Prosperity Without Conflict*

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Abstract

Measures of social conflict and growth feature a negative association across countries. We propose a theory of conflict over economic distribution which explains this outcome as a function of cross-country differences in the quality of deep-rooted institutions of property rights and conflict management. By stressing the role of institutional quality in determining the effects of conventional growth policies, we find that pro-growth policies may well be undesirable in societies that lack good institutions. This is because growth breeds excessive conflict in these societies. Alternatively, pro-growth policies are necessarily welfare improving in the presence of high quality institutions. In this context, high quality institutions can be thought of as a mechanism to achieve the goal of prosperity without conflict.

Keywords: growth policy, insecure property, conflict, diversion.

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1 Introduction

Measures of social conflict and growth feature a negative association across countries.¹ In principle, this evidence could result from a data generating process that is common to all countries: each country’s institutions might be improving over the development path leading more developed countries to exhibit faster growth, and less conflict, as their institutions improved. The policy recommendations from such a reading of the data are equally clear. Pro-growth policies, such as those put forward in the Washington Consensus, can both foster growth and abate conflict.

This paper proposes an alternative explanation for the data with sharply different policy recommendations. Our alternative links cross-country differences in the quality of deep-rooted institutions of property rights and conflict management to persistent differences in both conflict and growth rates. The negative association between growth and conflict across countries arises not from an evolution of institutions along each country’s development path, but from persistent institutional differences across countries. Our theory thus underscores the importance of parameter heterogeneity in growth econometrics.² Furthermore, we find that countries can be divided into two categories according to their response to conventional growth policy: pro-growth policies are desirable in countries with sufficiently high-quality institutions; the same pro-growth policies however are undesirable if institutional quality is poor.

Our emphasis on the model’s policy implications is relevant for two reasons. First, it seems critical in light of the disappointing results of practical development policies in the last two decades under the Washington Consensus.³ Indeed, more often than not, those policies not

²See e.g. Durlauf et al. (2005).
³See e.g. Easterly (2005), Rodrik (2005), Sachs (2005).
only failed to create growth, but they also contributed to generating significant conflict over economic distribution.\(^4\) Second, a new consensus is emerging, based on the role of property rights and the rule of law as key determinants of growth. Yet it is not clear what the distinct policy implications of this view are; a contribution of this paper is to provide a formal model of those implications.

A key finding is that introducing conflict over economic distribution into otherwise standard models of growth can significantly affect the policy implications of these models. By stressing the role of institutional quality in determining the effects of conventional growth policies, we find that pro-growth policies may well be undesirable in societies that lack good institutions. In a nutshell this result arises because growth breeds excessive conflict in those societies. This does not mean that growth is undesirable — pro-growth policies are necessarily welfare improving in the presence of high quality institutions. Rather, the positive association between growth and conflict occurs within a country and takes institutional quality as given. Our findings underscore the necessity of the development of high quality institutions of property rights and conflict management: they are required for society to achieve the goal of prosperity without conflict.

Formally, we model decentralized conflict over economic distribution in the context of an AK growth model. A technology of conflict accounts explicitly for the distinction between the defense and the challenge of claims to property.\(^5\) As a result, the security of property becomes the endogenous outcome of the conflict technology and a function of the resources allocated


to the defense of property, the resources allocated to the challenge of property claims, and the exogenous institutional quality of property rights.

In this context the efficacy of growth policy depends on the relative importance of two externalities associated with imperfect property rights. First, there is an investment externality, because part of an individual’s own output accrues to others. Consequently, the incentive to invest is too low relative to the first best. Second, there is a diversion externality. The diversion externality occurs because individuals do not internalize the fact that the social cost of future consumption is too high, as growth breeds conflict.

Pro-growth policies are the conventional prescription, and are supported by models that focus on the investment externality, in which growth and prosperity are outcomes that directly supplant diversion. This conventional view rests, explicitly or not, on a static relationship between production and diversion. In a dynamic environment, however, it must be recognized that future consumption requires both the creation of wealth as well as the means to secure effective property rights over it, and that the necessary investments, both productive and diversionary, necessarily require a reduction in current consumption. In this context, the positive link between growth and conflict arises from the fact that individuals will engage in each activity until their returns are equated. Consequently, for fixed institutional quality, government policies which promote growth by raising the marginal return to productive activities will necessarily breed conflict, as they must also induce a rise in the marginal return to diversionary activities. To the extent that government policies are unable to remove the diversion externality, governments may need to restrict growth in order to mitigate the problem of diversion.

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7Of course, a fully empowered planner could bring the economy arbitrarily close to the first-best outcome, in which case pro-growth policies would be the appropriate ones, as is the case in a model with good institutions of
The historical record provides ample evidence that the creation of wealth can breed conflict. For instance, the higher pecuniary benefits from crime in larger U.S. cities explains much of the higher crime rates in those cities relative to smaller cities and rural areas.\(^8\) Drug production and traffic also support our general theme.\(^9\) For instance, civil conflict in Colombia appears to be fueled by the creation of wealth from coca production. Relatedly, there is a strong positive relationship between gang violence and the value of drugs in the US over the 1980’s and 1990’s. Finally, recent cross-country evidence indicates a positive association between aid and conflict in countries with poor institutions\(^10\) and between resource abundance and conflict in countries with poor institutions.\(^11\)

The effect of this positive link between growth and conflict can have significant long-term effects and ought to be taken seriously. For instance, Temple (2003) suggests that Indonesia’s rapid growth under Suharto, which coexisted with poor institutional quality and widespread corruption, helps explain the severity of the 1997–98 crisis. Homer-Dixon (1994) traces the source of conflict between Senegal and Mauritania in the 1980s to the announcement of the construction of a dam in the Senegal river and the consequent increase in the value of land along the river basin. Similarly, Bates et al. (2002) emphasize the link between prosperity and conflict throughout history, from 13th-century England to 20th-century Kenya.

Also scholars from Adam Smith (1776) to Olson (1963) and Huntington (1968), to Bates (2001) have stressed the positive link between growth and conflict.\(^12\) For instance Olson (1963, property rights.

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\(^8\) See Glaeser and Sacerdote (1999).
\(^9\) See Angrist and Kugler (2005) and Fryer et al. (2005).
\(^10\) For example, Svensson (2000)
\(^11\) For example, Collier and Hoeflf (1998), Sala-i-Martin and Subramanian (2003), Fearon (2004). Also see Klare (2001) for an informal discussion of many examples.
\(^12\) In this respect we share Bates’ (2001, page 101) view that “the study of the political economy of development is the study of prosperity and violence.” Along similar lines, Huntington (1968, page 45) concludes that “Not only does social
page 552) notes that

> until further research is done, the presumption must be that rapid economic growth, far from being the source of domestic tranquility it is sometimes supposed to be, is rather a disruptive and destabilizing force that leads to political instability. This does not mean that rapid economic growth is undesirable or that political instability is undesirable. It means, rather, that no one should promote the first without bracing to meet the second.

The plan of the paper is as follows. Section 2 presents the model to be analyzed. Section 3 characterizes the second-best planning problem that arises naturally in the presence of insecure property rights. Section 4 shows how an income-tax system implements this second-best allocation and discusses the resulting equilibrium. Section 5 concludes. Proofs of all propositions are relegated to an Appendix.

2 A Model of Conflict Over Economic Distribution

The economy has a unit measure of household-producers, each of whom seeks to maximize utility from his consumption stream, given by

\[ U_i = \int_0^\infty e^{-\rho t} \log(c_i) dt, \]  

(1)

with \( \rho > 0 \), where \( c_i \) is agent \( i \)'s consumption. At each time \( t \) individual \( i \) produces output \( A k_i \), with \( A > 0 \), where \( k_i \) is \( i \)'s capital stock.

Output produced by an individual is insecure in that his claim to own output can be contested by others; in turn, the individual can contest the claims of others to their production. To and economic modernization produce political instability, but the degree of instability is related to the rate of modernization.

The historical evidence with respect to the West is overwhelming on this point.”
formalize the consequences of decentralized conflict over economic distribution as starkly as possible, we use a model that is symmetric across agents and assume that each individual competes against the economy-wide average. We suppose that individual outputs are reallocated according to sharing rules that depend on how much each individual has invested, both in defending his own output and in seeking to appropriate output which is produced by others.\footnote{This form of sharing rule has been widely used in the rent-seeking and conflict literature.}

Let $x_i$ be agent $i$’s stock of defensive capital and $z$ be the average stock of offensive capital of the other agents. Then the share of his own output that $i$ can hold onto is given by

$$p^i = \frac{\pi x_i^m}{\pi x_i^m + z^m}, \quad (2)$$

where $m \in (0,1]$ and $\pi \in [1,\infty)$ are parameters to be interpreted below. Further, individual $i$ claims a share of the output of other individuals according to

$$q^i = \frac{z_i^m}{\pi x^m + z_i^m}, \quad (3)$$

where $z_i$ is agent $i$’s stock of offensive capital and $x$ is the average stock of defensive capital.

The gross income that is fully secured to an individual is given by

$$y_i = p^i Ak_i + q^i Ak,$$

where $k$ is the average stock of productive capital. Net income in turn is allocated to current consumption $c_i$, and to investment in the three capital stocks, $k_i$, $x_i$ and $z_i$. We assume for simplicity that the capital stocks are subject to the same depreciation rate $\delta \in [0,1]$\footnote{Allowing for $\delta < 1$ allows for the possibility that stocks of diversionary capital (some of which may be intangible) are built over time.}, and, to ensure positive balanced growth, that $A/2 - \delta > \rho$.

The government’s role in ‘providing’ property rights is to provide resources — legal framework, police, court system, prison system — that leverage the defender’s defensive resources.
This is a compact abstraction of how a real property rights system actually works — the government provides support for the efforts of individuals to defend their own property. The impact of this support is summarized by the value of the parameters $\pi$ and $m$ in (2)–(3). We view these parameters as reflecting deep-rooted institutions that are not amenable to change in the short run; as a first approximation we treat them as constant. Furthermore, we view these deep-rooted institutions as varying across societies, according to their underlying institutions of property rights and conflict management.\textsuperscript{15}

The parameter $\pi$, which we refer to as the ‘property rights’ parameter, introduces an asymmetry which gives a differentiated effect to defensive capital. For any capital stocks $x_i$ and $z$, the larger is $\pi$ the larger is the share in output, $p^i$, that the defender receives. At one extreme, when $\pi$ is one there is no government support for the defender’s investment, no differentiated effect, and so the model gives equal access to both predator and defender. As the value of $\pi$ rises access becomes differentiated, favoring the defender. Ceteris paribus, an increase in $\pi$ allows the defender to reduce defensive capital and still maintain the previous claim on output; alternatively, holding defensive capital fixed makes it more costly for the predator to maintain the previous claim. The ideal of perfectness of property rights emerges as $\pi$ approaches infinity. Then the defender receives a 100% share of his own output, irrespective of the values of offensive and defensive capital. In a very natural way then the model allows property rights to be seen not as a dichotomy between perfect and imperfect, but as a continuum of imperfectness as $\pi$ varies between 1 and $\infty$.

The parameter $m$ is the elasticity of the relative share of own output $\frac{p^i}{1-p^i} = \pi \left( \frac{x_i}{z} \right)^m$ with respect to a change in the capital ratio $x_i/z$; it is also the elasticity of the relative share of

\textsuperscript{15}In empirical work, these differences are often proxied by using measures of civil liberties and political rights, the quality of government and the rule of law. See e.g. Rodrik (1999) for a discussion.
others’ output, \( \frac{q'}{1-q'} = \pi \left( \frac{z_i}{x} \right)^m \), with respect to a change in the ratio \( z_i/x \). It is a measure of the ‘effectiveness of conflict’ (see Hirshleifer (1995)). The larger is \( m \) the greater is the impact on one’s relative share of output from an increase in one’s relative capital stock. The incentive to engage in diversionary activities is therefore larger the larger is \( m \). Assuming that \( m \leq 1 \) ensures that there are diminishing returns to diversionary activities.

2.1 Growth Policy

Our goal is to demonstrate how differences in deep-rooted institutions can shape optimal growth policy. We think of growth policy in terms of any policy that alters the private agents’ incentive to create wealth. In practice, this may be accomplished by altering the relative price of output, investment, and diversionary activity. Of course, with enough policy instruments the economy could be brought to the first-best outcome. Alternatively, here we suppose that the government cannot directly control or tax diversionary investment. It is well-understood that the ability of the government to influence individuals’ incentives depends on the precise set of policy instruments available. However, it will become clear that our main results depend critically on the inability of the policy maker to implement the first-best allocation, not on specific tax instruments. We discuss the impact of investment taxes in Section 4.3, but in the interest of clarity we otherwise maintain the assumption that the government has access only to a system of income taxes. Given our focus on balanced growth, we need consider only a linear income tax system consisting of a proportional income tax and a lump-sum tax

\[
T(y_i) = \tau y_i + \ell. \tag{5}
\]

Agent \( i \)'s resource constraint is then

\[
y_i = c_i + I_i^k + I_i^x + I_i^z + T(y_i), \tag{6}
\]
where $y_i$ is given by (4) and the $I_i$’s are gross investment levels. We assume (i) that the government commits to all future taxes; (ii) that the government runs a balanced budget:

$$0 = \int_0^1 T(y_i) \, di; \quad (7)$$

and (iii) that the government is a benevolent agent, seeking to maximize social welfare. For our purposes, the latter assumption is not essential: even the most corrupt government leaders will want their economy to generate more wealth which they can appropriate for themselves.

2.2 Equilibrium

We restrict attention to symmetric balanced growth equilibria. Agent $i$’s problem is to choose a sequence $\{k_i, x_i, z_i, c_i\}$ which, given a sequence $\{T\}$, a sequence for the other agents $\{k, x, z, c\}$, and initial conditions $k(0), x(0), z(0) > 0$, maximizes the agent’s utility (1) subject to the sequence of resources constraints (6). A symmetric private equilibrium is an allocation $\{k, x, z, c\}$ that solves the problem of all agents simultaneously. To ensure that the economy starts on its balanced growth path we assume that $x(0) = z(0) = k(0)m / (1 + \pi)$.

A symmetric equilibrium is an allocation $\{k, x, z, c\}$ and a government policy $\{T\}$ such that (i) given the government policy, the allocation is a symmetric private equilibrium; (ii) given the allocation, the government policy satisfies the sequence of government budget constraints (7); and (iii) government policy maximizes $\int_0^1 U_i \, di$, where $U_i$ is given by (1).

2.3 Properties of Symmetric Private Equilibria

The first-order conditions for each individual’s problem imply that the growth rate of consumption must exceed the rate of time preference by an amount equal to the private net return
to investment activity,
\[
\frac{\dot{c}_i}{c_i} = \left(1 - \frac{dT}{\partial y_i} \right) \frac{\partial y_i}{\partial k_i} - \delta - \rho,
\]
(8)

where \(\dot{c}_i\) denotes the time derivative of \(c_i\). Further, a key feature of interior equilibria is that each individual optimizes by equating at the margin the impact on his income of each type of investment activity, whether productive or diversionary:
\[
\frac{\partial y_i}{\partial k_i} = \frac{\partial y_i}{\partial x_i} = \frac{\partial y_i}{\partial z_i}.
\]
(9)

In particular, any symmetric allocation satisfying (9), for all \(t\), implies that (see Appendix):
\[
p^t = 1 - q^t = \frac{\pi}{\pi + 1} \equiv p(\pi),
\]
(10)
\[
\frac{x}{k} = \frac{z}{k} = m(1 - p(\pi)) \equiv \phi.
\]
(11)

Symmetric equilibria have the property that the security of property, \(p(\pi)\), is determined solely by the property rights parameter \(\pi\). In turn, \(p(\pi)\) and \(m\) determine the returns to appropriation relative to production. This is captured by \(\phi\). The somewhat unintuitive result that \(x = z\) relies upon the homogeneity and the symmetry of the conflict technology, the symmetry of the interior equilibrium, and the fact that \(x\) and \(z\) depreciate at the same rate. This ensures that the incentives to engage in the defense and the challenge of property claims respond symmetrically to changes in the parameters of the model and it thus simplifies the details of the analysis, without obscuring intuition.

Equations (10) and (11) show the impact of the two externalities associated with insecure property. Each individual receives a share \(p(\pi) < 1\) of own output, which generates an investment externality; imperfectness of property rights thus acts as a “tax” on output. The quantitative impact of this externality in turn depends directly on the magnitude of the property rights parameter \(\pi\). In equilibrium the share of output that each individual receives is independent
of his diversionary capital stocks. A grand coalition that agreed to this share *ex ante*, with no diversionary expenditures, would make everyone better off since then the diversionary resources could be consumed or invested productively. However, given such an agreement, each individual playing non-cooperatively against the others would have an incentive to cheat and increase his share of output by building a predatory capital stock $z_i$.

The share scheme $p(\pi)$ is self-enforcing only when individuals hold positive diversionary stocks. In turn this gives rise to a diversion externality. For every unit of productive capital held in equilibrium, $2\phi$ units of diversionary capital are held as well. Endogeneity of the defense of property rights thus acts as a “tax” on productive investment, effectively increasing its cost in terms of foregone consumption from 1 per unit to $1 + 2\phi$ per unit. The magnitude of this diversion coefficient $\phi$ is larger the larger is the effectiveness of conflict, $m$, which increases diversionary incentives.\(^{16}\) It is larger the smaller is the equilibrium output share, $p(\pi)$, since the return to productive investment is lower in that case.

### 2.4 The No-Tax Economy

Suppose that $T(y_i) = 0$ and consider the resulting no-tax economy. The solution to this case will be a useful benchmark. In the no-tax economy, symmetric private equilibrium allocations are uniquely characterized by the common growth rate of consumption and investment activities

$$\gamma^p = Ap(\pi) - \delta - \rho$$

\(^{16}\)As $m$ goes to zero $\phi$ also goes to zero, eliminating the diversionary externality, but leaving the investment externality in place.
and the initial level of consumption\textsuperscript{17} (see Appendix)

\begin{equation}
 c_p(0) = (A - (1 + 2\phi)(\gamma_p + \delta))k(0). \tag{13}
\end{equation}

2.5 The First Best

The solution to this case will also be a useful benchmark. The first-best allocation would be implemented by a benevolent planner who could allocate the economy's resources. He would maximize the representative agent's utility subject to the resources constraint: \( y = c + I^k_i \). In this case, the planner would take into account the fact that the social marginal product of capital is \( A \), rather than \( p(\pi)A \), and he would set diversionary investments to zero. Consequently, the growth rate of households' consumption is constant and equal to

\begin{equation}
 \gamma^{fb} = A - \delta - \rho, \tag{14}
\end{equation}

and initial consumption is given by

\begin{equation}
 c^{fb}(0) = \rho k(0). \tag{15}
\end{equation}

Note that the first-best allocation obtains when the property rights parameter \( \pi \) is infinity, implying a perfect and costless system of property rights.

3 Second-best Optimal Allocations

The equilibrium allocation in the no-tax economy differs from the first-best because imperfection in property rights gives rise to two distortions, which we have labeled as the investment

\textsuperscript{17}Restrictions on the parameters are needed to ensure that \( c_p(0) \) is positive and, therefore, to ensure existence of a symmetric equilibrium in the no-tax economy. This however will not be necessary in the overall equilibrium, where growth policy is optimally determined.
externality and the diversion externality. To better understand the separate influences of these two externalities we now examine two constrained planning problems, each of which optimizes social welfare with respect to one externality, while taking the presence of the other as a constraint. To focus on the investment externality, the first constrained planning problem optimizes welfare with respect to the diversionary investments, setting them to zero, but constrains the planner to choose productive investments facing the same perception of marginal product of capital that the private agents face. To focus on the diversionary externality the second constrained optimization allows the planner to choose productive investment levels by correctly valuing the marginal product of capital, but constrains the levels of diversionary investment to be determined by the private agents’ incentive-compatible behavior. The resulting second-best optimal allocation will be shown to be an equilibrium allocation in Section 4.

3.1 Investment Externality

The investment externality is well-understood, and provides what is often taken to be the only intuition required in understanding the impact of imperfect property rights. Fix \( p_i = p(\pi) \).

Each agent has income
\[
y_i = p(\pi) Ak_i + (1 - p(\pi)) Ak.
\]
(16)

Consider a planner who chooses allocations \( \{c_i, I^k_i, I^x_i, I^z_i\} \), for all \( i \), to maximize the sum of agents’ utilities, subject to the aggregate resources constraint
\[
\int_0^1 (y_i - c_i - I^k_i - I^x_i - I^z_i) di = 0,
\]
(17)

taking the level of aggregate output \( Ak \) in (16) as given. That is, the marginal product of capital is perceived as \( \frac{\partial y_i}{\partial k_i} = p(\pi) A \). This second-best solution eliminates diversion; growth is
\[
\bar{\gamma} = p(\pi) A - \delta - \rho,
\]
(18)
and consumption is

\begin{equation}
\epsilon(0) = (A - (\gamma + \delta))k(0) = \left((1 - p(\pi))A + \rho\right)k(0).
\end{equation}

Compared to the first-best solution, the second-best subject to the investment externality results in a lower growth rate and a higher initial consumption level. This is well understood.

Compared to the private equilibrium in the no-tax economy the second-best growth rate and the private growth rate are the same. Thus, the inefficiently low growth rate in the no-tax economy can be attributed to the presence of the investment externality.

Second-best initial consumption is higher than the corresponding level in the no-tax economy. The difference is \(\epsilon(0) - c^p(0) = 2\phi(\gamma^p + \delta) > 0\); when diversionary investments are set to zero, optimal consumption is higher by the level that these investments have in the no-tax economy, \(2\phi(\gamma^p + \delta)\).

Writing social welfare as a function of the constant growth rate \(\gamma\) and initial consumption \(c(0)\),

\begin{equation}
U(\gamma, c(0)) = \frac{1}{\rho^2}(\gamma + \rho \log(c(0))),
\end{equation}

it will be useful to consider an increase in the growth rate, treated parametrically, at the second-best solution:

\begin{equation}
\frac{\partial U(\gamma, \epsilon(0))}{\partial \gamma} = \frac{1}{\rho^2} \frac{k(0)}{\epsilon(0)} \left((1 - p(\pi))A\right) > 0.
\end{equation}

Clearly, further growth is still desirable at this second-best solution. Indeed, given that diversionary investments have been set to zero, the previous second-best allocation could be brought to a first best level through the use of an output or investment subsidy that would induce the correct valuation of the marginal product of capital. Consumption would fall but growth and welfare would rise. This is the usual intuition about the impact of imperfect property rights. By causing an investment externality they reduce both welfare and growth, and
they can be ameliorated by policies that promote growth.

This second-best allocation could be implemented in equilibrium by a government that was endowed with the ability to set diversionary investments to zero. In reality however, precisely the problem facing policy makers is their inability to coerce zero levels of diversion. The more plausible scenario involves government ability to affect the levels of output and productive investment, the “white economy”, and government inability to control diversion investments, either directly or indirectly. We now look at this case.

3.2 Diversion Externality

Consider a planner who, in maximizing social welfare, directly deals with the investment externality by taking correctly into account the social marginal product of private capital. However, the planner is subject to the incentive compatibility constraint imposed by the agents’ diversionary-investment behavior, which cannot be directly controlled.

In the private equilibrium the relationship between agent $i$’s diversionary capital and productive capital is given by equation (11). This relationship translates into an incentive compatibility restriction on agent $i$’s investment choices:

$$I^x_i = I^z_i = \phi I^k_i.$$  \hspace{1cm} (22)

Productive investment is accompanied by diversionary investment. While the planner optimizes over $\{c_i, I^k_i\}$, for all $i$, he is constrained by the fact that equilibrium diversionary investments will be made by the agents according to equation (22), which reflects the critical relationship between productive and diversionary activity in a growing economy. The aggregate resources constraint is

$$\int_0^1 \left( y_i - (1 + 2\phi) I_i^k - c_i \right) di = 0.$$  \hspace{1cm} (23)
Noting that the solution will be interior, the relevant Hamiltonian is

\[ H = \int_0^1 e^{-\rho t} \log(c_i) di + \int_0^1 \lambda_k (I_k^i - \delta k_i) di \\
+ \lambda \left[ \int_0^1 \left( y_i - (1 + 2\phi)I_k^i - c_i \right) di \right]. \tag{24} \]

The solution to this constrained planning problem is recorded as

**Proposition 1.** There is a unique solution to the second-best problem, which is characterized by

(i) the common growth rate of \(k\) and \(c\)

\[ \gamma^* = \frac{A}{1 + 2\phi} - \delta - \rho; \tag{25} \]

(ii) the level of initial consumption

\[ c^*(0) = \rho (1 + 2\phi) k(0); \tag{26} \]

together with initial condition \(k(0)\).

It is immediate that the second-best solution features slower growth and a higher level of initial consumption than the first-best: that is, \(\gamma^* < \gamma^{fb}\), and \(c^*(0) > c^{fb}(0)\). Intuitively, to obtain \(\gamma^*\) the first-best growth rate must be adjusted downwards to account for the fact that the social cost of private capital in terms of consumption is \(1 + 2\phi\) rather than unity.

It is not surprising that imperfect property rights are associated with inefficiently low growth; however the mechanism here works through the diversion externality, rather than through the more familiar investment externality, which has been taken fully into account in the planning process, where \(\int_0^1 (\partial y_i / \partial k_j) di = A\) for each \(k_j\).

Relative to the first best, the second-best level of consumption is inefficiently high, reflecting the direct impact of the diversionary externality (\(2\phi > 0\)). Current consumption comes from income to which effective property claims have already been established, whereas investment
produces output that will be contested in the future. This imparts a ‘consume it or lose it’ bias in favor of current consumption.

Noting that initial consumption is \( c^*(0) = (A - (1 + 2\phi)(\gamma^* + \delta))k(0) \), and recalling that social welfare is given by (20), the welfare effect of a marginal increase in the growth rate, treated parametrically, at the second-best allocation is

\[
\frac{\partial U(\gamma^*, c^*(0))}{\partial \gamma} = \frac{1}{\rho^2} \left( 1 - \rho \frac{k(0)}{c^*(0)} (1 + 2\phi) \right) = 0. \tag{27}
\]

This is in sharp contrast with (21). In the present case, we can think of the growth rate at the second-best optimum as having been adjusted in such a way as to maximize welfare, taking into account the fact that growth breeds conflict. Despite the fact that this second-best growth rate is too low in first-best terms, further growth is undesirable in second-best terms.

### 4 Optimal Growth Policy

It is immediate from comparison of (12) with (25) that

**Proposition 2.** The second-best growth rate \( \gamma^* \) is lower than the growth rate in the no-tax economy \( \gamma^p \) if and only if \( p(\pi) > 1/(1 + 2\phi) \) (that is, if and only if \( p(\pi) > \frac{1}{2m} \)).

The growth rate in the no-tax economy is determined by the investment externality through \( p(\pi)A \); the second-best growth rate is determined by the diversion externality, through \( A/(1 + 2\phi) \). In the coincidental case where \( p(\pi) = 1/(1 + 2\phi) \) then the private equilibrium in the no-tax economy gives the second-best solution. Here the reduction in growth due to the investment externality coincides in magnitude with the reduction in growth that is required in the second-best solution to reflect the social opportunity cost of productive investment, \( 1 + 2\phi \).

Otherwise, when \( p(\pi) \neq 1/(1 + 2\phi) \), the private equilibrium in the no-tax economy and the second-best solutions diverge. When \( p(\pi) \) is larger than \( 1/(1 + 2\phi) \) growth is higher in
the no-tax economy than in the second-best, with correspondingly lower consumption; and
conversely when \( p(\pi) \) is smaller than \( 1/(1 + 2\phi) \).

Proposition 2 has strong implications about the desirability of pro-growth government policy. If \( p(\pi) > 1/2m \) then the second best calls for lower growth than is achieved in the no-tax economy, despite the fact that growth in the latter is already inefficiently low relative to the first best. Pro-growth policy is undesirable in these circumstances. A decrease in the growth rate would reduce the levels of diversion investment by \( 2\phi \), allowing the planner to increase welfare by providing a higher level of consumption.

When \( m = 1 \) the inequality \( p(\pi) > 1/2m \) holds for all values of the property rights parameter \( \pi > 1 \). Consequently, when \( m = 1 \), optimal policy always prescribes a reduction in growth below the equilibrium level in the no-tax economy. At the other extreme, when \( m \) is sufficiently small, optimal policy requires an increase in growth over the private level, because the investment externality is then the main source of efficiency losses. As \( m \) increases, the relative importance of the diversion externality increases and a growth promoting policy eventually becomes sub-optimal.

The higher is the property rights parameter \( \pi \) and, therefore, the more secure are property rights (higher \( p(\pi) \)), the smaller are the losses from both investment and diversion externalities. Nonetheless the proposition indicates that, for given \( m \), a higher value of \( p(\pi) \) increases the likelihood that a reduction in growth is the optimal second-best policy. This is because higher \( p(\pi) \) reduces the impact of the investment externality relative to the diversion externality.
4.1 Optimal Income Tax

The second-best solution described in Proposition 1 can be implemented in equilibrium. First, consumption growth must satisfy

\[ \frac{\dot{c}}{c} = (1 - \tau)p(\pi)A - \delta - \rho. \]  

(28)

It is immediate from a comparison between the expression for \( \gamma^* \) in proposition 1 and (28) that the second-best solution can be implemented in the decentralized economy only if the marginal tax rate is set such that

\[ (1 - \tau^*)p(\pi) = \frac{1}{1 + 2\phi}. \]  

(29)

This time-independent marginal tax rate induces the agent to value capital at the margin at its appropriate second-best level. This tax takes into account both externalities. We expect a subsidy aspect to \( \tau \) to boost growth in response to the growth-inhibiting effect of the investment externality.\(^{18}\) On the other hand, we expect a tax aspect to \( \tau \) to reduce growth since the private decision makers fail to internalize the social cost of diversionary investments which increases with growth. The instrument \( \tau \) thus has to deal with the two externalities simultaneously, and will be chosen to trade off the two conflicting impacts on welfare.

Second, the tax system also needs to achieve budget balance. The income tax collects instantaneous revenue per-capita \( \tau^*Ak \). This is offset by the lump-sum tax \( \ell^* \), which therefore solves

\[ \ell^* = -\tau^*Ak. \]  

(30)

We then have

\(^{18}\)If the problem of diversion investments has been dealt with (or simply ignored) then a subsidy defined by \( (1 - \tau^*)p(\pi) = 1 \) is called for to boost growth.
**Proposition 3.** There exists a symmetric equilibrium that implements the second-best allocation characterized in proposition 1 through the income tax system $T(y_i) = \tau^* y_i + \ell^*$. This equilibrium is Pareto superior in the class of symmetric equilibria and it has the property that $\tau^* > 0$ if and only if $p(\pi) > \frac{1}{2m}$.

To emphasize the circumstances in which a positive tax is required to reduce growth below the private equilibrium level in the no-tax economy, Figure 1 plots the optimal tax rate $\tau^*$ as a function of the security of property $p(\pi)$ for three different values of the effectiveness of conflict, $m \in \{0.5, 0.75, 1\}$. When $m$ is sufficiently small, as for example $m = 0.5$ in panel 1, optimal policy requires an income subsidy, because the investment externality is the main source of efficiency losses. As $m$ increases the investment externality continues to be the main source of efficiency losses as long as $p(\pi)$ is close to $1/2$. However, increasing $m$ increases the importance of the diversion externality, and an income tax becomes optimal for sufficiently high values of $p(\pi)$, as in panel 2. When $m = 1$ as in panel 3 the optimal tax rate is always positive.

[FIGURE 1]

If the effectiveness of conflict is sufficiently high ($m > 1/2$) optimal tax rates are hill-shaped with respect to the security of property $p(\pi)$, with positive tax rates for $p(\pi)$ sufficiently close to one. This indicates that income taxes are optimally used to limit increases in growth that are associated with increases in the property rights parameter $\pi$. For instance, starting from a situation where the optimal policy prescribes a zero tax rate, a marginal increase in $\pi$ is met by a tax increase. This response reflects the fact that the corresponding improvement in the security of property, $p(\pi)$, would lead to excessive growth in the no-tax economy since it breeds excessive conflict relative to the second best.
4.2 Institutional Quality, Growth and Conflict

The foregoing analysis highlights the distinction between two groups of societies: those with sufficiently good institutions \((1/2m > p(\pi))\) and those with sufficiently poor institutions. Pro-growth policies are optimal in the former, but not in the latter. This underscores what we consider the key problem of development, that of achieving prosperity without excessive conflict.

Here we consider the implications of differences in institutional quality, as reflected in \(\{\pi, m\}\), for equilibrium growth and conflict. As a measure of conflict, consider the equilibrium fraction of resources that are dissipated; that is, letting \(I^x\) and \(I^z\) be the aggregate levels of diversionary investments,

\[
\frac{I^x + I^z}{Ak} = \frac{2\phi(\gamma^* + \delta)}{A},
\]

where \(\gamma^*\) is given by (25) and \(\phi\) is given by (11).

Proposition 4. Conflict, as measured by (31), falls with institutional quality — that is, \(\frac{I^x + I^z}{Ak}\) falls as \(\pi\) rises or as \(m\) falls — if and only if \(A > \rho(1 + 2\phi)^2\). Conflict increases with productivity, \(A\).

Thus, suppose that countries differ only in terms of the quality of their institutions, as measured by \(\phi = m(1 - p(\pi))\). Then Proposition 4 implies a negative association between growth \((\gamma^*)\) and conflict \(\left(\frac{I^x + I^z}{Ak}\right)\) across countries, whenever \(A > \rho(1 + 2\phi)^2\). A sufficient condition is that \(A \geq 4\rho\). However, it should be noted that, for fixed institutional quality, higher productivity levels are associated with more conflict as well as more growth. It should also be noted that social welfare increases both with institutional quality and with productivity.

The reason improvements in institutional quality lead to increased growth is not because a constraint on feasible growth is relaxed as the diversion multiplier \(\phi\) falls. Rather, as \(\phi\) falls, faster growth becomes desirable and the second-best optimal growth rate therefore rises.
Similarly, the role of the productivity parameter $A$ in determining second-best growth involves more than a simple feasibility constraint. While Proposition 4 indicates that the optimal growth rate $\gamma^*$ rises with $A$, it should also be noted that the difference between first-best and second-best growth rates,

$$\gamma^{fb} - \gamma^* = A \left[ 1 - \frac{1}{1 + 2\phi} \right], \quad (32)$$

is strictly increasing in $A$. This reflects the fact that there are feasible growth opportunities which would be optimal under perfect property rights, but not otherwise. Furthermore, note that the marginal increase in the difference $\gamma^{fb} - \gamma^*$ associated with higher $A$ is increasing with the diversion coefficient $\phi$ — that is, $\frac{\partial^2 (\gamma^{fb} - \gamma^*)}{\partial A \partial \phi} > 0$ — and is therefore increasing with $m$ and falling with $\pi$. These points illustrate a general idea underlying our analysis: the development of institutions may promote growth not by releasing constraints on it, but rather by creating a situation in which higher rates of growth become desirable.

### 4.3 Implementing the First-Best Allocation

To implement the first-best requires a means for pushing the diversion investments to zero. While possible in principle, achieving this through the tax system is not a plausible alternative. Even assuming that diversion cannot be taxed directly, the effects of a tax on diversionary activities can be replicated if all non-diversionary activities can be taxed or subsidized. A subsidy to private productive investment will encourage productive investment relative to diversion investment. Thus the diversion externality can be manipulated directly by an investment subsidy. The income tax system must also adjust. An investment subsidy that is high enough to suppress diversion, as required by the first-best, will result in too high a rate of growth unless a marginal income tax at a sufficiently high rate is imposed to counter-act it. The lump-sum tax must then change to allow for budget balance.
To see this redefine the tax system to include an investment tax at the constant rate $\tau_k$ on private productive investment. This is an arbitrary tax specification that may not be locally optimal, but in combination with income taxes it allows achievement of the first best. Budget balance for the government now requires

$$\int_0^1 \left( \tau y_i + \tau_k k_i + \ell \right) di = 0. \quad (33)$$

The first-order conditions for agent $i$’s problem imply that

$$\frac{1}{1 + \tau_k} \frac{\partial y_i}{\partial k_i} = \frac{\partial y_i}{\partial x_i} = \frac{\partial y_i}{\partial z_i} = \frac{1}{1 - \tau} \left( \frac{\dot{c}_i}{c_i} + \delta + \rho \right). \quad (34)$$

To account for this modification, the second-best diversion problem needs to be restated only to the extent of replacing the diversion multiplier $\phi$ with $(1 + \tau_k)\phi$. Accordingly, the optimal allocation is still found as in proposition 1, simply replacing $\phi$ with $(1 + \tau_k)\phi$. It is immediate that, as $\tau_k$ approaches $-1$, the optimal allocation $(\gamma^*, c^*(0))$ approaches $(\gamma^{fb}, c^{fb}(0))$. The first best can be approximated arbitrarily closely as the subsidy rate on productive investment approaches 100%. The marginal return to diversion is infinite at zero diversion in our model and so a total subsidy is required to eliminate all diversion. This full subsidy of private investment is not a palatable solution. It becomes even less so when the implied income taxes for a decentralized solution are considered. To equate the private return and the social return on productive investment the marginal income tax rate must satisfy

$$\frac{1 - \tau}{1 + \tau_k} p(\tau) = 1 \quad (35)$$

requiring the marginal income tax rate to approach 100%. Under a 100% investment subsidy growth would be too high; a 100% income tax is needed to suppress this excessive growth. Finally, in the presence of a 100% income tax, first-best consumption will be fully subsidized by the lump-sum amount $\ell = \rho k$. 

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This taxation solution to the imperfect property rights problem is not one that can be recommended seriously as a policy alternative. It leaves the state of property rights unchanged at $p(\pi)$ but avoids the externalities by controlling agents’ decisions to the exclusion of diversion investments. However when all output, consumption and productive investment are cycled through the government budget the result is a Soviet-like authoritarian system. As a practical matter it is likely to be even less capable of achieving the first-best than the actual Soviet system was: it requires a well-functioning tax system whose absence is conspicuous precisely in societies that suffer property insecurity and conflict over economic distribution; it requires an ideal government that is benevolent and can commit to future government spending and tax policies; above all, counting on benevolence in a government that controls the quantities so completely would be naive.

Despite this the model presented here is of relevance in conceptualizing the manner in which collapsing authoritarian regimes may give rise to large-scale diversionary activity in their successor states. In terms of the present model, social order can be maintained in an authoritarian structure through extensive, exclusionary government decision-making. Despite the fact of order, the underlying property rights parameter $\pi$ can remain completely undeveloped because it plays no role in the maintenance of order. In (35) for example, the magnitude of $p(\pi)$ is irrelevant; the first-best is achieved, not by providing the legal and political institutions that leverage the agents’ own defensive investments (i.e. pushing $p(\pi)$ to 1, as would be achieved by a ‘nation-building’ program), but by implicitly controlling quantities to the point where diversionary investment is pushed down to zero. However, once the authoritarian structure collapses self-enforcement of property rights at the low value of $\pi$ results in an immediate, dramatic readjustment of individual investments away from productive capital towards diversionary capital. The habit of order in the previous regime has no persistence in a decentralized
successor regime in the face of low $\pi$ and high $m$. Just as the rapidity of the collapse of political order in the Soviet Union surprised most observers, so also the depth of disruption in the property system and the widespread lawlessness that followed decentralization of the old regime were a surprise to many. The distinction between order through central control, and the failure of order under decentralized decision-making when legal support for individual property rights protection is absent, is useful in understanding this emergence of disorder.

Despite the conclusion drawn above that achieving a first-best allocation through the fiscal system is impractical, nonetheless the exercise demonstrates that there may be important welfare benefits associated with income taxes and investment subsidies in a world with imperfect property rights. Many societies have poorly developed income and investment taxes, collecting most revenue from sales taxes and excise taxes. Arguably, this is also a reflection of poorly developed institutions. In this regard, our analysis indicates the potential benefits associated with responsible fiscal policy. Income taxes help mitigate the adverse effect of excessive growth when property rights are inadequate. Investment subsidies are in effect a differential tax against appropriative activities, which helps discourage the diversion of resources.

5 Conclusion

The purpose of this paper was to investigate the role institutions play in both achieving prosperity and mitigating conflict. We constructed a simple model of endogenous growth where imperfection in property rights creates conflict over economic distribution. The model explains the observed negative association between growth and conflict across countries as a function of differences in deep-rooted institutions of property rights and conflict management. We find that countries can be divided into two categories according to their response to conventional
growth policy: pro-growth policies are desirable in countries with sufficiently high-quality institutions; the same pro-growth policies however are undesirable if institutional quality is poor. Our model thus demonstrates the possibility that seemingly sound development policies such as those promoted by the Washington Consensus can breed inefficient conflict in countries with inappropriate institutions. If society is to forestall conflict while achieving prosperity, it must develop high quality institutions of property rights and conflict management. With respect to the new emerging consensus, based on the role of property rights and the rule of law as key determinants of growth, the contribution of this paper was to provide a formal model of those implications.

While our focus has been on the policy implications of imperfect institutions, our framework may shed light on several related questions. The role of property rights on technology adoption is still an open question. Other promising extensions could include an investigation of the link between inequalities and conflict; and the form of conflict, violent versus non-violent, in alternative environments. Finally, we have suggested that the model presented here is of relevance in conceptualizing the manner in which collapsing authoritarian regimes may give rise to large-scale diversionary activity in their successor states. Yugoslavia, the Soviet Union, Afghanistan and Iraq are instances of this phenomenon. The problems associated with flawed property rights, weakness in the rule of law, emergent mafia behavior and disintegration into smaller political units in transition economies of the former Soviet Union has received considerable attention in the literature (e.g., Johnson et al. (1997), Roland (2000), Roland and Verdier (2003)); these problems have not yet been satisfactorily resolved.
Appendix

Properties of the Symmetric Private Equilibrium (derivation of (8)–(11))

The Hamiltonian associated with \(i\)'s problem is

\[
H_i = e^{-\rho t} \log(c_i) + \mu_{k_i}(I^k_i - \delta k_i) + \mu_{x_i}(I^x_i - \delta x_i) + \mu_{z_i}(I^z_i - \delta z_i) + \mu_i \left[ p^i A k_i + q^i A_k - I^k_i - I^x_i - I^z_i - c_i - T(y_i) \right],
\]

(36)

where we have disregarded the non-negativity constraints on the capital stocks, since they turn out not to be binding in equilibrium. The first-order conditions associated with \(H_i\) include

\[
\frac{\partial H_i}{\partial c_i} = \frac{\partial H_i}{\partial I^k_i} = \frac{\partial H_i}{\partial I^x_i} = \frac{\partial H_i}{\partial I^z_i} = 0,
\]

(37)

which imply that \(\mu_{k_i} = \mu_{x_i} = \mu_{z_i} = \mu_i = e^{-\rho t} \frac{1}{c_i}\). Using this, the remaining first-order conditions include

\[
\frac{\partial H_i}{\partial x_i} = \frac{\partial H_i}{\partial z_i} = \frac{\partial H_i}{\partial k_i} = \mu_i \left( 1 - \frac{\partial T}{\partial y_i} \right) \frac{\partial y_i}{\partial k_i} - \mu_{k_i} \delta = -\dot{\mu}_{k_i},
\]

(38)

and

\[
\lim_{t \to \infty} e^{-\rho t} \frac{k_i}{c_i} = \lim_{t \to \infty} e^{-\rho t} \frac{x_i}{c_i} = \lim_{t \to \infty} e^{-\rho t} \frac{z_i}{c_i} = 0,
\]

(39)

together with \(i\)'s resources constraint.

Equations (8)–(9) follow immediately. To derive (10)–(11), differentiate (4) to see that \(\frac{\partial y_i}{\partial x_i} = \frac{\partial y_i}{\partial z_i}\) implies

\[
x_i = \frac{p^i (1 - p^i) k_i}{q^i (1 - q^i) k^i}
\]

(40)

and \(\frac{\partial y_i}{\partial k_i} = \frac{\partial y_i}{\partial x_i}\) implies

\[
x_i = m(1 - p^i).
\]

(41)

In a symmetric equilibrium, \((k_i, x_i, z_i) = (k, x, z)\) for each \(i\). Thus, \(p^i = 1 - q^i\). Then (40) implies \(x = z\). It follows that \(p^i = p(\pi)\), as stated in (10). (11) then follows from (41).
The No-Tax Economy (derivation of (12)–(13))

Equation (12) follows immediately from (8) and (10), with $T(y_i) = 0$. To find $c^p(0)$ in (13), write the resources constraint as

$$Ak = c(0)e^{-\gamma t} + (1 + 2\phi) (\dot{k} + \delta k),$$  

(42)

and note that the unique solution to this ordinary differential equation consistent with (39) is

$$k = \frac{c}{A - (1 + 2\phi)(\gamma^p + \delta)},$$

(43)

Proof of Proposition 1

The first-order conditions associated with $H$ in (24) are

$$\frac{\partial H}{\partial c_j} = \frac{\partial H}{\partial I_j} = 0, \quad \forall j,$$

(44)

which imply that

$$e^{-\rho t} \frac{1}{\xi_j} = \lambda = \frac{\lambda_{k_j}}{1 + 2\phi}, \quad \forall j,$$

(45)

together with

$$\frac{\partial H}{\partial k_j} = \lambda \int_0^1 \left( \frac{\partial y_i}{\partial k_j} \right) di - \delta \lambda_{k_j} = -\dot{\lambda}_{k_j}, \quad \forall j,$$

(46)

$$\lim_{t \to \infty} e^{-\rho t} \frac{k_j}{\xi_j} = 0, \quad \forall j,$$

(47)

together with the aggregate resources constraint (23). Using symmetry, noting that

$$\int_0^1 \left( \frac{\partial y_i}{\partial k_j} \right) di = A,$$

(48)

(45)–(46) imply the solution for $\gamma^*$ given in Proposition 1. To find $c^*(0)$, write the resources constraint (23) as

$$Ak = c(0)e^{-\gamma^* t} + (1 + 2\phi) (\dot{k} + \delta k).$$

(49)
The unique solution to this ordinary differential equation consistent with (47) is

\[ k = \frac{c}{A - (1 + 2\phi)(\gamma^* + \delta)}. \] (50)

Using the solution \( \gamma^* \), \( c^*(0) \) in the proposition follows.

It is clear that the non-negativity constraints that were omitted would not be binding. It is also clear that \( c^*(0) = [A - (1 + 2\phi)(\gamma^* + \delta)] k(0) \) and \( I_k = (\gamma^* + \delta)k \) is the unique symmetric solution to the system of first-order conditions. It remains to verify the second-order conditions. From Proposition 8 in Arrow and Kurz (1970, ch. 2), it is sufficient to show that the Hamiltonian (24) evaluated at the optimum is concave in \( k \). It is easy to verify that this is the case, by substituting the optimized values of \( c(0) \) and \( I_k \) in (24). This concludes the proof. \( \square \)

**Proof of Proposition 2**

It follows from comparing (12) and (25). \( \square \)

**Proof of Proposition 3**

As explained in the main text, the allocation described in Proposition 1 can be implemented through the income tax system with the marginal rate given by (29) and the lump-sum tax given by (30). It follows that the allocation \( \{c,k\} \) implied by Proposition 1, together with the allocation \( \{x,z\} \) which satisfies (11), satisfies all the first-order conditions associated with i’s problem, taking as given that \( T(y_i) = \tau^*y_i + l^* \). The Hamiltonian associated with i’s agents problem, (36), evaluated at the optimum is concave in \( (k,x,z) \), so the second-order conditions are also satisfied (Proposition 8 in Arrow and Kurz (1970, ch. 2)). Next, taking the agents’ implied decision rules for \( c, I^x_i, I^z_i \) and \( I^k_i \) as given, the policy \( \{T\} \) characterized by \( T(y_i) = \tau^*y_i + l^* \) is an optimal policy, since it implements the solution to the primal problem. Hence, the allocation \( \{c,k,x,z\} \) and the policy \( \{T\} \) just described form an equilibrium. Furthermore, it is
the Pareto superior equilibrium among all symmetric equilibria since it implements the unique solution to the problem associated with (24). Finally, the necessary and sufficient condition for $\tau^* > 0$ stated in the proposition follows immediately from (29).

\begin{proof}[Proof of Proposition 4]
It follows from (31).
\end{proof}
References


Figure 1: Optimal Income Tax Rates

Panel 1: $m = 0.5$

Panel 2: $m = 0.75$

Panel 3: $m = 1$