i>	<i>Effective access to justice</i>	<i>Transparent law enforcement</i>	<i>Impartial administration</i>
	(1)	(2)	(3)	(4)
Democracy	0.101*** (0.0177)	0.123*** (0.0194)	0.190*** (0.0241)	0.123*** (0.0199)
Democracy $\times$ Human Capital	0.003 (0.0036)	0.013*** (0.0040)	0.006 (0.0039)	0.007* (0.0040)
Observations	1,802	1,802	1,802	1,802
Countries	140	140	140	140
R <sup>2</sup>	0.903	0.884	0.830	0.878

**Notes:** The table presents OLS estimates. The dependent variables are expert-based indices of institutional quality, ranging from 0 to 1. All regressions include the first lag of the dependent variable, the first lag of the log of GDP per capita, country and period fixed effects. The democracy index is continuous and ranges from 0 to 1. Data on years of schooling is used to measure human capital. Standard errors clustered by country are reported in parenthesis. The following notation is used to highlight coefficients that are significantly different from zero: \* $p < .10$ , \*\* $p < .05$ , \*\*\* $p < .01$ .

**Table B.3** Democracy, human capital, and institutional quality — Subsample results

	<i>Private property protection</i>	<i>Effective access to justice</i>	<i>Transparent law enforcement</i>	<i>Impartial administration</i>
	(1)	(2)	(3)	(4)
<b>Panel A – Exclude Asia</b>				
Democracy	0.158*** (0.0412)	0.138*** (0.0417)	0.186*** (0.0413)	0.107*** (0.0335)
Democracy × Human Capital	0.007 (0.0056)	0.020*** (0.0064)	0.005 (0.0052)	0.010* (0.0050)
Observations	1,412	1,412	1,412	1,412
Countries	104	104	104	104
<b>Panel B – Exclude Africa</b>				
Democracy	0.178*** (0.0446)	0.132*** (0.0445)	0.188*** (0.0452)	0.115*** (0.0374)
Democracy × Human Capital	0.009 (0.0059)	0.023*** (0.0081)	0.009 (0.0065)	0.010 (0.0060)
Observations	1,393	1,393	1,393	1,393
Countries	98	98	98	98
<b>Panel C – Exclude America</b>				
Democracy	0.224*** (0.0476)	0.154*** (0.0435)	0.182*** (0.0423)	0.054* (0.0310)
Democracy × Human Capital	0.019*** (0.0068)	0.020*** (0.0068)	0.006 (0.0051)	0.0089 (0.0041)
Observations	1,349	1,349	1,349	1,349
Countries	115	115	115	115
<b>Panel D – Exclude Europe</b>				
Democracy	0.135** (0.0606)	0.071 (0.0549)	0.171*** (0.0757)	0.115* (0.0620)
Democracy × Human Capital	0.011 (0.0095)	0.045*** (0.0159)	0.030** (0.0142)	0.042** (0.0199)
Observations	1,292	1,292	1,292	1,292
Countries	105	105	105	105
<b>Panel E – From 1970 to 2015</b>				
Democracy	0.214*** (0.0584)	0.212*** (0.0518)	0.250*** (0.0603)	0.192*** (0.0494)
Democracy × Human Capital	0.010* (0.0058)	0.018*** (0.0062)	0.002 (0.0055)	0.005 (0.0055)
Observations	1,231	1,231	1,231	1,231
Countries	140	140	140	140
<b>Panel F – From 1950 to 2015</b>				
Democracy	0.186*** (0.0473)	0.173*** (0.0403)	0.206*** (0.0489)	0.141*** (0.0400)
Democracy × Human Capital	0.010* (0.0053)	0.020*** (0.0062)	0.005 (0.0055)	0.009* (0.0054)
Observations	1,548	1,548	1,548	1,548
Countries	140	140	140	140
<b>Panel G – From 1920 to 1990</b>				
Democracy	0.233*** (0.0568)	0.142** (0.0595)	0.249*** (0.0476)	0.067 (0.0458)
Democracy × Human Capital	0.020** (0.0083)	0.046*** (0.0133)	0.019** (0.0099)	0.031*** (0.0093)
Observations	1,089	1,089	1,089	1,089
Countries	105	105	105	105

**Notes:** The table presents second-stage estimates for different sub-samples. The dependent variables are expert-based indices of institutional quality, ranging from 0 to 1. All regressions include the first lag of the dependent variable, the first lag of the log of GDP per capita, country and period fixed effects. The democracy index is continuous and ranges from 0 to 1. Data on years of schooling is used to measure human capital. The instruments are: (i) the regional (jack-knifed) degree of democratization, (ii) the level of human capital 40 years ago, and (iii) the interaction of the first two instruments. Standard errors clustered by country are reported in parenthesis. The following notation is used to highlight coefficients that are significantly different from zero: \* $p < .10$ , \*\* $p < .05$ , \*\*\* $p < .01$ .

**Table B.4** Democracy, human capital, and institutional quality — Lexical Index of Electoral Democracy

	<i>Private property protection</i>	<i>Effective access to justice</i>	<i>Transparent law enforcement</i>	<i>Impartial administration</i>
	(1)	(2)	(3)	(4)
Democracy	0.199*** (0.0509)	0.164*** (0.0523)	0.228*** (0.0478)	0.124*** (0.0393)
Democracy × Human Capital	0.014** (0.0068)	0.032*** (0.0092)	0.012* (0.0073)	0.017** (0.0077)
Observations	1,800	1,800	1,800	1,800
Countries	140	140	140	140
SaWi (F-stat.) – Democracy	49.98	44.54	63.12	70.89
SaWi (F-stat.) – Human Cap	33.19	22.61	32.09	25.84
SaWi (F-stat.) – Interaction	27.79	16.65	26.80	20.45
CD (F-stat.)	38.10	30.39	40.61	41.54
AR (p-value)	0.000	0.000	0.000	0.000
StWr (p-value)	0.000	0.000	0.000	0.000
KP (p-value)	0.000	0.000	0.000	0.000

**Notes:** The table presents second-stage estimates. The dependent variables are expert-based indices of institutional quality, ranging from 0 to 1. All regressions include the first lag of the dependent variable, the first lag of the log of GDP per capita, country and period fixed effects. The democracy index is ordinal and ranges from 0 to 1. Data on years of schooling is used to measure human capital. The instruments are: (i) the regional (jack-knifed) degree of democratization, (ii) the level of human capital 40 years ago, and (iii) the interaction of the first two instruments. We report different first-stage diagnostics to indicate the strength and validity of our instrumental variables. Standard errors clustered by country are reported in parenthesis. The following notation is used to highlight coefficients that are significantly different from zero: \* $p < .10$ , \*\* $p < .05$ , \*\*\* $p < .01$ .

**Table B.5** Democracy, human capital, and institutional quality — Boix, Miller, Rosata (2013) Index

	<i>Private property protection</i>	<i>Effective access to justice</i>	<i>Transparent law enforcement</i>	<i>Impartial administration</i>
	(1)	(2)	(3)	(4)
Democracy	0.202*** (0.0540)	0.159*** (0.0607)	0.233*** (0.0536)	0.135** (0.0471)
Democracy × Human Capital	0.019** (0.0081)	0.037*** (0.0121)	0.018* (0.0093)	0.024** (0.0111)
Observations	1,662	1,662	1,662	1,662
Countries	140	140	140	140
SaWi (F-stat.) – Democracy	40.68	28.61	39.87	41.82
SaWi (F-stat.) – Human Cap	17.12	10.74	14.99	11.79
SaWi (F-stat.) – Interaction	17.57	8.62	13.57	9.29
CD (F-stat.)	23.84	17.11	21.46	19.81
AR (p-value)	0.000	0.000	0.000	0.000
StWr (p-value)	0.000	0.000	0.000	0.000
KP (p-value)	0.000	0.000	0.000	0.000

**Notes:** The table presents second-stage estimates. The dependent variables are expert-based indices of institutional quality, ranging from 0 to 1. All regressions include the first lag of the dependent variable, the first lag of the log of GDP per capita, country and period fixed effects. The democracy index is binary. Data on years of schooling is used to measure human capital. The instruments are: (i) the regional (jack-knifed) degree of democratization, (ii) the level of human capital 40 years ago, and (iii) the interaction of the first two instruments. We report different first-stage diagnostics to indicate the strength and validity of our instrumental variables. Standard errors clustered by country are reported in parenthesis. The following notation is used to highlight coefficients that are significantly different from zero: \* $p < .10$ , \*\* $p < .05$ , \*\*\* $p < .01$ .

**Table B.6** Democracy, human capital, and institutional quality — Ten-year data

	<i>Private property protection</i>	<i>Effective access to justice</i>	<i>Transparent law enforcement</i>	<i>Impartial administration</i>
	(1)	(2)	(3)	(4)
Democracy	0.258*** (0.0576)	0.159*** (0.0514)	0.225*** (0.0509)	0.120** (0.0490)
Democracy × Human Capital	0.018** (0.0079)	0.031*** (0.0076)	0.013* (0.0075)	0.020** (0.0079)
Observations	886	886	886	886
Countries	140	140	140	140
SaWi (F-stat.) – Democracy	118.59	133.60	136.24	144.52
SaWi (F-stat.) – Human Cap	42.76	36.28	42.06	35.47
SaWi (F-stat.) – Interaction	57.99	37.59	55.03	43.13
CD (F-stat.)	38.65	35.49	38.83	37.31
AR (p-value)	0.000	0.000	0.000	0.000
StWr (p-value)	0.000	0.000	0.000	0.000
KP (p-value)	0.000	0.000	0.000	0.000

**Notes:** The table presents second-stage estimates. The dependent variables are expert-based indices of institutional quality, ranging from 0 to 1. All regressions include the first lag of the dependent variable, the first lag of the log of GDP per capita, country and year fixed effects. The democracy index is continuous and ranges from 0 to 1. Data on years of schooling is used to measure human capital. The instruments are: (i) the regional (jack-knifed) degree of democratization, (ii) the level of human capital 40 years ago, and (iii) the interaction of the first two instruments. We report different first-stage diagnostics to indicate the strength and validity of our instrumental variables. Standard errors clustered by country are reported in parenthesis. The following notation is used to highlight coefficients that are significantly different from zero: \* $p < .10$ , \*\* $p < .05$ , \*\*\* $p < .01$ .

**Table B.7** Democracy, human capital, and institutional quality — Additional control variables

	<i>Private property protection</i>	<i>Effective access to justice</i>	<i>Transparent law enforcement</i>	<i>Impartial administration</i>
	(1)	(2)	(3)	(4)
<b>Panel A – Controls: conflict, pop. growth, institutional quality (region)</b>				
Democracy	0.221*** (0.0484)	0.217*** (0.0516)	0.267*** (0.0556)	0.192*** (0.0462)
Democracy × Human Capital	0.013** (0.0066)	0.031*** (0.0088)	0.016** (0.0068)	0.021*** (0.0071)
Observations	1,725	1,725	1,725	1,725
Countries	140	140	140	140
SaWi (F-stat.) – Democracy	60.39	52.87	58.40	63.20
SaWi (F-stat.) – Human Cap	47.49	30.42	44.21	32.00
SaWi (F-stat.) – Interaction	29.06	16.06	26.00	19.76
CD (F-stat.)	46.70	37.02	44.27	42.44
AR (p-value)	0.000	0.000	0.000	0.000
StWr (p-value)	0.000	0.000	0.000	0.000
KP (p-value)	0.000	0.000	0.000	0.000
<b>Panel B – Controls: Panel A + gov. consumption, invest., trade openness</b>				
Democracy	0.151*** (0.0541)	0.162*** (0.0564)	0.254*** (0.0717)	0.156*** (0.0532)
Democracy × Human Capital	0.015* (0.0083)	0.033*** (0.0093)	0.011 (0.0083)	0.024*** (0.0088)
Observations	1,360	1,360	1,360	1,360
Countries	137	137	137	137
SaWi (F-stat.) – Democracy	59.65	58.53	54.37	59.05
SaWi (F-stat.) – Human Cap	56.21	39.17	51.59	40.49
SaWi (F-stat.) – Interaction	25.42	20.15	26.41	23.45
CD (F-stat.)	40.13	32.50	35.25	37.96
AR (p-value)	0.000	0.000	0.000	0.000
StWr (p-value)	0.001	0.000	0.000	0.000
KP (p-value)	0.000	0.000	0.000	0.000

**Notes:** The table presents second-stage estimates. The dependent variables are expert-based indices of institutional quality, ranging from 0 to 1. All regressions include the first lag of the dependent variable, and country and period fixed effects. We also control for the first lag of civil conflict, population growth, the log of GDP per capita, and the regional (jack-knifed) level of institutional quality. In Panel B, we additionally control for the first lag of trade openness, investment, and government consumption. The democracy index is continuous and ranges from 0 to 1. Data on years of schooling is used to measure human capital. The instruments are: (i) the regional (jack-knifed) degree of democratization, (ii) the level of human capital 40 years ago, and (iii) the interaction of the first two instruments. We report different first-stage diagnostics to indicate the strength and validity of our instrumental variables. Standard errors clustered by country are reported in parenthesis. The following notation is used to highlight coefficients that are significantly different from zero: \* $p < .10$ , \*\* $p < .05$ , \*\*\* $p < .01$ .

**Table B.8** Democracy, human capital, leaders' competence (law degree), and institutional quality

	<i>Private property protection</i>	<i>Effective access to justice</i>	<i>Transparent law enforcement</i>	<i>Impartial administration</i>
	(1)	(2)	(3)	(4)
Competent Leader	-0.013 (0.0084)	-0.001 (0.0082)	0.011 (0.0095)	-0.001 (0.0105)
Democracy	0.170*** (0.0409)	0.123*** (0.0392)	0.176*** (0.0396)	0.091*** (0.0311)
Democracy × Human Capital	0.012** (0.0055)	0.024*** (0.0067)	0.010* (0.0057)	0.013** (0.0055)
Observations	1,802	1,802	1,802	1,802
Countries	140	140	140	140
SaWi (F-stat.) – Democracy	99.69	101.04	124.21	140.40
SaWi (F-stat.) – Human Cap.	43.05	31.61	40.92	33.07
SaWi (F-stat.) – Interaction	47.28	25.92	44.79	32.86
CD (F-stat.)	68.44	59.09	71.96	71.95
AR (p-value)	0.000	0.000	0.000	0.000
StWr (p-value)	0.000	0.000	0.000	0.000
KP (p-value)	0.000	0.000	0.000	0.000

**Notes:** The table presents second-stage estimates. The dependent variables are expert-based indices of institutional quality, ranging from 0 to 1. All regressions include the first lag of the dependent variable, the first lag of the log of GDP per capita, country and year fixed effects. The democracy index is continuous and ranges from 0 to 1. Data on years of schooling is used to measure human capital. The instruments are: (i) the regional (jack-knifed) degree of democratization, (ii) the level of human capital 40 years ago, and (iii) the interaction of the first two instruments. We report different first-stage diagnostics to indicate the strength and validity of our instrumental variables. A leader is classified as competent when he (or she) holds a law degree. Standard errors clustered by country are reported in parenthesis. The following notation is used to highlight coefficients that are significantly different from zero: \* $p < .10$ , \*\* $p < .05$ , \*\*\* $p < .01$ .

**Table B.9** Democracy, human capital, leaders' competence (PhD), and institutional quality

	<i>Private property protection</i>	<i>Effective access to justice</i>	<i>Transparent law enforcement</i>	<i>Impartial administration</i>
	(1)	(2)	(3)	(4)
Competent Leader	-0.001 (0.0116)	-0.000 (0.0126)	0.002 (0.0117)	0.015 (0.0128)
Democracy	0.169*** (0.0406)	0.123*** (0.0392)	0.176*** (0.0399)	0.091*** (0.0307)
Democracy × Human Capital	0.012** (0.0055)	0.024*** (0.0067)	0.010* (0.0057)	0.012** (0.0128)
Observations	1,802	1,802	1,802	1,802
Countries	140	140	140	140
SaWi (F-stat.) – Democracy	101.72	107.27	127.18	139.02
SaWi (F-stat.) – Human Cap.	43.25	31.97	41.36	33.12
SaWi (F-stat.) – Interaction	47.56	25.61	44.60	32.83
CD (F-stat.)	68.13	58.48	71.28	71.40
AR (p-value)	0.000	0.000	0.000	0.000
StWr (p-value)	0.000	0.000	0.000	0.000
KP (p-value)	0.000	0.000	0.000	0.000

**Notes:** The table presents second-stage estimates. The dependent variables are expert-based indices of institutional quality, ranging from 0 to 1. All regressions include the first lag of the dependent variable, the first lag of the log of GDP per capita, country and year fixed effects. The democracy index is continuous and ranges from 0 to 1. Data on years of schooling is used to measure human capital. The instruments are: (i) the regional (jack-knifed) degree of democratization, (ii) the level of human capital 40 years ago, and (iii) the interaction of the first two instruments. We report different first-stage diagnostics to indicate the strength and validity of our instrumental variables. A leader is classified as competent when he (or she) holds a PhD degree. Standard errors clustered by country are reported in parenthesis. The following notation is used to highlight coefficients that are significantly different from zero: \* $p < .10$ , \*\* $p < .05$ , \*\*\* $p < .01$ .