Social Capital, Government Expenditures and Growth

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Abstract

This paper shows that social capital increases economic growth by raising government investment in human capital through better political incentives and selection. We provide empirical evidence that a greater share of output is spent on public education where social capital is higher, both across countries and across U.S. states. We develop a theoretical model of stochastic endogenous growth with imperfect political agency. Only some people correctly anticipate the future returns to current spending on public education. Greater social diffusion of information makes this knowledge more widespread among voters. As a result, social capital alleviates myopic political incentives to underinvest in human capital. It also helps voters select politicians who ensure high productivity in public education. Through this mechanism, we show that social capital raises the equilibrium growth rate of output and reduces its volatility.

Keywords: Social Capital, Education Expenditure, Economic Growth, Elections, Government Expenditure, Imperfect Information

JEL classification: D72, D83, H52, H75, I22, I25, I26, O43, Z13

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1 Introduction

How does social capital contribute to economic development? A growing body of evidence documents it does (Knack and Keefer 1997; Zak and Knack 2001; Tabellini 2009; Algan and Cahuc 2010). However, the underlying causal mechanisms remain poorly understood.[1] In this paper we propose and analyze a novel channel through which social capital raises economic growth: increased social diffusion of information about government activity induces greater provision of public education.

Empirical evidence both across countries and across regions within a country bears out the intuition that human capital accumulation is a key transmission channel for the causal effect of social capital on economic growth. Gennaioli et al. (2013) find that social capital is positively associated with regional economic development, but this relationship is no longer statistically significant when controlling for human capital.[2]

We document that government spending on education is a higher share of GDP in places with greater social capital—whether measured by interpersonal trust or by the likelihood of obtaining information from friends. This relationship holds not only across countries but also across states of the U.S., where omitted factors have less variation than in a cross-country setting. It is robust to controlling for geographic and demographic characteristics, and for the overall size of government.[3]

Motivated by this evidence, we formalize our argument in a tractable model of stochastic endogenous growth with imperfect political agency. Long-run growth is sustained by investments in physical and human capital. Capital accumulation cannot be undertaken by the private sector alone, but requires an indispensable government investment in public education.

Office-seeking politicians with heterogeneous skills set taxes and allocate spending between public education and other public services. Voters retain or dismiss the incumbent government according to their inference of its skills, based on imperfect information. All voters observe the provision of public services that immediately raise their utility. Instead, not everyone correctly anticipates the returns to public education in terms of future economic

[1] The broad notion of social capital popularized by Putnam (1993, 2000) and Fukuyama (1995) has hindered the rigorous economic analysis of precise mechanisms because it is too vague and wide-ranging (Solow 1995; Durlauf and Fafchamps 2005; Jackson 2010; Guiso, Sapienza and Zingales 2011).

[2] More broadly, human capital is a leading determinant of economic growth both across countries (Barro 1991; Manuelli and Seshandri 2014) and across sub-national regions (Gennaioli et al. 2013; Islam, Minier and Ziliak 2015).

[3] Our findings are also robust to using instrumental-variable strategies to minimize the threat of reverse causation. Across countries, social capital can be instrumented by the grammatical structure of each country's language (Tabellini 2008). Across states, it can be instrumented by ancestral social capital in the countries of origin of each state's residents.

growth.

Awareness of the effectiveness of government investment in human capital spreads through social connections. Our precise operational definition of social capital is the rate of social diffusion of information. When it is low, we find that political career concerns induce a myopic bias in government spending. By oversupplying public services with immediate payoffs, politicians raise their appeal among all voters. By undersupplying public education, they lower their appeal only among a subset of more knowledgeable citizens. As a result, in equilibrium the government invests too little in human capital.

When social capital is higher, however, knowledge spreads more widely among voters. Politicians are more likely to lose re-election if they manage public education poorly. As a result, they raise education spending towards the first best. Moreover, their equilibrium selection reflects more accurately their skill at managing government investment in human capital. Both better political incentives and better political selection raise long-run growth.

Beyond accounting for our motivating evidence, our theory thus makes several empirical predictions that find support in the data. First, in our model social capital improves both politicians' incentives and their selection. This prediction is borne out by evidence from countries as diverse as China and Italy (Nannicini et al. 2013; Martinez-Bravo et al. 2017; Lockwood et al. 2021).

Our theory predicts more specifically that social capital improves public education by raising voter information. We present evidence that corroborates this channel, based on survey data from the United States. Respondents who report higher interpersonal trust score higher on standard measures of voter information, like the ability to name candidates and incumbents or to rate politicians. We find the same pattern when measuring social capital by the propensity to discuss politics with friends and family—a less standard measure, but one particularly germane to our focus on the social diffusion of information.

In turn, existing evidence confirms that better voter information raises both the amount and the productivity of government investment in human capital (Reinikka and Svensson 2004, 2005). More broadly, prior empirical studies bear out the notion that frictions in political agency induce underinvestment in public education, particularly in poorer countries. One reason for such insufficient investment is that poorly informed voters underestimate its returns and thus have a distorted demand for education (Jensen 2010; Banerjee and Duflo 2011; Bursztyn 2016).[4]

Finally, our theory also accounts for the empirical finding that social capital is associated

[4]Bursztyn (2016) shows that poverty biases people against education spending, both as voters and as parents. This bias can result both from credit constraints and from misperceptions caused by the cognitive burden of poverty (Shah, Mullainathan and Shafir 2012).

with lower volatility of output growth (Sangnier 2013). In our model, short-run fluctuations in growth rates result from the stochastic productivity of government investment in human capital. This productivity reflects the skills of endogenous selected politicians. Higher social capital makes voters more accurate at screening out underperforming incumbents. This improvement in screening not only increases the average productivity of public education and thus of output growth, but also reduces their variance.

Our work is connected to several strands of literature. Most closely, a few theoretical studies formalize how social capital can foster economic development by facilitating market transactions among private agents. In Zak and Knack's (2001) model, social capital alleviates agency frictions in financial intermediation, consistent with its empirical association with financial development (Guiso, Sapienza, and Zingales 2004). However, long-run growth may require a switch from transactions supported by social bonds to contracts supported by formal enforcement institutions (Routledge and von Amsberg 2003; Kumar and Matsusaka 2009; Lindner and Strulik 2015). This cautionary theoretical prediction is consistent with historical evidence (Greif 2006).

We propose a complementary mechanism operating through frictions in political rather than corporate agency, and we show that social capital enables higher long-run growth by improving voters' ability to monitor their government.[5] Thus, our model vindicates Bowles and Gintis's (2002) insight that social capital and government intervention are complements rather than substitutes.

We also contribute to the broader literature in economics that provides definitions of social capital consistent with rigorous formal modeling. Our precise, tractable definition is closest to Glaeser, Laibson and Sacerdote (2002), who interpret social capital as the resources that individuals can draw upon thanks to their network of interpersonal relations—a view that harks back to sociologists' original definition (Bourdieu 1986; Coleman 1988; Lin 2001).

Our focus on information is justified by the long-standing recognition that it is among the main resources obtained through social connections (Granovetter 1973; Coleman 1988; Lin 2001; Durlauf and Fafchamps 2005). Another product of social connections is trust, the most standard empirical proxy for social capital (Glaeser et al. 2000; Valenzuela, Park and Kee 2009).[6]

The concept of social capital becomes ambiguous when it conflates social connections and shared beliefs, norms and values (Putnam 1993, 2000; Fukuyama 1995). Guiso, Sapienza

[5] Empirically, social capital correlates with higher efficiency in all large organizations, whether private or public (La Porta et al. 1997).

[6] Moreover, in order to reap benefits from social relations it is insufficient to be merely connected, but it is necessary to be both connected and trusted (Castelfranchi, Falcone and Marzo 2006). Bourlès, Bramoullé and Perez-Richet (2017) study formally the effect of altruism in social networks.

and Zingales (2011) resolve this ambiguity by defining civic capital as the shared beliefs and values that help solve the problem of collective action. Both theory and empirical evidence confirm that growth-promoting cultural traits help economic development (Galor and Moav 2002; Doepke and Zilibotti 2008; Guiso, Sapienza, and Zingales 2016; Gorodnichenko and Roland 2017). Our analysis suggests that civic culture and social capital—specifically, the social diffusion of information—are distinct and complementary drivers of growth.

Our model also speaks to the political economy of public finance under imperfect information. Democratic governments underprovide public goods that are shrouded from voters' view (Eisensee and Strömberg 2007; Mani and Mukand 2007). More opaque expenditures and taxes are also more exposed to capture by special interests (Coate and Morris 1995; Glaeser and Ponzetto 2014; Ponzetto, Petrova and Enikolopov 2020).

A growing body of empirical evidence shows that when citizens are more informed policy outcomes improve because politicians become more responsive to voters' needs (Besley and Burgess 2002; Reinikka and Svensson 2005; Snyder and Strömberg 2010). The literature has focused on the media as the main source of variation in voter information. We are the first to highlight theoretically and document empirically that social capital plays a similar role by acting as a knowledge multiplier.

Furthermore, we incorporate political agency and the social diffusion of information into a full-fledged model of endogenous stochastic growth. Thus, we contribute to the literature on political business cycles. Electoral pressures induce politicians to choose policies that try to deliver short-run benefits but end up imposing long-run costs (Rogoff and Sibert 1988; Persson and Tabellini 1990; Rogoff 1990). Economic performance fluctuates as politicians with heterogeneous competence win and lose elections (Alesina, Londregan, and Rosenthal 1993; Alesina and Rosenthal 1995; Alesina, Roubini, and Cohen 1997).

Our analysis abstracts from variation in political incentives over the electoral calendar and from differences in policy preferences across rival parties. On the other hand, we model for the first time social capital in this framework, and we show it can alleviate the impact of imperfect political agency on aggregate volatility.

The rest of the paper proceeds as follows. Section 2 presents our motivating evidence on social capital and government spending on public education. Section 3 sets up our theoretical model of endogenous growth with political agency and social diffusion of imperfect voter information. Section 4 presents its dynamic stochastic equilibrium, shows how social capital alleviates deviations from social optimality, and discusses empirical support for our theoretical predictions. Section 5 concludes. The Appendix provides all mathematical derivations and proofs.

2 Motivating Evidence

The positive effect of social capital on economic development has been extensively documented (Knack and Keefer 1997; Zak and Knack 2001; Tabellini 2009; Algan and Cahuc 2010). At the same time, the predictive power of social capital for economic growth diminishes when also accounting for education (Gennaioli et al. 2013). This finding, based on sub-national data from countries all around the world, suggests that human capital plays an important role as a mediating factor. With this premise in mind, our analysis focuses on a specific causal mechanism: social capital raises long-run growth by improving investment in public education.

Accordingly, in this section we begin by providing evidence of the fundamental pattern implied by this mechanism. Government expenditure on education is a higher share of output where social capital is higher. We show first that this relationship holds across countries, supporting the insight that public education is a key link in the chain connecting social capital and cross-country differences in economic growth. We then strengthen our finding by showing that the same pattern holds across states within the U.S.

2.1 Social Capital and Public Education Spending across Countries

We measure social capital at the country level by averaging responses to questions in the World Values Survey Integrated Questionnaire, 1981–2022. We consider two complementary proxies for social capital. The first is interpersonal trust, by far the most commonly used measure of social capital in the literature. Consistent with standard coding, we define *Trust* as a dummy variable that equals 1 if the respondent reports that "most people can be trusted" and 0 if they report instead that "you can't be too careful with people."

Our second measure is motivated by our precise notion of social capital as the ties that enable the social diffusion of information. We define *Talking with People* as a dummy variable that equals 1 if the respondent reports that "talking with friends or colleagues" was one of the "sources to learn what is going on in their country and the world" they used in the previous week, and 0 otherwise. This measure reduces our number of observations because it has been included in the survey less frequently.

Both measures reflect social capital as the ability to obtain and rely upon information relayed by trusted contacts.[7] Both positively predict government expenditure on education across countries. Figure 1 depicts the correlation of public education spending with inter-

[7] The correlation between the two measures across countries for which both are available is 44.6%.

personal trust. Figure 2 displays its correlation with the share of survey respondents who acquire information by talking to other people. These correlations are robust to controlling for standard demographic and geographic characteristics: population, ethnic fractionalization, temperature, and average distance to the nearest coast.[8] They remain robust when we include as an additional control aggregate government spending as a share of GDP.[9]

Table 1 summarizes our cross-country variables.[10] We present the results of the corresponding multivariate regressions in Table 2. The empirical relationship between social capital and government investment in human capital is highly significant, both statistically and economically. After including all controls in our specification, an increase in social capital by one standard deviation is associated with an increase in public spending on education by approximately 0.35 standard deviations.[11]

As a final test of robustness, we use the grammar of a country's language as an instrument for the social capital of its residents. The evolution of grammar is a gradual process that spans centuries, intertwined with various cultural traits. Building upon the work of Kashima and Kashima (1998) and Licht, Goldschmidt, and Schwartz (2007), Tabellini (2008) argues that languages that forbid omitting first-person pronouns are indicative of cultural traditions that prioritize individuals relative to their social context and show greater respect for individual rights. Hence, he adopts this grammar rule as an instrument for interpersonal trust. We confirm that it is a highly significant predictor of social capital. Furthermore, it qualifies as a valid instrument if the long-term cultural patterns responsible for this language feature are uncorrelated with other unobservable factors that influence current differences in government spending.[12]

Table 3 presents the results of this instrumental-variable specification.[13] Columns (1), (3) and (5) show the first stage equations. Once all controls are included, grammar is a weak

[8] The choice of these controls follows Gennaioli et al. (2013).

[9] Overall government expenditure is independent of social capital in the model we develop in Sections 3 and 4 below. Thus, our theory supports including it in our regression as a valid control, even though its exogeneity may remain debatable from an empirical standpoint. Other political and economic variables are unquestionably endogenous to social capital. Our limited number of observations and the lack of suitable instruments prevent us from including such intermediate outcomes as controls.

[10] Data on government expenditures and population are from the World Development Indicators (2000–2010). Data on ethnic fractionalization are from Alesina et al. (2003). Temperature is from the World Bank Climate Change Knowledge Portal (1961–1999). Distance to nearest coast is from Gallup, Sachs and Mellinger (1999).

[11] The standardized coefficients are 0.342 when we measure social capital as interpersonal trust and 0.374 when we measure it as acquiring information by talking to other people.

[12] Likewise, Givati and Troiano (2012) use gender-differentiated personal pronouns as an instrument for attitudes toward women.

[13] We adopt Tabellini's (2008) weighting strategy for multilingual countries. Thus, the instrument coincides with the share of speakers of languages that allow omission of the subject pronoun, relative to the total number of speakers of all languages whose grammatical rules are coded by Kashima and Kashima (1998).

instrument for acquiring information by talking to other people (the first-stage F-statistic is below 10). In this case we implement our specification by limited information maximum likelihood estimation, since the 2SLS estimator performs poorly with weak instruments. In column (2) we confirm the significant positive correlation between public education spending and social capital, now instrumented with Tabellini's (2008) language instrument. Column (4) confirms that the result still holds when we include geographic and demographic controls. Column (6) shows robustness to controlling for the overall size of government.[14]

2.2 Social Capital and Public Education Spending in the United States

The United States provides an ideal environment to study the relationship between social capital and government spending on education at the subnational level, because responsibility for public education rests overwhelmingly with state and local governments. The National Center for Education Statistics (2023) reports that in the school year 2019-20 state revenue sources accounted for 47% of the funding of public schools. Local sources represented another 45%. Only 8% of funding was from federal sources. This breakdown of funding across government levels has been approximately constant over recent decades.

On the other hand, measurement at the subnational level of interpersonal trust, and of acquiring information by talking to other people, is challenging. The best known and longest-running surveys, such as the General Social Survey or the American National Election Studies, are designed to be representative of the nation as a whole, but not of the population of any individual state. Therefore, they do not enable measuring social capital at the state level.

To overcome this measurement challenge, we rely on data from the Civic Engagement Supplement of the Current Population Survey, a representative survey of the population of each state. As in our cross-country analysis, we measure social capital at the state level by averaging responses to questions in all available survey waves. The CPS Civic Engagement Supplement was administered in November 2008–11 and 2013. It included questions that correspond quite closely to those in the World Values Survey that we exploited for our cross-country analysis.

We define *Trust* as a dummy variable that equals 1 if the respondent reports that they

[14] The IV estimates in Table 3 are larger than the OLS estimates in Table 2. This is a commonly observed pattern. Its occurrence can be explained by two standard factors. First, using instruments can alleviate the downward attenuation bias caused by measurement error. Second, the IV estimates identify a local average treatment effect that may be greater than the overall average treatment effect represented by the OLS estimates. This difference could arise because the influence of social capital on public education spending is particularly strong in countries where social capital is predicted by Tabellini's (2008) language instrument.

can trust most or all of the people in their neighborhood, and 0 if they report instead they can trust only some or none.[15] We define *Talking with People* as a dummy variable that equals 1 if the respondent reports that in a typical month over the past year they discussed politics with family and friends at least a few times a week, and 0 if no more than a few times a month.

Both questions in the CPS Civic Engagement Supplement are slightly narrower in scope than their World Values Survey equivalents. The measure of interpersonal trust focuses specifically on people in the respondent's neighborhood. The measure of acquiring information by talking to others focuses specifically on information about politics. In both cases, this narrower specific focus seems well suited to our interest in the social diffusion of information about state and local government performance.

Across the United States just like across countries, we find that both measures of social capital are strong and significant positive predictors of public education spending as a share of state output.[16] Figure 3 depicts the correlation of state and local government spending on education with interpersonal trust. Figure 4 with the share of survey respondents who frequently discuss politics with other people. Once again, these patterns remain significant when we add demographic and geographic controls: population, its breakdown by age groups, the share of African Americans, land area, and dummies for the nine Census Divisions. They are also robust to controlling for the output share of aggregate state and local government expenditures.

Table 4 reports summary statistics and Table 5 regression results for our cross-state analysis.[17] Not only the statistical but also the economic significance of the relationship between social capital and public education spending is strikingly similar across countries and across the United States. In the specification that includes all controls, an increase in social capital by one standard deviation is associated with an increase in public spending on education by approximately 0.3 standard deviations.[18]

Finally, we instrument the social capital of a state's residents by the average social capital in their ancestors' countries of origin.[19] Immigrants are shaped by their culture of origin and adapt to their new environment only gradually. At the same time, immigration flows

[15] The underlying question on interpersonal trust was asked only in 2011 and 2013.

[16] The correlation between the two measures across the fifty states is 37.9%.

[17] Data on government expenditures are from the Annual Survey of State and Local Government (1993–2020). State GDP is from the Bureau of Economic Analysis. All demographic and geographic controls are from the 2010 Population Census.

[18] The standardized coefficients are 0.351 when we measure social capital as interpersonal trust, and 0.253 when we measure it as talking about politics with other people.

[19] We are grateful to an anonymous referee for suggesting this instrument. On similar lines, previous studies have shown an effect of immigrants' countries of origins on living arrangements and female labor-force participation (Reimers 1985; Blau 1992; Giuliano 2007; Fernández and Fogli 2009).

as large as those experienced by the United States since colonial times shape the culture of immigrants' destinations. Accordingly, ancestral social capital significantly predicts a state's current social capital. It is a valid instrument if the distribution of ancestral origins across states is uncorrelated with unobserved determinants of public education spending.

We construct this variable using data from the 2020 Population Census, which represents an unprecedented effort to record the ancestry of U.S. residents. It surveys self-reported racial and ethnic identity in great detail, tabulating 30 detailed Hispanic origins and 264 non-Hispanic race groups (not counting over 1,200 native tribes and villages). Letting n_{so} denote the number of respondents in state s who report ancestry from foreign country o, we define our instrumental variable as $z_s = \sum_o x_o n_{so} / \sum_o n_{so}$, where x_o is either of our measures of social capital in country o from the World Values Survey, and summations are taken over all countries for which this measure is available.[20]

We report the results of this instrumental-variable specification in Table 6, with the first-stage regressions in columns (1), (3), and (5). Ancestral social capital is a weak instrument for a state's average social capital when the two are measured as information acquisition by talking to other people. Accordingly, we implement all second-stage regressions in panel B by limited information maximum likelihood estimation. Column (2) confirms that the positive correlation between public education spending and social capital remains significant when the latter is instrumented with ancestral social capital. The estimates become noisier when we include control variables in columns (4) and (6), losing significance when moreover the instrument is weak. Nonetheless, they remain consistent with the OLS results in Table 5.

3 Theoretical Model

The empirical evidence in Section 2 establishes a strong and robust pattern. Governments spend more on public education where social capital is higher. Motivated by this finding, in this section we present a theoretical model that explains why social capital causes greater investment in public education, and thereby permanently raises the growth path of the

[20] Census data unavoidably fall short of providing a full decomposition of the U.S. population by country of origin. Many respondents are unable or unwilling to trace their ancestry to any specific origin country. About a third identify with no detailed race group, but exclusively as "white" (76.3 million respondents) or "Black or African American" (36.5 million). Moreover, the Census tabulates how many respondents report each ancestry, but not how many ancestries each respondent reports—particularly because it is required by law to define race and Hispanic origin as separate concepts, surveyed through distinct questions. As a consequence, respondents reporting multiple ancestries are effectively overweighted. A final limitation is specific to our setting: WVS data on social capital are not available for all ancestries. They are missing for the third most common origin country, Ireland (38.6 million mentions to Britain's 58.6 and Germany's 45.0).

economy.

The structure of our economy follows the seminal model of stochastic growth with real business cycles (King, Plosser, and Rebelo 1988). Endogenous long-run growth is driven by the accumulation of physical and human capital, which is undertaken both by private agents and by the government. Private and public investments are imperfect substitutes, so aggregate output has decreasing returns in each but constant returns in both together (Barro 1990).

To this classic framework we add political agency frictions that endogenously determine the government's ability and incentives to invest in human capital. Heterogeneous politicians motivated by career concerns aim at delivering policy outcomes that signal their skill and thereby increase their chances of re-election (Alesina and Tabellini 2008). Policy outcomes vary in their visibility: some are immediately apparent to everyone; others however are "shrouded," namely understood only by a subset of better-informed voters (Mani and Mukand 2007; Glaeser and Ponzetto 2014).

Crucially, we assume that the social returns to public education are a shrouded policy outcome. This key assumption is supported by empirical evidence. The education literature confirms that the returns to public investment in education are high, but delayed and hard for citizens to assess in advance. They are highest for early-childhood interventions, whose fruits are the most delayed in time (Cunha and Heckman 2008; Chetty et al. 2011). Moreover, voters tend to pay little heed to education policies (Bursztyn 2016). Broad misperception of the returns to education is a key determinant of educational failure in developing countries (Jensen 2010; Banerjee and Duflo 2011).

Our theory is focused on the role of social capital in alleviating such misperception. Thus, our theoretical measure of social capital is the social diffusion of information about the true returns to government education expenditure. This measure captures analytically sociologists' original definition of social capital as the resources that individuals can draw upon thanks to their network of interpersonal relations (Bourdieu 1986; Coleman 1988). It also reflects the long-standing recognition that information is among the main resources obtained from social interactions (Granovetter 1973; Lin 2001; Durlauf and Fafchamps 2005). In particular, social interactions play a key role in the acquisition of political information (Cialdini 1984; Zaller 1992; Beck et al. 2002).

3.1 Capital Accumulation and Endogenous Growth

A closed economy is populated by a measure-one continuum of infinitely lived households with identical preferences for private consumption c_t and government-provided public services

g_t:

$$U_t = \sum_{s=0}^{\infty} \beta^t \mathbb{E}_t \left[(1-\gamma) \log c_{t+s} + \gamma \log g_{t+s} \right], \tag{1}$$

where $\beta \in (0,1)$ is the discount factor and $\gamma \in (0,1)$ the relative weight of public services in the utility function. The representative household supplies inelastically one unit of labor, and its dynamic budget constraint is:

$$a_{t+1} = R_t a_t + (1-\tau_t) w_t - c_t, \tag{2}$$

where a_t denotes the household's assets, R_t their gross return, w_t labor earnings, and $\tau_t \in (0,1)$ the tax rate on labor income.[21]

Firms have a Cobb-Douglas production technology and operate in perfectly competitive product and factor markets. Thus, production is represented by the neoclassical aggregate production function:

$$y_t = A h_t^{1-\alpha} k_t^{\alpha} \text{ for } \alpha \in (0,1), \tag{3}$$

where y_t is output, A is a productivity shifter, h_t is human capital and k_t is physical capital. Each household is endowed with a homogeneous amount h_t of human capital and thus earns labor earnings: $w_t = (1-\alpha) y_t$. Physical capital depreciates fully every period, so its return equals: $R_t = \alpha y_t / k_t$.[22]

Physical capital is produced by private investment, so the physical capital stock coincides with household assets: $a_t = k_t$ for all t. Since capital is not durable, the dynamic budget constraint of the private sector can be rewritten:

$$k_{t+1} = \left[1 - (1-\alpha) \tau_t \right] y_t - c_t. \tag{4}$$

Human capital is produced by government investment in public education.[23] The government levies a flat tax τ_t on labor income and finances two types of public expenditures under a balanced-budget constraint:

$$\tau_t (1-\alpha) y_t = x_t^g + x_t^h, \tag{5}$$

[21] Since labor supply is perfectly inelastic, labor taxes coincide with non-distortive lump-sum taxes.

[22] The canonical specification of a logarithmic utility function, a Cobb-Douglas production function and non-durable capital is necessary for a stochastic growth model to have an exact analytical solution (Long and Plosser 1983).

[23] We assume for simplicity that the private sector alone invests in physical capital and the government alone invests in human capital. Our results would be substantially unchanged if we assumed that future output is determined as a Cobb-Douglas function of four investments: private investment in physical capital, private investment in human capital, public investment in physical capital, and public investment in human capital.

where x_t^g denotes expenditures on public services and x_t^h expenditures on public investment in education. The two expenditures translate into provision of public services and accumulation of human capital according to the stochastic technology:

$$g_t = x_t^g \exp\left(\eta_t^g\right) \text{ and } h_{t+1} = x_t^h \exp\left(\eta_t^h\right). \tag{6}$$

Public-sector productivity $\left(\eta_t^g, \eta_t^h\right)$ represents the stochastic competence of the ruling government in providing each public good. Government competence is independent across the two types of expenditure, and it follows a first-order moving average process:

$$\eta_t^g = \varepsilon_t^g + \varepsilon_{t-1}^g \text{ and } \eta_t^h = \varepsilon_t^h + \varepsilon_{t-1}^h. \tag{7}$$

The innovations ε_t^g and ε_t^h are independent over time, across policies, and across politicians. They are drawn from common-knowledge invariant distributions that are symmetric around their mean $\mathbb{E}\varepsilon_t^g = \mathbb{E}\varepsilon_t^h = 0$. These distributions have variances $\text{Var}\left(\varepsilon_t^g\right) = \sigma_g^2$ and $\text{Var}\left(\varepsilon_t^h\right) = \sigma_h^2$, and finite supports $[-\hat{\varepsilon}_g, \hat{\varepsilon}_g]$ and $[-\hat{\varepsilon}_h, \hat{\varepsilon}_h]$ respectively.

The dynamics of competence shocks can intuitively represent a political party that consists of overlapping generations of politicians. In each period t, the government comprises a cohort of senior party leaders who are approaching retirement, and a cohort of rising young politicians who will take over the party leadership in the following period. The first cohort has productivity $\left(\varepsilon_{t-1}^g, \varepsilon_{t-1}^h\right)$ and the second $\left(\varepsilon_t^g, \varepsilon_t^h\right)$, so the aggregate productivity of the ruling party is $\left(\eta_t^g, \eta_t^h\right)$.

On the equilibrium path, stochastic government productivity reflects not only exogenous ability draws, but also the endogenous dynamics of electoral success. Thus, we enrich the basic model of real business cycles (King, Plosser and Rebelo 1988) by endogenizing the stochastic productivity that drives aggregate fluctuations.[24]

3.2 Social Capital and Political Agency

Government policies are set by politicians motivated by career concerns. They internalize the welfare of the representative household, out of benevolence or simply because each politician belongs to a representative household. In addition, however, they derive an ego rent $z > 0$ in every period in which they hold office. If an incumbent is defeated in an election, their

[24] Aside from being endogenous, stochastic investment productivity (η_t^h) is isomorphic to a stochastic productivity of private production ($\ln A_t$). Cobb-Douglas technology implies that all productivity shocks are Hicks neutral. Full depreciation implies that lagged shocks to capital accumulation are indistinguishable from current shocks to aggregate productivity. Thus, we abstain from considering stochastic shocks to private-sector productivity. They could be added without loss of tractability but they would not yield any additional insight.

probability of returning to power in the future is nil. As a consequence, the government budget is not allocated purely to maximize social welfare, but also to increase the likelihood the incumbent is re-elected.

Voters have no direct knowledge of the government budget allocation $\left(x_t^g, x_t^h\right)$ nor of the incumbent's productivity realizations ε_t^g and ε_t^h. They rationally infer them based on imperfect information about government performance, which is asymmetric across the two types of public expenditure. All citizen directly perceive the immediate utility benefits from public services (g_t). In contrast, public investment in human capital bears its fruits (h_{t+1}) only with a lag. Future returns to public education are correctly anticipated by some voters. Others remain unaware of them until they are realized after the election. Thus they cast their ballot based on rational expectations ($\mathbb{E}_t h_{t+1}$) rather than actual observation of policy outcomes (h_{t+1}).

Information about the true returns to public education spreads among voters according to the classic model of social diffusion (Bass 1969). Each citizen may independently learn the true returns to human-capital investment from sources such as campaigning politicians and the media. This external information acquisition takes place at a constant rate p over continuous time. In addition, citizens also acquire information through social interactions with one another. Such interactions take place at a constant rate q and match random pairs of citizens. If one of them is already informed, knowledge then spreads socially to the other.

As a result, the share θ of informed voters evolves over time according to the differential equation:

$$\theta' = (p + q\theta)(1 - \theta). \tag{8}$$

Integrating Equation (8), after a unit amount of time the share of informed agents rises from zero to an eventual level:

$$\theta(p, q) = \frac{1 - e^{-p-q}}{1 + (q/p)\, e^{-p-q}}. \tag{9}$$

Voter knowledge is intuitively increasing in both exogenous information acquisition ($\partial\theta/\partial p > 0$) and social connectedness ($\partial\theta/\partial q > 0$). We refer to the rate of social information diffusion (q) as social capital.[25]

Within each period t, events unfold according to the following timeline.

[25] Empirical evidence supports the view that social capital raises voter awareness of all government activity. For simplicity, we assume all voters are perfectly informed of the quality of current public services g_t, regardless of their level of social capital. This assumption does not materially affect our results. What matters is that the future returns to government investment in human capital are relatively more opaque than the immediate utility from public services. Even if voters were imperfectly informed about all dimensions of government activity, greater social capital would make them disproportionately more knowledgeable about the more shrouded dimension (Glaeser and Ponzetto 2014).

1. All agents observe the stocks of physical capital k_t and human capital h_t, output y_t, factor rewards R_t and w_t, as well as the government's past competence shocks ε_{t-1}^g and ε_{t-1}^h.

2. The government sets the tax rate τ_t, which all citizens observe.

3. Citizens choose consumption c_t and investment in physical capital k_{t+1}. Simultaneously, the government chooses expenditures x_t^g and x_t^h. No citizen observes directly either expenditure, though all know their sum.

4. The government's competence shocks ε_t^g and ε_t^h are realized, but they are not directly observable until the following period $t+1$. The provision of public services g_t and the accumulation of human capital h_{t+1} are determined as a consequence. All citizens observe the provision of public services g_t.

5. Over an amount of time normalized to unity, each citizen independently observes h_{t+1} with a learning rate $p > 0$. Over the same period, information-sharing encounters between random pairs of citizens take place with a social diffusion rate $q > 0$. When uninformed citizens have such a meeting with an informed citizen, they endogenously learn h_{t+1}.

6. An election is held, pitting the incumbent against a single challenger, randomly drawn from a continuum of potential office-holders whose ability is independently realized from the same distribution.

The electoral aggregation of voters' preferences and information includes an intensive margin of political support, following the probabilistic voting approach (Lindbeck and Weibull 1987; Persson and Tabellini 2000). Each voter's preferences consist of two independent elements.

First, citizens have preferences over future policy outcomes. A voter i rationally expects future utility $\mathbb{E}_t^i\left(U_{t+1}|I_t\right)$ if the incumbent wins re-election and $\mathbb{E}_t^i\left(U_{t+1}|C_t\right)$ if the challenger wins instead, where $\mathbb{E}_t^i$ denotes the expectation given i's information at time t . These policy preferences can be summarized by the difference $\Delta_t^i \equiv \mathbb{E}_t^i\left(U_{t+1}|I_t\right) - \mathbb{E}_t^i\left(U_{t+1}|C_t\right)$.

Second, voters are swayed by the candidates' non-policy characteristics, such as their personal likeability or the long-standing ideology of their party. These non-policy preferences can be disaggregated into two independent components: a common shock Ψ_t and an idiosyncratic shock ψ_t^i that is i.i.d. across voters. All voters costlessly vote for their preferred candidate. Voter i supports the incumbent if and only if $\Delta_t^i \geq \Psi_t + \psi_t^i$.

The distribution of both preference shocks (Ψ_t and ψ_t^i) is symmetric around zero, so non-policy tastes do not induce a systematic pro- or anti-incumbent bias. Moreover, their support is sufficiently wide, and that of the politicians' competence shocks ε_t^g and ε_t^h sufficiently narrow, that neither the outcome of the election nor any single voter's ballot is perfectly predictable on the basis of policy outcomes g_t and h_{t+1} alone. Finally, we assume that both Ψ_t and ψ_t^i are uniformly distributed, and denote by ϕ the uniform density of Ψ_t.

3.3 Solving for the Dynamic Equilibrium

The solution of our model describes the dynamic stochastic general equilibrium of the economy in terms of four functions. The welfare function and the policy rule for private households are standard. The additional political agency features of our model entail that the solution also includes a value function for incumbent politicians and the policy rule according to which they set taxes and choose public investment in education.

These political-economy functions are shaped by career concerns, as voters infer government competence from the provision of public services and the returns to human-capital investment. Given that ability follows a first-order moving average process, incumbents' performance during their latest term in office contains all available information about their future competence. We disregard the possibility of politicians developing a reputation for ignoring career concerns, and restrict our analysis to Markov perfect equilibria. The requirement of Markov perfection is not restrictive for economic decisions in our environment.

According to the sequence of events outlined above, agents make choices and inferences as follows.

1. The initial state of the economy is described by the vector:

$$s_t \equiv \left(k_t, h_t, \varepsilon_{t-1}^g, \varepsilon_{t-1}^h\right), \tag{10}$$

   which includes the capital stocks and the known inherited components of government competence. Output is determined according to the aggregate production function:

$$y_t = y\left(k_t, h_t\right) \equiv A h_t^{1-\alpha} k_t^{\alpha}. \tag{11}$$

   In equilibrium, the welfare of the representative household is defined by the function $V\left(s_t\right)$.

2. The government sets taxes according to the equilibrium rule:

$$\tau_t = T\left(s_t\right). \tag{12}$$

3. Citizens observe the tax rate τ_t and choose private investment in physical capital according to the equilibrium rule:

$$k_{t+1} = K(s_t, \tau_t). \tag{13}$$

Consumption is jointly determined by the private-sector budget constraint (Equation 4). At the same time, the government chooses public investment in education according to the equilibrium rule:

$$x_t^h = H(s_t, \tau_t). \tag{14}$$

Expenditure on public services is jointly determined by the public-sector budget constraint (Equation 5).

4. Public-good provision is realized according to its production technology (Equation 6) and the evolution of government competence (Equation 7).

5. The observation of the state s_t, taxes τ_t and public services g_t, jointly with rational expectations of the strategy $H(s_t, \tau_t)$, allows all voters to infer with certainty the incumbent's competence at providing public services:

$$\varepsilon^g(s_t, \tau_t, g_t) \equiv \log g_t - \log\left[\tau_t(1-\alpha)\, y(k_t, h_t) - H(s_t, \tau_t)\right] - \varepsilon_{t-1}^g. \tag{15}$$

A fraction $\theta(p, q)$ of informed voters also learn the true value h_{t+1}, and can likewise infer with certainty the incumbent's competence at providing public investment in education:

$$\varepsilon^h(s_t, \tau_t, h_{t+1}) \equiv \log h_{t+1} - \log H(s_t, \tau_t) - \varepsilon_{t-1}^h. \tag{16}$$

The remaining fraction $1 - \theta(p, q)$ of uninformed voters do not learn h_{t+1}, and therefore from their point of view ε_t^h remains an unknown realization from the common-knowledge distribution of ability.

6. The future capital stocks k_{t+1} and h_{t+1} are determined before the election and do not depend on its outcome. Policy preferences hinge on the comparison between the ability of the incumbent $\left(\varepsilon_t^g, \varepsilon_t^h\right)$ and that of the challenger, which we denote by $\left(\omega_t^g, \omega_t^h\right)$. Challengers have no track record in office, so the only information about their competence is that it is an independent draw from the common distribution of ability.

Informed voters have policy preferences:

$$\Delta_1(s_t, \tau_t, k_{t+1}, g_t, h_{t+1}) \equiv V\left(k_{t+1}, h_{t+1}, \varepsilon^g(s_t, \tau_t, g_t), \varepsilon^h(s_t, \tau_t, h_{t+1})\right) - \mathbb{E}_t V\left(k_{t+1}, h_{t+1}, \omega_t^g, \omega_t^h\right); \quad (17)$$

while uninformed voters have policy preferences:

$$\Delta_0(s_t, \tau_t, k_{t+1}, g_t) \equiv \mathbb{E}_t V\left(k_{t+1}, e^{\varepsilon_{t-1}^h + \varepsilon_t^h} H(\tau_t, s_t), \varepsilon^g(s_t, \tau_t, g_t), \varepsilon_t^h\right) - \mathbb{E}_t V\left(k_{t+1}, e^{\varepsilon_{t-1}^h + \varepsilon_t^h} H(\tau_t, s_t), \omega_t^g, \omega_t^h\right). \quad (18)$$

Given the independent realizations of the uniform idiosyncratic shocks ψ_t^i, the incumbent is re-elected if and only if the realization of the aggregate popularity shock Ψ_t is such that:

$$\Psi_t \leq \theta(p, q)\, \Delta_1(s_t, \tau_t, k_{t+1}, g_t, h_{t+1}) + [1 - \theta(p, q)]\, \Delta_0(s_t, \tau_t, k_{t+1}, g_t). \quad (19)$$

To simplify the exposition, we provide here a simplified intuitive description of the dynamic equilibrium. The complete formal definition is provided in the Appendix.

Definition 1 *A Markov-perfect dynamic equilibrium consists of a welfare function $V(s_t)$, an additional value $Z(s_t)$ of holding political office, a tax-setting rule $T(s_t)$, a public investment rule $H(s_t, \tau_t)$, and a private investment rule $K(s_t, \tau_t)$ such that:*

1. *The social welfare function V is defined recursively, given the policy rules T, K and H, and the equilibrium probability of the incumbent's re-election.*

2. *The additional value of political incumbency Z is defined recursively, given the equilibrium probability of the incumbent's re-election.*

3. *Labor-income taxes T and expenditure on public education H are chosen by the government to maximize its objective function $V + Z$, which includes both social welfare and the private value of re-election Z. The government rationally anticipates the private investment choice K as well as the probability of re-election.*

4. *Private investment K is chosen by the representative household to maximize welfare V. The household rationally anticipates the government investment choice H as well as the incumbent's probability of re-election.*

The first component of the dynamic equilibrium is the social welfare function, which is defined recursively taking into account the equilibrium policy rule. It is not simply defined by a Bellman equation because citizens choose their investment in physical capital to maximize their utility—which coincides with social welfare—but politicians instead choose taxation and investment in human capital with an eye to re-election. The outcome of the election enters the welfare function because it determines whether in period $t+1$ the government has the competence of the period-t incumbent $(\varepsilon_t^g, \varepsilon_t^h)$ or the challenger's (ω_t^g, ω_t^h).

The second equilibrium component is the additional value of political incumbency that distorts politicians' choices away from social welfare maximization. Its recursive definition is simple because all the variation is coming from the probability of re-election, which responds to equilibrium policy choices and to the realization of competence shocks.

The government's policy choices take into consideration both politicians' concern for welfare and their personal desire for re-election. The government first sets a tax rate, which determines the budget constraints of both the private and the public sector. This choice incorporates rational expectations of the investments, both public and private, that it will induce. Then the government allocates public spending taking into account the tax rate τ_t and the ensuing public-sector budget constraint.

At the same time, households choose consumption and savings to maximize welfare. At the time of this choice, agents observe the tax rate τ_t that determines the private-sector budget constraint. Both the politicians and the representative household have rational expectations over each other's simultaneous investment choice and over electoral outcomes.

Economic decisions are made by private agents and by the government based on the same information. When the household budget and the government budget are allocated, everybody knows the predetermined component of government productivity $\left(\varepsilon_{t-1}^g, \varepsilon_{t-1}^h\right)$, but nobody knows the period-t innovation $\left(\varepsilon_t^g, \varepsilon_t^h\right)$. As a result, the government has no private information to signal and its policy rule depends only on public information (s_t). Yet, policy-making crucially reflects the government's incentives to manipulate voters' information by "signal-jamming." If the government raised expenditure on one public good above the expected equilibrium amount, voters who observe the respective policy outcome would be surprised and mistakenly infer an ability innovation above its true level.

4 Theoretical Predictions

This section presents the solution of our model and characterizes analytically its equilibrium dynamics. We begin by solving the auxiliary problem of a welfare-maximizing social planner. Its solution provides a benchmark of first-best optimality to which we then compare outcomes

in the decentralized economy.

We show that imperfect political agency causes two distortions that create a short-sighted bias against investment in human capital. First, politicians allocate insufficient resources to education because its long-term returns are less apparent to voters than the immediate utility of public services. Second, voters are unable to select the politicians who are most productive at managing investment in public education because they lack awareness of the different productivity of education spending under different governments.

Our main result is that social capital reduces these distortions. Greater social diffusion of information reduces the gap in voter awareness between the short-term value of public services and the long-term returns to public education spending. As a consequence, both the amount and the productivity of government investment in human capital rise closer to their first-best levels.

Our theory thus provides an explanation for the positive causal impact of social capital on economic growth. The specific mechanism we study is precisely consistent with our motivating evidence in Section 2. We conclude this section by discussing more broadly how the predictions of our model find support in empirical evidence. In particular, we show that survey evidence from the U.S. confirms that voters with higher social capital are better informed about their politicians.

4.1 The Efficient Benchmark

Suppose a benevolent planner controls both private and public spending, as well as political turnover. Optimal choices must be made with the same timing as those of the decentralized economy: c_t, k_{t+1}, x_t^g and x_t^h are chosen on the basis of s_t alone, before the competence shocks ε_t^g and ε_t^h are realized. After the realization of these shocks, the planner chooses political turnover to maximize social welfare.

We provide here an intuitive description of the social optimum, whose formal definition is in the Appendix.

Definition 2 *The solution to the planner's problem consists of a welfare function $V^*(s_t)$, a private investment rule $K^*(s_t)$, public spending rules $G^*(s_t)$ and $H^*(s_t)$, and a re-election rule such that:*

1. *The social welfare function V^* satisfies the Bellman equation for the welfare maximization problem, and the allocation of output (K^*, G^*, H^*) is the associated optimal policy rule.*

2. The incumbent politician is re-elected if and only if

$$V\left(K^*\left(s_t\right), e^{\varepsilon_{t-1}^h+\varepsilon_t^h} H^*\left(s_t\right), \varepsilon_t^g, \varepsilon_t^h\right) \geq \mathbb{E}_t V\left(K^*\left(s_t\right), e^{\varepsilon_{t-1}^h+\varepsilon_t^h} H^*\left(s_t\right), \omega_t^g, \omega_t^h\right).$$

Unlike the dynamic equilibrium of the decentralized economy characterized in Definition 1, the planner's problem is defined by a simple Bellman equation. All distortions in our model arise from imperfections in political agency. Politicians' objectives do not coincide with the voters' and the benevolent planner's because they also include a concern for getting re-elected ($z > 0$). This private concern is irrelevant for welfare maximization, both because the incumbent is a measure-zero atomistic agent, and because in any case some ruling politician enjoys the value of office z.[26]

The planner's problem admits a closed-form analytical solution.

Proposition 1 *The solution to the planner's problem is characterized by:*

1. The social welfare function:

$$V^*\left(s_t\right) = \frac{1}{1-\beta}\left\{\begin{array}{c}(1-\beta)(1-\gamma)\log\left[(1-\beta)(1-\gamma)\right] + \alpha\beta\log\left(\alpha\beta\right) \\ +(1-\beta)\gamma\log\left[(1-\beta)\gamma\right] + (1-\alpha)\beta\log\left[(1-\alpha)\beta\right] \\ +\log A + \alpha\log k_t + (1-\alpha)\log h_t \\ +(1-\beta)\gamma\varepsilon_{t-1}^g + \beta(1-\alpha)\varepsilon_{t-1}^h\end{array}\right\} \\ +\beta\mathbb{E}_t\left[\gamma\varepsilon_t^g + \frac{\beta}{1-\beta}(1-\alpha)\varepsilon_t^h \geq 0\right].$$

2. The allocation of output:

$$\frac{K^*\left(s_t\right)}{y\left(k_t, h_t\right)} = \alpha\beta,\ \frac{G^*\left(s_t\right)}{y\left(k_t, h_t\right)} = (1-\beta)\gamma,\ \textit{and}\ \frac{H^*\left(s_t\right)}{y\left(k_t, h_t\right)} = (1-\alpha)\beta.$$

3. Re-election of the incumbent politician if and only if

$$\gamma\varepsilon_t^g + \frac{\beta}{1-\beta}(1-\alpha)\varepsilon_t^h \geq 0.$$

[26] Moreover, our definition of the social optimum treats as mere flukes of electoral campaigning the non-policy factors that randomly sway voters towards or against the incumbent (Ψ_t and ψ_t^i). We assume that voters are influenced by transitory popularity shocks that do not truly translate into post-election welfare gains. Thus, electoral aggregation of preferences is another source of political frictions. Even fully informed voters fail to follow the welfare planner's optimal rule for the selection of politicians, which is based on inferred competence only. Alternatively, we could assume that the voters' taste shocks reflect a meaningful component of their welfare after the election. Then the outcome of the election would be welfare-maximizing if and only if voters are fully informed ($\theta(p,q) = 1$). Our results would be qualitatively unaffected, and the only quantitative difference would be in the distribution of the government's optimal competence η_t^*.

The model is solved by the educated guess of the tractable separable form:

$$V(s_t) = v_0 + v_k \log k_t + v_h \log h_t + v_\varepsilon^g \varepsilon_{t-1}^g + v_\varepsilon^h \varepsilon_{t-1}^h. \tag{20}$$

The invariant optimal allocation of output is a standard feature of analytically tractable real business cycle models. With Cobb-Douglas technology and preferences, all types of consumption and investment have constant budget shares. Consumption is optimized when the ratio of expenditure on private consumption and public services equals the ratio of their shares in the household utility function ($c_t/x_t^g = \gamma/(1-\gamma)$). Investment is optimized when the ratio of investments in private capital formation and public education equals the ratio of the shares of physical and human capital in the aggregate production function ($k_{t+1}/x_t^h = \alpha/(1-\alpha)$). With full capital depreciation every period, the allocation of output between consumption and investment is optimized when their ratio equals the ratio of the discounted weights of the current period and the infinite future in the social welfare function ($(c_t + x_t^g)/\left(k_{t+1} + x_t^h\right) = (1-\beta)/\beta$). All in all, output is optimally allocated to constant shares $(1-\beta)(1-\gamma)$ for private consumption, $(1-\beta)\gamma$ for government expenditure on public services, $\alpha\beta$ for private investment in physical capital, and $(1-\alpha)\beta$ for public investment in education.

While stochastic productivity is exogenous in the classic real business cycle model, the political dimension of our economy makes it endogenous to government turnover. The benevolent planner can optimally replace under-performing politicians and retain successful ones. This decision is independent of the initial state of the economy (s_t). It is determined exclusively by the realized competence innovations (ε_t^g and ε_t^h). The weights on the two orthogonal shocks in the welfare-maximizing retention rule are shaped by the same considerations outlined above for the allocation of output. Government productivity in the provision of public services matters for the utility flow next period, in proportion to the share of public services in the utility function (γ). Government productivity in education investments matters for capital accumulation next period—and through it for output for the infinite future starting one more period ahead (with a present value $\beta/(1-\beta)$)—in proportion to the share of human capital in the production function ($1-\alpha$).

Intuitively, the same weights appear also in the social welfare function that solves the planner's Bellman equation. Since the production technology gives rise to an AK model of endogenous growth, both exogenous productivity (A) and the capital stock have fully persistent effects, weighted by $1/(1-\beta)$. The relative weights of the two types of capital are naturally their shares in the production function (α for physical capital and $1-\alpha$ for human capital). The predetermined shock to the productivity of government expenditure on

public services (ε_{t-1}^{g}) has a purely transient impact whose weight equals the utility share of public services (γ). The predetermined shock to the productivity of government investment in education (ε_{t-1}^{h}) has a delayed but fully predictable effect on the future stock of human capital, whose impact on social welfare is fully persistent.

The final component of the value function highlights the welfare benefits of optimal political turnover. The benevolent planner anticipates the revelation of the competence innovations (ε_{t}^{g} and ε_{t}^{h}) by the end of the period. If they prove to be low, it is optimal to replace the incumbent with a fresh challenger whose ability is a random draw with mean zero on both dimensions. However, when incumbents turn out to be endowed with persistent high ability, welfare is maximized by retaining them and thereby ensuring that the following period's predetermined productivity is above average. The precise value of the optimal selection rule is given by the partial expectation of the combined welfare effect of the two skills when their aggregate is positive.[27]

We can complete the description of the first best by characterizing the growth path of the economy under the planner's solution.

Corollary 1 *The solution to the planner's problem defines a stochastic balanced growth path. The growth rate is*

$$\log y_{t+1} - \log y_t = \alpha \log \alpha + (1-\alpha) \log (1-\alpha) + \log A + \log \beta + (1-\alpha)\, \eta_t^*.$$

The optimal competence of the ruling government is

$$\eta_t^* = \left(\varepsilon_{t-1}^{h} + \varepsilon_{t}^{h}\right) \chi^* \left(\varepsilon_{t-1}^{g}, \varepsilon_{t-1}^{h}\right) + \left(\omega_{t-1}^{h} + \omega_{t}^{h}\right) \left[1 - \chi^* \left(\varepsilon_{t-1}^{g}, \varepsilon_{t-1}^{h}\right)\right],$$

where $\chi^* \left(\varepsilon_{t-1}^{g}, \varepsilon_{t-1}^{h}\right)$ *is a dummy for re-election according to the optimal rule from Proposition 1, which implies that* $\mathbb{E}\eta_t^* > 0$.

For any initial level of output $y_0 > 0$, the economy reaches immediately a stochastic balanced growth path. The average growth rate naturally reflects total factor productivity (A) and patience (β), which raises the saving rate. In addition, government efficiency in providing public investment (η_t^*) is the stochastic process driving randomness in growth. Optimal re-election implies, as we have just seen, a positive filtering of persistent productivity shocks that endogenously raises trend growth ($\mathbb{E}\eta_t^* > 0$).

[27] We denote the partial expectation by $\mathbb{E}\left[X \geq 0\right] \equiv \int_0^\infty X dF\left(X\right)$.

4.2 The Equilibrium Growth Path

The dynamic equilibrium of our decentralized economy, as presented in Definition 1, is more complicated than the planner's problem as a consequence of political-economy distortions. Nonetheless, our model retains a tractable analytical solution.

Proposition 2 *The equilibrium effect of social capital q on public investment in education and government expenditure on public services is summarized by a monotone decreasing function $\zeta(q)$ such that $(1-\alpha)\beta > \zeta(0) > \lim_{q\to\infty}\zeta(q) = 0$.*

The unique Markov-perfect dynamic equilibrium is characterized by:

1. *The social welfare function:*

$$V(s_t) = \frac{1}{1-\beta}\left\{\begin{array}{c}(1-\beta)(1-\gamma)\log[(1-\beta)(1-\gamma)] + \alpha\beta\log(\alpha\beta) \\ +(1-\beta)\gamma\log[(1-\beta)\gamma+\zeta(q)] + (1-\alpha)\beta\log[(1-\alpha)\beta-\zeta(q)] \\ +\log A + \alpha\log k_t + (1-\alpha)\log h_t \\ +(1-\beta)\gamma\varepsilon^g_{t-1} + \beta(1-\alpha)\varepsilon^h_{t-1}\end{array}\right\} + \beta\phi\left\{(\gamma\sigma_g)^2 + \left[\frac{(1-\alpha)\beta}{1-\beta}\sigma_h\right]^2\theta(p,q)\right\},$$

   which is monotone increasing in social capital ($\partial V/\partial q > 0$).

2. *The additional value of political incumbency:*

$$Z(s_t) = \frac{2}{2-\beta}z.$$

3. *The policy rule for taxation:*

$$T(s_t) = \frac{(1-\alpha)\beta + (1-\beta)\gamma}{1-\alpha}.$$

4. *The policy rule for public investment in human capital:*

$$H(s_t,\tau_t) = \frac{(1-\alpha)\beta - \zeta(q)}{(1-\alpha)\beta + (1-\beta)\gamma}(1-\alpha)\tau_t y(k_t,h_t),$$

   such that the output shares of public investment in human capital and government expenditure on public services are:

$$\frac{x^h_t}{y_t} = \beta(1-\alpha) - \zeta(q) \;\; \textit{and} \;\; \frac{x^g_t}{y_t} = (1-\beta)\gamma + \zeta(q).$$

5. *The households' rule for private investment in physical capital:*

$$K\left(s_t, \tau_t\right) = \frac{\alpha\beta}{\alpha\beta + (1-\beta)(1-\gamma)} \left[1 - (1-\alpha)\tau_t\right] y\left(k_t, h_t\right),$$

such that the output shares of private investment in physical capital and private consumption are:

$$\frac{k_{t+1}}{y_t} = \beta\alpha \text{ and } \frac{c_t}{y_t} = (1-\beta)(1-\gamma).$$

Like the first best, the dynamic equilibrium can be characterized by guessing that the value function has the form given by Equation (20). The impact of political-economy distortions is reflected in the coefficients of the welfare function, but it does not alter the overall functional form.

A second educated guess concerns the value of incumbency in the political equilibrium, which is a constant independent of the state of the economy s_t. This is an intuitive property of the model of political career concerns. It follows from the symmetry of the ruling politicians' and the voters' information when policy choices are made. Incumbents have no private information to signal, and they cannot fool rational voters in equilibrium. Their re-election then depends exclusively on the realizations of the shocks ε_t^g, ε_t^h, and Ψ_t. Since their distribution is invariant, so is the probability of re-election and hence the value of holding office.

The exact solution for the value of incumbency $Z\left(s_t\right)$ highlights the absence of any incumbency bias. In equilibrium, each candidate has an equal ex-ante likelihood of winning each election. Thus, the expected net present value of office-holding is discounted both for a pure time preference β and for a constant hazard rate $1/2$ of losing re-election and thus terminating the otherwise infinite stream of benefits z.

The differences between the equilibrium welfare function $V\left(s_t\right)$ from Proposition 2 and the first-best welfare function $V^*\left(s_t\right)$ from Proposition 1 reflect the two distortions that arise from the asymmetric visibility of immediate public-service provision and delayed returns to human-capital investment. Voters cannot reward public investment in education if they have failed to learn of its delayed returns. This entails both a distortion in politicians' incentives to invest in human capital or to provide public services, and a distortion in the selection of politicians based on their productivity at providing either public good.

The first distortion translates into a suboptimal allocation of output. In equilibrium as in the first best, the output shares of private consumption, private investment in physical capital, public investment in human capital, and government expenditure on public services are all constant and independent of the state of the economy. However, politicians' incentives

are skewed towards the provision of immediately visible public services and against public investment in education, whose returns are delayed and shrouded.

Intuitively, if the government deviated from equilibrium policy by lowering expenditure on education and raising expenditure on public services, its popularity among voters would increase. All voters would observe surprisingly high provision of public services (g_t) and would accordingly be fooled into inferring greater than actual competence at providing them (ε_t^g). Conversely, only a subset of informed voters would also observe surprisingly low provision of human-capital investment (h_{t+1}) and accordingly infer lower than actual education-specific competence (ε_t^h).

In a rational expectations equilibrium, the temptation to surprise voters is eliminated only because government education spending is permanently too low a share of output ($x_t^h/y_t < \beta(1-\alpha)$). Populist expenditure on current public services is instead too high ($x_t^g/y_t > (1-\beta)\gamma$). This misallocation permanently shifts down welfare, as shown in the second line of the exact solution for $V(s_t)$.

The second distortion caused by imperfect voter knowledge of the returns to public education expenditure reduces its productivity by worsening the selection of politicians. In principle, voters are keen on re-electing incumbents whose competence at providing all types of public goods is high. In practice, however, they cannot reward productivity in managing human-capital investment if they have failed to notice it.

Rational expectations allow citizens to anticipate exactly the equilibrium allocation of government expenditure. Thus, the direct observation of public-service provision (g_t) enables all voters to infer with certainty the true realization of the innovation ε_t^g. Knowledge of the returns to public investment (h_{t+1}) likewise yields perfect inference about the realization of ε_t^h. However, this knowledge belongs only to a subset of the electorate.

In equilibrium, as in the first best, the incumbent's re-election is independent of the initial state of the economy (s_t) and determined exclusively by the realized competence innovations (ε_t^g and ε_t^h). However, the importance of the latter is sub-optimally weighted by its visibility $\theta(p,q)$, so that re-election occurs if and only if:

$$\Psi_t \leq \gamma\varepsilon_t^g + \theta(p,q)\frac{(1-\alpha)\beta}{1-\beta}\varepsilon_t^h. \tag{21}$$

In a sense, lack of information makes citizens more cynical about politicians' competence at providing public education. Uninformed voters are rationally disillusioned about the differences between rival candidates, whose competence in managing public education they perceive as identical. Thus, their voting decision is swayed instead by random popularity shocks that are pure noise.

By improving the social diffusion of information about the true returns to public education investment, higher social capital alleviates both distortions. Proposition 2 captures its benefits through two monotone functions. The monotone decreasing function $\zeta(q)$ summarizes the effect of social capital on politicians' incentives. The function $\theta(p,q)$, which is monotone increasing in q, describes the share of informed voters and captures the effect of social capital on politicians' selection.

When voters share information more intensely, the visibility of government services and education investment becomes less asymmetric. Therefore, political incentives are less skewed towards the provision of crowd-pleasing public services. In response, public investment x_t^h rises while spending on immediate public consumption x_t^g falls ($\partial\zeta/\partial q < 0$). The political equilibrium moves closer to the optimum.[28]

At the same time, higher social capital implies that more voters reach the election with a full understanding of government competence. As a consequence, elections become a more effective screening mechanism. The value of social capital as a driver of the selection of better politicians is captured by the last term of the welfare function $V(s_t)$. Intuitively, screening for high ability in the provision of public investment is more valuable the more heterogeneous the skill distribution ($\partial V/\partial\sigma_h > 0$). In turn, this raises the welfare benefits of social capital ($\partial^2 V/\partial q\partial\sigma_h > 0$).[29]

The characterization of the dynamic equilibrium in Proposition 2 is completed by two elements that are not directly affected by political-agency considerations. The first is the government's choice of a tax rate ($T(s_t)$). The second is the representative household's choice of private investment in physical capital ($K(s_t,\tau_t)$).

Taxation is not directly affected by political career concerns. It does not signal competence. It does not change the inference of competence from the observed realization of public-good provision, conditional on the taxes that all voters pay and thus correctly perceive. Thus it provides no way of improving the incumbent's prospects of re-election. As a result, it is set at the welfare-maximizing level.[30]

In equilibrium, the tax rate (τ_t) and the overall size of government ($\left(x_t^g + x_t^h\right)/y_t$), as well as the output shares of private consumption (c_t/y_t) and private investment in physical capital

[28] However, the equilibrium allocation of output does not reach the optimum for any finite level of social capital. Only in the limit as the social diffusion of information become perfect—so all citizens learn in advance the true returns to public education investment—do the government's budget choices become undistorted ($\lim_{q\to\infty}\zeta(q) = 0$).

[29] Comparing $V(s_t)$ and $V^*(s_t)$ also shows that first-best electoral screening is not attained even with perfectly informed voters ($\lim_{q\to\infty} V(s_t) \neq V^*(s_t)$). Voters remain subject to random shocks Ψ_t such that even the worst incumbent stands a chance of winning the election and the best of losing it on a wave of unpredictable popularity, independent of competence.

[30] In our model, politicians do not have ideological preferences for raising or lowering taxes, nor do they intrinsically prefer overseeing a larger or smaller budget.

(k_{t+1}/y_t), are not only welfare-maximizing conditional on the distorted allocation of the government budget. They are also invariant at their first-best levels described by Proposition 1. The reason for this invariance is the log-linear structure of preferences and technology, which implies unit elasticity of substitution between private and public investment. As a consequence, the political-economy distortion to the amount of public investment does not propagate to private-sector decisions.[31]

The same two distortions that drive a wedge between equilibrium welfare ($V(s_t)$) in Proposition 2 and the first best ($V^*(s_t)$) in Proposition 1 also entail a distorted growth path for the economy in the dynamic equilibrium with imperfect political agency.

Proposition 3 *The economy follows a stochastic balanced growth path. The growth rate is*

$$\log y_{t+1} - \log y_t = \alpha \log \alpha + (1-\alpha) \log \left[1 - \alpha - \frac{\zeta(q)}{\beta} \right] + \log A + \log \beta + (1-\alpha)\, \hat{\eta}_t^h.$$

The equilibrium competence of the ruling government is

$$\hat{\eta}_t^h = \left(\varepsilon_{t-1}^h + \varepsilon_t^h \right) \chi \left(\varepsilon_{t-1}^g, \varepsilon_{t-1}^h, \Psi_t \right) + \left(\omega_{t-1}^h + \omega_t^h \right) \left[1 - \chi \left(\varepsilon_{t-1}^g, \varepsilon_{t-1}^h, \Psi_t \right) \right],$$

where $\chi \left(\varepsilon_{t-1}^g, \varepsilon_{t-1}^h, \Psi_t \right)$ is a dummy for re-election according to the equilibrium rule from Equation (21), which implies that $\mathbb{E}\hat{\eta}_t^h > 0$.

Higher social capital q increases the growth rate of output in the sense of first-order stochastic dominance. It also reduces the variance of the output growth rate.

In equilibrium, as in the first best, the economy reaches immediately a stochastic balanced growth path. However, a comparison of Proposition 3 with Corollary 1 establishes that the growth rate lags systematically behind the first best, and is the farther from it the lower the level of social capital.

As shown by Proposition 2, voters' lack of information distorts both politicians' incentives and their selection. It reduces below their optimal levels both the amount of public investment in human capital and the equilibrium productivity of government spending on education. The greater social diffusion of information that results from higher social capital improves both the allocation of output and electoral screening. Each of these channels

[31] Assuming an elasticity of substitution above unity could be more realistic. Besley and Persson's (2011) analysis of the origins of state capacity shows that fiscal capacity goes hand in hand with cohesive political institutions that promote the common interest. This finding suggests that equilibrium demand for the public sector is effectively elastic: the size of government expands when the government more efficiently pursues public welfare. Qualitatively, this alternative assumption would strengthen our result that the share of output devoted to public investment rises with social capital. Quantitatively, however, it would preclude an analytical solution of the model, as is well known from the real business cycle literature.

induces an upward shift in trend growth.

Proposition 3 concludes by establishing an intuitive effect of better electoral screening on the volatility of output. When more voters are aware of the returns to public education investment, politicians who are less effective at providing it are more likely to be replaced. This selection essentially acts as a truncation of the left tail of the distribution of ability. As a consequence, the variance of the growth rate, which coincides with the variance of the government's investment productivity shock, tends to decline unless the distribution of innovation is strongly positively skewed.

A positive skew would counteract the decline in variance, because higher social capital induces greater retention of incumbents with ability in the right tail. However, the negative effect prevails even for a modest positive skew, and a fortiori under our standard assumption of a symmetric distribution of innovations. Therefore, we should expect higher levels of social capital and the ensuing better monitoring of politicians to lower the volatility of output growth as well as increasing its average.

4.3 Empirical Support

Not only does our model provide a new theoretical explanation for the empirical finding that social capital has a significant impact on economic growth. It also predicts a precise chain of causation from social capital to political and economic outcomes. Greater social capital causes more widespread voter knowledge of government policy and its effectiveness. In turn, better voter information improves both the selection of politicians and their incentives to invest in public education. The resulting increase in government education spending towards its first-best level raises the average growth rate of the economy, and at the same time reduces its volatility. We conclude this section by discussing the empirical evidence, both pre-existing and novel, that supports the specific steps in this causal mechanism.

4.3.1 Social Capital and Political Knowledge across Voters

First, we provide new evidence that in U.S. data, as in our theory, higher social capital predicts greater voter knowledge. We rely on the American National Election Studies, 1964–2020. This dataset contains well established measures of both social capital and voter information.[32]

Just as in our cross-country analysis in Section 2.1, we define *Trust* as a dummy variable that equals 1 if the respondent reports that "most people can be trusted" and 0 if they report

[32]The ANES survey began in 1948, but questions about social capital were not asked until 1964.

instead that "you can't be too careful in dealing with people."[33] Just as in our cross-state analysis in Section 2.2, we define *Talking with People* as a dummy variable that equals 1 if the respondent reports that in the last week they discussed politics with family and friends, and 0 if they did not.

We begin by studying the relationship between our two measures of social capital and two straightforward measures of voter information. The first, *Name Recall*, is a dummy variable that equals 1 if the respondent could recall the name of any candidate running in the U.S. House race in their district. The second, *Name Recognition*, is a dummy variable that equals 1 if the respondent could identify the incumbent from a list of major party candidates for the U.S. House in their district.

Following Snyder and Strömberg (2010), we also examine whether social capital correlates with respondents' ability to rate their U.S. representative. This ability is an indicator of both voter information and political accountability, since being aware of a politician's stance is a necessary condition for holding them accountable. ANES respondents were asked to place their House representative on a seven-point ideological scale. We code the dummy variable *Ideological Rating* as 1 if the respondent provided a rating and 0 if they did not, or failed to recognize the candidate's name. Respondents were also asked to rate their feelings towards the incumbent on a "feeling thermometer" scale from 0 to 100. The dummy variable *Thermometer Provided* equals 1 if such a rating was provided and 0 if it was not, or the respondent did not recognize the candidate's name. Finally, we code the dummy variable *Preferences Provided* as 1 if the respondent mentioned at least one thing they liked or disliked about the incumbent U.S. representative in their district, and 0 if they mentioned nothing in particular, or reported they did not know anything about the candidate.[34]

Table 6 summarizes our ANES variables. We include as controls dummy variables for educational attainment, with high school graduates without a bachelor's degree as the reference category; for gender, with females as the reference category; and for race and ethnicity, with the reference category comprising respondents who are neither white, Black, nor Hispanic. Furthermore, all our regressions include fixed effects for age deciles, for survey year and for state of residence.[35]

[33] The formulation of the ANES question on generalized trust changed after 2008 to: "Generally speaking, how often can you trust other people?" We then code *Trust* as 1 if the respondent answers "most of the time" or "always" and 0 if they respond "about half the time," "once in a while" or "never."

[34] The ANES questionnaire asks first for name recall, without mentioning the candidates' names. Then it asks for a thermometer rating, listing the candidates' names without disclosing their identity. Then it asks for a list of itemized likes and dislikes, disclosing these are the names of the Democratic and Republican candidates, respectively. Then it asks for recognition of the incumbent, if any. Finally it asks for an ideological rating of each candidate, still without disclosing their incumbency status.

[35] We also cluster standard errors by state. Our results are substantially unchanged if instead we cluster—and define fixed effects—by congressional district.

Tables 7 and 8 present our regression results. We report the coefficients for each multivariate correlation both without controlling for education and conditional on controls for educational attainment. Since education need not be predetermined with respect to social capital, the coefficients may be biased, typically downward.[36] Both our measures of social capital are positively correlated with all measures of voters' information and their ability to rate politicians.[37] The relationship is also economically significant. For instance, including all controls, an increase in social capital by one standard deviation is associated with an increase in the likelihood of recognizing the incumbent representative by approximately 0.1 standard deviations.[38] These empirical findings align with our theory and bear out the predicted connection between social capital, the interpersonal diffusion of political information, and citizens' awareness of government performance.

4.3.2 Social Capital, Voter Information and Government Incentives

The second link in our theoretical mechanism is that greater voter knowledge translates into better incentives for ruling politicians. In particular, it alleviates a myopic bias leading to under-provision of government investment in human capital. This second prediction of our model finds empirical support in recent findings on the political economy of education expenditure in developing countries.

A growing consensus in the literature recognizes that suboptimal investment in public education stems not only from supply-side problems such as government inability to fund and staff effective schools, but also from demand-side failures. Citizens routinely misunderstand what education can and should achieve. They misperceive the returns to schooling and signally underestimate the returns to primary education. Such misperception induces costly distortions in their demand for education (Jensen 2010; Banerjee and Duflo 2011; Bursztyn 2016).

Better information helps rectify these distortions at the individual level (Jensen 2010). In the aggregate, more informed voters hold local governments more accountable and ensure that government education expenditure is higher, leading to more effective public schools (Reinikka and Svensson 2004, 2005). Conversely, where voters are uninformed, evidence from Africa shows that central-government grants earmarked for primary schooling are overwhelmingly diverted to other uses by local officials (Reinikka and Svensson, 2004).[39]

[36] Our results remain virtually unchanged when we do not control for any predetermined variables, and still retain statistical significance at the 1 percent level.

[37] The correlation between the two measures themselves across ANES survey respondents is 12.4%.

[38] The standardized coefficients are 0.092 when we measure social capital as interpersonal trust, and 0.138 when we measure it as talking about politics with other people. Across all ten specifications, the average standardized coefficient is 0.098.

[39] Empirically, it is unclear if the captured transfers are reallocated to other government spending programs

Reinikka and Svensson (2004) show that the under-provision of public investment in education is mitigated in areas with a higher socioeconomic status, which is broadly consistent with the role of social capital established in our model. On the other hand, Reinikka and Svensson (2005) focus on newspaper readership as a source of voters' information. The role of the media in increasing accountability and improving policy outcomes is also well-documented beyond education policy. It extends to government interventions that range from disaster relief (Besley and Burgess 2002; Eisensee and Strömberg 2007) to trade policy (Ponzetto, Petrova, and Enikolopov 2020), as well as the personal effort of individual politicians (Snyder and Strömberg 2010).

Our theoretical framework explicitly accounts for these empirical findings: exogenous individual information acquisition from outside the social network raises education spending ($\partial\zeta/\partial p < 0$). However, our model crucially highlights that social capital is always another determinant of political accountability and human-capital investment. For any rate of external information acquisition, higher social diffusion of information improves voter knowledge and the allocation of public expenditure ($\partial\theta/\partial q > 0 > \partial\zeta/\partial q$ for all $p < \infty$).[40]

This specific connection between social capital and expenditure on public education is borne out by our motivating evidence in Section 2. It is also supported by historical evidence. Social capital was a key driver of the rapid rise of the public high school in the United Stated between 1910 and 1940 (Goldin and Katz 1999). More recently, the introduction of village elections in China brought larger increases in the provision of local public goods—including education—in communities with greater social capital (Martinez-Bravo et al. 2017).

4.3.3 Social Capital, Voter Information and Politicians' Selection

Finally, our model predicts that social capital, through its positive effect on voter information, improves not only the incentives but also the selection of political office-holders. This prediction too is supported by existing empirical studies.

Both better information (Ferraz and Finan 2008) and greater social capital (Nannicini et al. 2013) make voters better at screening out corrupt politicians. Beyond such cases of outright misbehavior, the quality and efficiency of incumbent politicians is hard to measure objectively. In spite of this caveat, the evidence bears out at least suggestively the predicted

that local politicians find more popular. It may be more likely that bureaucrats and politicians illegitimately appropriate them. Theoretically, it would be straightforward to extend our model to include a third category of government spending that only incumbent politicians benefit from. Then better monitoring by voters with higher social capital would also reduce political rent extraction, implying an even higher effect on public investment in education and on economic growth.

[40] Moreover, Putnam (1993) argues that newspaper readership is itself a proxy for social capital, on the grounds that social capital promotes civic engagement and leads individuals to pay closer attention to events in their community, and to politics in particular.

link of both information (Banerjee et al. 2011) and social capital (Lockwood et al. 2021) with voters' ability to select politicians who are more qualified and who manage better the provision of local public goods.

Testing more specifically whether social capital and voter information raise not only the amount but also the productivity of government investment in human capital, as our model predicts, would require a reliable measure of the efficiency of public schooling under different governments—e.g., in different gubernatorial terms in the United States.[41] To the best of our knowledge, such an efficiency measure is not available. For instance, Reinikka and Svensson (2005) show that voter information raises both school funding and school performance, but they cannot disentangle whether the improvement in performance is wholly due to the increase in funding or reflects increased productivity too.

However, cross-country evidence supports a distinctive implication of our theory that follows precisely from the predicted positive impact of social capital on the selection of more productive politicians. Better government incentives lead to a sustained increase in public education spending and consequently in the average rate of economic growth. Better incentives, though, have no effect on volatility. On the other hand, in our model higher social capital also ensures that voters more reliably replace governments whose productivity at managing public education proves lackluster. As we established in Proposition 3, such improved screening results not only in a further increase in the average growth rate but also in a reduction in economic volatility. In line with this prediction, the data exhibit a negative cross-country correlation between social capital and the standard deviation of the growth rate of real GDP per capita (Sangnier 2013).

5 Conclusion

This paper has proposed and analyzed a precise mechanism through which social capital contributes to economic growth: by fostering greater and more productive public investment in education. We have formalized this novel argument through a dynamic stochastic general equilibrium model in which both long-run growth and short-run fluctuations are determined by the endogenous budget choices and abilities of elected governments.

Higher social capital means greater opportunities to acquire information through interpersonal relationships. We have proved it consequently mitigates a short-termist bias in

[41] We cannot test our prediction of improved political selection based on expenditure data only. Our theory predicts that greater social capital helps voters select politicians who are more efficient at managing public education, but not politicians who spend more on public education. As established in Proposition 2, the amount of education spending is independent of the ruling government's identity, which determines its productivity instead.

political agency, which hinders public investment in human capital and favors instead government expenditures whose benefits are more immediate but less lasting. As a result, social capital improves government incentives and induces an increase in education spending. At the same time it improves politicians' selection, so average government productivity at managing public education rises, while its variance falls. Through these twin improvements in political agency social capital increases long-run economic growth and dampens short-run economic volatility.

The theoretical predictions of our model are borne out in the data. We have presented novel evidence that both countries and U.S. states with higher levels of social capital allocate a larger fraction of their output to public education. We have also shown that U.S. citizens with higher social capital are better informed about their elected representatives. Other empirical studies confirm that social capital is positively associated with political accountability and public-good provision (Nannicini et al. 2013; Martinez-Bravo et al. 2017; Lockwood et al. 2021). It is not only positively associated with average output growth, but also negatively associated with is variance (Sangnier 2013).

Both theory and evidence thus support the view that public education is a key channel through which social capital promotes economic development. Nonetheless, our analysis is just one early step in the study of the exact mechanisms that connect social capital to growth.

We have shown how the social diffusion of information improves the incentives and selection of politicians, shifting their focus and their skill set towards growth-promoting policies. Human-capital investment is arguably the most important, but social capital may induce other pro-growth measures too, such as better protection of property rights or better regulation of entry and financial markets or better innovation policy. Some of these policies could provide fruitful avenues for expanding our empirical analysis.

Perhaps most promising, an extension could focus on other long-term public investments whose productivity can be gauged more easily than that of public schooling. Such a productivity measure would enable testing directly two predictions of our theory. First, that greater social capital raises not only the level but also the efficiency of productive government investment. Second, that this improvement reflects better political selection, so that voters with greater social capital are more likely to retain more productive governments and dismiss less efficient ones.

It would also be useful to consider growth-enhancing policies for which panel data are available with a longer time dimension than we could exploit in Section 2. A panel spanning the whole twentieth century would allow exploiting Algan and Cahuc's (2010) proxy for within-country changes in social capital over the century. Such longitudinal variation ex-

plains a significant share of changes in economic development, controlling for country fixed effects. Studying whether it also explains changes in enacted policy would complement our existing cross-sectional analysis.

Theoretically, it would also be interesting to explore how social capital may contribute to the development of more inclusive institutions by fostering cooperation in support of democracy—playing a similar role as human capital (Glaeser, Ponzetto, and Shleifer 2007). On the other hand, a growing body of evidence indicates that social capital can be associated with negative outcomes too (Acemoglu, Reed, and Robinson 2014; Satyanath, Voigtländer, and Voth 2017). In our formal analysis, we have abstracted from this dark side of social capital. However, our framework points to inequality as one of its likely causes.

As we have demonstrated, better social connectedness for all citizens is beneficial. Conversely, if some citizens have greater social capital than others, our theory implies they will wield disproportionate political influence. Hence, we should expect inequality in the social diffusion of information to cause detrimental policy distortions—the same harmful impact as heterogeneity in voter information more broadly (Majumdar, Mani, and Mukhand 2004; Glaeser and Ponzetto 2014). This perspective is consistent with sociologists' long-standing concerns about the negative consequences of inequality in social capital (Bourdieu 1986; Lin 2001).

Finally, in our analysis we have adhered to the typical view of social capital as a highly persistent and largely inherited cultural trait (Putnam 1993). Therefore, we have considered a one-way impact of social capital on human capital accumulation. However, there is some empirical evidence of a reverse effect of education on social capital (Goldin and Katz 1999; Algan, Cahuc, and Shleifer 2013). Such two-way causation implies the potential for a growth trap with mutually reinforcing low levels of both social and human capital. A sufficiently large positive shock to education could break the unfavorable legacy of poor culture and poor institutions, setting a country on a virtuous cycle of self-sustaining improvements in social connectedness, political quality and economic development (Glaeser et al. 2004).[42]

[42] Our model suggests, however, that such a positive feedback loop between human and social capital should prove transitory. In the long run, human capital and income follow a balanced growth path, with constant steady-state values for voter information and the output share of education spending. Ongoing growth in social capital—i.e., in the rate of social diffusion of information—would simply entail perfect information ($\lim_{q\to\infty}\theta = 1$), an outcome that seems implausibly optimistic. More likely, social capital would converge to a finite steady-state value, despite ongoing growth in human capital. Either way, the long-run equilibrium would remain characterized by Propositions 2 and 3. The tractability constraints imposed by both the real business cycle model and the embedded model of political career concerns imply instead that a transition path with endogenously growing social capital could not be fully characterized analytically, but would rather need to be simulated numerically.

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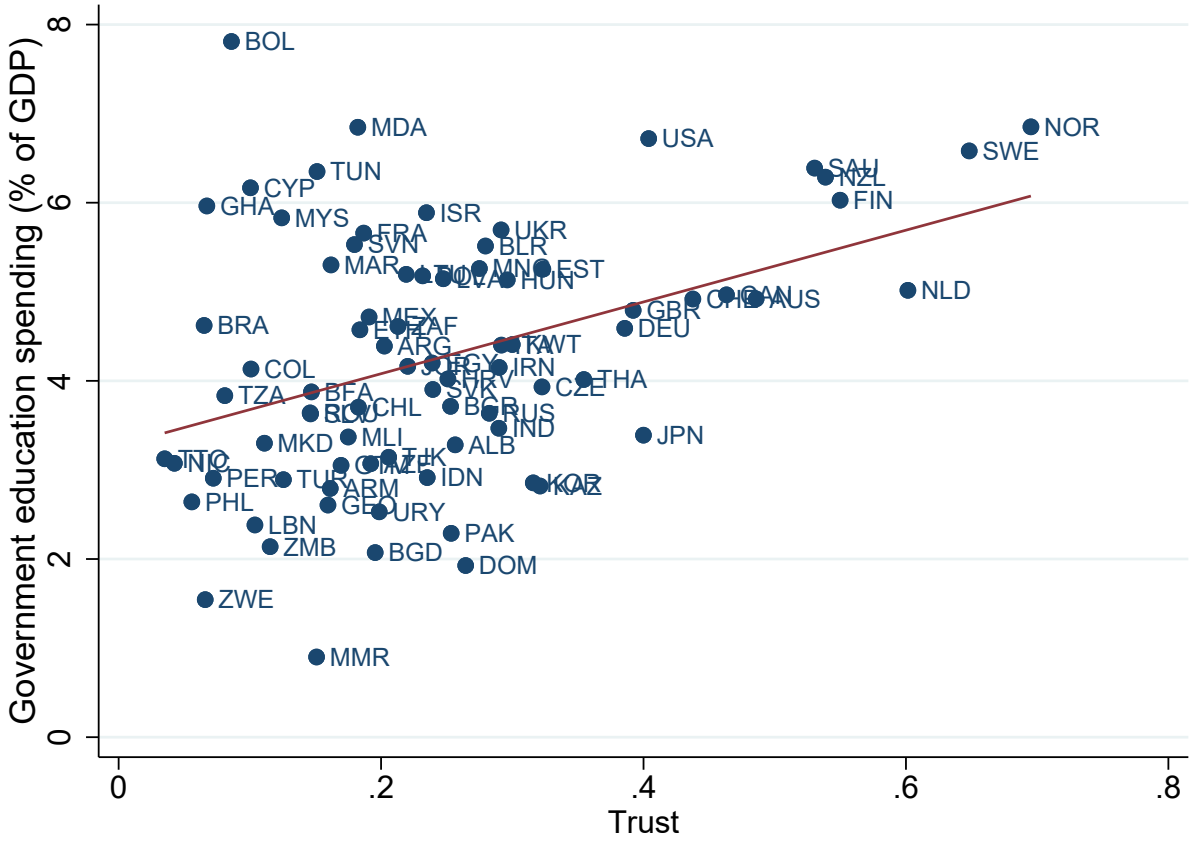
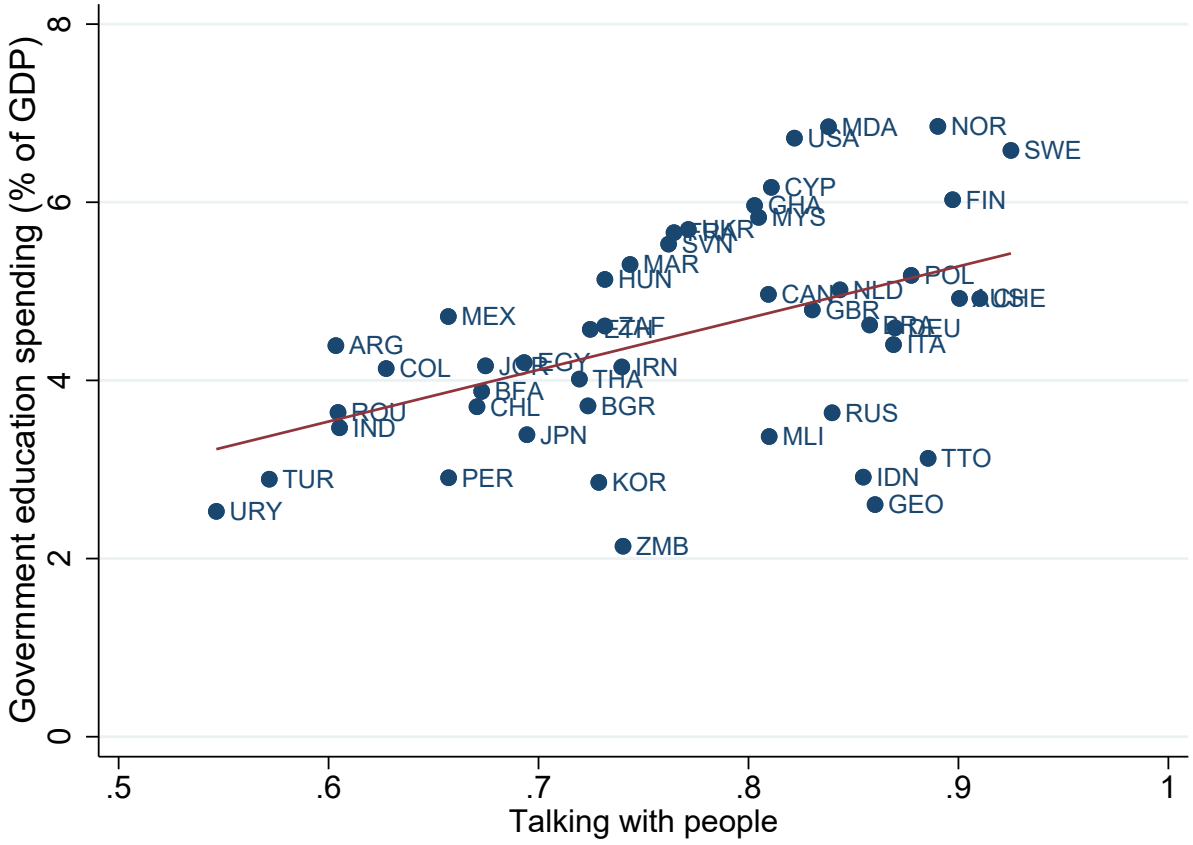
Figure 1: Trust and Public Education Spending across Countries



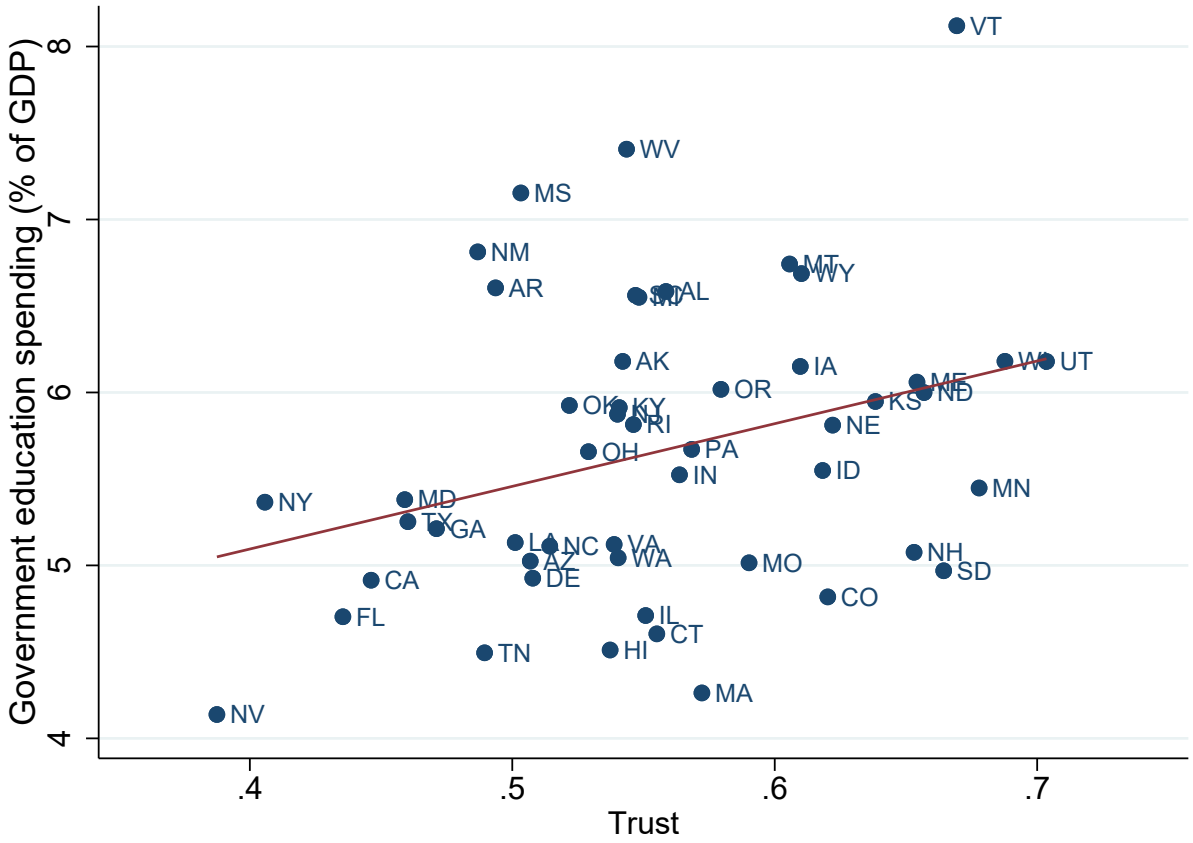
Notes: The figure plots the cross-country correlation of government expenditure on education as a percentage of GDP and the share of survey respondents who report that most people can be trusted. Government expenditures from the World Development Indicators (2000–2010). Survey data from the World Values Survey (1981–2022).

Figure 2: Talking with People and Public Education Spending across Countries



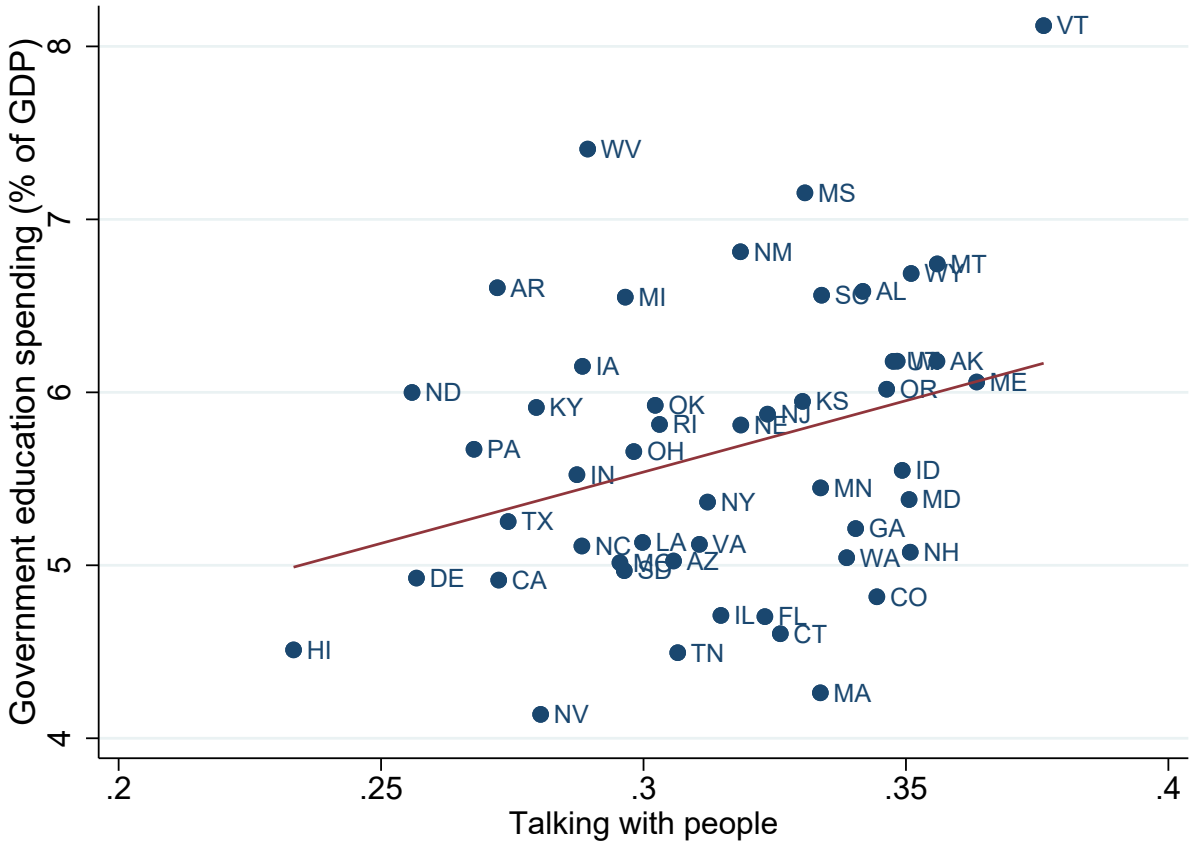
Notes: The figure plots the cross-country correlation of government expenditure on education as a percentage of GDP and the share of survey respondents who report that talking with friends or colleagues was one of the sources to learn what is going on in their country and the world they used in the previous week. Government expenditures from the World Development Indicators (2000–2010). Survey data from the World Values Survey (1981–2022).

Figure 3: Trust and Public Education Spending in the United States



Notes: The figure plots the cross-state correlation of state and local government expenditure on education as a percentage of state GDP and the share of survey respondents who report that they can trust most or all of the people in their neighborhood. Government expenditures from the Annual Survey of State and Local Government Finances (1993–2020). State GDP from the Bureau of Economic Analysis. Survey data from the Civic Engagement Supplement of the Current Population Survey (2008–2013).

Figure 4: Talking with People and Public Education Spending in the United States



Notes: The figure plots the cross-state correlation of state and local government expenditure on education as a percentage of state GDP and the share of survey respondents who report that in a typical month over the past year they discussed politics with family and friends at least a few times a week. Government expenditures from the Annual Survey of State and Local Government Finances (1993–2020). State GDP from the Bureau of Economic Analysis. Survey data from the Civic Engagement Supplement of the Current Population Survey (2008–2013).

Table 1: Cross-Country Data

	Mean	Std. Dev.	Obs.	Min.	Max.
Public Education Spending	4.263	1.423	78	0.900	7.810
Trust	.245	.143	78	.035	.695
Talking with People	.765	.100	47	.547	.925
Government Spending	25.41	10.29	78	3.568	56.33
Population (log)	16.64	1.471	78	13.85	20.87
Number of Ethnic Groups (log)	1.563	0.414	78	0.693	2.303
Temperature	14.54	8.71	78	–7.14	28.30
Inverse Distance to Coast	.010	.018	78	.000	.128
Pronoun Drop	.682	.468	50	0	1

Notes: Data on government expenditures and population are from the World Development Indicators (averages 2000–2010). *Public Education Spending* is government expenditure on education as a percentage of GDP. *Government Spending* is total government expenditure as a percentage of GDP. *Population (log)* is the logarithm of the number of residents. Data on social capital are from the World Values Survey (1981–2022). *Trust* is the share of respondents who report that most people can be trusted. *Talking with People* is the share of respondents who report that talking with friends or colleagues was one of the sources to learn what is going on in their country and the world they used in the previous week. *Number of Ethnic Groups (log)* is from Alesina et al. (2003). *Temperature* is the annual mean temperature in degrees Celsius, from the World Bank Climate Change Knowledge Portal (average 1961–1999) *Inverse Distance to Coast* is the inverse of the mean distance in km from the nearest ice-free coastline, from Gallup, Sachs and Mellinger (1999). *Pronoun Drop* is the population share of languages that allow omitting the subject pronoun, from Tabellini (2008).

Table 2: Social Capital and Public Education Spending across Countries

Panel A			
	(1)	(2)	(3)
Trust	4.028***	3.967***	3.405***
	(0.911)	(0.950)	(0.933)
Government Spending			.074***
			(.012)
Population (log)		–.150	–.028
		(.104)	(.094)
No. of Ethnic Groups (log)		.100	.119
		(.347)	(.313)
Temperature		–.004	.024
		(.018)	(.016)
Inverse Distance to Coast		–1.122	–10.344*
		(9.200)	(6.157)
R^2	.164	.191	.397
Observations	78	78	78
Panel B			
	(1)	(2)	(3)
Talking with People	5.806***	5.803***	5.327***
	(1.395)	(1.431)	(1.545)
Government Spending			.050***
			(.014)
Population (log)		–.100	–.026
		(.146)	(.143)
No. of Ethnic Groups (log)		–.246	–.083
		(.368)	(.336)
Temperature		–.016	.002
		(.020)	(.020)
Inverse Distance to Coast		–9.687	–14.118**
		(10.314)	(6.307)
R^2	.226	.279	.398
Observations	47	47	47

Notes: Data on government expenditures and population are from the World Development Indicators (averages 2000–2010). The dependent variable is government expenditure on education as a percentage of GDP. *Government Spending* is total government expenditure as a percentage of GDP. *Population (log)* is the logarithm of the number of residents. Data on social capital are from the World Values Survey (1981–2022). *Trust* is the share of respondents who report that most people can be trusted. *Talking with People* is the share of respondents who report that talking with friends or colleagues was one of the sources to learn what is going on in their country and the world they used in the previous week. *Number of Ethnic Groups (log)* is from Alesina et al. (2003). *Temperature* is the annual mean temperature in degrees Celsius, from the World Bank Climate Change Knowledge Portal (average 1961–1999) *Inverse Distance to Coast* is the inverse of the mean distance in km from the nearest ice-free coastline, from Gallup, Sachs and Mellinger (1999). Robust standard errors in parentheses. * $p \leq 0.1$; ** $p \leq 0.05$; *** $p \leq 0.01$.

Table 3: Social Capital and Public Education Spending across Countries – IV Estimation

Panel A	Trust (1st Stage)	Public Education Spending (2SLS)	Trust (1st Stage)	Public Education Spending (2SLS)	Trust (1st Stage)	Public Education Spending (2SLS)
Trust		7.752***		9.474***		8.416***
		(1.654)		(2.319)		(2.046)
Pronoun Drop	–.208***		–.187***		–.194***	
	(.045)		(.045)		(.043)	
Government Spending					–.001	.041**
					(.002)	(.016)
Population (log)			–.005	–.024	–.007	.047
			(.011)	(.121)	(.013)	(.103)
No. of Ethnic Groups (log)			–.114**	.580	–.117**	.533
			(.047)	(.363)	(.048)	(.338)
Temperature			–.006**	.062*	–.006**	.067**
			(.002)	(.032)	(.003)	(.037)
Inverse Distance to Coast			–0.216	–18.678	–0.094	–22.425*
			(1.916)	(13.274)	(1.992)	(11.845)
F stat. of excl. instruments	21.05		17.64		20.07	
Observations	50	50	50	50	50	50
Clusters (Languages)	34	34	34	34	34	34
Panel B	Talking with People (1st stage)	Public Education Spending (2SLS)	Talking with People (1st stage)	Public Education Spending (2SLS)	Talking with People (1st stage)	Public Education Spending (LIML)
Talking with People		13.282***		17.943***		17.874***
		(3.300)		(4.802)		(5.494)
Pronoun Drop	–.126***		–.098***		–.093**	
	(.033)		(.030)		(.036)	
Government Spending					.001	.001
					(.002)	(.030)
Population (log)			.004	–.022	.004	–.021
			(.013)	(.185)	(.014)	(.192)
No. of Ethnic Groups (log)			.061	–1.352*	.063	–1.344
			(.048)	(0.795)	(.048)	(0.818)
Temperature			–.002	.033	–.002	.033
			(.002)	(.033)	(.002)	(.032)
Inverse Distance to Coast			4.147	–95.083**	4.116	–94.843**
			(2.999)	(46.270)	(3.066)	(45.959)
F stat. of excl. instruments	14.51		10.80		6.90	
Observations	38	38	38	38	38	38
Clusters (Languages)	28	28	28	28	28	28

Notes: Data on government expenditures and population are from the World Development Indicators (averages 2000–2010). *Public Education Spending* is government expenditure on education as a percentage of GDP. *Government Spending* is total government expenditure as a percentage of GDP. *Population (log)* is the logarithm of the number of residents. Data on social capital are from the World Values Survey (1981–2022). *Trust* is the share of respondents who report that most people can be trusted. *Talking with People* is the share of respondents who report that talking with friends or colleagues was one of the sources to learn what is going on in their country and the world they used in the previous week. *Pronoun Drop* is the population share of languages that allow omitting the subject pronoun, from Tabellini (2008). *Number of Ethnic Groups (log)* is from Alesina et al. (2003). *Temperature* is the annual mean temperature in degrees Celsius, from the World Bank Climate Change Knowledge Portal (average 1961–1999) *Inverse Distance to Coast* is the inverse of the mean distance in km from the nearest ice-free coastline, from Gallup, Sachs and Mellinger (1999). Robust standard errors clustered by language in parentheses. * $p \leq 0.1$; ** $p \leq 0.05$; *** $p \leq 0.01$.

Table 4: U.S. State Data

	Mean	Std. Dev.	Obs.	Min.	Max.
Public Education Spending	5.658	0.846	50	4.138	8.120
Trust	.555	.074	50	.387	.704
Talking with People	.314	.032	50	.233	.376
Government Spending	19.29	2.743	50	15.08	28.42
Population (log)	15.15	1.020	50	13.24	17.43
Land Area (log)	10.66	1.172	50	6.941	13.25
Share under 25	.338	.022	50	.294	.430
Share 65 and over	.133	.017	50	.077	.173
Share Black	.103	.096	50	.004	.370
Ancestral Trust	.342	.035	50	.279	.436
Ancestral Talking w/ People	.810	.029	50	.713	.854

Notes: Data on government expenditures are from the Annual Survey of State and Local Government. State GDP is from the Bureau of Economic Analysis. *Public Education Spending* is state and local government expenditure on education as a percentage of state GDP (average 1993–2020). *Government Spending* is total state and local government expenditure as a percentage of state GDP (average 1993–2020). Data on social capital are from the Civic Engagement Supplement of the Current Population Survey (2008–2013). *Trust* is the share of respondents who report they can trust most or all of the people in their neighborhood. *Talking with People* is the share of respondents who report that in a typical month over the past year they discussed politics with family and friends at least a few times a week. Control variables are from the 2010 Population Census. *Population (log)* is the logarithm of the number of residents. *Land Area (log)* is the logarithm of land area in square miles. The *Share under 25*, *Share 65 and over*, and *Share Black* (or African-American) are shares of resident population. *Ancestral Trust* and *Ancestral Talking with People* are constructed as $z_s = \sum_o x_o n_{so} / \sum_o n_{so}$, where n_{so} is the number of residents of state s who report ancestry from foreign country o in the 2020 Population Census, while x_o is respectively *Trust* or *Talking with People* in country o from the World Values Survey (1981–2022).

Table 5: Social Capital and Public Education Spending in the United States

Panel A			
	(1)	(2)	(3)
Trust	3.624**	3.427*	4.010***
	(1.482)	(1.999)	(1.396)
Government Spending			.251***
			(.036)
Population (log)		–.535***	–.045
		(.145)	(.127)
Land Area (log)		.410***	–.024
		(.149)	(.123)
Share under 25		12.845*	4.793
		(7.347)	(5.100)
Share 65 and over		23.471**	5.729
		(10.458)	(9.285)
Share Black		1.181	–0.723
		(2.154)	(1.516)
R^2	.101	.471	.744
Observations	50	50	50
Panel B			
	(1)	(2)	(3)
Talking with People	8.250**	10.144***	6.652**
	(3.791)	(1.999)	(2.832)
Government Spending			.226***
			(.041)
Population (log)		–.546***	–.146
		(.152)	(.140)
Land Area (log)		.260**	–.070
		(.122)	(.119)
Share under 25		17.575**	10.115**
		(7.221)	(4.732)
Share 65 and over		27.906**	10.483
		(11.866)	(11.644)
Share Black		–0.937	–2.429*
		(2.086)	(1.260)
R^2	.098	.516	.729
Observations	50	50	50

Notes: Data on government expenditures are from the Annual Survey of State and Local Government. State GDP is from the Bureau of Economic Analysis. The dependent variable is state and local government expenditure on education as a percentage of state GDP (average 1993–2020). *Government Spending* is total state and local government expenditure as a percentage of state GDP (average 1993–2020). Data on social capital are from the Civic Engagement Supplement of the Current Population Survey (2008–2013). *Trust* is the share of respondents who report they can trust most or all of the people in their neighborhood. *Talking with People* is the share of respondents who report that in a typical month over the past year they discussed politics with family and friends at least a few times a week. All other data are from the 2010 Population Census. *Population (log)* is the logarithm of the number of residents. *Land Area (log)* is the logarithm of land area in square miles. The *Share under 25*, *Share 65 and over*, and *Share Black* (or African-American) are shares of resident population. Robust standard errors in parentheses. * $p \leq 0.1$; ** $p \leq 0.05$; *** $p \leq 0.01$.

Table 6: Social Capital and Public Education Spending in the United States – IV Estimation

Panel A	Trust (1st Stage)	Public Education Spending (2SLS)	Trust (1st Stage)	Public Education Spending (2SLS)	Trust (1st Stage)	Public Education Spending (2SLS)
Trust		6.213***		3.084		3.538*
		(2.208)		(2.788)		(1.926)
Ancestral Trust	1.486***		1.583***		1.580***	
	(.184)		(.299)		(.313)	
Government Spending					–.001	.250***
					(.003)	(.029)
Population (log)			.005	–.544***	.003	–.059
			(.008)	(.137)	(.012)	(.117)
Land Area (log)			–.010	.413***	–.008	–.020
			(.009)	(.126)	(.011)	(.105)
Share under 25			.750	13.131**	.782	5.209
			(.621)	(6.516)	(.615)	(4.360)
Share 65 and over			–.261	23.489***	–.186	5.807
			(.674)	(8.838)	(.685)	(7.726)
Share Black			–.188**	1.080	–.179*	–.857
			(.084)	(1.838)	(.091)	(1.323)
F stat. of excl. instruments	64.88		27.95		25.45	
Observations	50	50	50	50	50	50
Panel B	Talking with People (1st stage)	Public Education Spending (LIML)	Talking with People (1st stage)	Public Education Spending (LIML)	Talking with People (1st stage)	Public Education Spending (LIML)
Talking with People		31.620*		4.171		2.740
		(17.031)		(8.727)		(6.126)
Ancestral Talking w/ People	.315*		.516***		.508***	
	(.174)		(.174)		(.163)	
Government Spending					.003	.237***
					(.002)	(.039)
Population (log)			.001	–.593***	.006	–.156
			(.005)	(.154)	(.007)	(.113)
Land Area (log)			.012**	.361*	.007	–.022
			(.005)	(.198)	(.007)	(.125)
Share under 25			–.171	16.474**	–.249	9.069**
			(.317)	(6.902)	(.295)	(4.146)
Share 65 and over			–.464	25.398**	–.646	8.077
			(.413)	(10.068)	(.433)	(9.734)
Share Black			.110**	–.289	.089	–2.094**
			(.052)	(2.001)	(.063)	(1.020)
F stat. of excl. instruments	3.28		8.76		9.72	
Observations	50	50	50	50	50	50

Notes: Data on government expenditures are from the Annual Survey of State and Local Government. State GDP is from the Bureau of Economic Analysis. The dependent variable is state and local government expenditure on education as a percentage of state GDP (average 1993–2020). *Government Spending* is total state and local government expenditure as a percentage of state GDP (average 1993–2020). Data on social capital are from the Civic Engagement Supplement of the Current Population Survey (2008–2013). *Trust* is the share of respondents who report they can trust most or all of the people in their neighborhood. *Talking with People* is the share of respondents who report that in a typical month over the past year they discussed politics with family and friends at least a few times a week. *Ancestral Trust* and *Ancestral Talking with People* are constructed as $z_s = \sum_o x_o n_{so} / \sum_o n_{so}$, where n_{so} is the number of residents of state s who report ancestry from foreign country o in the 2020 Population Census, while x_o is respectively *Trust* or *Talking with People* in country o from the World Values Survey (1981–2022). All other data are from the 2010 Population Census. *Population (log)* is the logarithm of the number of residents. *Land Area (log)* is the logarithm of land area in square miles. The *Share under 25*, *Share 65 and over*, and *Share Black* (or African-American) are shares of resident population. Robust standard errors in parentheses. * $p \leq 0.1$; ** $p \leq 0.05$; *** $p \leq 0.01$.

Table 7: U.S. Voter Data

	Mean	Std. Dev.	Obs.	Min.	Max.
Name Recall	.316	.465	13,929	0	1
Name Recognition	.621	.485	17,683	0	1
Ideological Rating	.689	.463	9,433	0	1
Thermometer Provided	.860	.347	25,393	0	1
Preferences Provided	.480	.500	12,238	0	1
Trust	.463	.499	23,476	0	1
Talking with People	.705	.456	25,715	0	1
Less than High School Degree	.168	.373	31,175	0	1
BA Degree or More	.277	.447	31,175	0	1
Male	.455	.498	31,175	0	1
White	.747	.435	31,175	0	1
Black	.126	.331	31,175	0	1
Hispanic	.088	.283	31,175	0	1

Notes: Data from the American National Election Studies. All variables are dummies. *Name Recall* records if respondents can recall the name of any candidate running for the U.S. House in their district. *Name Recognition* records if respondents can identify the incumbent from a list of the major party candidates for the U.S. House in their district. *Ideological Rating* records if respondents can place their U.S. House representative on a seven-point ideological scale; it is nil if they do not recognize the candidate's name or cannot provide a rating. *Thermometer Provided* records if respondents can rate their feelings towards the incumbent on a scale from 0 to 100; it is nil if they do not recognize the candidate's name or cannot provide a rating. *Preferences Provided* records if respondents can mention at least one thing they like or dislike about the incumbent U.S. House representative in their district; it is nil if they report knowing nothing about the candidate or can mention nothing in particular they like or dislike about the candidate. *Trust* records if respondents report that most people can be trusted (1964–2008), or that they can trust people most of the time (2008–2020). *Talking with People* records if respondents discussed politics with family and friends in the last week. *Less than High School Degree* and *BA Degree or More* record educational attainment; high school and community college degrees comprise the omitted category. *Male* records gender; female is the omitted category. *White*, *Black* and *Hispanic* record race and ethnicity; other or multiple races, non-Hispanic, comprise the omitted category.

Table 8: Social Capital and Voter Information

Panel A				
	Name Recall	Name Recall	Name Recognition	Name Recognition
Trust	.118***	.070***	.129***	.089***
	(.013)	(.012)	(.008)	(.008)
Less than HS Degree		–.145***		–.171***
		(.020)		(.013)
BA Degree or More		.195***		.096***
		(.015)		(.012)
Male	.073***	.062***	.067***	.062***
	(.012)	(.011)	(.009)	(.010)
White	.086**	.92**	.100**	.099**
	(.041)	(.040)	(.046)	(.044)
Black	–.054	–.019	–.060	–.033
	(.034)	(.032)	(.053)	(.053)
Hispanic	.022	.076*	–.046	–.003
	(.038)	(.041)	(.054)	(.055)
R^2	.151	.163	.092	.119
Observations	6,256	6,256	10,080	10,080
Clusters (States)	50	50	50	50
Panel B				
	Name Recall	Name Recall	Name Recognition	Name Recognition
Talking with People	.189***	.145***	.187***	.147***
	(.011)	(.010)	(.008)	(.008)
Less than HS Degree		–.141***		–.181***
		(.014)		(.015)
BA Degree or More		.178***		.112***
		(.014)		(.009)
Male	.071***	.061***	.062***	.057***
	(.008)	(.008)	(.008)	(.008)
White	.089***	.092***	.089**	.086**
	(.026)	(.025)	(.036)	(.038)
Black	–.054**	–.014	–.066*	–.035
	(.024)	(.024)	(.038)	(.041)
Hispanic	.012	.068**	–.016	.034
	(.024)	(.028)	(.041)	(.048)
R^2	.145	.185	.130	.160
Observations	13,913	13,913	13,771	13,771
Clusters (States)	50	50	49	49

Notes: Data from the American National Election Studies. All variables are dummies. *Name Recall* records if respondents can recall the name of any candidate running for the U.S. House in their district. *Name Recognition* records if respondents can identify the incumbent from a list of the major party candidates for the U.S. House in their district. *Trust* records if respondents report that most people can be trusted (1964–2008), or that they can trust people most of the time (2008–2020). *Talking with People* records if respondents discussed politics with family and friends in the last week. *Less than High School Degree* and *BA Degree or More* record educational attainment; high school and community college degrees comprise the omitted category. *Male* records gender; female is the omitted category. *White*, *Black* and *Hispanic* record race and ethnicity; other or multiple races, non-Hispanic, comprise the omitted category. All regressions include fixed effects for age deciles, survey year, and state of residence (including D.C.). Robust standard errors clustered by state in parentheses. * $p \leq 0.1$; ** $p \leq 0.05$; *** $p \leq 0.01$.

Table 9: Social Capital and Voter Ratings

Panel A						
	Ideological Rating	Ideological Rating	Thermometer Provided	Thermometer Provided	Preferences Provided	Preferences Provided
Trust	.078***	.050***	.028***	.013***	.101***	.067***
	(.012)	(.013)	(.004)	(.004)	(.010)	(.010)
Less than HS Degree		–.151***		–.111***		–.132***
		(.024)		(.012)		(.021)
BA Degree or More		.095***		.040***		.124***
		(.016)		(.006)		(.013)
Male	.080***	.077***	.023***	.022***	.074***	.066***
	(.008)	(.010)	(.005)	(.004)	(.015)	(.015)
White	.089*	.090*	.044***	.042***	.063	.068
	(.048)	(.047)	(.011)	(.011)	(.048)	(.047)
Black	.119**	.139**	.009	.018	.041	.067
	(.055)	(.055)	(.017)	(.017)	(.054)	(.055)
Hispanic	.040	.073	.010	.028	.007	.049
	(.053)	(.054)	(.019)	(.020)	(.055)	(.057)
R^2	.079	.099	.102	.115	.136	.157
Observations	4,751	4,751	18,521	18,521	5,371	5,371
Clusters (States)	46	46	51	51	46	46
Panel B						
	Ideological Rating	Ideological Rating	Thermometer Provided	Thermometer Provided	Preferences Provided	Preferences Provided
Talking with People	.152***	.132***	.096***	.080***	.208***	.178***
	(.011)	(.012)	(.005)	(.005)	(.009)	(.009)
Less than HS Degree		–.083***		–.111***		–.109***
		(.014)		(.011)		(.014)
BA Degree or More		.076***		.035***		.113***
		(.016)		(.007)		(.014)
Male	.069***	.066***	.021***	.020***	.058***	.052***
	(.007)	(.007)	(.005)	(.005)	(.009)	(.010)
White	.078**	.080**	.046***	.041***	.051	.053
	(.032)	(.032)	(.014)	(.014)	(.052)	(.055)
Black	.102***	.123***	–.005	.006	.003	.031
	(.033)	(.033)	(.019)	(.020)	(.050)	(.054)
Hispanic	.049	.077*	.007	.025	.006	.045
	(.039)	(.042)	(.019)	(.021)	(.057)	(.063)
R^2	.072	.081	.103	.115	.144	.160
Observations	9,270	9,270	23,991	23,991	12,228	12,228
Clusters (States)	46	46	51	51	46	46

Notes: Data from the American National Election Studies. All variables are dummies. *Ideological Rating* records if respondents can place their U.S. House representative on a seven-point ideological scale; it is nil if they do not recognize the candidate's name or cannot provide a rating. *Thermometer Provided* records if respondents can rate their feelings towards the incumbent on a scale from 0 to 100; it is nil if they do not recognize the candidate's name or cannot provide a rating. *Preferences Provided* records if respondents can mention at least one thing they like or dislike about the incumbent U.S. House representative in their district; it is nil if they report knowing nothing about the candidate or can mention nothing in particular they like or dislike about the candidate. *Trust* records if respondents report that most people can be trusted (1964–2008), or that they can trust people most of the time (2008–2020). *Talking with People* records if respondents discussed politics with family and friends in the last week. *Less than High School Degree* and *BA Degree or More* record educational attainment; high school and community college degrees comprise the omitted category. *Male* records gender; female is the omitted category. *White*, *Black* and *Hispanic* record race and ethnicity; other or multiple races, non-Hispanic, comprise the omitted category. All regressions include fixed effects for age deciles, survey year, and state of residence (including D.C.). Robust standard errors clustered by state in parentheses. * $p \leq 0.1$; ** $p \leq 0.05$; *** $p \leq 0.01$.

A Appendix [for Online Publication]

A.1 Definitions of the Equilibrium and of the Social Optimum

Let the random variable $\chi(s_t, \tau_t, k_{t+1}, g_t, h_{t+1})$ be an indicator for the event of re-election described by the condition:

$$\Psi_t \leq \theta(p,q)\,\Delta_1(s_t, \tau_t, k_{t+1}, g_t, h_{t+1}) + [1-\theta(p,q)]\,\Delta_0(s_t, \tau_t, k_{t+1}, g_t). \tag{A1}$$

The dynamic equilibrium has the following definition.

Definition A1 *A Markov-perfect dynamic equilibrium consists of a welfare function $V(s_t)$, an additional value $Z(s_t)$ of holding political office, a tax-setting rule $T(s_t)$, a private investment rule $K(s_t, \tau_t)$, and a public investment rule $H(s_t, \tau_t)$ such that:*

1. *The social welfare function satisfies the recursive definition:*

$$\begin{aligned} V(s_t) = {} & (1-\gamma)\log\{[1-(1-\alpha)T(s_t)]\,y(k_t,h_t) - K(s_t, T(s_t))\} \\ & + \gamma\left\{\log[(1-\alpha)T(s_t)\,y(k_t,h_t) - H(s_t,T(s_t))] + \varepsilon^g_{t-1} + \mathbb{E}_t\varepsilon^g_t\right\} \\ & + \beta\mathbb{E}_t\left[\chi\left(s_t,\varepsilon^g_t,\varepsilon^h_t\right)V\left(K(s_t,T(s_t)), e^{\varepsilon^h_{t-1}+\varepsilon^h_t}H(s_t,T(s_t)),\varepsilon^g_t,\varepsilon^h_t\right)\right] \\ & + \beta\mathbb{E}_t\left\{\left[1-\chi\left(s_t,\varepsilon^g_t,\varepsilon^h_t\right)\right]V\left(K(s_t,T(s_t)), e^{\varepsilon^h_{t-1}+\varepsilon^h_t}H(s_t,T(s_t)),\omega^g_t,\omega^h_t\right)\right\}, \end{aligned}$$

   where for ease of notation:

$$\chi\left(s_t,\varepsilon^g_t,\varepsilon^h_t\right) \equiv \chi\begin{pmatrix} s_t, T(s_t), K(s_t,T(s_t)), \\ e^{\varepsilon^g_{t-1}+\varepsilon^g_t}\left[(1-\alpha)T(s_t)\,y(k_t,h_t) - H(s_t,T(s_t))\right], \\ e^{\varepsilon^h_{t-1}+\varepsilon^h_t}H(s_t,T(s_t)) \end{pmatrix}.$$

2. *The additional value of political incumbency satisfies the recursive definition:*

$$Z(s_t) = z + \beta\mathbb{E}_t\left[\chi\left(s_t,\varepsilon^g_t,\varepsilon^h_t\right)Z\left(K(s_t,T(s_t)), e^{\varepsilon^h_{t-1}+\varepsilon^h_t}H(s_t,T(s_t)),\varepsilon^g_t,\varepsilon^h_t\right)\right],$$

   with the same simplified notation for $\chi\left(s_t,\varepsilon^g_t,\varepsilon^h_t\right)$.

3. *Labor-income taxes are chosen by office-seeking politicians:*

$$T(s_t) = \arg\max_T \left\{ \begin{array}{l} (1-\gamma)\log\{[1-(1-\alpha)T]\,y(k_t,h_t) - K(s_t,T)\} \\ \qquad +\gamma\log[(1-\alpha)Ty(k_t,h_t) - H(s_t,T)] \\ +\beta\mathbb{E}_t\left\{\chi\left(s_t,T,\varepsilon^g_t,\varepsilon^h_t\right)\left[\begin{array}{l} V\left(K(s_t,T), e^{\varepsilon^h_{t-1}+\varepsilon^h_t}H(s_t,T),\varepsilon^g_t,\varepsilon^h_t\right) \\ +Z\left(K(s_t,T), e^{\varepsilon^h_{t-1}+\varepsilon^h_t}H(s_t,T),\varepsilon^g_t,\varepsilon^h_t\right)\end{array}\right]\right\} \\ +\beta\mathbb{E}_t\left\{\left[1-\chi\left(s_t,T,\varepsilon^g_t,\varepsilon^h_t\right)\right]V\left(K(s_t,T), e^{\varepsilon^h_{t-1}+\varepsilon^h_t}H(s_t,T),\omega^g_t,\omega^h_t\right)\right\} \end{array}\right\},$$

where for ease of notation:

$$\chi\left(s_t, T, \varepsilon_t^g, \varepsilon_t^h\right) \equiv \chi\left(s_t, T, K\left(s_t, T\right), e^{\varepsilon_{t-1}^g + \varepsilon_t^g}\left[\left(1-\alpha\right) T y\left(k_t, h_t\right) - H\left(s_t, T\right)\right], e^{\varepsilon_{t-1}^h + \varepsilon_t^h} H\left(s_t, T\right)\right).$$

4. *Expenditure on public investment is chosen by office-seeking politicians:*

$$H\left(s_t, \tau_t\right) = \arg\max_H \left\{ \begin{array}{l} \gamma \log\left[\left(1-\alpha\right)\tau_t y\left(k_t, h_t\right) - H\right] \\ +\beta \mathbb{E}_t \left\{ \chi\left(s_t, \tau_t, H, \varepsilon_t^g, \varepsilon_t^h\right) \left[\begin{array}{l} V\left(K\left(s_t, \tau_t\right), e^{\varepsilon_{t-1}^h + \varepsilon_t^h} H, \varepsilon_t^g, \varepsilon_t^h\right) \\ +Z\left(K\left(s_t, \tau_t\right), e^{\varepsilon_{t-1}^h + \varepsilon_t^h} H, \varepsilon_t^g, \varepsilon_t^h\right) \end{array} \right] \right\} \\ +\beta \mathbb{E}_t \left\{ \left[1 - \chi\left(s_t, \tau_t, H, \varepsilon_t^g, \varepsilon_t^h\right)\right] V\left(K\left(s_t, \tau_t\right), e^{\varepsilon_{t-1}^h + \varepsilon_t^h} H, \omega_t^g, \omega_t^h\right) \right\} \end{array} \right\}.$$

where for ease of notation:

$$\chi\left(s_t, \tau_t, H, \varepsilon_t^g, \varepsilon_t^h\right) \equiv \chi\left(s_t, T\left(s_t\right), K\left(s_t, T\left(s_t\right)\right), e^{\varepsilon_{t-1}^g + \varepsilon_t^g}\left[\left(1-\alpha\right)\tau_t y\left(k_t, h_t\right) - H\right], e^{\varepsilon_{t-1}^h + \varepsilon_t^h} H\right).$$

5. *Private investment is chosen by utility-maximizing households:*

$$K\left(s_t, \tau_t\right) = \arg\max_K \left\{ \begin{array}{l} \left(1-\gamma\right) \log\left\{\left[1 - \left(1-\alpha\right)\tau_t\right] y\left(k_t, h_t\right) - K\right\} \\ \quad +\beta \mathbb{E}_t \left[\chi\left(s_t, \tau_t, K, \varepsilon_t^g, \varepsilon_t^h\right) V\left(K, e^{\varepsilon_{t-1}^h + \varepsilon_t^h} H\left(s_t, \tau_t\right), \varepsilon_t^g, \varepsilon_t^h\right)\right] \\ +\beta \mathbb{E}_t \left\{ \left[1 - \chi\left(s_t, \tau_t, K, \varepsilon_t^g, \varepsilon_t^h\right)\right] V\left(K, e^{\varepsilon_{t-1}^h + \varepsilon_t^h} H\left(s_t, \tau_t\right), \omega_t^g, \omega_t^h\right) \right\} \end{array} \right\}.$$

where for ease of notation:

$$\chi\left(s_t, \tau_t, K, \varepsilon_t^g, \varepsilon_t^h\right) \equiv \chi\left(s_t, \tau_t, K, e^{\varepsilon_{t-1}^g + \varepsilon_t^g}\left[\left(1-\alpha\right)\tau_t y\left(k_t, h_t\right) - H\left(s_t, \tau_t\right)\right], e^{\varepsilon_{t-1}^h + \varepsilon_t^h} H\left(s_t, \tau_t\right)\right).$$

Let the binary function $\chi^*\left(s_t, \varepsilon_t^g, \varepsilon_t^h\right)$ equal one if the incumbent is retained and zero if he is replaced by a new random draw from the ability pool. The social optimum has the following characterization.

Definition A2 *The solution to the planner's problem consists of a welfare function $V^*\left(s_t\right)$, a private investment rule $K^*\left(s_t\right)$, public spending rules $G^*\left(s_t\right)$ and $H^*\left(s_t\right)$, and a re-election rule $\chi^*\left(s_t, \varepsilon_t^g, \varepsilon_t^h\right)$ such that:*

1. *The social welfare function satisfies the recursive definition:*

$$\begin{aligned} V^*(s_t) = (1-\gamma)\log\left[y(k_t,h_t) - K^*(s_t) - G^*(s_t) - H^*(s_t)\right] \\ + \gamma\left[\log G^*(s_t) + \varepsilon^g_{t-1} + \mathbb{E}_t\varepsilon^g_t\right] \\ + \beta\mathbb{E}_t\left[\chi^*\left(s_t,\varepsilon^g_t,\varepsilon^h_t\right)V\left(K^*(s_t), e^{\varepsilon^h_{t-1}+\varepsilon^h_t}H^*(s_t),\varepsilon^g_t,\varepsilon^h_t\right)\right] \\ + \beta\mathbb{E}_t\left\{\left[1-\chi^*\left(s_t,\varepsilon^g_t,\varepsilon^h_t\right)\right]V\left(K^*(s_t), e^{\varepsilon^h_{t-1}+\varepsilon^h_t}H^*(s_t),\omega^g_t,\omega^h_t\right)\right\}. \end{aligned}$$

2. *The allocation of output $K^*(s_t)$, $G^*(s_t)$, $H^*(s_t)$ solves:*

$$\max_{K,G,H}\left\{\begin{array}{c}(1-\gamma)\log\left[y(k_t,h_t)-K-G-H\right]+\gamma\log G \\ +\beta\mathbb{E}_t\left[\chi^*\left(s_t,\varepsilon^g_t,\varepsilon^h_t\right)V\left(K, e^{\varepsilon^h_{t-1}+\varepsilon^h_t}H,\varepsilon^g_t,\varepsilon^h_t\right)\right] \\ +\beta\mathbb{E}_t\left\{\left[1-\chi^*\left(s_t,\varepsilon^g_t,\varepsilon^h_t\right)\right]V\left(K, e^{\varepsilon^h_{t-1}+\varepsilon^h_t}H,\omega^g_t,\omega^h_t\right)\right\}\end{array}\right\}.$$

3. *The re-election rule is $\chi^*\left(s_t,\varepsilon^g_t,\varepsilon^h_t\right)=1$ if and only if:*

$$V\left(K^*(s_t), e^{\varepsilon^h_{t-1}+\varepsilon^h_t}H^*(s_t),\varepsilon^g_t,\varepsilon^h_t\right) \geq \mathbb{E}_t V\left(K^*(s_t), e^{\varepsilon^h_{t-1}+\varepsilon^h_t}H^*(s_t),\omega^g_t,\omega^h_t\right).$$

A.2 Proof of Proposition 1 and Corollary 1

To solve the planner's problem, we make an educated guess for the form of the social welfare function:

$$V^*(s_t) = v_0 + v_k\log k_t + v_h\log h_t + v^g_\varepsilon\varepsilon^g_{t-1} + v^h_\varepsilon\varepsilon^h_{t-1}. \tag{A2}$$

Then the allocation of output solves:

$$\max_{K,G,H}\left\{(1-\gamma)\log\left[y(k_t,h_t)-K-G-H\right]+\gamma\log G+\beta\left([v_k\log K+v_h\log H]\right)\right\}, \tag{A3}$$

which implies constant output shares:

$$\frac{K^*(s_t)}{y(k_t,h_t)} = \frac{\beta v_k}{1+\beta(v_k+v_h)}, \tag{A4}$$

$$\frac{G^*(s_t)}{y(k_t,h_t)} = \frac{\gamma}{1+\beta(v_k+v_h)}, \tag{A5}$$

and

$$\frac{H^*(s_t)}{y(k_t,h_t)} = \frac{\beta v_h}{1+\beta(v_k+v_h)}; \tag{A6}$$

the re-election rule is $\chi^*\left(s_t,\varepsilon^g_t,\varepsilon^h_t\right)=1$ if and only if:

$$v^g_\varepsilon\varepsilon^g_t + v^h_\varepsilon\varepsilon^h_t \geq 0; \tag{A7}$$

and social welfare is:

$$V^{*}\left(s_{t}\right)=\left(1-\gamma\right)\log\left[\frac{1-\gamma}{1+\beta\left(v_{k}+v_{h}\right)}y\left(k_{t},h_{t}\right)\right]$$
$$+\gamma\left\{\log\left[\frac{\gamma}{1+\beta\left(v_{k}+v_{h}\right)}y\left(k_{t},h_{t}\right)\right]+\varepsilon_{t-1}^{g}\right\}$$
$$+\beta v_{k}\log\left[\frac{\beta v_{k}}{1+\beta\left(v_{k}+v_{h}\right)}y\left(k_{t},h_{t}\right)\right]$$
$$+\beta v_{h}\left\{\log\left[\frac{\beta v_{h}}{1+\beta\left(v_{k}+v_{h}\right)}y\left(k_{t},h_{t}\right)\right]+\varepsilon_{t-1}^{h}\right\}$$
$$+\beta\mathbb{E}\left[v_{\varepsilon}^{g}\varepsilon_{t}^{g}+v_{\varepsilon}^{h}\varepsilon_{t}^{h}\geq0\right], \quad \text{(A8)}$$

where $\mathbb{E}\left[X\geq0\right]$ denotes the partial expectation $\int_{0}^{\infty}XdF\left(X\right)$.

Thus the guess is correct for:

$$v_{k}=\alpha\left[1+\beta\left(v_{k}+v_{h}\right)\right],\ v_{h}=\left(1-\alpha\right)\left[1+\beta\left(v_{k}+v_{h}\right)\right],\ v_{\varepsilon}^{g}=\gamma,\ v_{\varepsilon}^{h}=\beta v_{h}, \quad \text{(A9)}$$

and

$$v_{0}=\left(1-\gamma\right)\log\frac{1-\gamma}{1+\beta\left(v_{k}+v_{h}\right)}+\gamma\log\frac{\gamma}{1+\beta\left(v_{k}+v_{h}\right)}+\beta v_{k}\log\frac{\beta v_{k}}{1+\beta\left(v_{k}+v_{h}\right)}$$
$$+\beta v_{h}\log\frac{\beta v_{h}}{1+\beta\left(v_{k}+v_{h}\right)}+\left[1+\beta\left(v_{k}+v_{h}\right)\right]\log A+\beta\mathbb{E}\left[v_{\varepsilon}^{g}\varepsilon_{t}^{g}+v_{\varepsilon}^{h}\varepsilon_{t}^{h}\geq0\right]. \quad \text{(A10)}$$

Solving for the coefficients and plugging them into the expressions above yields the exact solution to the planner's problem.

The growth rate of output is:

$$\log y_{t+1}-\log y_{t}=\left(1-\alpha\right)\log\left(1-\alpha\right)+\alpha\log\alpha+\log\beta+\log A+\left(1-\alpha\right)\eta_{t}^{*}, \quad \text{(A11)}$$

where the optimal competence of the ruling politician is:

$$\eta_{t}^{*}=\chi_{t-1}^{*}\left(\varepsilon_{t-1}^{h}+\varepsilon_{t}^{h}\right)+\left(1-\chi_{t-1}^{*}\right)\left(\omega_{t-1}^{h}+\omega_{t}^{h}\right), \quad \text{(A12)}$$

such that:

$$\mathbb{E}\eta_{t}^{*}=\mathbb{E}\left(\chi_{t-1}^{*}\varepsilon_{t-1}^{h}\right)=\int_{-\infty}^{\infty}\left[1-F_{g}\left(-\frac{\beta\left(1-\alpha\right)}{\left(1-\beta\right)\gamma}\varepsilon\right)\right]\varepsilon dF_{h}\left(\varepsilon\right)=$$
$$=\int_{-\infty}^{\infty}\left[F_{g}\left(0\right)-F_{g}\left(-\frac{\beta\left(1-\alpha\right)}{\left(1-\beta\right)\gamma}\varepsilon\right)\right]\varepsilon dF_{h}\left(\varepsilon\right)+\left[1-F_{g}\left(0\right)\right]\int_{-\infty}^{\infty}\varepsilon dF_{h}\left(\varepsilon\right)$$
$$=\int_{-\infty}^{\infty}\left|\left[F_{g}\left(0\right)-F_{g}\left(-\frac{\beta\left(1-\alpha\right)}{\left(1-\beta\right)\gamma}\varepsilon\right)\right]\varepsilon\right|dF_{h}\left(\varepsilon\right)\geq0. \quad \text{(A13)}$$

A.3 Proof of Proposition 2

To solve for the equilibrium, we make educated guesses for the functional forms of social welfare:

$$V(s_t) = v_0 + v_k \log k_t + v_h \log h_t + v_\varepsilon^g \varepsilon_{t-1}^g + v_\varepsilon^h \varepsilon_{t-1}^h, \tag{A14}$$

and of the value of incumbency:

$$Z(s_t) = Z. \tag{A15}$$

The guess (A14) for the welfare function suffices to establish that private savings are:

$$\begin{aligned} K(s_t, \tau_t) &= \arg\max_K \left\{(1-\gamma)\log\left\{\left[1-(1-\alpha)\tau_t\right] y(k_t, h_t) - K\right\} + \beta v_k \log K\right\} \\ &= \frac{\beta v_k}{1-\gamma+\beta v_k}\left[1-(1-\alpha)\tau_t\right] y(k_t, h_t). \end{aligned} \tag{A16}$$

Recalling that $\mathbb{E}\omega_t^g = \mathbb{E}\omega_t^h = \mathbb{E}\varepsilon_t^h = 0$, (A14) also implies that voters' policy preferences are:

$$\Delta_1(s_t, \tau_t, k_{t+1}, g_t, h_{t+1}) = v_\varepsilon^g \varepsilon^g(s_t, \tau_t, g_t) + v_\varepsilon^h \varepsilon^h(s_t, \tau_t, h_{t+1}) \tag{A17}$$

for the share $\theta(p,q)$ of citizens who have observed h_{t+1}, and:

$$\Delta_0(s_t, \tau_t, k_{t+1}, g_t) = v_\varepsilon^g \varepsilon^g(s_t, \tau_t, g_t) \tag{A18}$$

the remainder $1-\theta(p,q)$ of voters who have not observed h_{t+1}. Then $\chi(s_t)$ as defined in Definition (1) is an indicator for:

$$\begin{aligned} \Psi_t \leq\ & v_\varepsilon^g \varepsilon^g\left(s_t, T(s_t), \left[(1-\alpha) T(s_t) y(k_t, h_t) - H(s_t, T(s_t))\right] \exp\left(\varepsilon_{t-1}^g + \varepsilon_t^g\right)\right) \\ & + \theta(p,q)\, v_\varepsilon^h \varepsilon^h\left(s_t, T(s_t), H(s_t, T(s_t)) \exp\left(\varepsilon_{t-1}^h + \varepsilon_t^h\right)\right). \end{aligned} \tag{A19}$$

In equilibrium, regardless of the form of the welfare function, voters' inference is correct. Equations (15) and (16) imply that:

$$\varepsilon^g\left(s_t, T(s_t), \left[(1-\alpha) T(s_t) y(k_t, h_t) - H(s_t, T(s_t))\right] \exp\left(\varepsilon_{t-1}^g + \varepsilon_t^g\right)\right) = \varepsilon_t^g \tag{A20}$$

and

$$\varepsilon^h\left(s_t, T(s_t), H(s_t, T(s_t)) \exp\left(\varepsilon_{t-1}^h + \varepsilon_t^h\right)\right) = \varepsilon_t^h. \tag{A21}$$

As a consequence, $\chi(s_t)$ is an indicator for:

$$\Psi_t \leq v_\varepsilon^g \varepsilon_t^g + \theta(p,q)\, v_\varepsilon^h \varepsilon_t^h, \tag{A22}$$

whose distribution is independent of s_t.

We assume that the support of all shocks is such that neither the aggregate outcome of the election nor any single voter's ballot is perfectly predictable on the basis of g_t and h_{t+1} alone. Formally:

$$\Psi_t \sim U\left[-\frac{1}{2\phi}, \frac{1}{2\phi}\right] \text{ and } \psi_t^i \overset{iid}{\sim} U\left[-\bar{\psi}, \bar{\psi}\right], \tag{A23}$$

such that:

$$\max\left\{-\frac{1}{2\phi},\frac{1}{2\phi}-\bar{\psi}\right\}\leq-\left[\gamma\hat{\varepsilon}_g+\frac{(1-\alpha)\beta}{1-\beta}\hat{\varepsilon}_h\right]<$$
$$\gamma\hat{\varepsilon}_g+\frac{(1-\alpha)\beta}{1-\beta}\hat{\varepsilon}_h\leq\min\left\{\frac{1}{2\phi},\bar{\psi}-\frac{1}{2\phi}\right\}. \quad \text{(A24)}$$

Then the uniform distribution of Ψ_t implies that:

$$\mathbb{E}\chi\left(s_t\right)=\frac{1}{2}. \quad \text{(A25)}$$

The guess (A15) for the value of holding political office is then correct for a constant:

$$Z=\frac{2z}{2-\beta}, \quad \text{(A26)}$$

conditional on the guess (A14) for the welfare function being correct.

Given (A14) and the ensuing value of office Z, expenditure on public investment is then:

$$H\left(s_t,\tau_t\right)=\arg\max_H\left\{\begin{array}{c}\gamma\log\left[\left(1-\alpha\right)\tau_t y\left(k_t,h_t\right)-H\right]+\beta v_h\log H\\+\beta\mathbb{E}\left[\left(v_\varepsilon^g\varepsilon_t^g+v_\varepsilon^h\varepsilon_t^h+Z\right)\chi\left(s_t,\tau_t,H\right)\right]\end{array}\right\}, \quad \text{(A27)}$$

recalling that $\chi\left(s_t,\tau_t,H\right)$ is independent of the unobservable challenger shocks ω_t^g and ω_t^h. Moreover, the simplification for Δ_1 and Δ_0 found above and the inferences (15) and (16) imply that $\chi\left(s_t,\tau_t,H\right)$ is an indicator for:

$$\Psi_t\leq v_\varepsilon^g\left\{\varepsilon_t^g+\log\left[\left(1-\alpha\right)\tau_t y\left(k_t,h_t\right)-H\right]-\log\left[\left(1-\alpha\right)\tau_t y\left(k_t,h_t\right)-H\left(s_t,\tau_t\right)\right]\right\}$$
$$+\theta\left(p,q\right)v_\varepsilon^h\left[\varepsilon_t^h+\log H-\log H\left(s_t,\tau_t\right)\right], \quad \text{(A28)}$$

such that:

$$\mathbb{E}\chi\left(s_t,\tau_t,H\right)=\frac{1}{2}$$
$$+\phi v_\varepsilon^g\left\{\log\left[\left(1-\alpha\right)\tau_t y\left(k_t,h_t\right)-H\right]-\log\left[\left(1-\alpha\right)\tau_t y\left(k_t,h_t\right)-H\left(s_t,\tau_t\right)\right]\right\}$$
$$+\phi\theta\left(p,q\right)v_\varepsilon^h\left[\log H-\log H\left(s_t,\tau_t\right)\right], \quad \text{(A29)}$$

while

$$\mathbb{E}\left[\varepsilon_t^g\chi\left(s_t,\tau_t,H\right)\right]=\phi v_\varepsilon^g\sigma_g^2 \text{ and } \mathbb{E}\left[\varepsilon_t^h\chi\left(s_t,\tau_t,H\right)\right]=\phi\theta\left(p,q\right)v_\varepsilon^h\sigma_h^2. \quad \text{(A30)}$$

Plugging these in:

$$H\left(s_t,\tau_t\right)=$$
$$\arg\max_H\left\{\left(\gamma+\beta Z\phi v_\varepsilon^g\right)\log\left[\left(1-\alpha\right)\tau_t y\left(k_t,h_t\right)-H\right]+\beta\left[v_h+Z\phi\theta\left(p,q\right)v_\varepsilon^h\right]\log H\right\}$$
$$=\frac{\beta\left[v_h+Z\phi\theta\left(p,q\right)v_\varepsilon^h\right]}{\gamma+\beta\left\{v_h+Z\phi\left[v_\varepsilon^g+\theta\left(p,q\right)v_\varepsilon^h\right]\right\}}\left(1-\alpha\right)\tau_t y\left(k_t,h_t\right). \quad \text{(A31)}$$

Given the guess (A14) and the ensuing value of office Z, labor-income taxes are:

$$T(s_t) = \arg\max_T \left\{ \begin{array}{l} (1-\gamma)\log\left\{\left[1-(1-\alpha)T\right]y(k_t,h_t) - K(s_t,T)\right\} \\ +\gamma\log\left[(1-\alpha)Ty(k_t,h_t) - H(s_t,T)\right] \\ +\beta\left[v_k\log K(s_t,T) + v_h\log H(s_t,T)\right] \\ +\beta\mathbb{E}\left[\left(v_\varepsilon^g\varepsilon_t^g + v_\varepsilon^h\varepsilon_t^h + Z\right)\chi(s_t,T)\right] \end{array} \right\}, \tag{A32}$$

where $\chi(s_t,T)$ is an indicator for:

$$\Psi_t \leq v_\varepsilon^g\varepsilon_t^g + \theta(p,q)\,v_\varepsilon^h\varepsilon_t^h, \tag{A33}$$

such that:

$$\mathbb{E}\chi(s_t,T) = \frac{1}{2},\ \mathbb{E}\left[\varepsilon_t^g\chi(s_t,T)\right] = \phi v_\varepsilon^g\sigma_g^2 \text{ and } \mathbb{E}\left[\varepsilon_t^h\chi(s_t,T)\right] = \phi\theta(p,q)\,v_\varepsilon^h\sigma_h^2. \tag{A34}$$

Hence, considering the solutions for $K(s_t,\tau_t)$, and $H(s_t,\tau_t)$, taxes are:

$$\begin{aligned} T(s_t) &= \arg\max_T \left\{(1-\gamma+\beta v_k)\log\left[1-(1-\alpha)T\right] + (\gamma+\beta v_h)\log T\right\} \\ &= \frac{1}{1-\alpha}\frac{\gamma+\beta v_h}{1+\beta(v_k+v_h)}. \end{aligned} \tag{A35}$$

Finally, using the guess (A14) on the right-hand side of the recursive definition of the social welfare function itself:

$$\begin{aligned} V(s_t) = {} & (1-\gamma)\log\left\{\left[1-(1-\alpha)T(s_t)\right]y(k_t,h_t) - K(s_t,T(s_t))\right\} \\ & + \gamma\left\{\log\left[(1-\alpha)T(s_t)\,y(k_t,h_t) - H(s_t,T(s_t))\right] + \varepsilon_{t-1}^g\right\} \\ & + \beta\left\{v_k\log K(s_t,T(s_t)) + v_h\left[\log H(s_t,T(s_t)) + \varepsilon_{t-1}^h\right]\right\} \\ & + \beta\mathbb{E}\left[\left(v_\varepsilon^g\varepsilon_t^g + v_\varepsilon^h\varepsilon_t^h\right)\chi(s_t)\right] + \beta\mathbb{E}\left\{\left(v_\varepsilon^g\omega_t^g + v_\varepsilon^h\omega_t^h\right)\left[1-\chi(s_t)\right]\right\}. \end{aligned} \tag{A36}$$

The distribution of $\chi(s_t)$ and the solutions for $K(s_t,\tau_t)$, $H(s_t,\tau_t)$, and $T(s_t)$ then imply that:

$$\begin{aligned} V(s_t) = {} & (1-\gamma)\log\left[\frac{1-\gamma}{1+\beta(v_k+v_h)}y(k_t,h_t)\right] \\ & + \gamma\left(\log\left\{\frac{\gamma+\beta Z\phi v_\varepsilon^g}{1+\beta(v_k+v_h)}\frac{\gamma+\beta v_h}{\gamma+\beta v_h+\beta Z\phi\left[v_\varepsilon^g+\theta(p,q)\,v_\varepsilon^h\right]}y(k_t,h_t)\right\} + \varepsilon_{t-1}^g\right) \\ & + \beta v_k\log\left[\frac{\beta v_k}{1+\beta(v_k+v_h)}y(k_t,h_t)\right] \\ & + \beta v_h\left(\log\left\{\beta\frac{v_h+Z\phi\theta(p,q)\,v_\varepsilon^h}{1+\beta(v_k+v_h)}\frac{\gamma+\beta v_h}{\gamma+\beta v_h+\beta Z\phi\left[v_\varepsilon^g+\theta(p,q)\,v_\varepsilon^h\right]}y(k_t,h_t)\right\} + \varepsilon_{t-1}^h\right) \\ & + \beta\phi\left[\left(v_\varepsilon^g\sigma_g\right)^2 + \theta(p,q)\left(v_\varepsilon^h\sigma_h\right)^2\right]. \end{aligned} \tag{A37}$$

Recalling the Cobb-Douglas production function (11), our educated guess (A14) is correct

for:

$$v_k = \alpha\left[1+\beta\left(v_k+v_h\right)\right],\ v_h = (1-\alpha)\left[1+\beta\left(v_k+v_h\right)\right],\ v_\varepsilon^g = \gamma,\ v_\varepsilon^h = \beta v_h, \tag{A38}$$

and

$$\begin{aligned} v_0 = (1-\gamma)\log\frac{1-\gamma}{1+\beta\left(v_k+v_h\right)} + \beta v_k \log\frac{\beta v_k}{1+\beta\left(v_k+v_h\right)} \\ + \gamma\log\left\{\frac{\gamma+\beta Z\phi v_\varepsilon^g}{1+\beta\left(v_k+v_h\right)}\frac{\gamma+\beta v_h}{\gamma+\beta v_h+\beta Z\phi\left[v_\varepsilon^g+\theta\left(p,q\right)v_\varepsilon^h\right]}\right\} \\ + \beta v_h\log\left\{\beta\frac{v_h+Z\phi\theta\left(p,q\right)v_\varepsilon^h}{1+\beta\left(v_k+v_h\right)}\frac{\gamma+\beta v_h}{\gamma+\beta v_h+\beta Z\phi\left[v_\varepsilon^g+\theta\left(p,q\right)v_\varepsilon^h\right]}\right\} \\ + \left[1+\beta\left(v_k+v_h\right)\right]\log A + \beta\phi\left[\left(v_\varepsilon^g\sigma_g\right)^2+\theta\left(p,q\right)\left(v_\varepsilon^h\sigma_h\right)^2\right]. \end{aligned} \tag{A39}$$

Solving out:

$$v_k = \frac{\alpha}{1-\beta},\ v_h = \frac{1-\alpha}{1-\beta},\ v_\varepsilon^g = \gamma,\ v_\varepsilon^h = \frac{(1-\alpha)\beta}{1-\beta}, \tag{A40}$$

and

$$\begin{aligned} (1-\beta)v_0 = (1-\beta)(1-\gamma)\log\left[(1-\beta)(1-\gamma)\right] + \alpha\beta\log\left(\alpha\beta\right) \\ + (1-\beta)\gamma\log\left[(1-\beta)\gamma+\zeta\right] + (1-\alpha)\beta\log\left[(1-\alpha)\beta-\zeta\right] \\ + \log A + \frac{\beta}{1-\beta}\phi\left\{\left[(1-\beta)\gamma\sigma_g\right]^2+\theta\left(p,q\right)\left[(1-\alpha)\beta\sigma_h\right]^2\right\}, \end{aligned} \tag{A41}$$

for:

$$\zeta \equiv \frac{(1-\alpha)\beta^2(1-\beta)\gamma Z\phi\left[1-\theta\left(p,q\right)\right]}{(1-\beta)\gamma\left(1+\beta Z\phi\right)+(1-\alpha)\beta\left[1+\beta Z\phi\theta\left(p,q\right)\right]}, \tag{A42}$$

such that:

$$\frac{\partial\zeta}{\partial q} = -\frac{(1-\alpha)\beta^2(1-\beta)\gamma\left[(1-\alpha)\beta+(1-\beta)\gamma\right](1+\beta Z\phi)Z\phi}{\left\{(1-\beta)\gamma\left(1+\beta Z\phi\right)+(1-\alpha)\beta\left[1+\beta Z\phi\theta\left(p,q\right)\right]\right\}^2}\frac{\partial\theta}{\partial q} < 0. \tag{A43}$$

We can collect the results above in an exact solution for all equilibrium functions. The social welfare function depends on social capital according to:

$$\frac{\partial V}{\partial q} = -\frac{\left[(1-\alpha)\beta+(1-\beta)\gamma\right]\zeta}{(1-\beta)\left[(1-\alpha)\beta-\zeta\right]\left[(1-\beta)\gamma+\zeta\right]}\frac{\partial\zeta}{\partial q} + \beta\phi\left[\frac{(1-\alpha)\beta}{1-\beta}\sigma_h\right]^2\frac{\partial\theta}{\partial q} > 0. \tag{A44}$$

A.4 Proof of Proposition 3

The electoral process implies that the competence of the ruling politician evolves according to:

$$\hat{\eta}_t = \chi_{t-1}\left(\varepsilon_{t-1}+\varepsilon_t\right) + \left(1-\chi_{t-1}\right)\left(\omega_{t-1}+\omega_t\right), \tag{A45}$$

where χ_{t-1} is an indicator for:

$$\Psi_{t-1} \leq \gamma \varepsilon_{t-1}^{g} + \frac{(1-\alpha)\beta}{1-\beta} \theta(p,q) \varepsilon_{t-1}^{h}. \tag{A46}$$

The cumulative distribution function of $\hat{\eta}_t^h$ is:

$$\begin{aligned}
\Pr\left(\hat{\eta}_t^h \leq \eta\right) &= \Pr\left[\chi_{t-1}\left(\varepsilon_{t-1}^h + \varepsilon_t^h\right) + \left(1-\chi_{t-1}\right)\left(\omega_{t-1}^h + \omega_t^h\right) \leq \eta\right] \\
&= \Pr\left(\chi_{t-1} = 1 \wedge \varepsilon_{t-1}^h + \varepsilon_t^h \leq \eta\right) + \Pr\left(\chi_{t-1} = 0 \wedge \omega_{t-1}^h + \omega_t^h \leq \eta\right) \\
&= \Pr\left[\Psi_{t-1} \leq \gamma \varepsilon_{t-1}^{g} + \frac{(1-\alpha)\beta}{1-\beta} \theta(p,q) \varepsilon_{t-1}^h \wedge \varepsilon_{t-1}^h + \varepsilon_t^h \leq \eta\right] + \frac{1}{2}\Pr\left(\omega_{t-1}^h + \omega_t^h \leq \eta\right) \\
&= \int_{-\infty}^{\infty} \left[1 + \frac{(1-\alpha)\beta}{1-\beta}\theta(p,q)\phi\varepsilon\right] F_h(\eta - \varepsilon) f_h(\varepsilon) d\varepsilon,
\end{aligned} \tag{A47}$$

where $F_h(\varepsilon)$ is the cumulative distribution function of ε_t^h and $f_h(\varepsilon)$ its probability density function. An increase in q induces an increase in $\hat{\eta}_t^h$ in the sense of first-order stochastic dominance because:

$$\int_{-\infty}^{\infty} \varepsilon F_h(\eta - \varepsilon) f_h(\varepsilon) d\varepsilon = \mathbb{E}\left[\varepsilon_t^h F_h\left(\eta - \varepsilon_t^h\right)\right] < \mathbb{E}\varepsilon_t^h \mathbb{E}\left[F_h\left(\eta - \varepsilon_t^h\right)\right] = 0. \tag{A48}$$

The growth rate of output is:

$$\log y_{t+1} - \log y_t = \log A + (1-\alpha)\log\left[\beta(1-\alpha) - \zeta\right] + \alpha \log(\beta\alpha) + (1-\alpha)\hat{\eta}_t^h. \tag{A49}$$

The equilibrium distribution of $\hat{\eta}_t^h$ has raw moments:

$$\mathbb{E}\hat{\eta}_t^h = \mathbb{E}\left(\chi_{t-1}\varepsilon_{t-1}^h\right) = \frac{(1-\alpha)\beta}{1-\beta}\theta(p,q)\phi\sigma_h^2 \tag{A50}$$

and

$$\begin{aligned}
\mathbb{E}\left[\left(\hat{\eta}_t^h\right)^2\right] &= \mathbb{E}\left[\chi_{t-1}\left(\varepsilon_{t-1}^h + \varepsilon_t^h\right)^2\right] + \mathbb{E}\left(1-\chi_{t-1}\right)\mathbb{E}\left[\left(\omega_{t-1}^h + \omega_t^h\right)^2\right] \\
&= \mathbb{E}\left[\chi_{t-1}\left(\varepsilon_{t-1}^h\right)^2\right] + \mathbb{E}\chi_{t-1}\mathbb{E}\left[\left(\varepsilon_t^h\right)^2\right] \\
&\quad + \mathbb{E}\left(1-\chi_{t-1}\right)\left\{\mathbb{E}\left[\left(\omega_{t-1}^h\right)^2\right] + \mathbb{E}\left[\left(\omega_t^h\right)^2\right]\right\} \\
&= \mathbb{E}\left[\chi_{t-1}\left(\varepsilon_{t-1}^h\right)^2\right] + \frac{3}{2}\sigma_h^2 \\
&= \frac{(1-\alpha)\beta}{1-\beta}\theta(p,q)\phi\mathbb{E}\left[\left(\varepsilon_{t-1}^h\right)^3\right] + 2\sigma_h^2,
\end{aligned} \tag{A51}$$

so the variance of the output growth rate is:

$$\begin{aligned} Var\left(\log y_{t+1} - \log y_t\right) &= (1-\alpha)^2 Var\left(\hat{\eta}_t^h\right) \\ &= (1-\alpha)^2 \left\{ \frac{(1-\alpha)\beta}{1-\beta}\theta(p,q)\phi\mathbb{E}\left[\left(\varepsilon_{t-1}^h\right)^3\right] + 2\sigma_h^2 - \left[\frac{(1-\alpha)\beta}{1-\beta}\theta(p,q)\phi\sigma_h^2\right]^2 \right\} \\ &= (1-\alpha)^2 \left\{ 2\sigma_h^2 - \left[\frac{(1-\alpha)\beta}{1-\beta}\theta(p,q)\phi\sigma_h^2\right]^2 \right\}, \quad \text{(A52)} \end{aligned}$$

given that $\mathbb{E}\left[\left(\varepsilon_{t-1}^h\right)^3\right] = 0$ since the distribution of ε_{t-1}^h is symmetric around $\mathbb{E}\varepsilon_{t-1}^h = 0$.