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EXPLAINING AFRICA'S GROWTH TRAGEDY: A THEORETICAL MODEL OF DICTATORSHIP AND KLEPTOCRACY

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Explaining Africa's Growth Tragedy:
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Abstract

In this paper, we construct a dynamic model of a kleptocratic dictatorship to explain sub-Saharan Africa's dismal economic performance between the early 1970s and the mid-1990s. The dictator's objective is to maximize a discounted stream of revenue generated through theft of the economy's output by choosing the optimal expropriation rate and the size of the security force employed to enforce his rule. The model is used to evaluate alternative intervention options open to developed countries such as unconditional, conditional and selective foreign aid, financial and military assistance to rebel groups, as well as medical relief to combat the HIV/AIDs pandemic.

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JEL Classification: D78, O11, O17, O55

1. Introduction

Over the last four decades, Africa's economic performance has substantially lagged that in other regions of the world. In the 1980s, GDP per capita *declined* by 1.3 percent per annum on average in sub-Saharan Africa. Between 1990 and 1994, this worsened to –1.8 percent per annum, more than 6 percentage points below the average for all low-income developing countries. These figures are all the more disappointing as development economists had forecasted favourable growth prospects when many African states secured their independence from their European colonial masters in the 1960s. Despite disadvantages due to their "colonial inheritance", these African economies were expected to grow more quickly than their Asian counterparts. Indeed, from the mid-1960s to 1973, many African countries did achieve respectable growth rates. For example, Nigeria and Indonesia had comparable income levels in the early 1970s. But coinciding with the political centralization of African states and the abandonment of multi-party democracy for authoritarian one-party rule, economic performance on the continent deteriorated rapidly and did not recover until the second half of the 1990s.[1] The United Nations Development Programme calls the 1980s the "lost decade" for many of these states.

Over the years, many empirical studies have been undertaken to establish the root causes of Africa's growth tragedy (see Collier and Gunning (1999) for a survey).[2] Development economists have classified the explanatory factors for Africa's dismal growth experience along two axes: *domestic versus external* and *destiny versus policy*. *Domestic-destiny* factors include poor soil quality, tropical conditions favourable to diseases such as malaria, low population density resulting in high internal transport costs, and the small size of countries (leading to small markets and higher risks). *External-destiny* factors include high transport costs to export markets due to the preponderance of land-locked countries and the lack of access to navigable rivers, as well as the lack of diversification in colonial economies that make the countries vulnerable to terms of trade shocks. *Domestic-policy* factors include autocratic regimes that encourage large public sectors (which form their support bases), poor infrastructure (transport, telecommunication networks and courts), inefficient education and health services, an urban bias and the heavy taxation of agriculture through marketing monopolies, as well as financial repression with directed bank lending to governments and public enterprises. Finally, *external-policy* factors include misaligned exchange rates, high taxes on exported crops, quotas on imports that create favourable conditions for corruption, and accumulated foreign debts resulting from the need to finance public sector expansion.

While there is little doubt that destiny factors have contributed to Africa's slow growth, it is clearly more useful for economists to focus on the "wrong" policies adopted by African leaders in the 1970s, 1980s and early 1990s. A striking feature of the post-colonial African political landscape is the prevalence of single-party rule and the large number of dictatorships in particular.[3] The literature on African politics provides many clues as to why such poor policies were consciously chosen by these rational political elites (see, for example, Thomson (2000)). In the next section, we will present a brief overview of Africa's political economy. Our dynamic model of a kleptocratic dictatorship is presented in Section

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[1] By the mid-1990s, many sub-Saharan African dictatorships had collapsed due either to the sickness or death of the dictators (the "strong men" of Africa who had led the anti-colonial movements prior to independence), or because of the precipitous economic decline brought about by their policies. There was a sudden, quite remarkable revival of multi-party democracy in many states in the 1990s.

[2] See Sender (1999) for a rare dissenting view on Africa's post-colonial development.

[3] In 1988, 29 sub-Saharan African countries had one-party political systems, 10 were ruled by military oligarchies, only 9 had multi-party constitutions, 2 were monarchies and 2 were racial oligarchies.

3. Section 4 discusses the model's steady state solutions and explains how macroeconomic performance and social welfare are related to the characteristics and preferences of the dictator. In Section 5, we use the model to evaluate the desirability of alternative aid strategies that may be adopted by developed countries, and in the process shed light on the 'selectivity' versus 'conditionality' debate. Section 6 considers the impact of the dictator's planning horizon (that is, the expected longevity of his rule) when the growth rate of the economy depends endogenously on his behavior. Section 7 summarizes and concludes the paper.

2. Post-Colonial Africa's Political Economy

2.1 The Rise of Dictatorships

Perhaps the most important of the many legacies left behind by colonial rule was the arbitrary nature of state boundaries as the continent was formally carved up by the major European powers following the 1884-5 Berlin conference. For example, within the borders of Tanzania co-existed about 200 ethnic groups. Not surprisingly then, national unity lay at the heart of post-colonial African nationalism. The objective was the transformation of multi-cultural, multi-religious and multi-racial societies into unitary nations. The primacy of national unity quickly resulted in political activity being channelled through just one state-sanctioned party and the abandonment of the liberal democratic constitutions and multi-party elections that were hastily conjured by the departing colonial rulers. These fragile pluralist institutions distinctly lacking in historical moorings were soon abandoned, with a reversion to the hierarchical, centralised and autocratic model of government found earlier under imperial rule.

The political norm in most African states from the 1970s to the early 1990s was a highly personalised executive governing through tightly-controlled one-party structures, where the leader (although bound by traditions or customs) were free from legal-rational constraints. Personal rule in Africa ("patrimonialism") was authoritarian, arbitrary, ostentatious and inefficient. Without free elections or political competition, rent-extracting dictators governing kleptocratic ("vampire", "pirate" or predatory) states could only be removed by civilian revolts or military coups d'etat.

2.2 Foreign Aid and Africa

As most of sub-Saharan Africa slid into ever-steeper economic decline in the 1970s and 1980s, many concerned developed countries poured enormous sums of money into the affected countries through foreign direct aid and government-to-government loans or indirectly through loans via multilateral institutions and international developmental agencies such as the IMF, World Bank and United Nations. The objective of foreign aid has ranged from the prevention of social catastrophe to assisting countries achieve self-sustaining economic growth. However, these poorly conditioned aid and loans proved completely ineffective in lifting economic growth. Easterly (2002) reports that he can only find one successful case out of 138 where aid had a positive and significant impact on growth in the recipient country. Similarly, in a study of non-military aid flows to 96 countries, Boone (1996) finds that aid does not significantly increase investment and growth, nor benefit the poor as measured by improvements in human development indicators. Boone finds that virtually all foreign aid is consumed rather than invested because much of it is stolen by elites in the recipient countries. In fact, it has been argued that foreign aid almost certainly helped create and aggravate problems in Ethiopia, Somalia, Sudan and Zaire by subsidizing and propping up dictators whose rules proved especially disastrous.[4] More recent papers by Burnside and Dollar (2000) and others find that aid may be helpful, but only when selectively extended to countries with good fiscal, monetary and trade policies.

From our brief overview of post-colonial African politics, it is obvious that Africa's economic performance would be poorly explained by the standard neoclassical growth model or even endogenous ("new") growth models. The artificial construct of a social planner maximizing the collective welfare of economic agents is fairly useless in explaining the workings of a kleptocratic state. Instead, we aim to build a macroeconomic model of a typical African economy where a dictatorial ruler only looks after his own selfish interests and engages in diversion rather than production. The primary objective of such a ruler is to maximize the revenues generated from his expropriation of output produced by citizens net

[4] For example, it is estimated that Mobutu Sese Seko, whose dictatorial regime in Zaire lasted 32 years, stole US$4 billion from foreign aid, amounting to almost half of all the foreign aid received by Zaire between 1970 and 1994.

of the costs incurred in maintaining a security force to enforce his coercive rule and successfully suppress any potential uprising.[5]

2.3 Related Literature

While other researchers have adopted the rational choice approach in explaining the workings and policy choices of various political regimes, there is very little research that links the actions of a rational, optimizing political regime to the economic performance and growth dynamics of a country under its rule. For example, Wintrobe (1990) develops a static model where the dictator cares about both consumption and power. Dictatorial regimes are classified as ‘tinpots’ or ‘totalitarian’ based on the relative importance of the two objectives. However, in this model, economic performance is exogenous. The author finds that an exogenous improvement in economic conditions induces a tinpot dictator to reduce repression but a totalitarian dictator to increase repression. Chen and Fang (1999) examine the actions of a dictatorship that is characterized by differences between its preference for redistribution and that of the ‘median citizen’. The dictator, however, does not solve an explicit optimization problem. The model predicts that democracies will prevail at high levels of economic development while countries with low levels of economic development will be trapped in equilibria with long-lasting dictatorships. The level of economic development is, however, exogenous to the model.

The working paper of Overland, Simon and Spagat (2000) most closely resembles our proposed model in the sense that the economic performance of a dictatorship is modelled endogenously. In this model, the probability of a successful revolt (that is, the survival function for the dictator) is somewhat arbitrarily specified to depend on the aggregate capital stock. The dictator’s rate of expropriation is also exogenous. The authors adopt the Bellman equation approach to solve the dynamic optimization problem. However, because a successful revolt is a possible actual outcome, the complexity of the model renders analytical solutions impossible. The authors run simulations based on over 400 alternative sets of parameters values and discuss what outcomes occur with the highest frequencies. They obtain a ‘bifurcation’ result: below certain aggregate capital levels, dictatorships tend to collapse, while above these levels, dictatorships prevail but grow at

[5] This paper is part of a larger research project that will also examine models where competition between rival ethnic groups and external conflicts between neighboring states impact economic performance and growth. The project is driven by the observation that, for most former African colonies, the period since independence has been characterized by destructive power struggles, as well as by the use of government machinery to channel money to favored ethnic groups.

rates in excess of the social optimum. It is then argued that this phenomenon is observed in East Asia and Africa. However, the analytical intractability of the model precludes the authors from performing any useful policy analysis with it.

In our model, the dictator optimally chooses the expropriation rate as well as the size of his security force, which determines the probability that a citizen revolt will succeed. Households optimally choose their consumption path taking the dictator's choices as given. The dictator in turn takes into account the impact of his choices on the households' decisions such that both optimization problems are solved simultaneously. In equilibrium, no revolt actually occurs as the dictator offers just sufficient incentive for cost-benefit analysing households to prefer not revolting to revolting. The model is explained in more detail in the next section; here it suffices to say that our careful construction of the "no revolt condition" renders the model sufficiently tractable that we can perform useful and practical policy experiments with it.

In summary, the principal innovations of our paper are: (1) the endogenous modelling of economic performance in the context of a model of dictatorship; (2) the incorporation of complete micro-foundations with careful simultaneous modelling of the dictator's and the representative citizen's dynamic optimization problems; and (3) the use of the model for extensive and in-depth policy analyses with significant real world implications.

3. The Model

3.1 Overview

The model comprises three types of agents: citizens, a dictator, and members of his security force. The dictator's objective is to maximize a discounted stream of revenue derived from expropriating part of the output y_{pt} that is produced by citizens according to $y_{pt} = Ak_{pt}^{\alpha}$, where $0 < \alpha < 1$, A is the constant level of technology, and k_{pt} is capital per worker. The fraction of output that he expropriates at time t is denoted e_t. In order to enforce his coercive rule, the dictator deploys a proportion, u_{st}, of the labour force as his personal security force.[6] The remaining fraction, $u_t = 1 - u_{st}$, supplies labour for the production of output.

[6] The dictator's personal security force should be distinguished from a military force employed to contain external threats. We do not model such a military force here.

When choosing e_t and u_{st}, the dictator takes into account the impact of his choices on the citizens' decision-making. A person deployed in the security force is paid the same wage as one working in the production sector. However, unlike an ordinary citizen, a member of the security force does not face expropriation by the dictator. For simplicity, we assume that members of the security force always consume all of their income. Moreover, the security force itself never revolts against the dictator.[7]

Taking the dictator's choices as given, citizens solve a Ramsey-type optimization problem to determine their optimal paths for consumption and capital accumulation. At each point in time, citizens may decide to revolt against the dictator and establish an alternative political regime. A revolt succeeds or fails with probabilities λ_t and $1-\lambda_t$ respectively. These probabilities in turn depend on the size of the dictator's security force. Citizens compare their welfare from not revolting to the expected welfare from a revolt; they are risk averse and will only revolt when the welfare from doing so exceeds that from remaining acquiescent. Their decision rule leads to the no-revolt condition, which we abbreviate and refer to henceforth as the "NRC".

3.2 The No-Revolt Condition (NRC)

The gross income earned from production by a representative civilian under the dictator's rule is equal to y_{pt}. Then her income after expropriation by the dictator is $(1-e_t)y_{pt}$. Alternativelly she may choose to revolt, whereupon she receives $(1-g_t-\psi)y_{pt}^s$ in the event of a successful revolt or $(1-g_t-e_t-p)y_{pt}^u$ when the revolt fails, where y_{pt}^s and y_{pt}^u are the per-citizen output levels when the revolt is successful and unsuccessful respectively, g_t is the cost of engaging in a revolt (say the damage inflicted on the productive infrastructure during a revolt that permanently reduces production possibilities), ψ is the time-invariant expropriation rate the successor political regime is expected to impose when the revolt is successful (with $\psi < e_t$), and p is the penalty the dictator imposes over and above e_t should the attempted revolt fail. We discuss how this penalty is determined in Section 4.1.2.

To render the model more realistic, we model the permanent cost of a revolt (that is, the proportion of output that is "lost" at each point in time after the revolt), g_t, as follows:

[7] While military coups were commonplace in post-colonial Africa, revolts by internal security or police forces were almost non-existent. Military coups were usually led by middle-ranking or junior officers with different and complex motives. We believe that it is very difficult and ultimately unproductive to attempt to model the relationship between a dictator and heterogenous lower-ranking military officers.

$$g_t = u_{st} \cdot g \,, \qquad (1)$$

where g is the exogenous component of g_t. In this specification, the cost of a revolt is higher the larger the size of the dictator's security force.[8]

Suppose the representative citizen's instantaneous utility function takes the CRRA form:

$$U\left(x(e_{t,}u_{st})\right) = \frac{1}{1-\phi} x^{1-\phi} \,, \qquad (2)$$

where ϕ measures the degree of risk aversion and x is the payoff under the alternative scenarios of no revolt, a successful revolt, and an unsuccessful revolt.

The dictator announces e_t and u_{st} at each point of time. Citizens then compare their lifetime utility from not revolting to the expected lifetime utility from revolting at the announced levels of e_t, u_{st} and p. They revolt only when the the latter is at least as high as the former. That is,

$$\int_0^\infty \left[E\left(U\right)|_{revolt} \right] dt > \int_0^\infty \left[U \;|_{No-revolt} \right] dt \,.$$

On the other hand, the dictator, who we assume always wishes to retain power, will choose e_t and u_{st} such that

$$\int_0^\infty \left[E\left(U\right)|_{revolt} \right] dt \leq \int_0^\infty \left[E\left(U\right)|_{No-revolt} \right] dt \,.$$

The dictator does so by maximizing his objective function (gross revenues from expropriation minus wage payments to the security force) subject to the NRC.[9] Notice that this also implies that expected utility from the two alternatives may not match at every point in time. We can therefore write the *instantaneous* NRC as:

$$E\left(U\right)|_{No-revolt} - E\left(U\right)|_{revolt} = \Phi_t \qquad (3)$$

This expression holds when the expected lifetime utility from revolt equals the lifetime utility from not revolting, in which case Φ_t should be normally distributed with a zero mean. Obviously, at some points in time, Φ_t will be positive while at others it will be

[8] The idea is that a larger security force can cause greater damage to an economy's infrastructure in their attempt to suppress an uprising.

[9] The deterministic nature of the model and the NRC means that there is a zero probability that the "state of the world" changes from 'no revolt' to 'revolt'. That there have actually been relatively few citizen revolts in post-colonial Africa (and even fewer successful ones) supports our modelling approach.

negative. However, in the long run, intertemporally, the deviations must cancel one another out. As $E(U)|_{No-revolt} = U_t^n$ and $E(U)|_{revolt} = \lambda U_t^s + (1-\lambda)U_t^u$, the instantaneous NRC is

$$U_t^n - \lambda U_t^s - (1-\lambda)U_t^u = \Phi_t$$

where

$$U^n = U\left[(1-e_t)\, y_{pt}\right],$$

$$U_t^s = U\left[(1-g_t-\psi)\, y_{pt}^s\right],$$

and

$$U_t^u = U\left[(1-g_t-e_t-p)\, y_{pt}^u\right]. \qquad (4)$$

Using our functional form for the utility function, (2), the instantaneous NRC may be written as

$$\left[(1-e_t)\,y_{pt}\right]^{1-\phi} - \lambda\left[(1-g_t-\psi)\,y_{pt}^s\right]^{1-\phi} - (1-\lambda)\left[(1-g_t-e_t-p)\,y_{pt}^u\right]^{1-\phi} = (1-\phi)\Phi_t. \qquad (5)$$

Note that y_{pt}, y_{pt}^s and y_{pt}^u are determined by the citizens' optimization, which we now explain.

3.3 Citizens' Optimization Problem

As in the Ramsey-Cass-Koopmans (RCK) model, the citizens in our model optimally allocate their income at each point in time between consumption and saving to maximize lifetime utility, subject to their intertemporal budget constraint. However, unlike the RCK model, this constraint incorporates the dictator's announced expropriation rate, e_t, the proportion of labour force deployed in the security force, u_{st}, and the size of the penalty that is imposed when a revolt fails, *p*. We assume that individuals are infinitely lived and have infinite planning horizons.

Given that the dictator ensures at every point in time that the NRC is satisfied so that an individual citizen always decides not to revolt, her optimal time path of consumption is a solution to the following dynamic optimization problem:

$$\max_{c_{pt}} \int_0^\infty e^{\beta t} U(c_{pt})\, dt \qquad \text{subject to}$$

(i) $\dot{k}_{pt} = (1-e_t)\, y_{pt} - c_{pt}$, where $y_{pt} = A k_{pt}^{\alpha}$, and

(ii) a given e_t, u_{st} and p,

where the utility function is that given in equation (2) and β is the rate of time preference. Note that k_{pt} may represent a broad definition of capital that includes physical as well as human capital. For simplicity, we assume that the depreciation rate of capital is zero.

The Euler equation derived from the first order conditions of the optimization problem (as shown in Appendix A) is

$$\frac{\dot{c}_{pt}}{c_{pt}} = \frac{1}{\theta}\left[\alpha\left(1-e_t\right)Ak_{pt}^{\alpha-1}-\beta\right]. \qquad (6)$$

Even though no revolt actually occurs in equilibrium, to compute the NRC we need to derive the hypothetical incomes and productive output that would be generated should a revolt be successful or otherwise. The two hypothetical Euler equations are

$$\frac{\dot{c}_{pt}}{c_{pt}} = \frac{1}{\theta}\left[\alpha\left(1-g_t-e_t-p\right)A\left(k_{pt}^{u}\right)^{(\alpha-1)}-\beta\right], \qquad (6')$$

and

$$\frac{\dot{c}_{pt}}{c_{pt}} = \frac{1}{\theta}\left[\alpha\left(1-g_t-\psi\right)A\left(k_{pt}^{s}\right)^{(\alpha-1)}-\beta\right]. \qquad (6'')$$

These equations, together with their respective capital accumulation constraints, give rise to the following expressions for steady state output per citizen when there is no revolt, when the revolt is unsuccessful, and when the revolt is successful:

$$\left.\begin{aligned} y_{pt}^{*} &= A\left(\frac{\alpha A}{\beta}\right)^{\frac{\alpha}{1-\alpha}}\left(1-e_t\right)^{\frac{\alpha}{1-\alpha}} \\ y_{pt}^{*u} &= A\left(\frac{\alpha A}{\beta}\right)^{\frac{\alpha}{1-\alpha}}\left(1-e_t-g_t-p\right)^{\frac{\alpha}{1-\alpha}} \\ y_{pt}^{*s} &= A\left(\frac{\alpha A}{\beta}\right)^{\frac{\alpha}{1-\alpha}}\left(1-g_t-\psi\right)^{\frac{\alpha}{1-\alpha}} \end{aligned}\right\rangle. \qquad (7)$$

Note that in the benchmark RCK model, $y_{pt}^{*} = A\left(\alpha A/\beta\right)^{\alpha/(1-\alpha)}$.

The corresponding expressions for consumption per citizen in the three cases are

$$\left.\begin{aligned} c_{pt}^{*} &= \left(1-e_t\right)y_{pt}^{*} \\ c_{pt}^{*u} &= \left(1-e_t-g_t-p\right)y_{pt}^{*u} \\ c_{pt}^{*s} &= \left(1-g_t-\psi\right)y_{pt}^{*s} \end{aligned}\right\rangle. \qquad (8)$$

3.4 The Security Force

As noted previously, each member of the security force receives a wage equal to that earned by a civilian citizen in the production sector. This wage is given by

$$w_{st} = (1-\alpha) y_{pt} . \tag{9}$$

For simplicity, we assume that security force members always consume their entire income. The consumption of a representative agent in the security force is therefore

$$c_{st} = (1-\alpha) y_{pt} . \tag{10}$$

Although the labour market clearing condition implies that wages for civilians and security force members are equal, the latter is a priviledged group in that their incomes are exempt from expropriation. This is an example of a patron-client relationship where the patron offers material benefits to a group in exchange for loyalty. As stated previously, we asssume that members of the security force never rebel aginst their patron, the dictator.

3.5 The Dictator's Optimization Problem

In seeking to maximize his lifetime income, the dictator faces a trade-off in his choice variables, the expropriation-output ratio, e_t, and the size of his security force as a proportion of the total labour force, u_{st}. Citizens are more likely to revolt the higher the expropriation rate. A larger security force will be more successful in suppressing a citizens' revolt but results in less labour being available for use in production and therefore less output to expropriate, holding the expropriation rate constant. In equilibrium, the dictator chooses a combination of the expropriation rate and the size of the security force such that citizen's marginally prefer not revolting to revolting, as summarized in the NRC.

The dictator is assumed to have access to foreign bank accounts and other foreign investment opportunities, so that his revenues from expropriation do not constitute part of the domestic capital stock. Consequently, only the savings of civilians are transformed into the economy's capital stock by a latent financial sector (which is not modelled).

In addition, we abstract from the dictator's role as a provider of public goods and services. We can think of the dictator financing a fixed amount of expenditures (on highways, water systems, fire services, schools etc) by levying a non-distortionary lump-sum tax on each citizen.[10]

[10] Of course, in a more complicated model, the quantity of public goods and services provided by the dictator may impact the citizens' decision to revolt, as will the choice of taxes.

The dictator's problem is therefore to choose $(e_t, u_{st}) \in (0,1)$ at each point in time to maximize a stream of expropriated output net of the costs of deploying his security force, subject to the NRC:

$$\max_{e_t, u_{st}} D = \int_0^\infty e^{-\beta_D t} D_t dt = \int_0^\infty e^{-\beta_D t} \left[e_t y_{pt} (1 - u_{st}) L_t - w_{st} u_{st} L_t \right] dt$$

such that

$$\left[(1-e_t) y_{pt}\right]^{1-\phi} - \lambda\left[(1-g_t-\psi) y_{pt}^s\right]^{1-\phi} - (1-\lambda)\left[(1-g_t-e_t-p) y_{pt}^u\right]^{1-\phi} = (1-\phi)\Phi_t,$$

where β_D is the dictator's rate of time preference and L_t is the size of the labor force.

Finally, we need to specify how the probability of success of a potential revolt, λ_t, depends (negatively) on the size of the dictator's security force, u_{st}. For simplicity, we assume a linear function of the form

$$\lambda_t = 1 - u_{st}. \tag{11}$$

4. Solutions, Comparative Statics and Dynamics

4.1 Solving the Model

4.1.1 Simplifying Assumptions

The model, as presented above, turns out to be highly complex. For example, the general form of the NRC allows our dictator to choose complicated paths for u_{st} and e_t where their values at each point in time depends on the instantaneous values of y_{pt} on the transition to the steady state. To simplify the model, we need to restrict u_{st} and e_t to be constant on the transitional path as well as in the steady state. That is, u_{st} and e_t always jump instantaneously to their new steady state values in response to a shock. The dictator's optimal choices then depend solely on the steady state values of the variables in the civilians' optimization problem, such as y_{pt}^*.[11] We can justify this simplification in several ways. For example, the full optimization problem may impose an information overload for a dictator in the real world (as it does for the economic modeler!), so that the heuristic

[11] While the simplifications to the dictator's optimization problem render the dynamics of the model less interesting and although our focus is on the steady state behavior of the model, we argue that it is nevertheless important that the model be cast in a dynamic framework. This allows the reader to discern clearly the choices facing an omniscient dictator unconstrained by computational complexity issues and those facing a more "realistic" boundedly-rational one. That is, we believe it is better to start with the complete model and impose restrictions on it on the grounds of computability, than to start with a simple static model and leave the reader wondering about the form of the fully specified model.

shortcut taken here is a realistic “second-best” solution that he rationally adopts. Secondly, the dictator may choose to adjust u_{st} and e_t fully at the instant of a shock’s arrival if gradual adjustment of u_{st} is costly. For example, it is expensive and inefficient to train new soldiers or security force members one by one or in dribs and drabs. That is why we often observe armies and police forces training their new recruits in large batches and intakes. In essence, we are implicitly imposing adjustment costs that are the reverse of those in the *q*-theory of investment, where instantaneous adjustments to the capital stock are costly. Here, it is *gradual* adjustment that is costly. In any case, Appendix B shows that allowing e_t to vary in the transition path to the steady state will not alter the qualitative nature of the model.

With our simplifications, the instantaneous NRC `and the intertemporal NRC are identical, so

$$U_t^n - \lambda U_t^s - (1-\lambda) U_t^u = \Phi_t \tag{12}$$

at every point in time. We further simplify matters by assuming that the dictator does just enough at every point in time to prevent a revolt, that is $\Phi_t = \bar{\Phi} = 0 \ \forall t$. We can therefore express analytically the trade-off between u_{st} and e_t that is encapsulated in the NRC:

$$\left(\frac{\alpha A}{\beta}\right)^{\frac{\alpha(1-\phi)}{1-\alpha}} \left[(1-e_t)^{\frac{(1-\phi)}{1-\alpha}} - \lambda_t (1-g_t-\psi)^{\frac{(1-\phi)}{1-\alpha}} - (1-\lambda_t)(1-e_t-g_t-p)^{\frac{(1-\phi)}{1-\alpha}} \right] = 0, \tag{13}$$

where $\lambda_t = 1 - u_{st}$. Note that we have substituted equation (7) into (5) after imposing our simplifying assumptions. Finally, by imposing $\phi = \alpha$, the above expression reduces to

$$e_t = \frac{p+g}{1-u_{st}} - (p+g-\psi). \tag{14}$$

4.1.2 Determination of the Optimal Credible Penalty

Let χ represent the intrinsic (time-invariant) character, personality and psychological make-up of the dictator. A dictator with a larger value of χ is one who strikes greater terror and fear into the hearts of his citizens. Setting aside the NRC for a moment, suppose the citizens have actually decided to mount a revolt, which unfortunately fails. Following this unsuccessful revolt, the probability of a subsequent revolt succeeding is reduced to an extent that is related to χ:

$$\lambda_t^{post} = \lambda_t / (1+\chi), \tag{15}$$

where λ_t^{post} is the probability of a successful revolt following an unsuccessful one. The probability of success falls after a failed revolt for several plausible reasons. An important one is that the citizens may be demoralized and psychologically defeated; hence the negative relationship between χ and λ_t^{post}. Suppose also that, after the initial revolt, the dictator does not levy an additional penalty on the next unsuccessful revolt.[12] Then the "post-revolt" NRC is given by

$$e_t^{post} = \frac{g}{\lambda_t^{post}} - (g - \psi), \qquad (16)$$

where e_t^{post} is the optimal expropriation rate after the unsuccessful revolt. Since the pre-revolt optimal expropriation rate is given by $e_t = (p+g)/\lambda_t - (p+g-\psi)$, we can compute the optimal, credible penalty as the difference between the pre-revolt and post-revolt optimal expropriation rates. That is,

$$p = e_t^{post} - e_t = \chi g\ . \qquad (17)$$

Intuitively, the psychological effect of a failed revolt enables the dictator to expropriate a greater proportion of output for a given size of his security force. It is this additional expropriation that makes the initial pre-revolt penalty level, *p*, credible in the first place. That is, citizens know that it is ex-post optimal for the dictator to levy the penalty over and above the original expropriation rate because the threat of a further revolt is diminished for any given size of the security force.

4.1.3 Solving the Dictator's Problem

Using (14), the dictator's optimization problem reduces to

$$\max_{e_t, u_{st}} D = \int_0^\infty e^{\beta_D t} \left[e_t y_{pt} (1-u_{st}) L_t - (1-\alpha) y_{pt} u_{st} L_t \right] dt \ \ ,$$

subject to

$$e_t = \frac{(1+\chi)g}{1-u_{st}} - (p + g - \psi)\,. \qquad (18)$$

Suppose the labour force is of constant size $L_t \equiv 1$ and that $\psi = 0$. Then the Lagrangian is

$$\Im = \left[e_t (1-u_{st}) - (1-\alpha) u_{st} \right] y_{pt}^* - \mu \left[\left(e_t + (1+\chi)g \right) (1-u_{st}) - (1+\chi) g \right], \qquad (19)$$

[12] Without this assumption, the problem of determining the penalty becomes a recursive one, resulting in a highly complicated expression for the optimal value of *p*.

where, from (7), $y_{pt}^{*} = A\left(\alpha A/\beta\right)^{\alpha/(1-\alpha)}\left(1-e_{t}\right)^{\alpha/(1-\alpha)}$ and μ is the Lagrange multiplier.

The first order conditions are:

$$\frac{d\Im}{de_{t}} = \left[\left(1-u_{st}\right)\right]y_{pt}^{*} - \left[e_{t} - \left(e_{t}+1-\alpha\right)u_{st}\right]\left(\frac{\alpha}{1-\alpha}\right)\frac{y_{pt}^{*}}{\left(1-e_{t}\right)} - \mu\left(1-u_{st}\right) = 0, \quad (20)$$

$$\frac{d\Im}{du_{st}} = -\left[e_{t} + \left(1-\alpha\right)\right]y_{pt}^{*} + \mu\left[e_{t} + (1+\chi)g\right] = 0. \quad (21)$$

We can re-write these conditions as

$$\left(\frac{\alpha}{1-\alpha}\right)\frac{\left[e_{t}\left(1-u_{st}\right) - \left(1-\alpha\right)u_{st}\right]}{\left(1-u_{st}\right)\left(1-e_{t}\right)} = \frac{g-\left(1-\alpha\right)}{e_{t}+(1+\chi)g}, \quad (22)$$

$$e_{t} = \frac{p+g}{1-u_{st}} - (1+\chi)g. \quad (23)$$

Combining these two equations yields

$$\left(1-\alpha\right)\left[1+(1+\chi)g\right]\left(1-u_{st}\right)^{2} + \left(2\alpha-1\right)\left(1+\chi\right)g\left(1-u_{st}\right) - \alpha\left(1+\chi\right)g = 0. \quad (24)$$

Solving for u_{st}, we obtain

$$u_{s}^{*} = 1 - \frac{1}{2}\left(\frac{1}{1-\alpha}\right)\left(\frac{(1+\chi)g}{1+(1+\chi)g}\right)\left[\left(1-2\alpha\right) + \sqrt{1+\frac{4\alpha\left(1-\alpha\right)}{(1+\chi)g}}\right]. \quad (25)$$

Substituting u_{s}^{*} into the NRC gives

$$e^{*} = \frac{(1+\chi)g}{1-\frac{1}{2}\left(\frac{1}{1-\alpha}\right)\left(\frac{(1+\chi)g}{1+(1+\chi)g}\right)\left[\left(1-2\alpha\right)+\sqrt{1+\frac{4\alpha\left(1-\alpha\right)}{(1+\chi)g}}\right]} - (1+\chi)g. \quad (26)$$

Therefore, $y_{pt}^{*} = \left(\alpha A/\beta\right)^{\alpha/(1-\alpha)}\left(1-e^{*}\right)^{\alpha/(1-\alpha)}$ and, from (8), $c_{pt}^{*} = \left(1-e^{*}\right)y_{pt}^{*}$.[13] Note that y^{*} and c^{*} are strictly lower than they would be in the absence of the kleptocratic dictatorship (where $e^{*} = 0$).

The partial derivative of u_{st} with respect to g is:

$$\begin{aligned}\frac{du_{st}}{dg} = &-\frac{1}{2}\left(\frac{1}{1-\alpha}\right)\left[\left(1-2\alpha\right)+\sqrt{1+\frac{4\alpha\left(1-\alpha\right)}{(1+\chi)g}}\right]\left(\frac{1}{1+(1+\chi)g}\right)^{2} \\ &+\frac{1}{4}\left(\frac{1}{1-\alpha}\right)\left(\frac{(1+\chi)g}{1+(1+\chi)g}\right)\left[1+\frac{4\alpha\left(1-\alpha\right)}{(1+\chi)g}\right]^{-0.5}\frac{4\alpha\left(1-\alpha\right)}{\left[(1+\chi)g\right]^{2}}\end{aligned}. \quad (27)$$

[13] Because we assume that the depreciation rate of capital is zero, citizens do not need to save in the steady state in order to maintain a constant capital stock.

The solution to the dictator's optimization problem is illustrated in Fig.1. His objective function D is maximized at the combination of u_{st} and e_{st} where the iso-revenue curve intersects the NRC.

4.2 Comparative Statics and Transitional Dynamics

We now examine the impact of several key parameters on the steady state values of y_{pt}, c_{pt}, e_t and u_{st}. These parameters capture the cost of revolt, g, the personality of the dictator, χ, and the attractiveness of alternative political regimes, ψ.[14]

4.2.1 Increase in the Cost of Revolt

The cost of a revolt is measured by g. As discussed previously, g may be interpreted as the proportion of the economy's productive capacity that is destroyed in an uprising that results in clashes between citizens and the dictator's security force.

Fig. 2 shows that increasing the cost of revolt increases the dictator's steady state expropriation rate, e_t^*. On the other hand, the relationship between g and u_{st} exhibits a mild inverted-U shape: u_{st} at first increases and then declines as g continues to rise. For the chosen set of parameter values, in the region where g is small, an increase in g encourages the dictator to drastically increase the expropriation rate, even if it necessitates the hiring of a larger (and more costly) security force. As g becomes larger, the dictator increases the expropriation rate gradually while gradually shrinking the size of his security force. Both steady state output and consumption per civilian decline monotonically as g increases.

4.2.2 Personality of the Dictator

Recall our definition of χ as a parameter representing the immutable character and personality of the dictator. Our model specification results in χ having an identical effect to g since they appear symmetrically in the NRC.[15] The results shown in Fig. 2 therefore apply equally to χ as they do to g. That is, a more ruthless and cruel dictator lowers his citizens' output and consumption levels. Note that these levels are strictly lower than what they

[14] The baseline values of parameters used in the simulations that follow are: $\alpha = 1/3$, $\beta = 0.02$, $p = 0.3$, $g = 0.5$, and $\psi = 0.05$.

[15] However, χ and g are distinct parameters. The former appears only in U_t^u while the latter appears in both U_t^u and U_t^s.

would be without the dishonest and self-serving political regime. In the absence of the kleptocratic dictatorship, $c^*_{pt} = y^*_{pt}$ since $e^* = 0$.

4.2.3 Attractiveness of Alternative Political Regimes

The attractiveness of alternative political regimes is captured by the parameter ψ, which measures the proportion of output that is extracted by such a regime. The higher the value of ψ, the less pleasant is the alternative to the dictator. Fig. 3 shows that a lower value of ψ (that is, a more attractive alternative regime) elicits more repressive behavior by the dictator, with higher equilibrium values of e_t and u_{st}. The intuition behind this somewhat surprising result is that the existence of a more attractive political alternative to the current dictatorship increases the incentive for ordinary citizens to revolt. To prevent this, the dictator increases the size of his security force, which also enables him to extract a greater proportion of output. Steady state consumption and output per citizen are therefore increasing in ψ. We can show, however, that the dictator's net revenue declines progressively as the alternative regime becomes more and more attractive. Although e_t increases as ψ falls, its positive impact on net revenues is offset by the cost of maintaining the burgeoning security force.

4.2.4 Transitional Dynamics

In this model, an increase in χ or g generates the same transitional dynamics as a decline in ψ. Fig. 4 illustrates the two possible adjustment paths to the new steady state corresponding to different choices of parameter values. In the first, consumption per citizen c_{pt} jumps upwards at the instant of the shock and then declines to the new (lower) long run level. In the second, c_{pt} jumps down instantaneously and then declines to the same new long run level. In both cases, capital per citizen k_{pt}, a non-jumping state variable, declines smoothly to the new, lower long run level.[16]

5. Evaluating Alternative Aid Strategies

We are now ready to use the model to explore the implications of alternative policy options open to developed countries wishing to assist citizens in countries under dictatorial rule.

[16] In dynamic optimization problems such as that faced by the citizens in this model, control variables like c_{pt} may jump while state variables like k_{pt} cannot.

These options include: (i) unconditional foreign aid; (ii) conditional foreign aid with potential sanctions; (iii) financial assistance to the political opposition (if it exists) or military assistance to rebels; and (iv) funds for medical relief in the face of the HIV/AIDS pandemic. We assume that the dictator is able to expropriate a portion of foreign aid just as he does a part of domestic output.

As discussed in Section 2, while earlier studies concluded that aid does not significantly increase growth nor benefit the poor, Burnside and Dollar (2000) find that aid targeted at countries with good existing policies have a positive impact on growth. This work and follow-up papers by Collier and Dollar (2001, 2002) have had a major impact upon policy; Easterly (2003) documents how it has influenced both individual governments and international organizations. As a result, policy conditionality, until recently seen as the main instrument for increasing the effectiveness of aid, has been dramatically displaced by the concept of selectivity. However, the correct basis for the selection of recipient countries has been keenly debated. The original Burnside and Dollar policy indicator has been discarded in favor of the more comprehensive World Bank's Country Policy and Institutional Assessment (CPIA) index. In addition, Hansen and Tarp (2001) and Dalgaard and Hansen (2001) argue that aid's positive impact on growth is characterized by diminishing returns. In this section, we will use our model of kleptocracy and dictatorship to weigh in on the conditionality versus selectivity debate.

5.1 Incorporating Foreign Aid in the Model

Obstfeldt (1999) showed that aid has no effect on capital or output per worker in the Ramsey-Cass-Koopmans model, regardless whether growth is exogenous or endogenous.[17] Fortunately, our model proves much more useful for policy analysis in this regard.

To model the impact of various forms of foreign aid, we need to modify the model slightly. Suppose that an individual citizen's instantaneous utility is now given by

$$U(x,z) = \frac{1}{1-\phi} x^{1-\phi} + \frac{1}{1-\vartheta} z^{1-\vartheta}, \tag{28}$$

where x is the income earned from engaging in productive activities and z is the foreign aid received by each citizen net of expropriation by the dictator. For simplicity (in order to obtain an analytical solution), we assume that individuals are risk averse in x and risk

[17] Dalgaard, Hansen and Tarp (2004) show that in an overlapping-generations (OLG) model, the impact of aid on long run productivity depends on the relative magnitudes of the return to capital investments and the discount rate of economic agents.

neutral in *z*. Risk neutrality in z implies that $\vartheta = 0$. This reduces the utility function to an additively separable quasi-linear form:

$$U(x,z) = \frac{1}{1-\phi} x^{1-\phi} + z \,. \qquad (29)$$

Suppose the dictator's expropriation rates for domestic output and foreign rate are identical. Then

$$z_t = (1-e_t) f \,, \qquad (30)$$

where *f* is the time-invariant amount of gross foreign aid per citizen.

As before, the NRC implies that

$$U_t^n - \lambda U_t^s - (1-\lambda) U_t^u = \Phi_t \,.$$

With the inclusion of foreign aid in the model,

$$\begin{aligned} U^n &= U\left[(1-e_t) y_{pt}, (1-e_t) f \right], \\ U_t^s &= U\left[(1-g_t-\psi) y_{pt}^s, (1-g_t-\psi) f \right], \qquad (31) \\ U_t^u &= U\left[(1-g_t-e_t-p) y_{pt}^u (1-g_t-e_t-p) f \right]. \end{aligned}$$

Substituting these expressions into the NRC yields

$$\begin{aligned} &\left[(1-e_t) y_{pt}\right]^{1-\phi} - \lambda\left[(1-g_t-\psi) y_{pt}^s\right]^{1-\phi} - (1-\lambda)\left[(1-g_t-e_t-p) y_{pt}^u\right]^{1-\phi} \\ &\quad + \left[g_t - \lambda e_t + \lambda\psi + (1-\lambda) p\right](1-\phi) f = (1-\phi)\overline{\Phi}. \end{aligned} \qquad (32)$$

From the citizen's optimization problem, we obtain

$$y_{pt}^* = \left(\frac{\alpha A}{\beta}\right)^{\frac{\alpha}{1-\alpha}} (1-e_t)^{\frac{\alpha}{1-\alpha}} \,,$$

$$y_{pt}^{*u} = \left(\frac{\alpha A}{\beta}\right)^{\frac{\alpha}{1-\alpha}} (1-e_t-g_t-p)^{\frac{\alpha}{1-\alpha}} \,,$$

and

$$y_{pt}^{*s} = \left(\frac{\alpha A}{\beta}\right)^{\frac{\alpha}{1-\alpha}} (1-g_t-\psi)^{\frac{\alpha}{1-\alpha}} \,. \qquad (33)$$

The NRC thus becomes

$$\begin{aligned} &\left(\frac{\alpha A}{\beta}\right)^{\frac{\alpha(1-\phi)}{1-\alpha}} \left[(1-e_t)^{\frac{1-\phi}{1-\alpha}} - \lambda(1-g_t-\psi)^{\frac{1-\phi}{1-\alpha}} - (1-\lambda)(1-e_t-g_t-p)^{\frac{1-\phi}{1-\alpha}} \right] \\ &\quad + \left[g_t - \lambda e_t + \lambda\psi + (1-\lambda) p\right](1-\phi) f = (1-\phi)\overline{\Phi}. \end{aligned} \qquad (34)$$

When $\phi = \alpha$, solving for e_t yields

$$e_t = \left(\frac{p+g}{\lambda}\right) - \left(p+g-\psi\right) - \frac{(1-\phi)\overline{\Phi}}{\lambda}\left[\left(\frac{\alpha A}{\beta}\right)^{\alpha} + (1-\phi) f\right]^{-1}. \qquad (35)$$

The model is calibrated by choosing the following baseline parameter values: $\alpha = 1/3$, $\beta = 0.02$, $\chi = 0.6$, $g = 0.5$, $\psi = 0.05$ and $\overline{\Phi} = 0$.

5.2 Unconditional Foreign Aid

5.2.1 Does unconditional or poorly conditioned foreign aid increase citizen welfare?

Conditionality refers to the giving of aid on the basis of promises to adopt good policies in the future. In practice, conditionality has almost always failed so that the aid extended to many developing countries in the last forty years have been, for all intents and purposes, virtually unconditional. [18] The blame is shared by recipient countries that fail to keep their promises and by aid agencies that do not strictly enforce the stated conditions nor mete out the necessary punishment when required.

What is the relationship between the size of unconditional or poorly conditioned foreign aid, f, and key variables of interest such as e_t, u_{st}, y_{pt} and c_{pt}? Fig. 5 shows that an increase in f in fact makes the dictator more repressive. By increasing the amount of money (from domestic output and foreign aid) that the dictator can potentially expropriate, the optimizing dictator responds to an increase in f by increasing the relative size of his security force u_{st}, which then allows him to increase his expropriation rate e_t. Output and consumption per citizen, y_{pt} and c_{pt} respectively, decline correspondingly. These results are therefore in accord with the lamentable track record of foreign aid to African states. Such aid, by enriching and strengthening the position of the kleptocratic dictator, stymies political and economic reform. Nor does it avert a social catastrophe or humanitarian crisis since it makes the citizens worse off.

Fig. 6 indicates that the negative relationship between output per citizen and the size of foreign aid is less pronounced when the dictator is innately harsher, that is, when χ is larger. Nevertheless, output per citizen is lower for larger values of χ over a wide range of values for f.

5.2.2 Dynamics of an increase in unconditional foreign aid

[18] For example, Alesina and Dollar (2000) find no relationship between official finance and policy reform.

When foreign aid is added to the model, the $\dot{c}_{pt} = 0$ schedule continues to be given by

$$k^*_{pt} = \left(\frac{\alpha A}{\beta}\right)^{\frac{1}{1-\alpha}} (1 - e_t)^{\frac{1}{1-\alpha}},$$

while the $\dot{k}_{pt} = 0$ schedule is now described by

$$c_{pt} = (1-e_t) A k_{pt}^{\alpha} + (1-e_t) f . \tag{36}$$

The relationship between c_{pt} and f is thus given by

$$\frac{dc_{pt}}{df} = -\left[A k_{pt}^{\alpha} + f\right]\left(\frac{de_t}{df}\right) + (1-e_t) . \tag{37}$$

From our simulations, we know that e_t increases when the amount of foreign aid f increases, that is $de_t / df > 0$, and that $1-e_t < \left(A k_{pt}^{\alpha} + f\right) de_t / df$. Therefore $dc_{pt} / df < 0$ and the $\dot{c}_{pt} = 0$ schedule shifts to the left while the $\dot{k}_{pt} = 0$ schedule shifts down just as in Fig. 4. Again, consumption per citizen, c_{pt}, may jump upwards or downwards at the moment f increases. In both cases, c_{pt} declines thereafter to the new steady state level while capital per citizen, k_{pt}, declines smoothly to its new long run level.

5.3 Strict Conditional Aid with Sanctions

5.3.1 Optimal conditionality

Suppose the amount of foreign aid extended, f_t, is now strictly conditional on the behavior of the dictator. Specifically, suppose it depends on his expropriation rate e_t according to

$$f_t = (1-\gamma e_t) f , \tag{38}$$

where γ measures the sensitivity of aid to the dictator's expropriation rate and f is the maximum amount of aid attainable. This parameter may also be interpreted as a proxy for the "tightness" or severity of sanctions against the dictator. Of course, in reality it may be difficult to perfectly observe the extent of the dictator's thievery. Increasing international pressure on financial institutions to divulge information on the tainted assets of corrupt heads of states will greatly assist aid donors in making conditionality of this nature work.

The dictator now maximizes

$$D = \int_0^{\infty} \left[e_t \left(y^*_{pt} + f_t \right)(1-u_{st}) L_t - (1-\alpha) u_{st} y^*_{pt} L_t \right] dt , \tag{39}$$

subject to the NRC as well as equation (38).

With the dictator's revenue decreasing in γ, tightening sanctions beyond a certain point may become counter-productive. Beyond this point, the dictator rejects foreign aid altogether, as the revenues obtained by expropriating both domestic output and foreign aid with the punitive constraint is lower than expropriating domestic output alone.

Formally, the dictator maximizes $D_t = Max\{D_{ft}, D_{wft}\}$, subject to $e_t = (g+p+\psi)/(1-u_{st}) - (g+p)$ and $f_t = (1-\gamma e_t)f$, where the dictator's revenues with conditional foreign aid are $D_{ft} = \left[e_t\left(y^*_{pt} + f_t\right)(1-u_{st})L_t - (1-\alpha)u_{st}y^*_{pt}L_t\right]$ while his revenues without aid are $D_{wft} = \left[e_t y^*_{pt}(1-u_{st})L_t - (1-\alpha)u_{st}y^*_{pt}L_t\right]$.

Our simulations indicate that e_t and u_{st} decline till the break-even point where $D_{ft} = D_{wft}$ (see Fig. 7). Moreover, y_{pt} and c_{pt} are maximised at this point. The optimal degree of tightness of sanctions associated with this point, γ^*, can be computed numerically.

5.3.2 *Interaction of Conditionality and Selectivity*

Advocates of selectivity argue that aid should be channeled only to countries whose policies (both macroeconomic and microeconomic) are in some sense already acceptable. Put simply, aid should be extended to countries on the basis of what they have done (which cannot be changed) rather than what they promise to do (which suffers from time inconsistency). Translating this debate on the appropriate form of aid-to-policy linkage to our model, we can think of χ (the parameter capturing the immutable characteristics of the dictator) as representing selectivity. Countries with larger values of χ are those with less desirable traits, as observed by the donor prior to the granting of aid. The parameter γ, as discussed previously, represents the extent of conditionality.

Fig. 8, which is essentially Fig. 7 plotted with different values of χ, shows that γ has a smaller impact on steady state consumption per citizen, c_{pt}, when χ is larger. That is, the effect of conditionality on the well being of citizens in the recipient country depends on selectivity. In particular, the optimal value of γ is decreasing in χ: donor countries can impose tougher conditions (larger values of γ^*) when they are more selective (that is, extending aid only to dictators who are innately less offensive). The reason behind this result is that such dictators are less likely to reject the aid on the grounds that the attached conditions make them worse off than not receiving aid at all. Obviously, a given amount of aid results in higher consumption per citizen when χ is smaller. (The ridge line in Fig. 8 shows the maximum value of c_{pt} attainable for any given value of χ.)

The results of this exercise suggest that conditionality and selectivity may be mutually enhancing rather than being mutually exclusive. Indeed, very recent papers such as Mosley, Hudson and Verschoor (2004) make a case for a ‘new conditionality’ that combines both conditionality and selectivity. For example, there may be multiple levels of commitment and withdrawal, rather than a simple yes/no decision on whether to give aid or not.

5.4 Political Assistance or Military Assistance to Rebels

We model assistance to opposition political groups (if they exist) and military assistance to rebels by arguing that these types of assistance increase the probability that a citizen revolt succeeds, *ceteris paribus*.

The probability that a revolt succeeds is now given by

$$\lambda_t = 1 - \left(\frac{u_{st}}{\xi} \right), \tag{40}$$

where $\xi > 1$ measures the extent of political and military assistance. Note that when $\xi = 1$, the model reverts to the original.

We assume that political and military assistance cannot be used for consumption or for building up capital. Note also that now $g_t = u_{st} g / \xi$. That is, the damage to production possibilities that results from clashes between the dictator’s security force and the citizenry during an uprising decreases with ξ as the public is better able to safeguard them with foreign assistance. Fig. 9 shows that steady state values of e_t and u_{st} are decreasing in ξ, while the steady state values of c_{pt} and y_{pt} are increasing in ξ.

5.5 Medical Relief for the HIV/AIDS Pandemic

As is widely known, HIV/AIDs is wreaking a wide swath of destruction in Africa, ravaging the continent by prematurely taking away many members of the most productive part of the its labour force: prime-age males and females. It is estimated that 30 per cent of this group is infected with HIV even in South Africa and Botswana, two of the more successful economies in sub-Saharan Africa. Before killing its victims, HIV/AIDs weakens their bodies, destroys their health, and lowers their capacity for work.

In this extension to our model, foreign medical assistance improves worker health and, consequently, raises labour productivity. However, we assume that once again the dictator expropriates a fraction e_t of this assistance.[19]

The economy's productivity level A_t is modelled as follows:

$$A_t = A_0 + \Upsilon_1\left[(1-\Upsilon_2 e_t)f\right]^{\phi}, \tag{41}$$

where $\Upsilon_1,\ \Upsilon_2 > 0$, and $\phi < 1$ indicates that productivity is increasing in foreign aid, f, but at a decreasing rate. That is, the first few dollars of medical aid have the greatest impact on health (and therefore productivity) outcomes. A_0 is the economy's baseline productivity level in the absence of foreign aid.

Fig. 10 shows that, as foreign medical assistance is assumed to be dispensed without any conditions attached, indicators of the dictator's degree of repression, e_t and u_{st}, are increasing in f, just as in Section 5.1. However, the negative impact of rising repression on a citizen's output and consumption levels is offset by the direct positive effect of foreign medical assistance on labour productivity and hence the wage rate. Because foreign aid exhibits diminishing returns with respect to its recipient's health and productivity, there is a hump-shaped relationship between f and c_{pt}. Our result therefore suggests that there is an optimal level of foreign medical assistance for recipient countries under dictatorial rule.

6. Impact of the Dictator's Planning Horizon when the Economy's Growth Rate is Endogenous

While the title of our paper refers to Africa's *growth* performance, our discussion of the model thus far has centred on output and consumption *levels*. Suppose we now the endogenize the economy's growth rate by specifying the rate of technological progress to be a function of the dictator's behavior, and more specifically, his expropriation rate:

$$\frac{\dot{A}}{A} = Z\left(1-e_t\right)^{\iota}, \tag{42}$$

where Z is a multiplicative constant and $\iota > 0$ is an elasticity parameter.[20] Such a specification may be justified on the grounds that, in the real world, the expropriation rate may determine the extent of foreign direct investment and hence the rate of technological transfer/diffusion from advanced countries.

[19] Medical equipment and supplies (bandages, drugs etc) are highly susceptible to theft and extortion by a dictator's henchmen.
[20] The following parameter values we used in our simulations: $\iota = 0.5$ and $Z = 0.03$.

Fig. 11 shows that when the rate of technological progress depends on the dictator's expropriation rate, an increase in the dictator's planning horizon decreases u_{st} and e_t while increasing y_{pt} and c_{pt}.[21] Moreover, these effects are more pronounced when the dictator has a lower discount rate β_D. That is, at any given planning horizon, a dictator with a higher discount rate will behave more repressively, expropriating a greater fraction of the economy's output and employing a larger security force. These results indicate that a dictator who is more insecure about the longevity or permanence of his rule will behave worse from a social welfare perspective. This presents a dilemma for well-meaning foreign powers that wish to seek an overthrow of the dictatorial regime. Applying diplomatic or military pressure on the dictator (which led to unambiguously salutary outcomes in Section 5.4) may now result in adverse outcomes for his citizens in terms of income and consumption until he is actually removed from power.

7. Summary and Conclusion

In this paper, we presented a theoretical model of dictatorship and economic performance with the goal of explaining sub-Saharan Africa's dismal post-colonial growth experience. We argued that Africa's colonial legacy created the conditions for the abandonment of multi-party democracy in favour of one-party, and ultimately, authoritarian personal rule. In many countries, personal rule was synonymous with kleptocratic dictatorships, where political leaders were more interested in enriching themselves and in private gains than in promoting the welfare of their citizens.

Our dynamic continuous time model features a rational, optimizing dictatorship that seeks to maximize revenues generated through diversion of the economy's output. The dictator employs a security force of sufficient size such that the probability of success of a potential citizens' revolt is low enough to discourage them from attempting it. Taking the dictator's optimal choices of his expropriation rate and size of his security force as given, citizens/civilians solve a Ramsey-type dynamic optimization problem to obtain their consumption and physical capital paths. An extension of the model endogenized the economy's growth rate by making it a function of the dictator's expropriation rate. Having obtained the steady state solutions of the model, we examined how the equilibrium values of variables such as consumption, output, the expropriation rate and size of the security

[21] These plots are based on results from simulations programmed in GAUSS. The planning horizon refers to the number of periods in the objective function corresponding to a discrete-time version of (15). Details of all simulations and the corresponding program codes are available from the authors upon request.

force vary with the characteristics, preferences and planning horizon of the dictator. We found that the consumption of citizens and output are increasing in the expected longevity of the dictator's rule and declining in the cost of revolts, the inherent ruthlessness of the dictator, and the attractiveness of alternative political regimes. In every instance, consumption and output are strictly lower than would be the case without a kleptocratic dictatorship. We also explored the dynamics governing the model away from the steady state. In addition, the model was calibrated to conduct and evaluate several policy experiments with important real-world implications.

Simulations of alternative intervention policies available to developed economies interested in the welfare of citizens living under dictatorial regimes suggest that unconditional or poorly conditioned foreign aid induces a dictator to become more repressive, raising his expropriation rate and the size of his security force. On the other hand, conditioning the magnitude of foreign aid on the dictator's observed behavior raises citizens' consumption and output, provided that the conditions are not so harsh that the dictator rejects the aid altogether. Moreover, conditionality and selectivity in aid policy may be mutually enhancing. Political assistance and military assistance to covert rebel groups are also shown to be beneficial to macroeconomic performance. Finally, we find that there exists an optimal level of medical aid for relieving the HIV/AIDS crisis ravaging the African continent. When the amount of medical aid is small, increasing it greatly improves the health and productivity outcomes of citizens. However, beyond a certain level, the marginal improvements in these outcomes are offset and dominated by the worsening of the dictator's repressive behavior arising from his ability to expropriate part of the funds or equipment intended for medical relief.

Appendix A: Solving the Citizen's Optimization Problem

The Hamiltonian for the optimal control problem is given by

$$H = e^{-\beta t} \frac{c_{pt}^{1-\theta}}{1-\theta} + \gamma_t \left\{ (1 - e_t) A k_{pt}^{\alpha} - c_{pt} \right\} \tag{A1}$$

The first order conditions are:

$$\frac{dH}{dc} = e^{-\beta t} c_{pt}^{-\theta} - \gamma_t = 0 , \tag{A2}$$

$$\frac{dH}{dk} = \gamma_t \alpha \, (1 - e_t) A k_{pt}^{\alpha - 1} = -\dot{\gamma}_t , \tag{A3}$$

while the transversality condition is:

$$\lim_{t \to \infty} \gamma_t k_{pt} = 0 .$$

The Euler equation describing the optimal consumption path is obtained by combining the two first order conditions:

$$\frac{\dot{c}_{pt}}{c_{pt}} = \frac{1}{\theta} \left[\alpha \, (1 - e_t) A k_{pt}^{\alpha - 1} - \beta \right] . \tag{A4}$$

The $\dot{c}_{pt} = 0$ schedule is given by

$$k_{pt}^{*} = \left(\frac{\alpha A}{\beta} \right)^{\frac{1}{1-\alpha}} (1 - e_t)^{\frac{1}{1-\alpha}} , \tag{A5}$$

while the $\dot{k}_{pt} = 0$ schedule is

$$c_{pt} = (1 - e_t) A k_{pt}^{*\alpha} . \tag{A6}$$

In equilibrium,

$$c_{pt}^{*} == (1 - e_t) y_{pt}^{*} = A \left(\frac{\alpha A}{\beta} \right)^{\frac{\alpha}{1-\alpha}} (1 - e_t)^{\frac{1}{1-\alpha}} . \tag{A7}$$

Appendix B: Dynamics of the Model

The laws of motion for consumption and capital derived from the civilian optimization problem as outlined in Appendix A are

$$\frac{\dot{c}_{pt}}{c_{pt}} = \frac{1}{\theta} \left[\alpha (1 - e_t) A k_{pt}^{\alpha - 1} - \beta \right], \tag{B1}$$

$$\dot{k}_{pt} = (1 - e_t) A k_{pt}^{\alpha} - c_{pt} . \tag{B2}$$

Linearizing around the steady state yields

$$\begin{pmatrix} \dot{k}_{pt} \\ \dot{c}_{pt} \end{pmatrix} = \begin{pmatrix} \beta & -1 \\ -\frac{(1-\alpha)\beta}{\theta k_{pt}^*} & 0 \end{pmatrix} \begin{pmatrix} k_{pt} - k_{pt}^* \\ c_{pt} - c_{pt}^* \end{pmatrix}. \tag{B3}$$

Because $|M| = \begin{vmatrix} \beta & -1 \\ -\frac{(1-\alpha)\beta}{\theta k_{pt}^*} & 0 \end{vmatrix} = -\frac{(1-\alpha)\beta}{\theta k_{pt}^*} < 0$, Eigen values have opposite signs, implying that the solution is a saddle path.

Let Γ be the root of the characteristic equation representing the Eigen values of the system. The characteristic equation for the system may be written as

$$c(\Gamma) = |M - \Gamma I| = \begin{vmatrix} \beta - \Gamma & -1 \\ -\frac{(1-\alpha)\beta}{\theta k_{pt}^*} & -\Gamma \end{vmatrix} = 0. \tag{B4}$$

That is,

$$\Gamma^2 - \beta\Gamma - \frac{(1-\alpha)\beta}{\theta k_{pt}^*} = 0. \tag{B5}$$

Solving this quadratic equation gives us the Eigen values of the system:

$$\Gamma = \frac{\beta \pm \sqrt{\beta^2 + 4\frac{(1-\alpha)\beta}{\theta k_{pt}^*}}}{2}. \tag{B6}$$

We may define the roots as:

$$\Gamma_1 = \frac{\beta - \sqrt{\beta^2 + 4\frac{(1-\alpha)\beta}{\theta k_{pt}^*}}}{2} < 0, \qquad \Gamma_2 = \frac{\beta + \sqrt{\beta^2 + 4\frac{(1-\alpha)\beta}{\theta k_{pt}^*}}}{2} > 0.$$

With Γ_1 and Γ_2 being real roots, the solution of the system can be written as

$$\begin{pmatrix} k_{pt} - k_{pt}^* \\ c_{pt} - c_{pt}^* \end{pmatrix} = \begin{pmatrix} -1 & -1 \\ \Gamma_1 - \beta & \Gamma_2 - \beta \end{pmatrix} \begin{pmatrix} A_1 e^{\Gamma_1 t} \\ A_2 e^{\Gamma_2 t} \end{pmatrix}. \tag{B7}$$

That is,

$$\begin{aligned} c_{pt} - c_{pt}^* &= (\Gamma_1 - \beta) A_1 e^{\Gamma_1} + (\Gamma_2 - \beta) A_2 e^{\Gamma_2}, \\ k_{pt} - k_{pt}^* &= -A_1 e^{\Gamma_1} - A_2 e^{\Gamma_2}. \end{aligned} \tag{B8}$$

Equation of the Stable Arm:

A standard means of calculating the slope of the stable arm is to let $A_2 = 0$. Note that A_2 is the coefficient on the exponential term with the unstable Eigen value. Thus, on the stable arm,

$$\begin{aligned} c_{pt} - c_{pt}^* &= \left(\Gamma_1 - \beta\right) A_1 e^{\Gamma_1 t} \\ k_{pt} - k_{pt}^* &= -A_1 e^{\Gamma_1 t} \end{aligned} \qquad \text{(B9)}$$

Combining the above expressions yields

$$c_{pt} = c_{pt}^* + \left(\beta - \Gamma_1\right)\left(k_{pt} - k_{pt}^*\right), \qquad \text{(B10)}$$

$$\beta - \Gamma_1 = \frac{\beta + \sqrt{\beta^2 + 4\dfrac{(1-\alpha)\beta}{\theta k_{pt}^*}}}{2} = \Gamma_2 > 0, \qquad \text{(B11)}$$

$$c_{pt} = c_{pt}^* + \Gamma_2\left(k_{pt} - k_{pt}^*\right). \qquad \text{(B12)}$$

This final expression is the equation of the stable arm. The slope of the stable arm around the steady state is

$$\frac{dc_{pt}}{dk_{pt}}\Big|_{stable} = \Gamma_2 > 0.$$

Similarly, by substituting $A_1 = 0$ in the solution, we obtain the following equation for the unstable arm:

$$c_{pt} = c_{pt}^* + \Gamma_1\left(k_{pt} - k_{pt}^*\right). \qquad \text{(B13)}$$

The slope of the unstable arm around the steady state is therefore

$$\frac{dc_{pt}}{dk_{pt}}\Big|_{Unstable} = \Gamma_1 < 0.$$

As $k_{pt}^* = \left(\frac{\alpha A}{\beta}\right)^{\frac{1}{1-\alpha}} (1-e_t)^{\frac{1}{1-\alpha}}$, the fact that $\frac{dc_{pt}}{dk_{pt}}\Big|_{stable} = \Gamma_2 > 0$ for $0 \le e_t < 1$ ensures that the *qualitative* results of the model will be unaffected by changes in e_t as the slope of the stable arm does not alter sign. The *quantitative* outcome may however be affected, although that is not our focus here.

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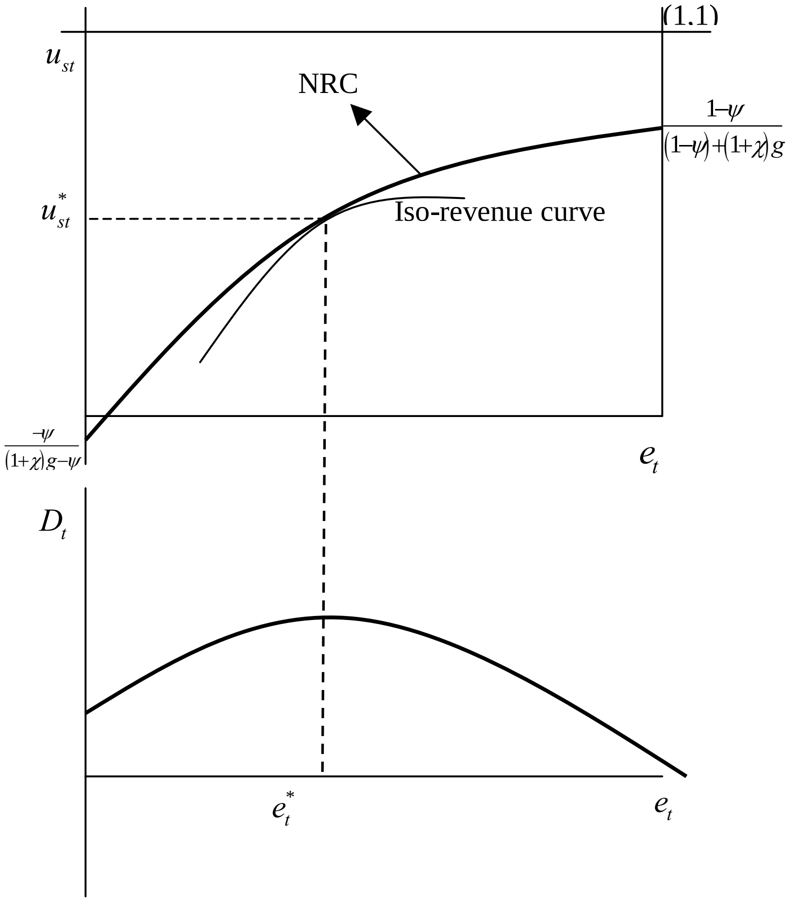


Fig.1 The dictator's optimization problem

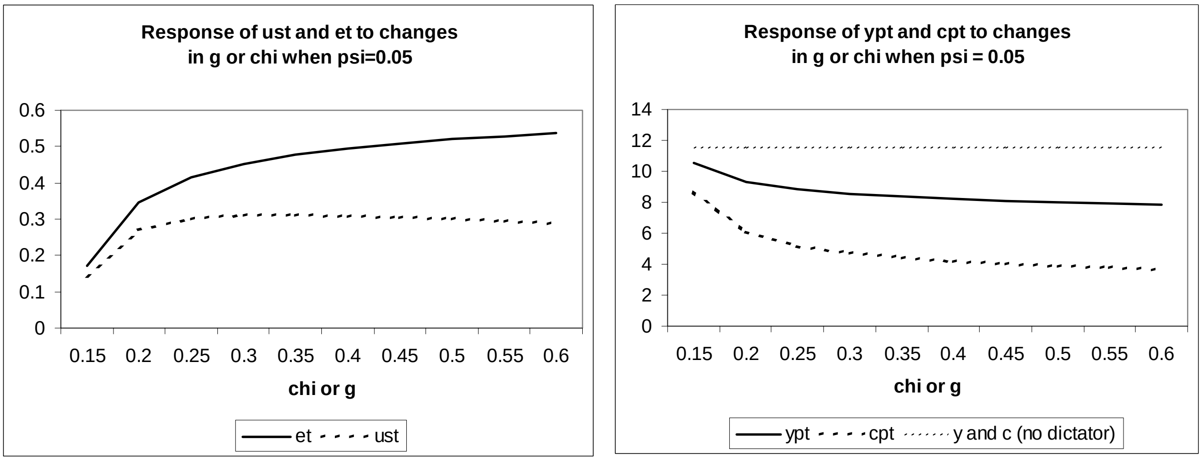


Fig. 2 Impact of g and χ on u_{st}, e_t, y_{pt} and c_{pt}

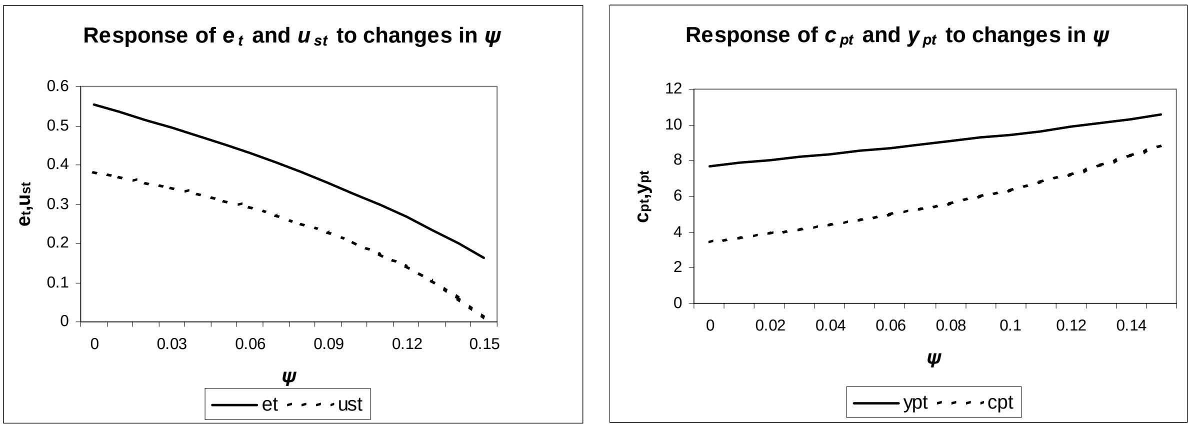
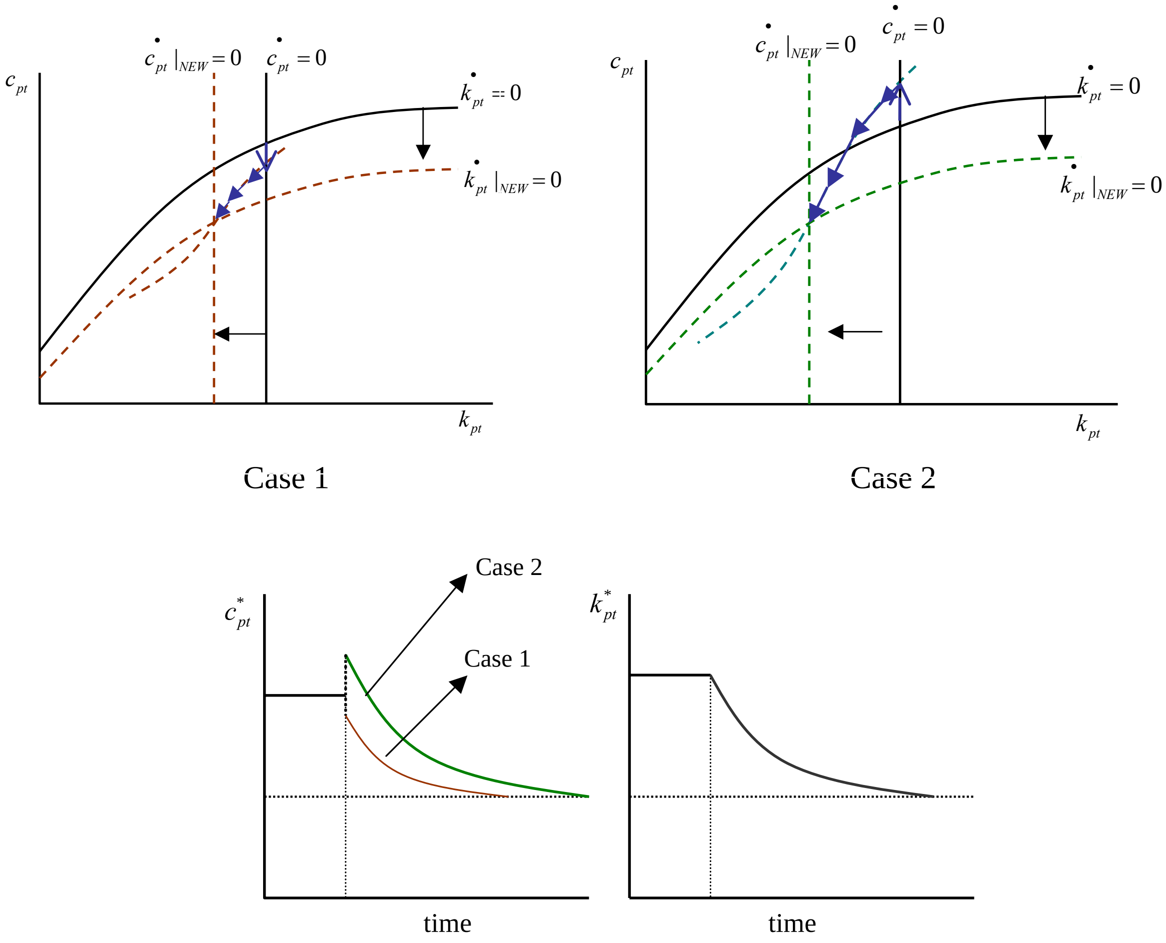
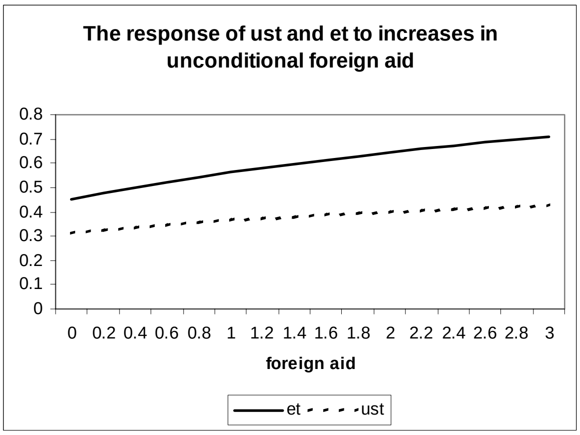


Fig. 3 Impact of ψ on u_{st}, e_t, y_{pt} and c_{pt}



Time paths of c_{pt} and k_{pt}

Fig. 4 Transitional dynamics of a rise in χ and g or a fall in ψ



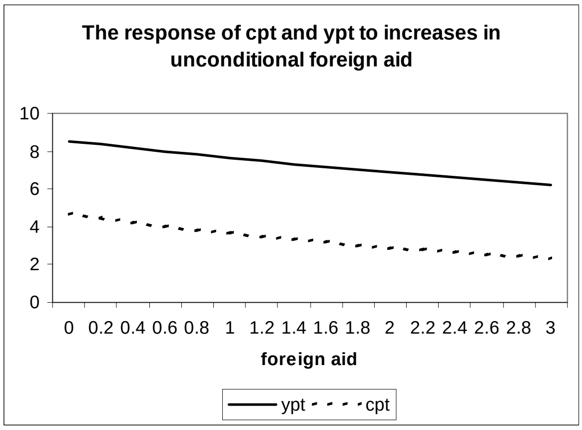


Fig. 5 Impact of unconditional foreign aid on u_{st}, e_t, y_{pt} and c_{pt}

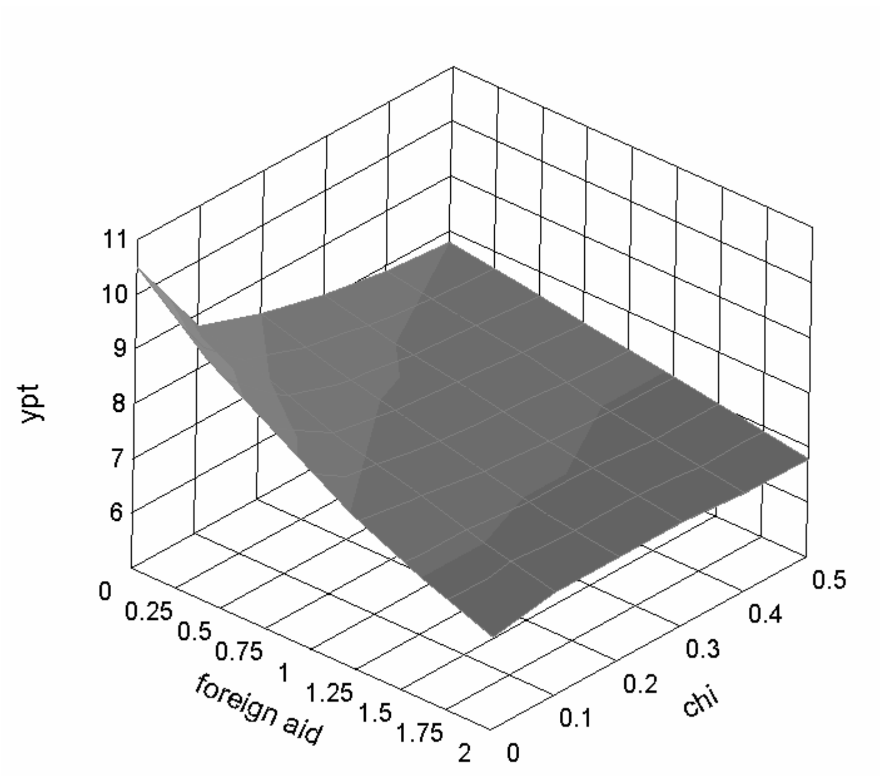


Fig. 6 Outcome of unconditional foreign aid and the dictator's characteristics

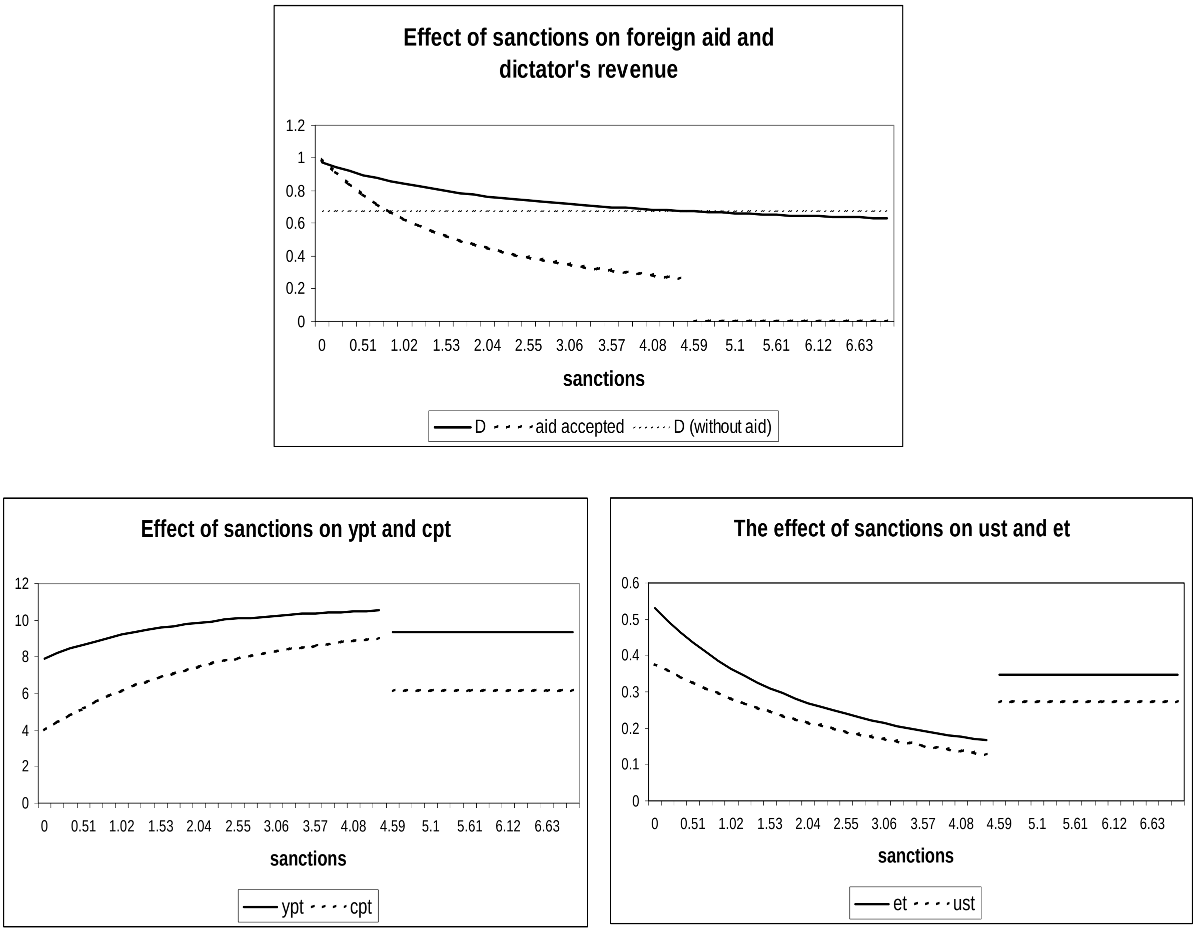


Fig. 7 Impact of conditional foreign aid on u_{st}, e_t, y_{pt} and c_{pt}

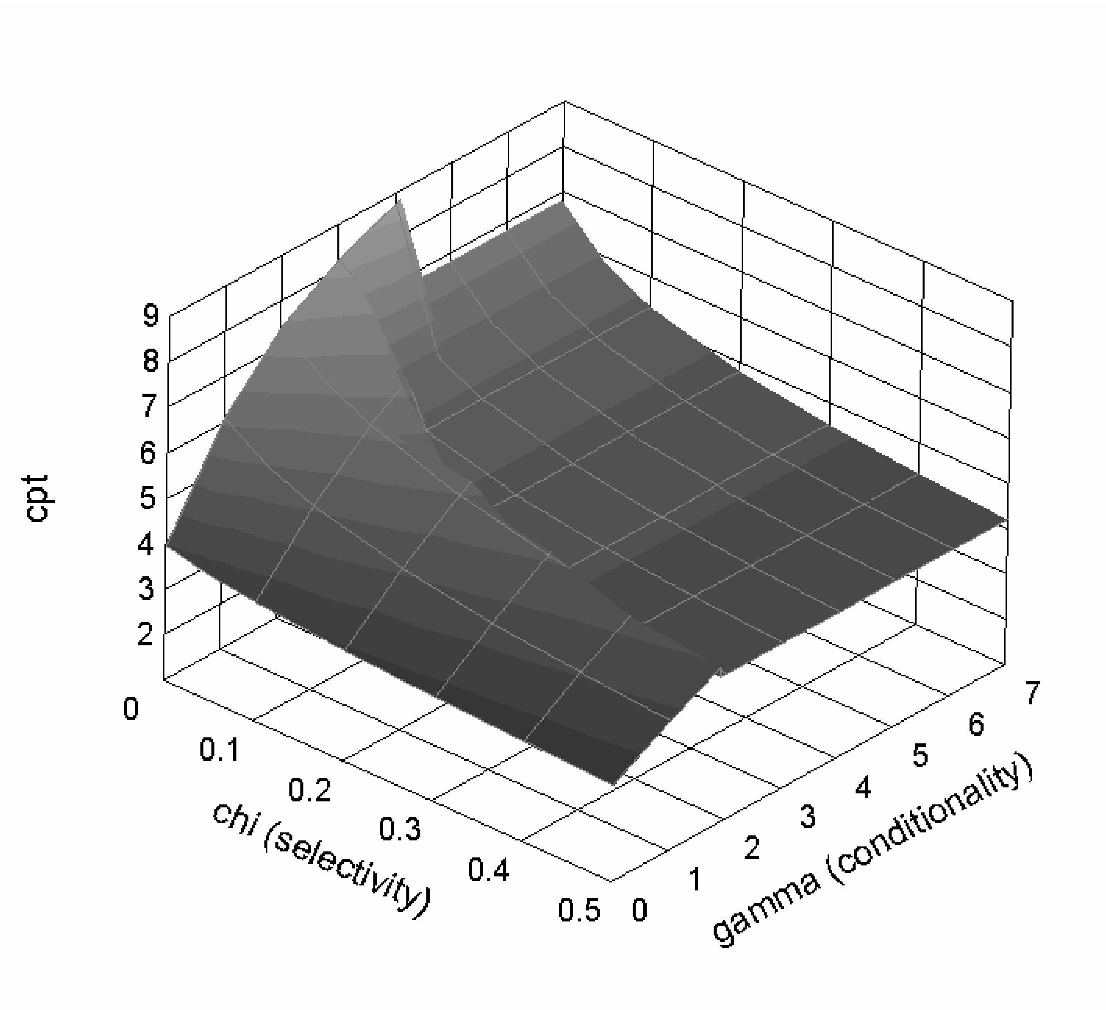


Fig. 8 Selectivity and conditionality of foreign aid

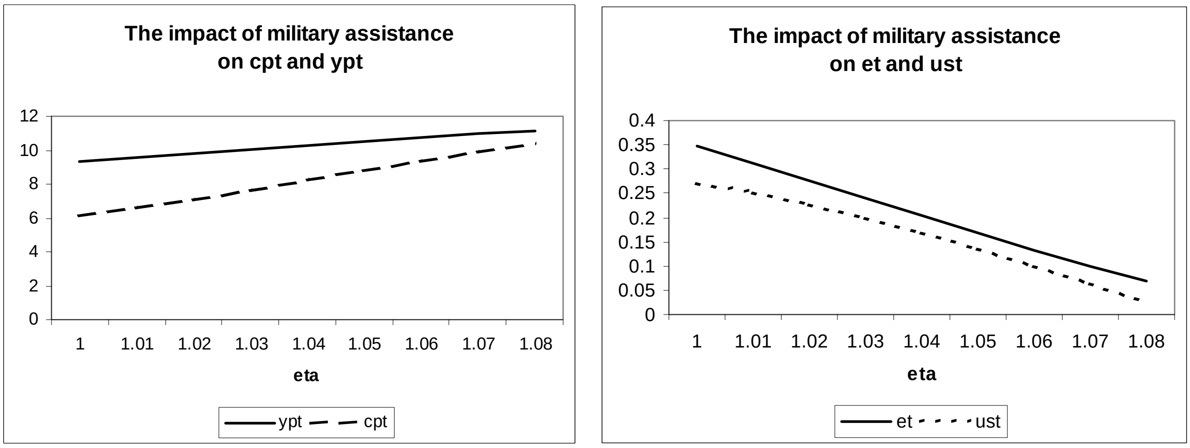


Fig. 9 Impact of military assistance on u_{st}, e_t, y_{pt} and c_{pt}

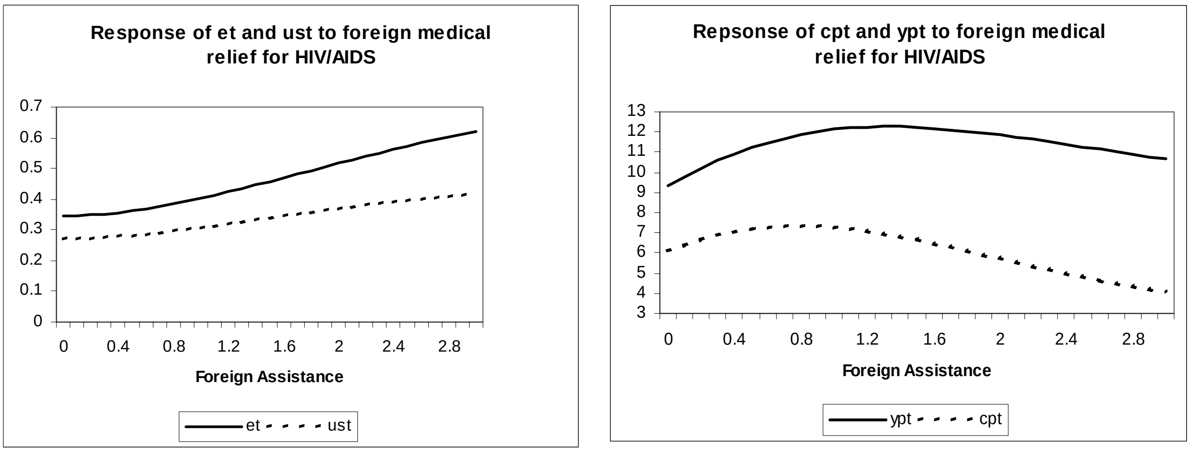


Fig. 10 Impact of foreign medical relief on u_{st}, e_t, y_{pt} and c_{pt}

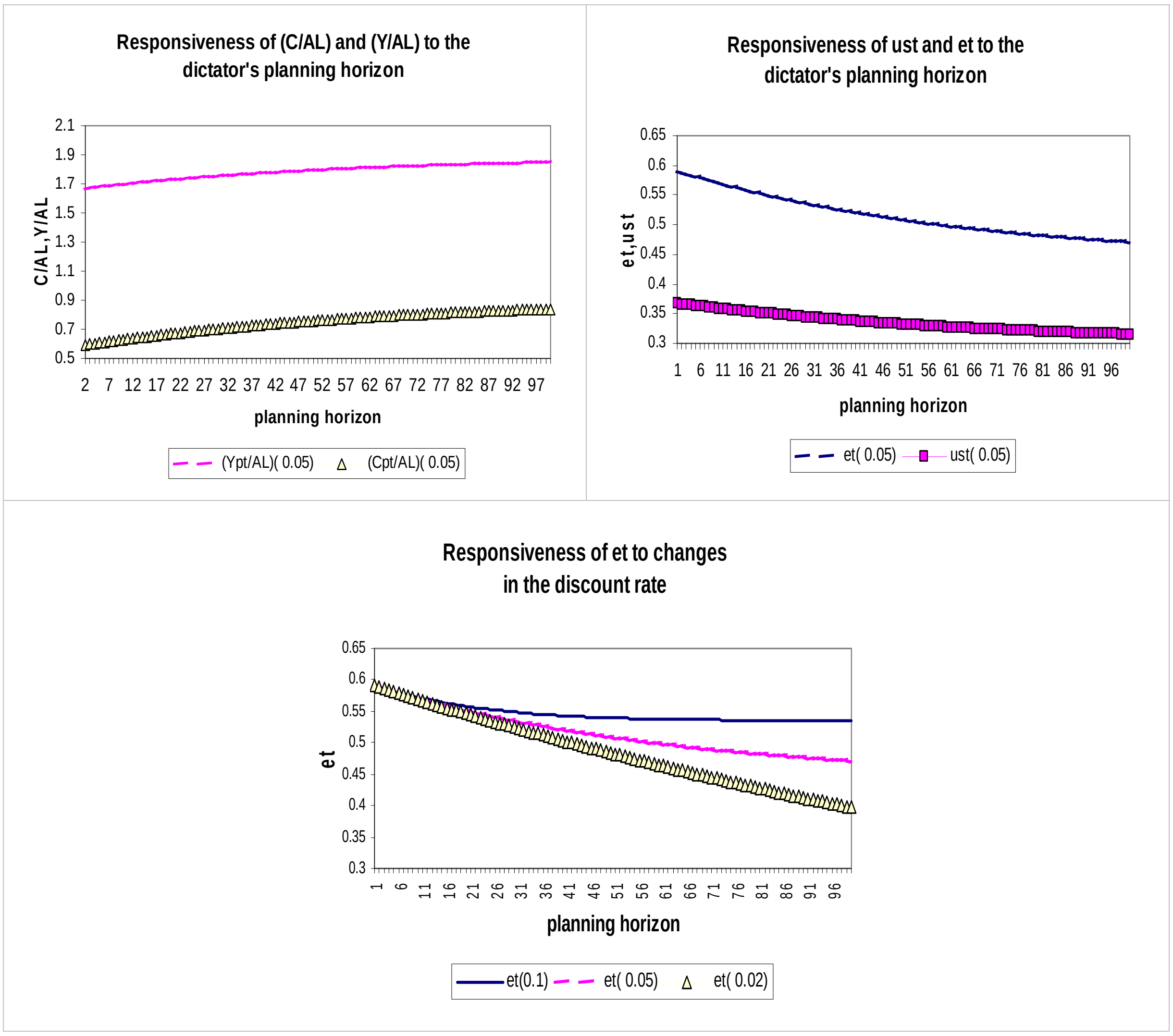


Fig. 11 Impact of the dictator's planning horizon and discount rate on u_{st}, e_t, y_{pt} and c_{pt}