Education, Corruption, and the Distribution of Income*

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Abstract: We examine how the interaction between education and corruption affects institutional reform and economic development. Since institutional reforms are the endogenous outcomes of political processes, our model focuses on the relationship between educational attainment and the effectiveness of political participation. While corruption is well known to reduce average income and education, education is shown to induce dual feedback effects on corruption. Education increases not only output and hence corruption rents, but it also generates more informed electorates that better monitor the actions of the government. In democracies, increases in education may then limit the incentives for corruption of opportunistic politicians, and even induce institutional reforms that eliminate corruption. Feasible paths out of poverty traps are characterized either by initial changes in institutions or education.

Key words: Inequality, corruption, education, economic development.

JEL Classification: O1

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1. Introduction

The recent empirical growth literature has emphasized the importance of both human capital and good institutions for economic development. An intense debate has emerged about the relative importance of these two factors, and the extent to which institutions cause human capital accumulation and growth, or vice versa. Central to the debate are a number of countries, many in East Asia, which experienced rapid growth in the absence of strong economic institutions. Instead their growth has been the result of pro-growth policies that favour physical and human capital accumulation; see Glaeser et al. (2004).

The evidence seems to point to two disparate development paths, one institution led, the other based on factor accumulation, especially human capital.

In this paper we present a model that highlights that either development path is endogenously determined by a country’s initial conditions. Initial conditions, both in terms of average human capital and the distribution of wealth, are shown to determine the endogenous policy choices of an incumbent, self-interested government that give rise to a host of distinct development paths. Either institution-led or education-led development can lead to equilibria that feature high income, high education, and quality institutions. The model also examines the conditions that lock countries in a low-income equilibrium, one that is characterized by poor institutions, low human capital, and high inequality. The multiplicity of development paths may explain the empirical literature’s difficulty in identifying whether high quality institutions “cause” education, or whether education “causes” quality institutions. Since initial inequality is the crucial determinant of the development path, our results are consistent with Easterly (2007), who shows that unequal distributions are major impediments to educational achievement, quality institutions and development.1

Our model rests on three strands of the literature. First, we base our analysis on Galor and Zeira’s (1993) approach to education. In their framework credit market imperfections limit agents’ human capital investments, and to this we add two policy dimensions. On the one hand, government corruption (our concept of “bad institutions”) that results in the misappropriation of public funds, which reduces disposable income and hence the level of education. On the other hand, governments may use their power of taxation to provide public education (or education subsidies), which increases educational attainment. Second, we follow Wallis (2005) and provide the government

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1 Chong and Gradstein (2007) also provide empirical evidence of a correlation between poor institutions and inequality, and find double causality between the two.
with the opportunity to pass institutional reforms that rule out corruption and increase incumbents’ reelection probabilities. This mechanism is akin to Acemoglu and Robinson (2000), where political elites agree to share power by extending franchise in order to prevent being ousted in a revolution.

The third key aspect of our analysis is that we model a new dimension of political participation. While previous models examined the transition from dictatorship to democracy and the extension of franchise, we assume that democracy is established and examine the implications of education increasing the efficacy of political participation. A voluminous political science literature documents that education determines the effectiveness of political participation, even in democratic societies (see OCED 2007 for a survey). Specifically, education attainment is associated with political participation that is more “civic orientated” (political interest and attentiveness) and “elite-challenging” (electorates better identify and punish corrupt behavior). This indicates that even in democratic societies, the quality of institutions can vary with the level of education. Evidence that more educated electorates are more likely to identify and punish corruption is found in Galston (2001), Delli Carpini and Keeter (1996), Popkin and Dimock (1999), Glaeser and Saks (2006), and Nie et al. (1996). An economic application of this concept is developed by Glaeser, Ponzetto, and Shleifer (2007) who examine the relationship between education, civic activity and the transition from dictatorship to democracy.

Since our interest are the macroeconomic implications of education affecting the effectiveness of political participation, we focus on a particular type of “grand” corruption that affects economic outcomes in a democracy. Grand corruption is undertaken by political elites that implement policies to foster their own utility, either through misappropriation or distorted allocation of public funds. Corruption tends to reduce education levels since it reduces disposable incomes and the ability to invest in education. On the other hand, education affects corruption. More educated electorates generate higher output and corruption rents but their higher level of political participation.

2 Wallis shows that major transport infrastructure projects in the US were ridden with corruption, which led to a fiscal crisis in the early 1840s. Many states responded by writing new constitutions that increased the transparency of government borrowing and expenditure, which reduced corruption. Cross-country differences in the degree of budget transparency and the possibility of discretionary taxation are large; see Alesina et al. (1999) and the references there cited.

3 See Acemoglu and Robinson (2000) and Bourguignon and Verdier (2000).


5 We consider grand corruption as opposed to bribes paid by private agents or bureaucratic (“petty”) corruption (see Bardhan, 2001 and Tanzi, 2001). Jain (2001) argues that it is grand corruption that has the most damaging economic effects. See Alesina and Angeletos (2005) for an analysis of grand corruption.
participation increases the risk that corrupt incumbents are detected and punished. The threat may be sufficiently large for a corrupt government to find it in their interest to pass institutional reforms that eliminate future corruption.

We present a number of representative equilibria. Governments in countries with high initial educational attainment will abstain from corruption, since the elite is motivated to behave honestly in order to maintain political power when facing a highly educated electorate. The resulting low level of corruption leads to a virtuous cycle where further accumulation of human capital results in an equal distribution of wealth. Countries with intermediate levels of education are most likely to be stuck in poverty traps since that level of education is shown to be most conducive to corrupt political regimes. For low levels of education, the distribution of wealth is the key determinant of policy choices. When there is little education, corrupt behavior is unlikely to be detected but corruption rents are low. To increase its corruption rents, the elite may foster human capital accumulation and income growth through public education. Pro-growth policies pay off only if the distribution of wealth is sufficiently equal; otherwise the cost of the public education offsets any corruption gains.

The paper adds to the growing literature on endogenous political institutions, and is closely related to Acemoglu and Robinson (2000) and Bourguignon and Verdier (2000). The political elite in Bourguignon and Verdier faces a similar trade-off as in our model: education increases rents (in their case due to a technological externality) but also electoral participation. Since greater electoral participation leads to more redistribution, Bourguignon and Verdier find a monotonic relationship between education and development which is difficult to ascertain in the data. Our analysis shares with Acemoglu and Robinson (2000) that the political elite may be interested in committing to institutional changes that limit its power in the short run, but which increases their long term payoff. Acemoglu and Robinson focus on the threat of revolution that forces parties to extend the franchise and commit to redistribution. In our model the threat to the elite (and the subsequent institutional change) is due to the well-documented capacity of a more educated electorate to monitor the behavior of the ruling party. Since education not only threatens the reelection, but also increases corruption rents, there is a mitigating factor that is absent in Acemoglu and Robinson. For

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intermediate levels of education, plausible parameter values show higher corruption than when educational attainment is high or low.

Our work is also related to the literature on the causes and effects of corruption. One strand of this literature identifies the static incentives for corruption and rent-seeking. Another strand examines the impact of corruption on growth, following the seminal work of Mauro (1995, 1997) who documents that corruption reduces growth. The relationship between education and corruption has, however, received little attention. Two notable exceptions are Ehrlich and Lui (1999) and De La Croix and Delavallade (2008). Ehrlich and Lui examine how individuals’ decisions to allocate their time between human capital investments and rent-seeking activity affects growth. De la Croix and Delavallade explore the idea that corruption affects the diversion of public funds from growth-enhancing human capital accumulation to other types of expenditures where corruption is easier to conceal. They thus present a complementary explanation to ours, in which the “predatory technology” is the key determinant of education and growth. A crucial difference is that De la Croix and Delavallade examine a representative agent model; hence inequality across individuals plays no role in their analysis, while in our framework it is the fundamental driving force that determines development paths.

The paper is organized as follows. Section 2 describes the production sector and education decisions, using the overlapping-generations model with imperfect capital markets developed by Galor and Zeira (1993). It shows how the tax rate affects bequests and the level of human capital, and highlights the role played by initial inequality. Section 3 introduces the political structure of the model, in which a political elite chooses the tax rate for the provision of a public good. Section 4 examines the strategic behavior of the political elite as a function of education and inequality. Subsequently we examine the dynamics of education and characterize the possible development paths. Section 5 concludes.

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7 This literature started with Krueger (1974). For recent surveys see Bardhan (1997) and Tanzi (1998).
2. Production, Education and Taxation

2.1. Description of the Economy

The production and education structures follow Galor and Zeira (1993), to which we add a proportional income tax that is levied in order to finance a public good.

2.1.1 Production

Consider a small, open economy with skilled and unskilled labour, denoted $L_s$ and $L_u$, respectively. Skilled and unskilled workers produce output in separate, competitive sectors denoted by $j$, with $j = u, s$. The production functions are given by,

$$ Y_j = K_j^\alpha (A_j L_j)^{1-\alpha}, \quad 0 < \alpha < 1 $$  \hspace{1cm} (1a)

where $K$ and $A$ represent physical capital and technology, respectively. We assume $A_s > A_u$, implying that technology used by skilled workers is more productive.

Firms borrow at the constant world interest rate, $r$, and income is taxed at rate $\tau$, which is determined endogenously by the political process that is specified in section 3. For now we take $\tau$ to be given. Equality between the world interest rate and the domestic after-tax return on capital determines capital-labor ratios,

$$ k_j = A_j (1-\tau)/r(1-\alpha), $$

where $k_j = K_j / L_j$. As a result, wages, $w_j$, are independent of the labor supply and given by

$$ w_j = \lambda_j (1-\tau) \alpha/(1-\alpha), \quad \lambda_j = (1-\alpha)A_j(\alpha/r)^{\alpha/(1-\alpha)}. \hspace{1cm} (2)$$

Note that wages depend negatively on the tax rate, through the effect that the latter has on the capital stock. Using the labor market clearing constraint, $L_u + L_s = 1$, aggregate output can be expressed as

$$ Y = Y_u + Y_s = (1-\tau) (1-L_s/L_u) \lambda_u (1-L_s) + \lambda_s L_s. \hspace{1cm} (1b)$$

Not surprisingly, higher taxes depress output while an increase in the fraction of the labor force that is educated raises output.

We assume that production requires the provision of a public good, which can be thought of as an infrastructure requirement. We follow García-Peñalosa and Turnovsky (2005), and assume that $\phi Y$ units of the public good are required to produce a level of

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8 We refer the reader to the original paper for a detailed discussion and motivation of the assumptions.
output $Y$, with $0 < \phi < 1$. The public good has a constant unit cost, $c$, implying that the total cost is $c\phi Y$. The public good is financed through the proportional income tax, implying that the tax rate must be at least $c\phi$, although it may be higher if the party is corrupt or if it subsidizes education.

2.1.2 Education, consumption and bequests
There is a mass 1 of overlapping-generations dynasties indexed by $i$. Agents live for two periods, implying that the population measure is 2. Agents differ in their initial wealth, with all the skilled workers holding wealth $x_{s,0}$ and all the unskilled $x_{u,0} < x_{s,0}$ at time 0. The timing of education and bequests is as follows. At the beginning of the first period, an individual receives a bequest and decides whether or not to invest in education. Education takes no time. The individual is then employed in the first period, receives a wage corresponding to her skill level, and has an offspring at the end of the period. In the second period, the individual does not work, she consumes and leaves a bequest. There are elections at the beginning of each period, and all agents vote.

Each worker derives utility from her own consumption, $c_j$, and the bequest left to her offspring, $b_i$, and the utility function takes the form

$$U_i = \left( \frac{c_u}{1 - \beta} \right)^{1-\beta} \left( \frac{b_i}{\beta} \right)^\beta,$$

where $\beta < 1$. (3)

Utility optimization implies that consumption and bequests are constant fractions of per capita output, $c_i = (1 - \beta)y_i$ and $b_i = \beta y_j = x_{i,t+1}$, where $x_{i,t+1}$ is the inheritance that a young individual from dynasty $i$ receives from her parents, i.e. her wealth. Substituting for consumption and the bequest, the indirect utility function is given by

$$U_i = y_i. \quad (3')$$

We employ the common assumption that there exists a fixed education cost, $e$, and that borrowing to finance education is not possible. The incomes of an unskilled and a skilled agent can then be written as

$$y_{u,t} = (1 + r)(1 - r_i)w_u(r_i) + x_i, \quad (4a)$$

$$y_{s,t} = (1 + r)(1 - r_i)w_s(r_i) + (x_i - e). \quad (4b)$$

9 None of our results would change in the more general case in which borrowing to invest in education is possible but costly due to imperfect capital markets, as in Galor and Zeira (1993).
After receiving their bequest, young agents decide whether or not to study. A necessary condition to invest in education is that bequests are large enough to cover the cost of education, i.e. $x_u \geq e$. Wealthy agents then invest in education if their lifetime income as skilled workers exceeds that of being unskilled, that is, if $y_s > y_u$. This inequality reduces to the condition that the return to education must be greater than the interest an agent could obtain from investing $e$ in physical capital, that is,

$$\lambda_s - \lambda_u \geq e.$$  

Note that this equation is independent of the agents' wealth, implying that if it is satisfied, all agents wish to become educated. Furthermore, it implies that a sufficiently low tax rate $\tau \leq \hat{\tau}$ is required for agents to wish to invest in education, where $\hat{\tau} = 1 - \left(\frac{e}{\lambda_s - \lambda_u}\right)^{1-\alpha}$.

2.1.3 Dynamics

The dynamics of the model are given by the evolution of bequests, which are characterized by

$$x_{u,t+1} = \beta(1 + r)\left(\lambda_u (1 - \tau) \frac{1}{\alpha(1-\alpha)} + x_{u,t}\right),$$  

$$x_{s,t+1} = \beta(1 + r)\left(\lambda_s (1 - \tau) \frac{1}{\alpha(1-\alpha)} + x_{s,t} - e\right).$$  

The bequests of all dynasties with wealth $x_t < e$ are governed by equation (5a), while those of dynasties with wealth $x_t \geq e$ are governed by (5b). These two functions are depicted in Figure 1, where the lower line represents the bequest function of the unskilled and the higher one the bequest function of the skilled. Under the assumption of a constant tax rate and $(1 + r)\beta < 1$ (which occurs if the propensity to bequeath is not too large), these two functions intersect the 45° degree line and converge to the steady states $x_{u,t+1} = x_{u,t} = \bar{x}_u$ and $x_{s,t+1} = x_{s,t} = \bar{x}_s$.

Figure 1 about here

Assuming a constant tax rate, the long-run distribution of wealth converges to an invariant distribution that is a function of the initial distribution (see Galor and Zeira, 1993). The long-run levels of wealth held by skilled and unskilled can then be expressed as.
\[
\bar{x}_u[r] = \frac{\beta(1+r)}{1-(1+r)\beta} \lambda_u (1-r)^{\alpha}, \quad (6a)
\]

\[
\bar{x}_s[r] = \frac{\beta(1+r)}{1-(1+r)\beta} \left( \lambda_s (1-r)^{\alpha} - e \right), \quad (6b)
\]

while the steady state fraction of skilled (unskilled) workers is given by the proportion of dynasties whose initial wealth exceeds (falls below) the cost of education.

Galor and Zeira discuss the equilibrium at length. They examine the role of the production function (technology and interest rate), and the initial distribution of wealth in determining the feasible equilibria. Here, we are interested in the political economy of taxation and hence investigate the impact of the tax rate on the education decision.

An equilibrium with inequality requires a tax such that rich dynasties can afford education, while poor dynasties cannot, i.e. \( \bar{x}_u[r] < e \leq \bar{x}_s[r] \). From (6) this implies a tax in the interval \( [\bar{x}_u, \bar{x}_s] \), where \( \bar{x}_u = 1 - (e(1 - \beta(1+r))/\beta(1+r)\lambda_u)^{1-\alpha} \). Any tax rate lower than \( \bar{x}_u \) allows a descendent of those currently unskilled to eventually study, while any tax greater than \( \bar{x}_s \) implies that the return to education is too low and nobody invests in education.

In our two-class economy, we can define the initial degree of inequality as the distance between the initial wealth of the educated and that of the non-educated, \( x_{s,0} - x_{u,0} \). For given levels of education and average wealth, a lower value of \( x_{u,0} \) implies greater wealth inequality. In what follows we assume that the initial distribution of wealth is such that the initial equilibrium exhibits inequality. That is, \( x_{u,0} < e < x_{s,0} \).

The assumption is necessary to focus on the interesting case of initially unequal societies. The analysis of how political corruption and reform affect educational attainment would be irrelevant if all workers could afford education from time \( t=0 \).

**2.2. Dynamic Effects of Taxation**

We can now analyze the dynamic effects of tax changes on income and bequests, and hence on the distribution of income and educational attainment. Lower taxes have a direct and an indirect effect on individual incomes: for a given wage level, lower taxes increase disposable income, but they also raise the net return to capital, which leads to a capital inflow that raises wages. These two effects shift the bequest functions upwards, which implies higher bequests at \( t+1 \), as depicted in figure 1.
The impact on education depends on the tax level. Any tax that exceeds the threshold $\tau_u$ generates an equilibrium with inequality, although income and steady state wealth will be higher for both the skilled and the unskilled due to the inflow of physical capital (see equations (6)). Tax levels below $\tau_u$ shift the bequest function sufficiently upwards to eliminate the fixed point for the unskilled, as depicted in Figure 1. In this case, all dynasties are skilled in the long-run, i.e. $L_s = 1$. This equilibrium results in higher aggregate output and complete equality.

Figure 2 about here

The transition to such an equilibrium takes time, however, and the duration depends on the initial level of inequality, i.e. on $x_{u,0}$. Figure 2 depicts the dynamic adjustment of the economy in response to a reduction in the tax rate from $\tau_0$ to $\tau_1 < \tau_u$. The tax reduction shifts up the bequest schedule, which increases the wealth of the next generation. If the initial wealth level of the unskilled at $t$ is low, for example $x_0$, their offspring will receive an inheritance of $x_1$ which is less than the cost of education. They will hence be unable to study and the skilled labor supply at $t+1$ will be equal to that at $t$. Some descendent of this dynasty will eventually be able to study, but it will take time. Now suppose that the initial level of wealth of the unskilled is high, say $x_u$. In this circumstance their bequest is $x_1 > e$, implying that all those born at $t+1$ will be able to afford education and the skilled labor force at $t+1$ will be equal to 1. From figure 2, it is clear that the number of periods it takes for unskilled dynasties to be able to afford education, denoted $N$, is higher the lower $x_{u,0}$ is, i.e. the greater inequality is.

3. Political Economy

3.1. The Political Equilibrium

Having established the relationship between education and the distribution of wealth in response to a change in taxes, we can now examine the effects of inequality and education on corruption via the political process. Assume that there are many (infinitely lived) parties, and that at the beginning of each period an election takes place. The elected party is in power for one period before it faces reelection.
3.1.1 The government budget and corruption

There are two types of public expenditure that the government can finance. The first is the provision of the public good, which has a cost \( c\phi Y_t \). The government could also decide to introduce an education subsidy, \( s_t \), that reduces the cost of investing in human capital to \( e - s_t \). We define the “competitive” tax, denoted \( \tau^c_t \), as the tax rate that is just sufficient to cover the cost of public expenditure. Since tax revenues are given by \( \tau_t Y_t \), the competitive tax rate is \( \tau^c_t = c\phi + s_t / Y_t \). In the absence of education subsidies, the tax rate required to finance infrastructure is simply \( \tau^c = c\phi \).

We suppose that the true cost of infrastructure, \( c \), is not known to the electorate, which introduces the possibility of grand corruption, where the elected party pockets part of the tax revenues. The party in power could claim that the cost is greater than \( c \) and set a tax \( \tau_t > \tau^c_t \), in order to appropriate some of the tax revenue. Corruption rents, denoted \( \pi_t \), are given by

\[
\pi_t = (\tau_t - c\phi)Y_t - s_t,
\]

which increase with aggregate income and fall with the education subsidy. If the elected party engages in corruption, it will choose a tax rate that maximizes its corruption rents, as will be detailed below.

3.1.2 Preferences and possible actions of political parties

We suppose that parties derive utility from corruption rents, \( \pi_t \), and from ego rents, \( u \), defined, as in the political economy literature, as non-pecuniary benefits from being office.\(^{10}\) We write a party’s expected payoff as

\[
V = \sum_{t=0}^{\infty} \left( \prod_{j=0}^{t-1} p_j \frac{u + \pi_t}{(1 + \delta)^t} \right),
\]

where \( \delta \) is the subjective discount rate and \( p_j \) is the probability of reelection at time \( j \), which will be specified below.

At any point in time, the party in power can undertake three possible actions. First, it decides whether or not to subsidize education. Second, it chooses the tax rate: it

\(^{10}\) See Downs (1957) on the concept of ego rents, and, for example, Rogoff (1990) and Besley (2006) for recent applications.
can either be honest and set the competitive tax rate, or set a tax above the competitive one, i.e. be corrupt. Third, we suppose that the party can also undertake institutional reform. Institutional reform guarantees complete transparency regarding $c$, which identifies $\tau^c_i$ as the appropriate tax to voters. This could take the form of the creation of an external accounts committee or the requirement that the government budget is approved by parliament. Once institutional reform is undertaken, it remains in place, implying that future ruling parties cannot levy taxes in excess of $\tau^c_i$ and hence cannot extract corruption rents. Institutional reform is passed at the end of the period, which renders it a commitment device: a ruling party that passes reform today is “tying its hands” and committing to not being corrupt in the future.

3.1.3 Reelection probabilities

In order to relate education to the effectiveness of political participation, we posit that education affects how closely individuals can monitor the behavior of the incumbent party. This can be due, for example, to skilled individuals having better information about the cost of the public good and hence being more able to assess whether the competitive tax level is imposed. The unskilled, on the other hand, are unable to monitor the ruling party. Thus the probability that a corrupt party is caught increases in the number of educated individuals. For simplicity, we assume that the probability of being caught is equal to the fraction of skilled individuals in the population, $L_{S,t}$.

Whether or not the incumbent party is reelected depends on whether it has been caught. If the party is shown to be corrupt, voters expect it to be corrupt in the future and will not reelect it; if it has not been proven corrupt (either because it was honest or because it was corrupt but not caught), it will be reelected. Consequently, when a party is honest, it is reelected with certainty, that is,

$$p_H = 1.$$  \hspace{1cm} (9a)

Reelection with certainty in the presence of competitive taxes is assumed for simplicity. Alternative assumptions are possible. In particular, our results are robust to the assumption that the probability of reelection for honest parties be less than 1. All that is required is that the reelection probability is independent of the number of skilled workers and greater than the reelection probability for corrupt parties.
Consider now the corrupt party’s reelection probability, denoted \( p_c \). Given that the probability of being caught is \( L_{sj} \), we have
\[
p_c[L_{sj}] = 1 - L_{sj}, \tag{9b}
\]
which is decreasing in the number of skilled workers, taking the value 1 if there are no educated individuals and 0 if the entire population is skilled.

A corrupt party that passes institutional reform faces an election probability of
\[
p_{cr}[L_{sj}] = 1 - qL_{sj}, \quad 0 \leq q < 1 \tag{9c}
\]
which indicates, on the one hand, that it will be punished for its past behavior, and, on the other, that it will be rewarded for its future honest behavior. How important is the punishment for past corrupt behavior is given by \( q \). For \( q = 0 \), voters implement no punishment and a party that reforms is elected with certainty. For \( q = 1 \) (full punishment) there is no gain from the reform strategy and hence it would never be implemented; consequently we assume \( q < 1 \). Institutional reform then implies that a previously corrupt party increases its reelection probabilities by tying its hands and committing to competitive future taxes. Institutional reforms are thus plausible when political parties see the electoral participation as sufficiently elite challenging. In that case the elected party trades the ego rents that reform delivers to the incumbent for corruption rents.

### 3.2. The Endogenous Level of Corruption

Before we proceed to examine a party’s possible strategies, we must determine the optimal degree of corruption, i.e. the tax rate that corrupt parties impose. Recall that corruption rents are given by \( \pi_i = (\tau_i - c\phi)Y_i - s_i \), which increases in the tax rate for given level of output. However, as we saw in section 2, a higher tax rate reduces the capital-labor ratio and aggregate output. These two opposing forces imply that corruption rents are a concave function of \( \tau \). Using (1b) to substitute for \( Y_i \), we obtain that the level of corruption that maximizes corruption rents is
\[
\tau^* = 1 - \alpha(1 - c\phi). \tag{10}
\]

The analysis of corrupt regimes would be trivial if corruption were associated with equality, hence we assume \( \tau^c < \tau_e < \tau^* < \hat{\tau} \). This implies that the optimal corrupt tax rate \( \tau^* \) does not affect the level of education, while the competitive tax rate
\( \tau^c = c \phi \) allows all dynasties to become educated even in the absence of subsidies. This assumption is satisfied for an intermediate range of the cost of education. If the cost of education were too high, even the competitive tax rate would be too large for the wealthiest individuals to study; if the cost of education were too low, all dynasties would be able to afford education even when \( \tau^* \) is imposed. In either of these two cases, the level of education is independent of the tax rate and of the level of corruption.

The monetary rent obtained by a corrupt party at time \( t \) is then a function of the level of education and the subsidy,

\[
\pi_t[L_{S,t}, s_t] = a(1 + \varphi L_{S,t}) - s_t, \tag{11}
\]

where \( \varphi = A_s / A_u - 1, \quad a = a_0 A_u, \quad \text{and} \quad a_0 = (1 - \alpha) \left( \frac{\alpha^2}{r} \right)^{(1-\alpha)} (1 - c \phi)^{(1-\alpha)}. \)

Higher levels of education generate higher output and therefore greater corruption rents. Rents also increase in the level of unskilled productivity, \( A_u \), the skill premium, \( A_s / A_u \), and decrease in the world interest rate, \( r \), as well as in the cost of the public good, \( c \). In order to focus on the interesting cases, we suppose that \( a \) and \( \varphi \) are large so that the rents from corruption are sufficiently high. In particular, we assume \( \delta a > u \), which rules out excessively high ego rents that would drive the models results, leaving competitive taxes as the only dominant strategy; see appendix. Second, we assume that \( \varphi > q \) to rule out that the punishment is so severe that corrupt parties would never be interested in passing reform.

4. Party Behavior and the Dynamics of Education

4.1. Corruption, Subsidies and Reform

At time 0, the economy starts with a level of education, \( L_{S,0} \), and an incumbent party. A summary of the timing of the various actions is as follows. The elected party chooses a tax rate (either \( \tau^* \) or \( \tau^c \)) and whether or not to subsidize education, which determines the level of education in the next period, \( L_{S,t+1} \). At the end of \( t \), the political party also chooses whether to institute institutional reform. In period \( t+1 \) educated individuals assess whether the previous ruling party was corrupt, an election takes place, and either the incumbent is reelected or a new party takes power. The party in power for period

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11 See appendix.
$t + 1$ chooses the tax (if reform was not passed). This tax determines savings at $t + 1$ and hence the level of education at $t + 2$.

Given the sequence of events we need to consider three possible strategies for the incumbent. First, the party can be corrupt at all periods and never pass institutional reform. This implies a constant tax, no changes in education, i.e. $L_{S,t} = L_{S,0} = L_S \forall t$, and constant corruption rents since output is constant. The probability of reelection faced by such a party is $1 - L_S$, implying an expected payoff of

$$V_c[L_S] = (u + \pi[L_{S,0}])\sum_{t=0}^{\infty} \left(1 - \frac{L_S}{1 + \delta}\right)^t = \frac{(1 + \delta)(u + a(1 + qL_S))}{\delta + L_S} \tag{12a}$$

The payoff reflects that the level of education increases the corruption rent, but lowers the reelection probability. Depending on parameter values either the former or the latter effect dominates.

An alternative strategy for a ruling party is to be corrupt in the first period and then to pass institutional reform. When this strategy is chosen, corruption will be short-lived, and reforms result in low taxes that eventually allow everyone to invest in education.\(^{12}\) This strategy then provides corruption rents $\pi(L_S)$ in period 1, a higher probability of reelection, and hence higher expected ego rents, but no future corruption rents. The expected payoff for a corrupt-reforming party is

$$V_{CR}[L_S] = u + \pi[L_{S,0}] + (1 - qL_S)\sum_{t=1}^{\infty} \frac{u}{(1 + \delta)^t} = u + a(1 + qL_S) + (1 - qL_S)\frac{u}{\delta} \tag{12b}$$

This payoff is linear in the level of education, with $L_S$ having two effects as it increases corruption rents but reduces the probability of reelection. Our assumptions that $\delta a > u$ and $q > \phi$ imply that $V_{CR}[L_S]$ is increasing in $L_S$.

The third strategy for a ruling party is to expand education. By subsidizing education, the party can increase the level of education, which raises output and hence the corruption rent obtained. The optimal subsidy is $s_t = e - x_{u,t-1}$, as any subsidy lower than that will not allow the poor to study and hence will have no impact on the size of the skilled labor force.\(^{13}\) The timing of education subsidies is as follows. At the

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\(^{12}\) Note that once reform is implemented, the ruling party has no incentive to remove it. Since the only reason why they may wish to do so is to extract corruption rents, and since voters can observe institutional changes, the latter will infer that a party that removes the reform will be corrupt next period and will not reelect it with probability 1. The payoff from removing the reform is hence zero.

\(^{13}\) There is also the possibility of generating an education expansion by setting the competitive tax rate over a number of periods, which would allow poor dynasties to accumulate sufficient wealth to eventually afford education. As we discuss in the appendix, this strategy will yield the same predictions as the introduction of public education,
beginning of period \( t \), the government borrows in the international capital market an amount \( s_t \), and uses it to finance an education subsidy. The offspring of poor dynasties can now invest in education, implying that \( L_{s,t} = 1 \). Tax revenues are then collected, part of them is used to repay the loan, and the rest is pocketed by the party. Since the entire population is now educated, institutional reform will be passed in order to have a positive probability of reelection next period. Both institutional reform and a fully educated population imply that further corruption is not feasible.

When education is subsidized, corruption rents are given by
\[
\pi[1, e - x_u] = a(1 + \phi) - (1 + r)(e - x_u),
\]
where \( x_u \) is the initial wealth of the unskilled. This expression captures the trade-off faced by the party: subsidies to education increase \( L_s \) and hence tax revenue, which tends to increase rents, but the cost of financing the subsidy reduces rents for given tax revenue. The payoff to this strategy is then given by
\[
V_{SR}[x_u] = \frac{1 + \phi}{\delta} u + a(1 + \phi) - \frac{qu}{\delta} - (1 + r)(e - x_u).
\]
This payoff is independent of the initial level of education since the party is only corrupt once all agents are educated. The payoff \( V_{SR}[x_u] \) is, however, affected by the distribution of wealth. Greater inequality (a lower value of \( x_u \)) requires a larger education subsidy and hence results in lower corruption rents and a lower value of \( V_{SR}[x_u] \).

### 4.2. Corruption in the Absence of Ego Rents

To illustrate the trade-offs faced by the ruling party, we build intuition by deriving the optimal strategy in the absence of ego rents, i.e. when \( u = 0 \). In this case, institutional reform is never implemented since it would yield no utility, and the optimal strategy is the one that yields the highest expected discounted corruption rents. We hence only need to compare the payoffs from pervasive corruption and education subsidies. Given that \( u = 0 \), (12a) and (12c) yield the expected payoffs
\[
V_C[L_s] = \frac{1 + \phi}{\delta + L_s} \pi[L_s] = \frac{1 + \phi}{\delta + L_s} a(1 + \phi L_s)
\]
\[
V_S[x_u] = a(1 + \phi) - (1 + r)(e - x_u).
\]
and will be preferred over education subsidies when the discount rate is sufficiently low.
The party faces a trade off between extracting low corruption rents over a long period of time or expanding education and obtaining a high corruption rent once. Which of the two strategies delivers the highest payoff depends on the initial level of education, the initial degree of inequality, and parameters such as the discount rate and the production technology.

The level of education plays a crucial role. First note that $V_S$ is constant for all $L_S$. The payoff from being utterly corrupt, is increasing and concave if $\varphi > 1/\delta$, and decreasing and convex otherwise. That is, whether it is increasing or decreasing crucially depends on the skill premium and the discount rate. The reason for this is that education increases the monetary rent, and this effect will be stronger the larger the skill premium is, making it more likely that $V_C$ is increasing. Education also has a negative effect in that it reduces the probability of reelection and thus expected future rents, which are valued less the higher the discount rate is.

Figure 3 about here

Figure 3 depicts the $V_C$ and $V_S$ schedules as a function of the initial level of education. The payoff $V_S$ is less than $V_C$ when $L_S = 1$ since no further gains can be achieved from a period of competitive taxes when the entire population is already educated. Furthermore,

$$V_C[0] > V_S[x_u] \iff A_u > \bar{A} \equiv \frac{\delta}{1 + \delta} \left( A_u - \frac{(1 + r)(e - x_u)}{a_0} \right)$$

where $\bar{A}$ is a threshold level of productivity. The level of unskilled productivity plays a key role in determining the equilibrium strategy. Figure 3a presents the case in which unskilled productivity is high. In this case, the $V_C$ schedule is above $V_S$ throughout, implying that the elected party chooses to be corrupt in all periods. The intuition is that a higher level of $A_u$ implies that the skill premium, $A_s / A_u$, is low and an education expansion causes only a small increase in corruption rents. As a result, the $V_S$ strategy is always dominated.

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14 Since the value of $V_c$ at 0 and 1 is independent of whether this function is increasing or not, the same equilibrium strategy would be chosen if the schedule were decreasing.
Figure 3b depicts the case of a low unskilled productivity, which implies large gains in corruption rents due to increased education. How large these gains are depends on the initial level of education. The lower the level of education, the higher the increase in corruption rents is as compared to those obtained without the subsidy, and therefore the more likely it is that \( V_S > V_C \). We can see in figure 3b that the intersection between \( V_S \) and \( V_C \) defines a threshold level of education, \( L^*_S \). When education is greater than \( L^*_S \), the elected party is permanently corrupt, while when \( L_S < L^*_S \) it opts for education expansion before reaping the corruption rents. This implies that only economies with low initial levels of education can escape the poverty trap. Else the threat of shrewd political participation provides incentives to the political elite to maintain a corrupt, low output environment that provides them with high rents.

Greater inequality (lower \( x_u \)) implies that the elected party forgoes more tax revenue in order to finance the education subsidy and reduces \( V_S \), resulting in a downward shift of the schedule as depicted in figure 3b. If inequality is sufficiently high, \( V_S \) lies below \( V_C \) for all levels of education. That is, greater inequality reduces the range of education levels for which \( V_S \) dominates. Sufficiently high degrees of inequality render permanent corruption the dominant strategy throughout.

4.3. Education, Corruption and Institutional Reform

The presence of an ego rent provides incentives to simply stay in power and forgo corruption rents. While institutional reform guarantees reelection and hence ego rents, it excludes corruption rents. All three strategies, (12a)-(12c) are now feasible and, as suggested by the intuition obtained in the previous section, the level of productivity and the degree of initial inequality are crucial determinants of the equilibrium strategy. In order to focus on each of these aspects, we start by examining the effect of productivity in the choice of strategy. Subsection 4.3.2 focuses on the effect of different degrees of inequality.

4.3.1. Productivity and political strategies

The payoffs to the three possible strategies are given by

\[
V_C[L_S] = \frac{1 + \delta}{\delta + L_S} (u + a(1 + \varphi L_S))
\]  

(15a)
Clearly $V_{SR}$ is constant for all $L_S$; the payoff to the corrupt/reform strategy, $V_{CR}$, is linearly increasing in $L_S$; and the payoff from being utterly corrupt, is increasing and concave if $\varphi > \varphi_*$, and decreasing and convex otherwise, where $\varphi = (u + a) / a\delta$.

Intuitively, for sufficiently high skill premiums the positive effect of education on corruption rents dominates, while for low skill premiums the negative impact of education on the reelection probability is strongest. The optimal strategy does not depend on the size of the skill premium and here we consider, without loss of generality, the case of $\varphi > \varphi_*$ (see appendix).

Examining initial conditions, we find that for $L_S = 0$, $V_{CR}[0] < V_C[0]$, while $V_C[0] < V_{SR}$ if and only if $A_u > \overline{A}$. At $L_S = 1$, the payoffs simplify to $V_C[1] < V_{CR}[1]$ and $V_{SR} < V_{CR}[1]$. In addition, the $V_{CR}$ schedule is steeper than $V_C$ since education reduces the reelection probabilities of a reforming party less than of a party that does not reform. This renders three possible configurations of the payoff schedules as depicted in Figure 4.

Figure 4a considers the case of high unskilled productivity, that is, $A_u > \overline{A}$. In this case, the strategy $V_{SR}$ is always dominated. The intuition for this is straight forward: a high level of unskilled productivity implies that the skill premium $A_u / A_y$ is low, and hence an expansion of education causes only small increases in corruption rents. For corrupt parties the tradeoff is simply to settle for ego rents with probability, $(1 - qL_S)$, or opting for ego and corruption rents with a lower probability, $(1 - L_S)$. The two payoff functions intersect only once, at $L_S^*$, indicating that for economies with a skilled labour supply smaller than $L_S^*$, the elected party is always corrupt, while in those with sufficiently educated populations, $L_S > L_S^*$, politicians opt for institutional reform after an initial period of corruption.

Figure 4 about here
The alternative scenario is that of \( A_u < \bar{A} \), where \( V_{SR} \) always dominates for low values of \( L_s \) as a result of the high skill premium. For intermediate values of unskilled productivity, that is if \( A < A_u < \bar{A} \), where \( \bar{A} \) is defined in the appendix, all three strategies can be chosen. This is represented in figure 4b, where we can see that for low levels of education \( V_{SR} \) is preferred, for intermediate levels the ruling party’s dominant strategy is to be utterly corrupt, while for highly educated populations \( V_{CR} \) will dominate. The case of low unskilled productivity, i.e. \( A_u < A \), is depicted in figure 4c. A low productivity of the unskilled implies that the rent is low and hence the strategy \( V_C \) is dominated for all values of \( L_s \). If the level of education is low, i.e. \( L_s < \tilde{L}_s \), the strategy \( V_{SR} \) is preferred as the increase in the corruption rent due to education expansion is large. For high levels of education, \( V_{CR} \) dominates as the increase in the corruption rent is insufficient to compensate for the reduced reelection probability. We summarize the results in the following proposition.

**Proposition 1: Political Equilibria and Productivity**

The optimal strategy of elected parties depends on the level of the productivity of the unskilled

(i) With high unskilled productivity, there exists a threshold level of education \( L_s^* \) such that for \( L_s < L_s^* \) the party is permanently corrupt while for \( L_s \geq L_s^* \), the party implements institutional reform.

(ii) With intermediate unskilled productivity there exist two threshold levels of education, \( L_s^* \) and \( L_s^{**} \), such that

(a) for \( L_s \leq L_s^* \), the party fosters education,

(b) for \( L_s^* < L_s < L_s^{**} \), the party is permanently corrupt,

(c) for \( L_s \geq L_s^{**} \), the party implements institutional reform.

(iii) With low levels of unskilled productivity there exists a threshold level of education, \( \tilde{L}_s \) such that for \( L_s \leq \tilde{L}_s \), the party engages in education expansion while for \( L_s > \tilde{L}_s \), the party implements institutional reform.

Proposition 1 indicates that an increase in the productivity of unskilled workers raises not only national income, but also the incentives for corruption. This suggests that the presence of natural resources or an international transfer of unskilled technology will raise incentives for corruption.
4.3.2. Inequality and political strategies

Consider now the role of the distribution of wealth. Greater inequality, measured by a lower wealth of the unskilled, implies that the subsidy required in order to induce an education expansion is larger. This reduces the corruption rents that the party can obtain and hence the payoff from this strategy, shifting downwards the $V_{SR}$ schedule, as depicted in Figure 5.

Figure 5 about here

The continuous horizontal line in Figure 5 represents a low level of initial inequality (high $x_u$). In this case corruption never dominates. The dashed line depicts an intermediate value of $x_u$, in which case $V_C$ dominates for intermediate levels of education, while with high inequality (dotted line) the strategy $V_{SR}$ is never chosen. We summarize these findings in proposition 2:

**Proposition 2: Political Equilibria and Inequality**

Consider an economy with a low level of unskilled productivity. There exist two inequality thresholds, $x_u^*$ and $x_u^{**}$, such that

(i) For low levels of inequality, i.e. $x_u^{**} < x_u$, $V_{SR}$ dominates for low values of $L_S$ and $V_{CR}$ dominates for high values of $L_S$.

(ii) For intermediate levels of inequality, i.e. $x_u^* < x_u < x_u^{**}$, $V_{SR}$ dominates for low levels of education $L_S < L_S^*$, $V_C$ dominates for $L_S^* < L_S < L_S^{**}$, and $V_{CR}$ dominates for $L_S > L_S^{**}$.

(iii) For high levels of inequality, i.e. $x_u \leq x_u^*$, $V_C$ dominates for low and intermediate levels of education $L_S < L_S^{**}$, and $V_{CR}$ dominates for $L_S > L_S^{**}$.

Proposition 2 indicates that inequality plays an important role in the choice of the optimal political strategy. For a given skilled labor force, $L_S$, and productivity level, $A_u$, a more unequal distribution of wealth renders it more likely that corruption prevails. The intuition is that high inequality implies a higher subsidy and hence lower corruption rents, making it less likely that this strategy dominates. On the contrary, when inequality is low, the subsidy is less costly and hence it is more likely that the party funds education subsidies.
4.4. The Evolution of Wealth

We can now examine the dynamics of wealth under the three possible strategies. If the party is always corrupt, the economy maintains the two class distribution with the same number of skilled and unskilled as there were initially, and their steady state wealth will converge to $\tau \left( \tau^* \right) < e < \tau \left( \tau^* \right)$. Output is then low for two reasons: first because the high tax rate implies a low capital-labor ratio, and second because a fraction of the labor force remains uneducated.

If institutional reform is passed at time $t$, the skilled labor force will be unchanged for $N-1$ periods. However, the reduction in the tax rate allows the unskilled dynasties to increase their bequests, and at $N$ all the labor force will become skilled. In this case, development is fostered by political reform, with reform taking place first and triggering the education expansion. Lastly, the party in power can increase education at period 1 and then implement institutional reform. This strategy allows the economy to escape from the poverty trap. Note, however, that in this case the expansion of education occurs first and is followed by institutional change. These results are summarized in proposition 3.

**Proposition 3: Political Strategies and Long-Run Development**

Consider the three possible strategies chosen by the party:

(i) If the party is permanently corrupt the economy remains in a low-education, low-output, high-inequality trap.

(ii) If the party implements institutional reform, wealth accumulation eventually allows the unskilled to acquire education, leading to high output and an equal distribution of wealth.

(iii) If the party engages in education expansion, the increase in education leads to high output and an equal distribution of wealth. Education expansion will then bring about institutional change.

5. Discussion and Conclusions

Propositions 1, 2 and 3 summarize the possible patterns of development in an economy with endogenous education and corruption. Three main results emerge. The first one concerns the relationship between education and corruption at the aggregate level. Although we have postulated a positive relationship between education and political knowledge at the individual level, this does not translate into a monotonic relationship between the aggregate level of education and politicians’ behavior.
The reason for the non-monotonic relationship is that education tends to increase the corruption rent obtained by a corrupt party, while it also reduces the probability of reelection. When a large fraction of the population is educated, a corrupt party’s probability of reelection is low, which forces the party to implement institutional reform that increases the probability of reelection but rules out future corruption. The rent effect dominates for intermediate levels of education, and in this case the economy remains in a low-education, low-income, high-corruption trap. For low levels of education, and low unskilled productivity, opportunist politicians find it in their interest to induce an education expansion that results in high-education, high-output and no corruption.

The second implication of our analysis is that there are two possible paths to development. In one case, institutional reform reduces corruption and this eventually leads to education expansion. That is, an improvement in institutions brings about high education and equality. Alternatively, low taxation results in a highly educated labor force, and this will in turn prevent future corrupt behavior. Institution-led development is likely to occur in highly educated economies, while education-led development can only take place if the productivity of the unskilled is low and the distribution of wealth not too unequal.

Lastly, we have shown that countries with very low levels of education may fare better in the long-run than those with intermediate levels of education. Two conditions are required for the former to get out of the poverty trap. First, the productivity of the unskilled must be low so that current corruption rents are low. Second, inequality should not be too high, implying that education expansion is not too costly. The party in power uses subsidies to induce an education expansion, thus increasing next period’s corruption rents. In doing so, however, it rules out future corruption. Resource-rich countries with high unskilled productivity are therefore more likely to remain locked in a high-corruption/low-education equilibrium. This helps explain the empirical evidence which indicates that resource abundance may lead not only to low growth rates but also to poor governance.15

The cases we have identified in the model can be illustrated with two examples. First, Latin American economies have been, to a large extent, characterized by poor institutions and widespread corruption. In the mid-20th century these were economies

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with intermediate levels of education. Rents were sufficiently large to create the incentives for corruption, but the level of political knowledge of the electorate was not high enough to identify corrupt behavior. As a result, these economies were locked in a bad-institutions/low-output/high-inequality equilibrium.16

Our second example concerns East Asian and sub-Saharan African economies, which in the mid-20th century, at the end of colonization, were both characterized by extremely low levels of educational attainment. In the 1950s the perception among development economists was that the serious problem was faced by East Asia. African countries were resource rich, and natural resources would bring in the revenues needed to trigger growth (Hance, 1956); East Asian economies were uneducated, resource poor, and highly populated, and hence had no way of escaping the poverty trap. Yet, the next few decades witnessed large public education programs and a massive increase in per capita incomes in the Asian economies, and stagnation in most African countries (Temple, 1999).

Our analysis suggests a possible explanation for these observed disparities. As well as poor, East Asian countries were relatively equal (see the discussions in Benabou, 1996, and Aghion, Caroli and García-Peñalosa, 1999). The model predicts that under these conditions the optimal strategy for the party in power is to fund education at a large scale, with the resulting expansion in educational attainment leading to higher output levels though not necessarily to institutional change. This is precisely what took place in the last decades of the 20th century.17 In Africa, abundant natural resources made the productivity of the unskilled high, leading to large potential rents. Corruption prevailed, impeding education and maintaining low output levels.

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16 Other arguments that have been put forward for the poor economic performance of Latin American economies include vested interests of landed elites, and social conflict. See, for example, Acemoglu and Robinson (2006).
Appendix I

In this appendix we examine the payoffs to the party from the possible strategies derived in section 4. There are five possible strategies,

\[ V_H = \frac{1 + \delta}{\delta} u, \]
\[ V_C[L_s] = \frac{1 + \delta}{\delta + L_s} \left( u + a(1 + \varphi L_s) \right), \]
\[ V_{CR}[L_s] = \frac{1 + \delta}{\delta} u + a + \left( a\varphi - \frac{qu}{\delta} \right) L_s, \]
\[ V_{SR}[x_u] = \frac{1 + \delta}{\delta} u + a(1 + \varphi) - \frac{qu}{\delta} - (1 + r)(e - x_u), \]
\[ V_{HCR}[N] = \frac{1 + \delta}{\delta} u + \frac{1}{(1 + \delta)^N} \left( a(1 + \varphi) - \frac{qu}{\delta} \right). \]

The strategies are defined in the text except for the first and the last. \( V_H \) is the payoff from being honest in all periods, which is simply the discounted ego rents. \( V_{HCR}(N) \) is the payoff from the following strategy. The party is initially honest, choosing a competitive tax for \( N-1 \) periods, which allows poor dynasties to accumulate wealth and become educated in period \( N \). Honesty ensures reelection for \( N \) periods. At \( N \), the party sets the corrupt tax rate and obtains rents. Since the entire population is now educated, the party would choose to pass constitutional reform at \( t=N \) in order to have a positive probability of staying in power. That is, there are two alternative ways to induce education expansion: \( V_{SR}[x_u] \) and \( V_{HCR}[N] \). The strategy \( V_{SR}[x_u] \) yields lower rents (as the subsidy has to be financed) but the rents are obtained immediately; \( V_{HCR}[N] \) provides a higher rent but requires waiting for \( N \) periods before obtaining it. As is the case with \( V_{SR}[x_u] \), the payoff \( V_{HCR}[N] \) is independent of the level of education, but affected by the distribution of wealth, since a lower \( x_u \) increases \( N \).

In order to focus on the interesting cases, we suppose that the ego rent is not too high, namely

\[ \delta a > u, \]  
(A.1)

which rules out being always honest, i.e. \( V_H \), as an optimal strategy. Second, we suppose that the extent of punishment is not too high relative to the skill premium,

\[ \varphi > q. \]  
(A.2)

We can now compare the various payoffs. First note that although there are two possible strategies that result in education-led development, \( V_{SR}[x_u] \) and \( V_{HCR}[N] \), one will be above the other one, depending on parameter values, and hence we need to consider only one of them. In fact, \( V_{SR}[x_u] > V_{HCR}[N] \) if and only if \( (1 + r)(e - x_u) < (a(1 + \varphi) - qu / \delta)(1 - (1 + \delta)^{-N}) \), implying that for high (low) values of the discount rate, \( V_{SR}[x_u] \) is above (below) \( V_{HCR}[N] \). We concentrate in the case in which \( V_{SR}[x_u] \) dominates, although it is possible to show that all the results continue to hold when the discount rate is low and \( V_{HCR}[N] \) is above \( V_{SR}[x_u] \).

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Consider now the three remaining strategies, \( V_c[\text{Ls}], V_c[\text{CR}], \) and \( V_c[\text{SR}]. \)

Recalling that \( a = a_o A_u \) and \( \varphi = A_s / A_u - 1 \), we can show that

- \( V_{CR} > 0 \),
- \( V_c[0] > V_{CR}[0] \) and \( V_c[1] < V_{CR}[1] \),
- \( V_{SR}[x_u] < V_{CR}[1] \),
- \( V_c > 0, V_c'' < 0 \) if and only if \( \varphi > \varphi \equiv (u + a) / a \delta \), which can also be expressed as \( A_u < \hat{A} \), where \( \hat{A} = \delta (A_s - u / \delta a_o) / (1 + \delta) \),
- \( V_{SR}[x_u] > V_c[0] \) if and only if \( A_u < \bar{A} \), where
  \[
  \bar{A} = \frac{\delta}{1 + \delta} \left( A_s - \frac{(1 + r)(e - x_u) + qu \delta}{a_o} \right),
  \]
- \( V_c[L] > V_{SR}[x_u] = V_{CR}[\hat{L}] \) if and only if \( A_u > A \), where
  \[
  \hat{L} = 1 - \frac{(1 + r)(e - x_u)}{a_o (A_s - A_u) - qu \delta} \quad \text{and} \quad \hat{A} = \frac{\delta (1 + r)(e - x_u) - (1 - q)u}{\delta (1 - q)u}
  \]
with \( \bar{A} > A \) if and only if \( \delta (1 + r)(e - x_u) > u (1 - q) \).

We then need to consider two cases. The first one is that in which \( \delta (1 + r)(e - x_u) > u (1 - q) \), which implies \( \hat{A} > \bar{A} > A \). If the skill premium is high, i.e. \( \varphi > \varphi \), \( V_c[\text{Ls}] \) is increasing and we have the three cases depicted in figure 4 and discussed in the text. If the skill premium is low so that \( \varphi < \varphi \), then \( V_c[\text{Ls}] \) is decreasing and \( A_u > \bar{A} \), implying that we have a configuration equivalent to that in figure 4a. The second case is that in which \( \delta (1 + r)(e - x_u) < u (1 - q) \), which implies \( \bar{A} < A \). It is then possible to show that \( V_{CR} \) dominates for high levels of education, while for low levels \( V_c \) dominates if \( A_u > \bar{A} \), and \( V_{HCR} \) dominates otherwise.

Lastly, consider the political equilibria if assumption \( \tau^c < \tau_u < \tau^* < \hat{\tau} \) does not hold so that either \( \tau^* < \tau_u \) or \( \tau^c > \hat{\tau} \). If the cost of education is sufficiently low, i.e. \( \tau^* < \tau_u \), unskilled dynasties can study even under the corrupt tax rate. Then \( L_S = 1 \) irrespective of the tax rate and initial conditions, and \( V_{CR} \) will be the dominant strategy since it has the highest payoff under full education. If education costs are sufficiently high, then \( \tau^c > \hat{\tau} \), implying that even the competitive tax rate would be too large for the wealthiest individuals to study. The economy would then converge to \( L_S = 0 \) irrespective of the tax rate and the initial level of education. Note however, that whether it escapes or not corruption depends on the initial level of education. If the initial level of education was sufficiently high, \( V_{CR} \) will dominate and there will be no corruption in the long-run. If the initial level of education is low, \( V_c \) dominates implying that output is low both because \( L_S = 0 \) and because of the high (corrupt) tax rate.
References


Figure 1: Bequests and Taxation
Figure 2: Dynamic Effects of Lower Taxes on Education

\[ x_{t+1} \]

\[ x_0 \quad x_1 \quad e \quad x'_{1} > e \]
Figure 3: Political strategies in the absence of ego rents

3a: High productivity $A_u > \bar{A}$

3b: Low productivity $A_u < \bar{A}$
Figure 4: Political strategies with ego rents

4a: High productivity $A_u > \bar{A}$

4b: Intermediate productivity $\underline{A} < A_u < \bar{A}$

4c: Low productivity $\underline{A} > A_u$

Figure 5:
Inequality and political strategies