

Democracy, Rural Inequality, and Human Capital Formation

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Abstract

Much research suggests democracies invest more in human capital formation than dictatorships. In particular, scholars have suggested that democracies outspend autocracies on education, due to electoral and interest group pressure. However, some democracies spend no more on education - and some spend much less - than autocracies. What explains this variation within democracies? The answer is the influence of landed agricultural elites. Urban industrial elites support human capital investment because it leads to higher rates of return even if wages increase. Yet greater education spending encourages out-migration from the countryside, reducing the supply and increasing the price of agricultural labor. Given the differential impact of education spending across economic sectors, the effect of democracy on education spending may be conditional on the power of landed elites. We test this argument in two ways. First, we run a series of time series cross-sectional regressions on data from 107 countries for the period 1970 to 2000. Second, we conduct a difference-in-difference analysis, comparing countries that democratize at high versus low levels of land inequality, for 73 countries for the same time period. Results confirm a negative relationship between the power of landed elites and investment in public education under democracy, adding important and novel insight into the sources of differences in public-goods spending and human capital investment both within across political regimes.

Keywords: democracy, education spending, social spending, inequality, rural inequality

Word Count: 8389

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1 Introduction

On average, democracies outperform autocracies in terms of public goods provision. In particular, democracies spend more on public primary and secondary education ([Stasavage, 2005](#); [Huber and Stephens, 2012](#); [Ansell, 2010](#); [Kaufman and Segura-Ubiergo, 2001](#); [Lindert, 2004](#); [Avelino, Brown and Hunter, 2005](#); [Harding and Stasavage, 2014](#)). Such investments can generate huge payoffs, as small increases in education spending can have large effects on citizens' welfare. Indeed, as [Galor, Moav and Vollrath \(2009\)](#) have suggested, education spending is an important part of the explanation for the "great divergence" between rich and poor countries. This in turn suggests that democratic institutions may play an important role in generating long-term improvements in human welfare ([Baum and Lake, 2003](#)).

A quick look at the data reveals a puzzle, however: upon democratization, democracies vary a fair amount in how much they spend on public education. Compared to certain dictatorships, quite a few democracies spend much less. Consider the following contrasting examples. On the one hand, Costa Rica and Lesotho confirm the literature's expectations. Following its transition to democracy in 1949, Costa Rica abolished its army and funneled military expenditures to education. Today, it outspends most of its neighbors by a fair amount, devoting about 8% of GDP to education, almost twice the regional average. Likewise, in Lesotho, growth in education spending has been similarly impressive. In the years following regime change education spending roughly doubled, to over 10% of GDP.

By contrast, Guatemala and Paraguay democratized at about the same time as Lesotho – but education spending has not increased much at all. Guatemala has increased education spending by just 0.3% of GDP, while in Paraguay education spending has actually declined since democratization, by about 0.4% of GDP. Cases such as these represent puzzles for the hypothesized relationship between democracy and education spending. Moreover, as we show below, these four countries are not outliers. Wide variation exists in public education spending across countries classified as democracies. Why do some democracies

spend more, while others spend less?

The answer can be found by bringing in an actor that the literature relating regime type to education spending specifically and to human capital formation more broadly has thus far ignored: agrarian elites.¹ Political scientists have long held that landowning elites tend to oppose the emergence of democracy (Rueschemeyer, Stephens and Stephens, 1992; Gerschenkron, 1962; Moore, 1993; Mahoney, 2001). Their opposition is not simply rooted in fear of redistribution (whether of land or of taxable income) (Boix, 2003; Acemoglu and Robinson, 2006), but also because democracy tends to raise the price of rural labor (Ansell, 2010). Democracy may indeed bring about increased government investment in public services, which tends to improve human capital - particularly in the relatively poorer countryside (Acemoglu et al., 2015). Although this may enhance aggregate economic growth, the costs and benefits of such investment tend to fall unevenly across economic sectors. In particular, the expansion of educational opportunities tends to raise costs for landowners who depend on cheap, unskilled labor.

We hypothesize that the relative power of landed elites, who may be able to partially “capture” the policy process after democratization (Acemoglu and Robinson, 2008; Albertus and Menaldo, 2018), shapes the relationship between democracy and public education spending. Even after suffrage expansion and other reforms that accompany regime change, landed elites typically retain considerable political influence. Given this, we expect to observe a negative relationship under democracy between the power of landed elites and investment in public education.

In the next section we elaborate on our theoretical argument. We subsequently test our hypothesis using time series cross-sectional data from 107 countries over several decades, and then leverage difference-in-difference analysis to assess whether these results hold under a causal inference approach. Results consistently support the idea that powerful

¹We use landed, landowning, agrarian, and rural elites as the same concept. While others have considered the conditions under which a different set of elites support the expansion of education (Ansell, 2008; Acemoglu et al., 2015; Hollenbach, 2021), this paper is the first to tease out the role of landed elites under democracy.

landed elites can undermine public education spending under democracy. Overall, our results suggest that democracy is associated with higher education spending only when landed elites are relatively weak. The conclusion explores the implications of this finding and suggests paths for future research.

2 Democracy and Public Education

The theoretical argument for why democracies tend to spend more on primary and secondary education than dictatorships is straightforward. In a dictatorship, elites control decision-making and seek to keep taxes and demand for redistribution low. They also have incentives to suppress the supply of education due to what [Ansell \(2010, pg. 6\)](#) calls a “scarcity effect.” The relative scarcity of a factor of production in an economy determines its rate of return. Consequently, where education is scarce, it generates a high rate of return. To the extent that educated, autocratic elites can limit access to education, they perpetuate their control over the rents that accrue to the educated. If the supply of education were to increase, such rents would dissipate. This gives autocratic elites strong self-interest in limiting the expansion of education.

Under democracy, by contrast, scholars have argued that electoral competition and interest group pressures put upward pressure on public education spending ([Brown and Hunter, 2004](#); [Lake and Baum, 2001](#); [Haggard and Kaufman, 2018](#)). Democratization expands participatory opportunities to lower and middle class citizens, who understand that education encourages meritocracy and undermines “old-boy” networks where *who you know* matters more than *what you know* or the skills you acquire. Demanding that politicians provide greater education spending undermines the scarcity effect, as non-elites seek to transfer to themselves the rents from education that used to accrue only to elites. In addition, under democracy teachers’ unions are relatively more influential, and act as a special interest lobby ([Moe and Wiborg, 2016](#)), further strengthening the connection

between democracy and education spending. In short, the reason why democracies on average spend more on public education is that, in principle, politicians have stronger incentives to respond to voters' demands and pay attention to powerful interest groups than they do under dictatorship.

Empirical findings have consistently supported this intuition. [Lindert \(2004\)](#) showed that in the early 20th century the expansion of public schooling in wealthy countries followed the emergence of democracy. This finding has been replicated in several other contexts, with different samples. For example, [Lake and Baum \(2001\)](#) found that secondary-school enrollment increased with democracy in the developing world (see also [Acemoglu et al., 2015](#); [Brown, 1999](#)). [Brown and Hunter \(2004\)](#) and [Huber and Stephens \(2012\)](#) showed similar results for Latin America, as did [Stasavage \(2005\)](#) and [Harding and Stasavage \(2014\)](#) for Africa.

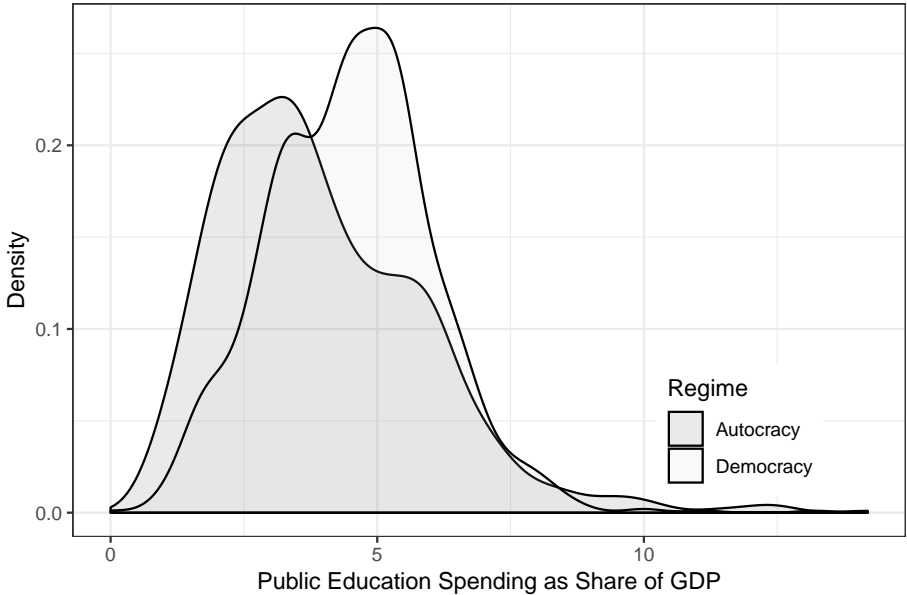
Dictators, of course, may view education as an important tool to promote regime loyalty and nation-building, potentially dampening the observed effect of democracy on the expansion of education relative to autocracy ([Paglayan, 2020](#)). Nevertheless, it appears that democratic governments on average tend to invest more, in order to meet the demands of voters and interests groups and win reelection. In his comprehensive study, [Ansell \(2010\)](#) shows that democracy has a positive and significant effect on total educational spending as a percentage of GDP, and on educational spending as a percentage of the government budget.²

²That this spending goes to improving educational quality, however, should not be assumed. In democracy, higher education spending might mean higher salaries for teachers and administrators or upgrades in infrastructure – the sort of visible investments made to appeal to supporters. [Dahlum and Knutsen \(2017\)](#) lend empirical support to this proposition; they find that democracies improve education spending but not quality.

3 Democracy, Land Inequality and Education Spending

Despite these findings, the relationship between democracy and education spending is not always so straightforward. Figure 1 below shows the distribution of public education spending (from UNESCO, see below) as a yearly percent of GDP across democracies and dictatorships, using the dichotomous measure of democracy developed by [Boix, Miller and Rosato \(2014\)](#). While democracies do spend more on average, autocracies frequently outspend democracies. In fact, democracies run the gamut from relatively low to relatively high education spenders.

Figure 1: Distribution of Public Spending Across Regime Types



What we know about how democracies actually operate also raises theoretical challenges to the notion they should always invest a lot in education. For one, despite the core supposition of the literature cited above, democracies do not always respond to the interests of the masses or labor unions. Rather, even under competitive elections and universal suffrage the policy process under democracy may be captured by powerful economic elites ([Acemoglu and Robinson, 2008](#)). Although democratization changes the de jure distribution of power, it also creates incentives for elites to invest in manipulating

its de facto distribution, to offset any potential political losses they might accrue under universal suffrage (Albertus and Menaldo, 2018). Various authors have documented the potential mechanisms that help explain how elites retain political power in democracy, such as “over-representing the wealthy in political institutions, inducing gridlock, imposing military veto power over policy and elite dominance over local politics” (Albertus and Menaldo, 2014, pg. 576). The idea that democracy is susceptible to capture suggests that the degree to which it engages in costly public spending depends on the relative power of different economic elites to influence the political process (Ansell and Samuels, 2014; Haggard and Kaufman, 2018).

This logic suggests that democracy can usher in pressures that might either expand or limit public education spending. As Acemoglu et al. (2015) note, “The type of education democracy produces depends on what forces democracy unleashes and who wields power” (pg. 1907). This raises the question of *which* elites matter? For the case at hand, we follow the work of Galor, Moav and Vollrath (2009) (hereafter GMV) and others who have suggested that agrarian elites have good reason to resist pressures to increase public education spending. GMV, for example, argue that in any country, agricultural landowners have incentives to undermine investment in institutions that promote human capital accumulation, because they seek to keep wages low – and investment in human capital tends to put upward pressure on wages.

GMV support this claim by showing that cross-nationally, land inequality is generally associated with lower public education spending. For example, persistent differences in the distribution of landownership between North and Latin America are associated with significant divergence in both education provision and subsequent per capita income levels across these regions. Although all of the economies in the western hemisphere were developed enough by the mid-19th century to support an expansion of primary and secondary public education, only the U.S. and Canada did so (Coatsworth, 1993; Sokoloff and Engerman, 2000). GMV also note that within the U.S., education levels have historically varied

as a function of the degree of land inequality at the state level, with differences not simply reducible to the presence of slavery or not before 1865.

Various works support these findings. [Baten and Juif \(2014\)](#) show that the historical levels of land inequality are associated with lower academic achievement in a panel of countries. In a study of 19th century Prussia, [Cinnirella and Hornung \(2016\)](#) demonstrate that land reforms that liberated serfs increased the private demand for education, leading to higher enrollment rates. Likewise, within Latin America, variations in the degree of landowning inequality have driven variation in investment in human capital. In particular, Argentina, Chile, and Uruguay, where land inequality was somewhat less pronounced than elsewhere, historically invested significantly more in public education ([Sokoloff and Engerman, 2000](#)). Similarly, [Nugent and Robinson \(2010\)](#) show that in Costa Rica and Colombia, where coffee was typically grown on small farms (reflecting lower overall inequality in land distribution), income and human capital are significantly higher today than in Guatemala and El Salvador, where coffee plantations have historically tended to be larger and land more concentrated and, as a consequence, rural elites have been more resilient.³ In a comparison of the region to Asia, [Wegenast \(2009\)](#) argues that Latin American rural elites used education and labor policies to restrict schooling beyond primary education to ensure cheap labor and preserve the political status quo.

What scholars like GMV and Wegenast have not yet done, however, is link the findings that a powerful landlord class is associated with *lower* education spending on average with findings that democracy is associated with *higher* education spending on average, as in [Ansell \(2010\)](#), [Acemoglu et al. \(2015\)](#), or [Lake and Baum \(2001\)](#). We draw these two lines of research together to explain how democracy's impact depends crucially on the relative power of landed elites.

The logic is as follows. Regime change is more likely where landed elites are relatively weak. However, if democratization does come to pass in a country with powerful landed

³However, see [Albertus and Popescu \(2020\)](#) on how the land reform is not guaranteed to improve education levels in rural areas.

elites, policy outcomes are likely to reflect their influence. After all, regime change does not simply substitute an autocratic elite for rule by the masses and/or labor unions. Instead, former autocratic elites will seek to limit their losses under democracy - particularly those who believe that regime change may generate significant economic losses.

Expanding public education can generate positive externalities by increasing a country's factor endowment of skilled labor. This improves economic efficiency and global competitiveness, which tends to increase aggregate general welfare. However, these positive externalities accrue only to those who benefit from education. This includes the workers who acquire more skills, as well as the elites who employ them. Meanwhile, for elites who depend on a large pool of unskilled labor, an expansion of public education generates negative externalities.

The process of economic development raises the stakes of this game, because it increases the impact of investment in human capital on national economic performance. As GMV (2009, pg.144) note, there is high complementarity between investment in human capital and investment in improvements in technological and physical capital. That is, investment in education pays off in terms of long-term growth in non-agricultural sectors. Meanwhile, there is much lower complementarity between human capital investment and growth in the agricultural sector, where the return on education is far lower. Improvements in education also tend to increase labor productivity in non-agricultural sectors but decrease the return to land, because workers tend to seek out jobs with higher wages and better long-term opportunities for themselves and their families. This lowers the supply of agricultural labor, putting upward pressure on wages with no compensating increase in productivity. Landowners, therefore, have no economic interest in supporting greater investment in education. In fact, their interests run in the opposite direction.

The logic of our argument relies on the notion that policies that promote overall development can generate significant conflicts of interest between urban and rural elites, an idea central to "dual-sector" models of economic development for decades. In prein-

dustrial societies the central economic conflict is between landowners and agricultural workers. Yet as countries begin to industrialize, conflict can arise between agrarian and industrial elites, as the latter seek out a better-educated labor force and so push for public spending on education. This effect should be particularly pronounced under democracy, where voters and pro-education interest groups have relatively greater voice and ability to influence policy, at least in principle. Meanwhile, agrarian elites will continue to push for policies that deprive the poor of education.

Landed elites have strong interests in keeping rural wages low and keeping workers on the farm year in and year out, and their relative political strength can translate into lobbying power that shapes education spending. To the extent that landowners who depend on masses of unskilled labor remain powerful under democracy, they should have both the will and the way to contain public education spending. Democratization should only drive an increase in education spending where agrarian elites are relatively weak. Under such conditions elites from other economic sectors with stronger interests in cultivating human capital can dominate the political process.

The relative strength of agrarian elites has far-reaching implications for patterns of economic growth around the globe. Industrialists benefit from greater investment in public education, and have incentives to support reforms that improve worker productivity. Meanwhile, agrarian elites will seek to block the accumulation of human capital, slowing the process of economic development. Who wins depends on the relative strength of the forces in play.

4 Time Series Cross-Sectional Analysis

To test our hypothesis that the strength of agrarian elites conditions the effect of regime type on education spending under democracy, we first conduct a series of time series cross-sectional regressions on data from 107 countries over the period 1970-2000. This period

captures both the third wave of democratization and important global developments in education, which particularly impacted the developing world. Specifically, this period coincides with significant international efforts to expand educational access, such as the establishment of the UN's Education for All movement and the World Conference on Education in Thailand in 1990. This time period therefore represents a hard test for our hypothesis: despite these international pressures, all of which pushed the same direction in every country, we still expect domestic-level structural factors to shape our outcome of interest.

4.1 Specifications and Estimation Procedure

The literature examining cross-national variation in levels of social spending suggests two approaches to specifying regressions. In the first, scholars study year-to-year changes in spending, but acknowledge that spending in year y depends on spending in year $y - 1$. To address this issue scholars often use a lagged dependent variable, or study first-differences in spending (for example, see [Acemoglu et al., 2015](#); [Ansell, 2010](#)). However, either approach focuses on short-term changes in the dependent variable, which is problematic for studies that emphasize differences in levels or long-term trends. Moreover, some evidence suggests that including a lagged dependent variable (LDV) artificially weakens the effect of other explanatory variables ([Achen, 2000](#)).

A second approach calls for measuring spending levels without including lagged values on the right-hand side or transforming the dependent variable. This method is preferred by [Huber, Mustillo and Stephens \(2008\)](#), for example. We find that this approach more closely fits our analytic goal of studying long-term spending trends given levels of democracy and rural inequality. After all, levels of rural inequality do not typically change quickly over time. Rather, the effect of regime type and rural inequality should accumulate over time and have lasting effects on the level of social spending, including on education.

Another issue concerns estimation technique. Studies that estimate levels of spending

with time-series cross-sectional analysis using OLS confront well-known challenges. Most importantly, excluding the LDV means that we must deal with temporal autocorrelation. Two methods are generally prescribed: 1) OLS with panel-corrected standard errors, sometimes with a temporal autocorrelation parameter (Beck and Katz, 1995), or 2) including country fixed effects. The second option makes sense if we conceptualize rural inequality as a treatment, rather than as a time-varying continuous covariate.

While we believe the models with PCSEs are more theoretically appropriate, for the sake of transparency we provide results for both methods. Specifically, we provide results from four models: OLS regressions with 1) year and 2) country dummies, 3) a linear panel model with panel-corrected standard errors (PCSEs) estimated via a two-step Prais-Winsten feasible generalized least squares (FGLS) procedure, and 4) an augmented version of Model 3 allowing for an AR(1)-type autocorrelation.⁴

Our main linear regression takes the form:

$$y_{i,t} = \alpha + \gamma D * RI_{i,t} + \mathbf{x}_{i,t}\beta + u_{i,t}, \quad (1)$$

where $y_{i,t}$ refers to public spending on education as a share of GDP for country i at time t , $D * RI$ is an interaction term of a measure of democracy and rural inequality for country i at time t , $\mathbf{x}_{i,t}$ is a vector of covariates, including the component terms of the interaction, and $u_{i,t}$ is an error term.

⁴We avoid the two-way fixed effect specification since, as (Kropko and Kubinec, 2020) have recently shown, it is statistically unidentified in non-DiD frameworks.

5 Data

5.1 Dependent Variable

Our dependent variable is the yearly level of public education spending as a share of GDP.⁵ In doing so, we follow other scholars who have examined aggregate levels of spending (i.e., at all levels of government) across countries (Lindert, 2004; Brown and Hunter, 2004; Huber and Stephens, 2012; Stasavage, 2005; Ansell, 2010). Plots of and descriptive statistics regarding the distribution of this variable can be found in Section A.1 of our supplementary material. We note here only that it has a positive skew, a mean of 4.25% and a wide standard deviation of 2.1. These data are drawn originally by the United Nations Educational, Scientific, and Cultural Organization (UNESCO) Institute for Statistics and are defined as public expenditure on education at all levels of government (UNESCO, 2018).

5.2 Independent Variables

5.2.1 Democracy

Democracy is a highly contested concept. At the heart of these discussions is the question of whether the concept can be measured as a continuous or binary variable. One continuous measure comes from the Polity IV project, which focuses on executive constraints. The Varieties of Democracy (V-Dem) project offers another continuous indicator, the Polyarchy index, which centers on elections and the institutions that uphold them (Teorell et al., 2016). A third approach comes from Boix, Miller and Rosato (2014) (BMR), who code democracy dichotomously based on a participatory threshold and the presence of free and fair partisan contestation.

⁵Alternative measures of “educational investment” either do not exist for the time-period or set of countries we study. For instance, panel data for spending across levels of education are unavailable for many (usually developing) countries over time. The same is true of enrollment rates. Using these measures would generate biased estimates (Stasavage, 2005).

All three of these measures are widely used in scholarship on the emergence and consequences of different political regimes. Furthermore, even though they measure somewhat distinct aspects of democratic governance, all these indicators are highly correlated (.83 or higher). We use all three in the analyses that follows to demonstrate that how one measures democracy does not meaningfully affect our results. After all, our theoretical argument suggests that to the extent they are powerful, agrarian elites can capture different facets of the democratic process, exerting influence and putting downward pressure on education spending. However one measures democracy, rural inequality should attenuate its effect on education spending.

5.2.2 Rural Inequality

Scholars have often used a measure of land inequality to proxy for the relative power of agrarian elites. However, as [Ansell and Samuels \(2014\)](#) note, land inequality *per se* does not get at the key conceptual issue, which is the relative importance of agricultural labor given different distributions of land. Given this, we adopt their measure of ‘Rural Inequality’ (RI). This takes the relative concentration of landholdings (measured with Vanhanen’s [\(2000\)](#) Family Farms measure) and weights it by the relative density of the rural population. Specifically, we calculate RI as: $(1 - \text{Family Farms}) * (1 - \text{Urbanization})$, with urbanization also taken from Vanhanen [\(2000\)](#).

The logic of this formulation is that land inequality may matter less for questions about the status of rural labor in countries where relatively few people live in rural areas (for example, a ranching society such as Australia), while conversely even a relatively moderate level of land inequality might retard education spending if most of a country’s population lives and works in rural areas (i.e. where there are many landless peasants). This measure is bounded between 0 and 1. Since Vanhanen’s data are collected only for approximately ten-year intervals, our dataset has at maximum three observations per country. (See the appendix for additional descriptive information on this and other variables.)

5.2.3 Interaction

As noted, scholars have separately suggested that democracy is positively associated with education spending while Rural Inequality is negatively associated with it. Given this we expect the relationship between democracy and education spending to be *conditional* on levels of Rural Inequality, meaning that our key variable is the interaction of Democracy and Rural Inequality. We expect that at low levels of RI democracy should have a positive effect on education spending, but at higher levels it should have a smaller or negative effect.

5.3 Controls

There is no consensus in the literature on what controls to include when exploring cross-national education spending. Following Ansell's (2010) lead, because we have a limited number of observations we seek to keep our models sparse and only include measures of globalization, population under age 15, and GDP per capita. We measure globalization, which previous work has found has a negative effect on human capital spending (Kaufman and Segura-Ubiergo, 2001; Avelino, Brown and Hunter, 2005), using trade as a percent of GDP. Age under 15 should also impact education spending (Ansell, 2010), because as a country's population ages the government should face weaker demands for education spending. Finally, we control for GDP per capita, which we log, to capture the intuition that richer countries are likely to invest more in public education.⁶ We avoid including lags of the explanatory variables following recent work showing that while lagging IVs corrects some biases it introduces new ones, leading to misleading inferences (Bellemare, Masaki and Pepinsky, 2017).

⁶In our appendix we show that models with additional covariates (industry as a share of GDP, the share of workers employed in industry, and regional dummies) do not meaningfully change our results. We have also tested for the effect of lagged enrollment rates with no substantive change to coefficients. However, doing so reduces our sample size by 33 observations, potentially introducing bias.

To summarize, our first data set contains 157 observations for 107 countries. Since the rural inequality measure is only measured once every decade, countries appear at most three times in the data, but an average of 1.5 times.

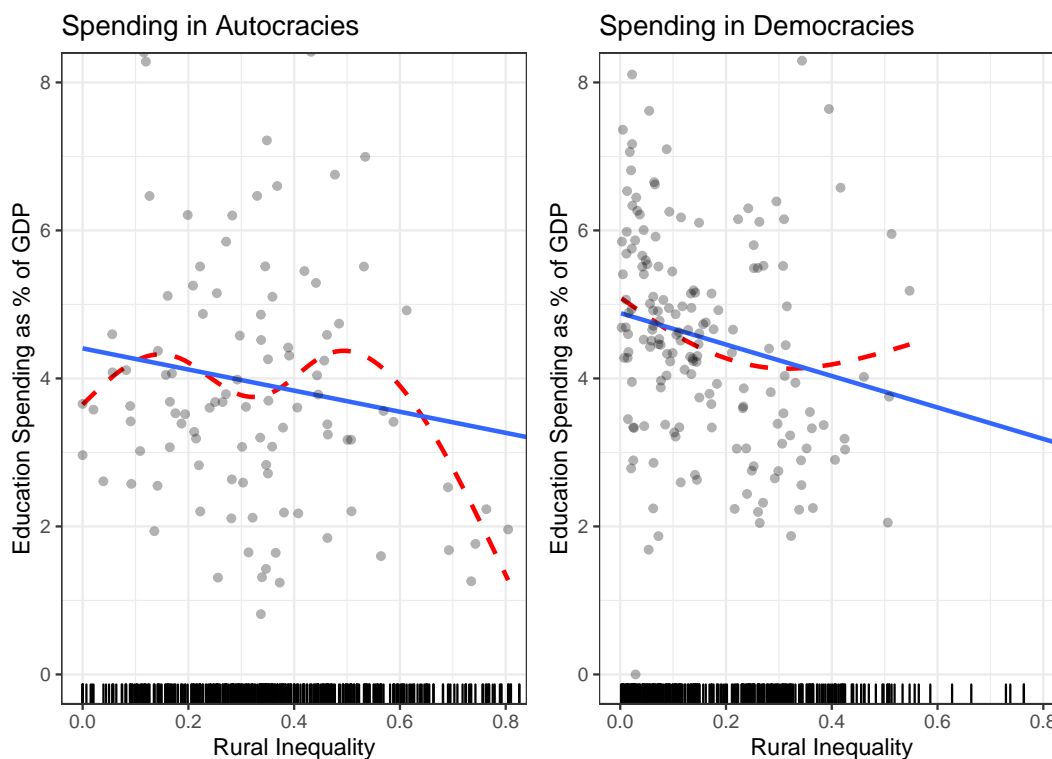
6 Preliminary Data Examination

Before conducting regression analyses, we visually assess whether the conditional relationship between democracy and rural inequality on education spending appears in the raw data.⁷ Figure 2 shows the relationship between Rural Inequality (on the x-axis) and Education Spending (on the y-axis) in autocracies (the left panel) and democracies (the right panel) using the dichotomous measure of democracy and with no controls. The graphs show two lines: a linear regression in solid blue, and a loess regression in dashed red. The linear regression shows unambiguously that as RI rises, spending on education in democracies falls. Moreover, the drop appears substantial: in democracies, an increase in RI of one standard deviation is associated with a drop of almost half a percent of GDP. The relationship is similar but weaker for autocracies. Meanwhile, the loess line generally tracks the negative relationship, but is more sensitive to outliers at high levels of RI (the rug plot along the bottom of both panels shows that democracies with high levels of rural inequality are rare).

We gain additional insight when we use a continuous measure of democracy. In figure 3, we cut the data into three equally-sized bins according to levels of the Polity variable. That is, each bin contains an equal number of observations. The left panel includes observations for Polity scores ranging from -10 to -7 (strong autocracies); the middle panel includes those for Polity from -6 to 7 (middling regimes); and the right panel includes observations with the highest Polity scores (strong democracies). All panels show the same negative relationship between rural inequality and education spending. However, the re-

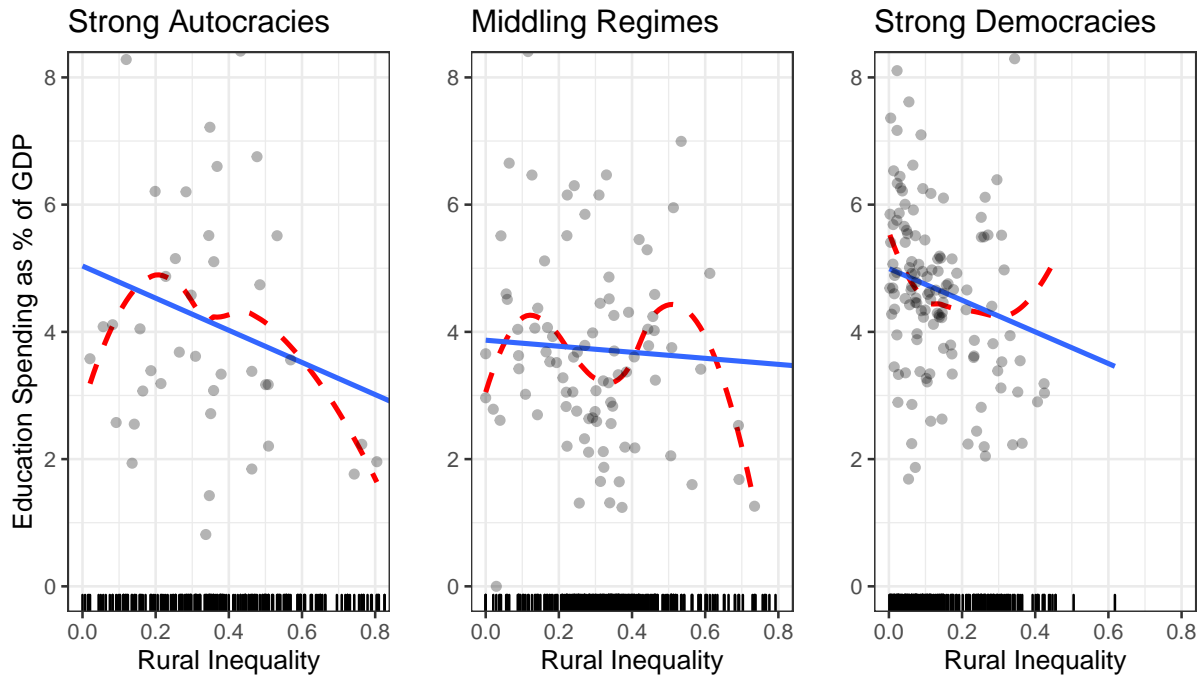
⁷The inspiration for this test is the *Interflex* package in R by [Hainmueller, Mummolo and Xu \(2019\)](#).

Figure 2: Public Education Spending under Different Political Regimes, Given Levels of Rural Inequality



gression line (in solid blue) is steepest for countries with the highest Polity scores. This is true even though the range of values of rural inequality along the x-axis is much narrower in those cases. Once again we see a large difference, with a one standard deviation increase in RI associated with a drop of half a percentage point of GDP in education spending. This is striking: even for the “highest quality” democracies, RI appears to attenuate the effect of democratic politics on education spending. (As before, the loess line is sensitive to outliers at extreme levels of rural inequality.) A similar result is observable when using the V-Dem measure of democracy (see page page 9 of the appendix for the corresponding figure). Together, these plots offer preliminary support the notion that rural inequality is associated with lower education spending across regime types, but that this relationship is particularly strong under democracy.

Figure 3: Spending Public Education in Different Political Regimes (Polity) Across Levels of Rural Inequality

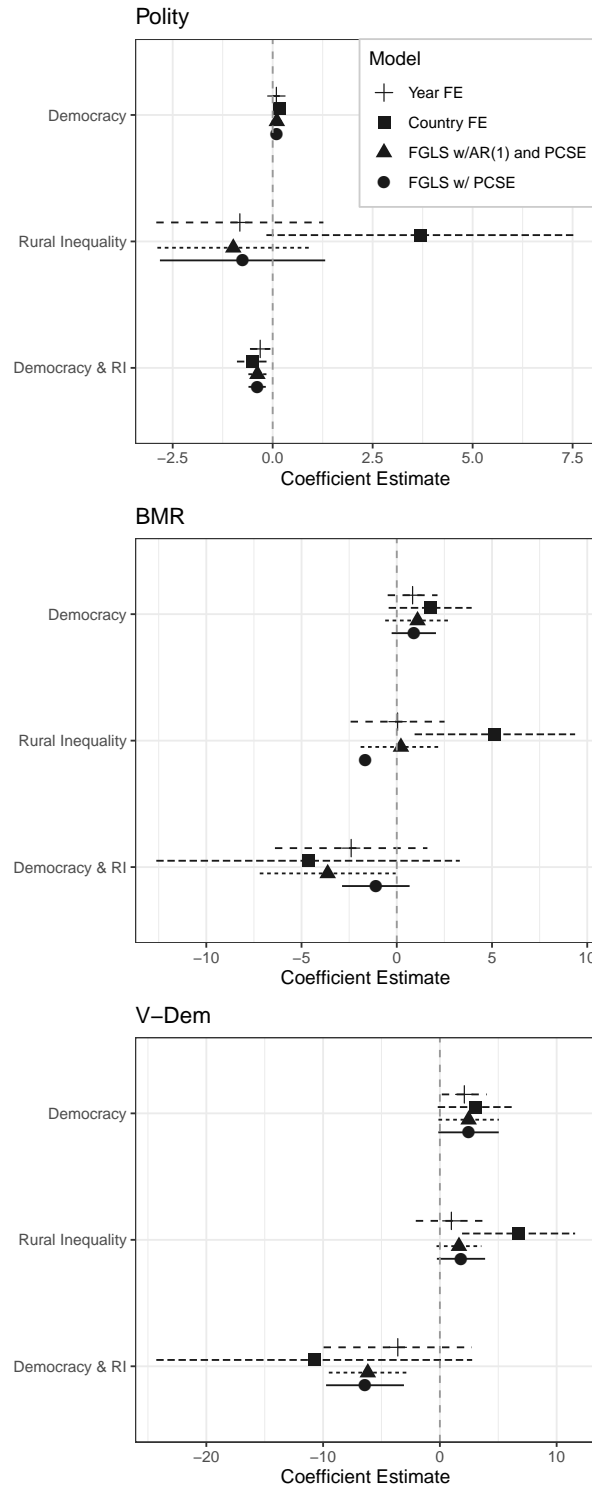


7 TSCS Results

Figure 4 shows coefficients and standard errors for these models, using the continuous and binary measures of democracy respectively. We remove the intercept and controls, and set confidence intervals to .95. Full regression tables can be consulted starting on page 9 of the appendix.

The key coefficient is the interaction term, Democracy * RI. Our preliminary exploration of the data suggested that this relationship would be negative, and multiple regression consistently confirms this hypothesis. The interaction is statistically significant in all four specifications using Polity, using the FGLS with the AR(1) PCSE specification under BMR, and using both FGLS specifications for V-Dem. (It is unsurprising that when using the BMR measure the standard errors (and the coefficients) on the interaction term are larger, because the dichotomous measure is a blunter instrument than either the Polity or V-DEM measures.)

Figure 4: Regression Results



The coefficient on the interaction is substantively fairly large across models. For example, in the BMR FGLS with AR(1) model, the coefficient is roughly -3.5, implying that education spending in democracies with the highest levels of rural inequality will be about 3.5 percent of GDP lower than democracies with no rural inequality. A more reasonable comparison might be between democracies with a half standard deviation difference in RI, or 0.1. According to our results these two countries would still see a difference in education spending of 0.35 percentage points of GDP, a significant amount. (In the next section we plot predicted values across the range of rural inequality.)

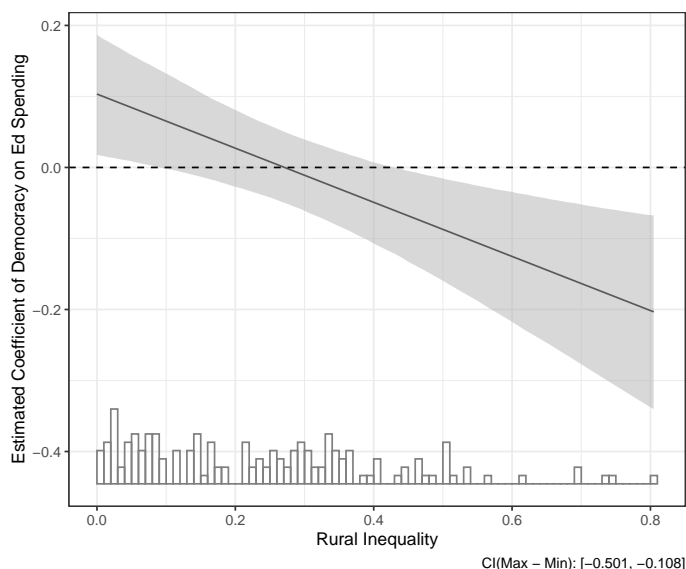
Let us now consider the other coefficients. As the literature has consistently found, democracy has a positive and often significant effect on education spending. In the presence of the interaction, we interpret this coefficient as the effect of democracy on education spending where rural inequality equals zero. Although the sign on this variable is positive, our results suggest something substantively important: the effect of democracy is relatively small (around .1 for Polity and 1 for BMR) when compared to the impact of rural inequality under democracy. That is, it may be that democracies tend to spend more on education than autocracies, but this effect appears to hold only when landed elites are politically relatively unimportant.

The impact of Rural Inequality on its own varies across models, though it is most commonly negative, and significant only for the simplest OLS model in the right panel. We interpret this as the effect of RI on education spending for autocracies (that is, when $D = 0$). These results suggest that RI, on its own, does not play as large of a role in explaining differences in education spending across autocracies, as it does in democracies.

As recommended by [Brambor, Clark and Golder \(2006\)](#), Figure 5 graphs marginal effects and accompanying standard errors of the interaction of Democracy and Rural Inequality on education spending.⁸ The figure visually portrays our key extension of existing research: at low levels of rural inequality, democracy is indeed associated with higher ed-

⁸We deploy the *Interplot* package by [Solt, Hu and Kenkel \(2018\)](#).

Figure 5: Marginal Effects of Rural Inequality on Education Spending under Democracy (Polity)



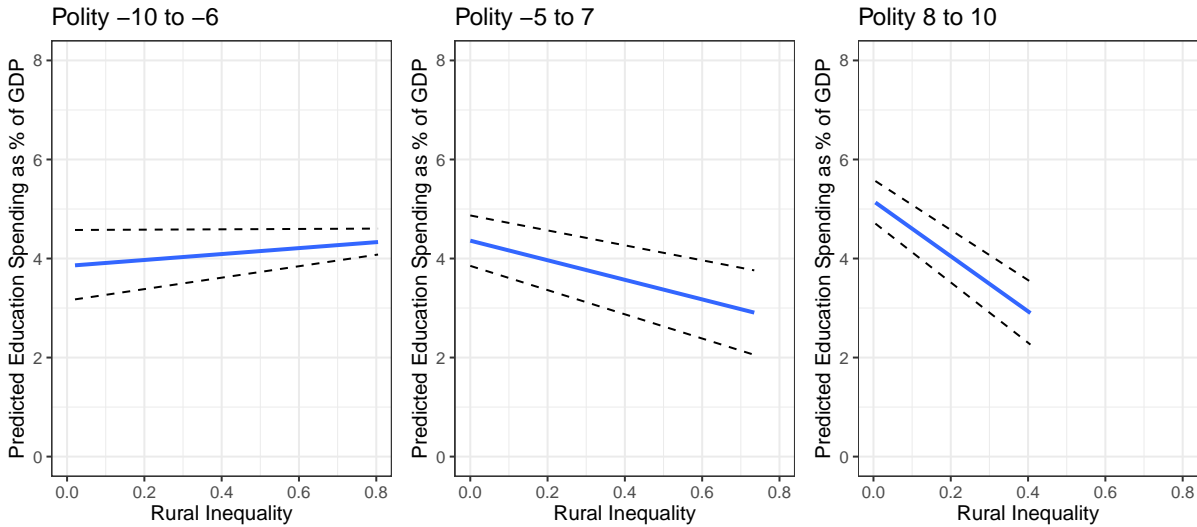
education spending. However, as rural inequality increases, this relationship attenuates and eventually becomes negative. Importantly, this relationship is not a function of the number of observations. Even though there are relatively few democracies with levels of RI above 0.5, the distribution of RI is fairly even from 0 to 0.5. As the figure reveals, even at relatively low levels, moderately increasing rural inequality is associated with relatively lower education spending.

7.1 Predicted Values

To aid in the substantive interpretation of our coefficients, we plot *predicted* spending on education as a share of GDP across levels of rural inequality for three groups of countries according to their Polity scores: countries with Polity scores from 1) -10 to -2; 2) -1 to 8; 3) 9 to 10, reflecting the true distribution of Polity across countries if we were to assign them to equally-sized bins. This replicates Figures 3, showing that the same sort of relationships are revealed when we model the data. To do so, we obtain fitted values from the panel regression with AR(1) Prais-Winsten correction and panel-corrected standard errors for

the continuous measure of democracy. In Figure 6 the blue regression lines show the association of rural inequality with education spending alongside predicted upper and lower bounds in the dashed lines. The results echo those presented in Figure 3 for the unmodeled data. Here, rural inequality has the strongest negative effect in countries with the highest Polity scores, again highlighting our key finding: under democracy, the greater the rural inequality, the lower the education spending. An increase in rural inequality of 0.2 (one standard deviation) is associated with a decline of education spending of one full percentage point of GDP, all else equal. This relationship is weaker for countries with middling Polity scores, and disappears entirely for full autocracies.

Figure 6: Predicted Spending on Education as Share of GDP



8 Difference-in-Difference Analysis

The preceding analysis strongly suggests that rural inequality moderates the effect of democracy on education spending. Its principal limitation, however, is that neither democracy nor rural inequality is randomly assigned. Indeed, both regimes covary for reasons the literature has already discussed. The nature of the world puts limits on our (or anyone’s) research design, which limits our ability to make credible causal claims. It is impossible

to fully overcome this identification challenge given our data, but to at least partly address concerns our research design might raise, in this section we provide results from a simple difference-in-differences (DD) model to estimate the differences in spending across democratizing countries.

The canonical DD model has two groups (a treatment and a control) and two time periods (pre- and post-intervention). Since we are interested in the effects of rural inequality under democracy, we restrict our sample to countries that have democratized and differentiate between those that do so at high versus low levels of rural inequality, creating our comparison groups. More specifically, the first difference is between countries with low versus high levels of rural inequality; the second difference is the comparison before and after democratization for each country in our sample. We estimate:

$$y_{it} = \alpha + RI_i\beta + dem_i\eta + X_i\gamma + \sum_{n=1970}^{2010} T(t)\pi_t + \sum_{n=1}^{10} C(i)\delta_i + (RI * dem)\gamma_{dd} + \epsilon_i, \quad (2)$$

where y_{it} is education spending for country i at time t , RI is a group identifier for low or high levels of rural inequality, dem is an indicator for whether country i is a democracy at time t , $T(t)$ equals 1 if an observation is from year t ; $C(i)$ equals 1 if that observation is from country i ; X_i is a vector of covariates that enter the analysis according to the specification, discussed later. The impact of the democracy and high levels of rural inequality is captured by the γ_{dd} term.

8.1 Data

For this analysis we make use of a larger dataset. First, we take all countries for which there is rural inequality data and sort them according to values of rural inequality in the

year 1970. We favor this date because doing so allows us to include data on the maximum number of countries that existed in the time under analysis. Since levels of rural inequality tend to change slowly if at all,⁹ we favor the earliest possible and most comprehensive measure of rural inequality to test the argument that inequality moderates the effects of democracy on social spending.

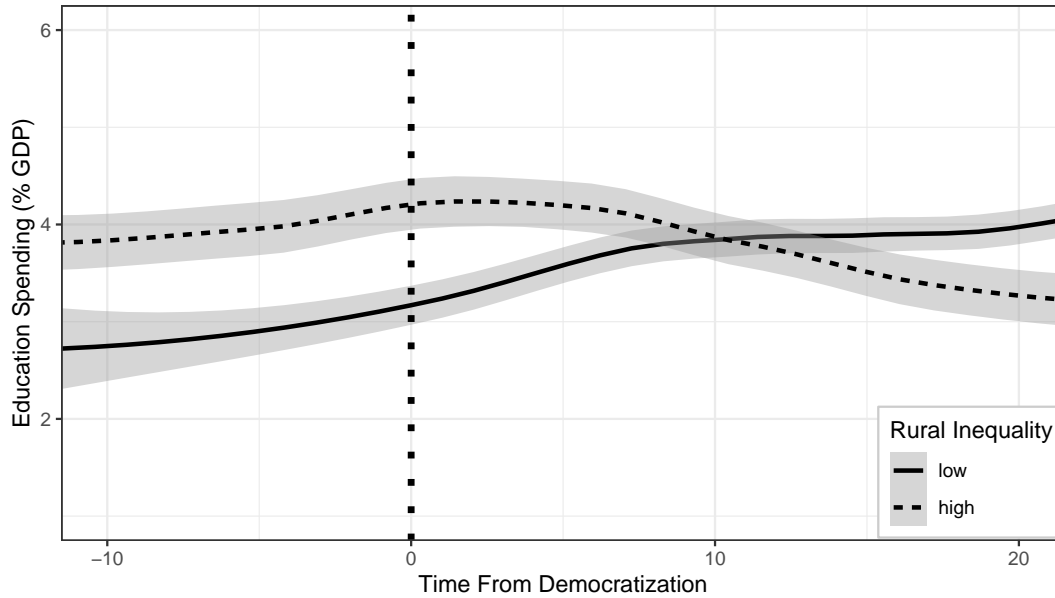
We then cut the data into two equally-sized bins according to their values on rural inequality, creating our two comparison groups. Finally, we include only countries that democratized between 1970 and 2010. This returns 73 countries, 29 of which have been marked as having low rural inequality. While alternative splits are possible, this uneven division between low and high rural inequality countries is important because it speaks to the true distribution of rural inequality across the world. In sum, our dataset comprises a series of country-level longitudinal observations, in which all countries switch from autocracy to democracy but do so at different levels of rural inequality.¹⁰

The DD estimator's key identifying assumption is that of parallel trends. In our model, this means that trends in education spending in countries with low levels of rural inequality should be parallel to those of countries with high levels of rural inequality prior to democratization. Visual inspection of spending trends in the 10 years prior to democratization in figure 7 suggests that the DD estimator is a valid approach: for both groups there is a slight yet parallel increase in spending as democracy approaches. The figure also reveals two interesting facts. First, autocracies with high rural inequality appear to outspend those with low rural inequality in the years leading up to democratization. Yet second, this trend reverses within ten years—countries with low rural inequality sustain increases in spending on education over time, whereas the opposite occurs in countries that democratized with high rural inequality. This accords neatly with our argument: low levels of rural inequality are a boon to education spending under democracy, while the

⁹Measures of rural inequality over time within country are highly correlated, between .8 and .98.

¹⁰The reason the bins have different Polity ranges here as compared to earlier is because the sample here is somewhat smaller, due to the inclusion of control variables.

Figure 7: Parallel Trends



opposite is true for high levels of rural inequality.

8.2 Results

To offer further evidence in favor of this hypothesis, we run a series of regressions where the term of interest is the interaction of a country's membership in one group or another (high and low rural inequality) and time-period (before or after democratization). We cluster standard errors at the country level and retain observations five years prior and twenty years after democratization. As is standard practice in DD models, we include year and country fixed effects.

Table 1 shows the regression results. Simple DD estimates show that democracy has a positive effect and rural inequality a large negative effect, and that their combination has a moderately high negative effect on education spending, significant at the 0.05 level across specifications. Our preferred model (Year and Country FE) suggests that democracies with high levels of rural inequality spend about half a percentage point of GDP less on education than those with low rural inequality. This result is similar but larger than the one we

Table 1: Education Spending Regressed on Covariates

	Simple	Year FE	Country FE	Year & Country FE
Democracy	1.45** (0.26)	0.99** (0.30)	0.72** (0.19)	0.66** (0.17)
High Rural Inequality	0.99* (0.42)	0.75 (0.41)	-1.16** (0.21)	-1.69** (0.25)
DD estimates (Dem*RI)	-0.93* (0.39)	-0.80 (0.41)	-0.53* (0.26)	-0.52* (0.24)
R ²	0.06	0.15	0.82	0.83
Adj. R ²	0.06	0.09	0.80	0.80
Num. obs.	690	690	690	690
RMSE	1.65	1.62	0.76	0.76

** $p < 0.01$, * $p < 0.05$

calculated using standard TSCS techniques: in the previous section we found that a half standard deviation increase in RI reduces education spending by 0.35 percentage points. The appendix provides evidence from a series of regression-adjusted DD estimates which include many of the same covariates in the previous section. Estimates are similar in magnitude and significant at a 0.1 level.

8.3 Falsification and Placebo Checks

Finally, we conducted a series of falsification tests to demonstrate that the causal effect of rural inequality on spending does not exist when it should not exist - for example, because choices with regard to our research design are driving the results. First, we generate fake treatment and control groups. Specifically, we generate a rural inequality placebo by creating 10,000 datasets in which we randomly assign countries in our sample into low or high levels of rural inequality. Since this assignment is not meaningful, running DD regressions identical to the ones conducted in the preceding section should return a coefficient of zero. Moreover, we can calculate an exact p-value by comparing the proportion of simulated DD estimates that are at least as extreme as our simple DD estimate of -0.52.

Second, we adjust the treatment “start year.” We acknowledge that prior to democ-

ratization RI should affect education spending in meaningful ways. But this relationship is historically determined and established long before democratization occurs. In our argument, democratization interacts with RI to co-determine spending after political liberalization. In terms of our DD design this means that in the years immediately prior to democratization RI should not drive distinct increases or decreases in education spending across our comparison groups. If this were the case, our treatment would simply be RI and not democratization *and* RI. To show that it is democratization that is driving differences among our two RI groups, we randomly shift the year of democratization back by between 1 and 10 years, generating 10,000 altered datasets. If democratization is truly generating differences between groups, the mean DD estimates from this analysis should be attenuated relative to our main model and statistically indistinguishable from zero.

Finally, we keep the same comparison and treatment groups but we replace the dependent variable with one that could not have been plausibly affected by treatment ([Gertler et al., 2016](#)). This works as a check on our research design by showing that our comparison groups do not systematically predict changes on anything other than education spending. We include the same observations as in the main analysis but include ethnic fractionalization as the dependent variable, using the index from [Alesina et al. \(2003\)](#). There are no theories linking levels of rural inequality in democracy to changes in the proportion of ethnic fractionalization. As before, the DD estimate should be zero and not significant.

Table 2 shows that results from these falsification and placebo tests reveal nothing unusual about our DD estimates. The mean DD estimates of the RI and Democracy falsification tests are either close to zero or statistically indistinguishable from it. Moreover, exact p-values calculated using these simulations demonstrate that DD estimates from our preferred model are statistically significant. Finally, the outcome placebo performs as expected: there is no relationship between our treatment and an unrelated outcome. In sum, our estimates of the effect of rural inequality on education spending under democracy are negative, consistent in magnitude, and statistically significant at conventional levels across

Table 2: Robustness Tests

	Coefficient
<i>Preferred Model (Year & Country FE)</i>	
DD Estimate	-0.52
P-value	<0.05
<i>RI Falsification Test</i>	
Mean DD Estimate	-0.00
Exact P-value	0.05
<i>Period Falsification Test</i>	
Mean DD Estimate	-0.26
Exact P-value	0.00
<i>Outcome Placebo</i>	
Mean DD Estimate	0.00
P-value	0.00

Note: Mean DD estimate is calculated as the mean DD estimate across 10,000 altered samples where either RI (low or high) or the year in which democracy began is randomly varied. The exact p-value is calculated as the proportion of coefficients in this distribution that are at least as extreme as that of our preferred model.

research designs and model specifications.

Our results explain the puzzle of variation in spending across democracies: when landed elites are relatively weak, democracies do spend more - but where they remain powerful after regime change, landed elites can undermine the relationship between democracy and education spending. This says something powerful about the limits of democratic systems of government, and about the specific forces that hold back the expected effect of universal suffrage and interest-group lobbying on social spending and investment in human capital development. As our results confirm, landed elites can shape redistributive policy long after regime change occurs.

9 Conclusion

On average, democracies spend more on education – and this may help explain why democracies perform better on a number of human welfare indicators (Baum and Lake, 2003). However, the average obscures significant variation. Some democracies spend

quite a bit more than the average autocracy – but some spend quite a bit less. Our argument helps explain why. Put most simply, highly urbanized democracies with weak landed elites spend the most on education, while democracies with powerful agrarian elites who depend on manual labor spend the least.

The political explanation for this pattern lies with the differential impact of the externalities that an expansion of education generates. Because they seek to keep agricultural wages low and have no interest in offering workers opportunities to acquire skills and knowledge, agrarian elites under democracy have good reason to lobby against the expansion of public education, working against the impact of popular pressures and teachers' union lobbying, for example. Meanwhile, industrial elites may have very different incentives, given that they need relatively better-educated workers for their investments to return a steady profit. Our results support this argument. The presence of powerful agricultural elites who depend on rural labor drives variation in the extent of governments' investment in education spending under democracy.

Our argument and empirical results build on existing research on the relationship between democracy and (human) development. Some democracies perform better on human development indicators, while others perform worse. We should not lose sight of the political influence of the agricultural sector for this question. Where agrarian elites who depend on manual labor remain politically important, human development is likely to suffer. Only where such elites are weak to begin with, where their influence is overwhelmed by the growth of other economic sectors or where they become less dependent on human labor (through mechanization, for example) will the likelihood for greater investment in human capital increase.

The findings in this paper also have implications for understanding subnational variation in education spending. It is not simply that it is bureaucratically more challenging to establish high-quality education systems in rural regions – the issue is that economic elites in such regions have powerful interests in opposing the expansion of education, to keep

rural wages in line. Future research could explore this question in greater depth.

Finally, this paper contributes to a growing body of research that questions whether under democracy economic inequality should be associated with higher redistributive government spending. The logic of the Meltzer-Richard median voter model has been extended to the study of regime change (Boix, 2003; Acemoglu and Robinson, 2006). Empirical evidence, however, offers little support for this idea, and instead suggests that most of the “action” in cases of regime change occurs through intra-elite contestation (Ansell and Samuels, 2014). Our argument, following Lizzeri and Persico (2001), suggests that the same dynamic characterizes social spending even after regime change. The relative income of the median voter is far less important for redistributive politics than the economic interests and relative political influence of different groups of elites.

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