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Foreign Aid - a Fillip for Development or a Fuel for Corruption?

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ABSTRACT

We present an analysis of the effects of foreign aid on economic development when the quality of governance may be compromised by corruption. The analysis is based on a dynamic general equilibrium model in which growth is driven by capital accumulation and public policy is administered by government-appointed bureaucrats. Corruption may arise due to the opportunity for bureaucrats to embezzle public funds which are otherwise used to provide productive public goods and services. Our main results may be summarised as follows: (1) corruption impedes economic development and compromises the effectiveness of aid programmes; (2) the incidence of corruption may, itself, be affected by both the development process and the donation of aid; (3) foreign aid is good for development when governance is good, but may be bad (perhaps very bad) for development when governance is bad; and (4) corruption and poverty may co-exist as permanent, rather than just transitory, fixtures of an economy.

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Keith Blackburn[*] and Gonzalo F. Forgues-Puccio[†]

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1 Introduction

One of the most long-standing debates surrounding economic development concerns the effectiveness of foreign aid in reducing poverty. It is a debate which has reigned for more than 50 years, and which is as vibrant today as it has been in the past.[1] In spite of all that has been written, both academics and policy makers continue to disagree about the merits of overseas aid programmes as a means of overcoming the impoverishment of many countries around the world and alleviating the plight of millions of people. This lack of consensus is due largely to the conflicting results of empirical studies which have failed to produce sufficiently robust evidence that might resolve the issue one way or the other. The present paper offers an explanation for this.[2]

Proponents of foreign aid, whilst recognising its limitations, contend that it has done much to promote growth and raise living standards, and that the outcome for many countries would have been a great deal worse without it (e.g., Sachs 2005). It is further argued that the reason why aid programmes may have failed on occasions is not that they lacked potential to improve economic performance, but rather that they were simply insufficient. This view is encapsulated in the "big push" approach to economic development - that is, the proposal to inject low-income countries with substantial amounts of funds in order to enable them to escape from the poverty trap equilibrium into which they seem to have fallen. Critics of this approach claim that it is seriously misguided as there is no systematic evidence to suggest that foreign aid has been instrumental in fostering growth and development. On the contrary, it is argued that three decades of overseas assistance have done little or nothing to alleviate poverty, but have merely encouraged corruption and helped to keep bad governments in power (e.g., Easterly 2006a). Our paper falls somewhere in between these two camps: on the one hand, we show how a sufficient donation of aid can, in principle, rescue an economy from a state of low development that would otherwise persist; on the other hand, we also demonstrate how such a policy can be largely ineffective, and even destructive, if the economy is misgoverned and riddled with corruption. We establish these, and other, results within the context of a dynamic general equilibrium model in which corruption and growth are determined jointly as the endogenous outcomes of individuals' decisions. A key property

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[1] For a review of the many issues and arguments involved, see McGillivray *et al.* (2006).

[2] After the clearly visible achievements of the Marshall Plan in post-war Europe, the US President, Harry S. Truman, announced his intention to extend its success by increasing aid to the developing world. There was no evidence at the time that the policy would succeed outside of Europe, and there is still no conclusive evidence today.

of the model is the existence of threshold effects that give rise to multiple development regimes and multiple (history-dependent) long-run equilibria. To the best of our knowledge, the paper is the first to present an analysis of how foreign aid may succeed or fail in eliminating poverty traps that are caused by poor quality governance. As argued by Temple (2010) in a recent thorough review of the literature, such an analysis offers the potential for making important new in-roads that go further and deeper than existing approaches. By way of providing background and motivation for the analysis, we devote the remainder of our introductory discussion to a broad overview of the different literatures on which we draw.

1.1   Aid, Poverty Traps and Governance

During the 1960s, the so-called "gap" models provided the theoretical basis for analysing the impact of foreign aid on growth.[3] Using these models, Rosenstein-Rodan (1961) famously calculated the amount of aid that developing countries would need in order to achieve certain growth targets. Unfortunately, these calculations turned out to be over-optimistic and to rest on some questionable assumptions. One of the most popular models at the time was the Harrod-Domar framework which purported to show how growth could be constrained by insufficient savings that limited the capabilities of an economy to accumulate capital. Foreign aid was seen as a means of filling this "savings gap" and accelerating the process of capital accumulation.[4] The main problem with this framework, and others like it, was the treatment of aid as a permanent fixture, implying that recipient countries might well be able to achieve their growth targets, but only because of the persistent generosity of donors: if aid was stopped, then investment and growth would simply fall back to their initial levels. This is not the type of scenario envisaged by "big push" advocates, whose arguments are more suitably illustrated within a different, more recent, class of models. These are the models that one finds in the literature on poverty traps, threshold effects and non-linearities. The key message of this literature is that, for one reason or another, an economy may exhibit multiple (good and bad) long-run equi-

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[3]These models are no longer popular in the academic literature, but they are still used by policy makers. For further discussion of them, see Deverajan *et al.* (2002) and Easterly (1999).

[4]In addition to insufficient savings, other types of "gap" have been identified as characterising developing countries. For example, Chenery and Strout (1966) argue that low levels of exports limit the amount of foreign exchange that can be used to import capital goods, whilst Bacha (1990) and Taylor (1990) emphasise the limited capacity of governments to collect sufficient tax revenues for financing public investment.

libria that are history-dependent in the sense that whichever one transpires is governed by where the economy starts off.[5] This means that countries with essentially the same structural characteristics, but different initial conditions, may face very different prospects as regards their economic development. In particular, these prospects may be very bleak for countries that are poor to begin with as they may never gain sufficient momentum to escape the lure of a bad equilibrium. Herein lies the basic justification for giving such countries a "big push" in order to enable them to break free from this equilibrium.

Proponents of the "big push" approach point to three main reasons for why less developed countries may become caught in a poverty trap (e.g., Sachs *et al.* 2004). First, contrary to the predictions of neo-classical theory, low levels of capital in poor countries may be associated with low marginal productivities of capital, implying weak incentives to invest. This may be due to several factors, such as low states of human development (reflected in both the education and health status of the labour force) and poor quality infrastructure (including roads, electricity and communications). Only when capital reaches some threshold level might its productivity be high enough to stimulate investment. Second, impoverished households living close to subsistence may have little inclination to save, given that they are already struggling to satisfy basic needs. Again, only above some threshold stage of development might households earn sufficient income to be willing to undertake savings. Third, fertility rates in poor countries tend to be high as children often contribute to the family from an early age and as parents often rely on their offspring to provide old-age support during later years in life. These motives for child-bearing are strengthened by the relatively high infant mortality rates amongst poor populations, and it may once again be the case that some critical point of development must be reached before mortality rates are low enough and the opportunity cost of child-rearing is high enough so as to induce a noticeable reduction in family size and a greater participation in market activity.

In spite of the above, the notion of poverty traps as real-world phenomena remains a contentious empirical issue. According to some authors, the existence of such phenomena is unequivocal and the long-run distribution of world income is distinctly bimodal, being characterised by polarised clusterings of rich and poor countries (e.g., Bloom *et al.* 2003; Quah 1993a, 1993b, 1996, 1997). According to other authors, there is very little evidence of poverty traps (at least those caused by low levels of savings or productivity) and the limiting world income distribution is more-or-less unimodal (e.g.,

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[5]An extensive discussion of the literature can be found in Azariadis and Stachurski (2005).

Azariadis and Stachurski 2004; Easterly 2006b; Kremer *et al.* 2001).[6] This conflict in results has been seen, in part, as an indication that conventional regression methods are not well-suited to analysing the issue. A different approach has involved the use of calibration exercises to evaluate the quantitative predictions of theoretical models that seek to explain poverty trap equilibria. As yet, however, these exercises have failed to resolve matters, there being some analyses which suggest that poverty traps are pervasive (e.g., Graham and Temple 2006) and others which indicate the opposite (e.g., Caucutt and Kumar 2008; Kraay and Radatz 2007).[7]

To some observers, the lack of robust evidence on the existence of poverty traps does not mean that these events are absent or rare, but rather reflects a limitation in conventional views and interpretations. Thus it has been argued that one needs to move away from traditional notions of poverty traps and to consider, instead, the deeper and more nuanced idea of "institutional" poverty traps caused by poor quality governance (e.g., Easterly 2006b). This idea has been gaining much support over recent years as both academics and practitioners have become increasingly aware of the importance of institutions in determining economic performance. Indeed, some development experts have called for a radical re-appraisal of the way that one thinks about global poverty and the way that one assesses the merits of poverty alleviation programmes.[8] The role of governance is a key aspect of this and the issue to which most attention has been directed is that of corruption.[9]

Broadly speaking, corruption is defined as the abuse of authority by pub-

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[6] Azariadis and Stachusrski (2004) present evidence that bimodality in the world income distribution is a transitional phenomena, and that convergence between countries is the outcome in the long-run. Easterly (2006b) finds that divergence between countries may persist, but that this divergence is related more to institutions than to initial incomes.

[7] In Graham and Temple (2006), who use a variable-returns-to-scale model, it is estimated that around 25 percent of the countries of the world are locked in a poverty trap. In Caucutt and Kumar (2008) and Kraay and Radatz (2007), who calibrate models based on other potential sources of stagnation (such as coordination failures, imperfect capital markets, insufficient savings and low productivity), the hypothesis of poverty traps is rejected.

[8] For example, Birdsall (2007) (writing as President of the Centre for Global Development) has urged the foreign aid donating community to re-think its views on African development, arguing that the nations of this continent are not trapped by their poverty but by their weak institutions.

[9] Corruption is one aspect of governance which also relates to matters of transparency, accountability, political stability, social order, the rule of law and the like. Clearly, these factors are likely to be interdependent and the same is true of the relationship between governance and corruption: just as bad governance fosters corruption, so corruption undermines good governance.

lic officials to make personal gains.[10] There is now a considerable body of evidence on the relationship between corruption and economic development. This evidence points to a relationship that is both negative and two-way causal: that is, corruption leads to low levels of development which, in turn, cause corruption to flourish.[11] At the theoretical level, Blackburn *et al.* (2006), Blackburn and Forgues-Puccio (2007) and Blackburn and Sarmah (2008) have modelled this two-way causality, showing how it can produce threshold effects and multiple (history-dependent) long-run equilibria, including a poverty trap equilibrium. The present paper builds on those investigations to study the effectiveness of foreign aid in eliminating this type of equilibrium when the cause of it is bad governance.

1.2   The Empirical Debate on Aid Effectiveness

As indicated earlier, much of the controversy surrounding foreign aid is due to the conflicting empirical evidence on its effects. This evidence is the result of a large body of research which has failed to produce a consensus in spite of refinements in econometric techniques and improvements in the quality of data.

According to Hansen and Tarp (2000), the empirical literature on the macroeconomic (growth) effects of foreign aid can be classified into three chronological groups.[12] The first generation of studies covers the period between 1968-1972 and focuses on the effect of aid on savings. The general conclusion to be found in these studies is that this effect is either negative or insignificant (e.g., Griffin 1970; Griffin and Enos 1970; Weisskopf 1972). The second generation of work spans the early 1970s to the mid-1990s and explores in more detail the links between aid, investment and growth. In one of the first investigations Papanek (1973) challenged the earlier results by presenting evidence of a strong positive correlation between growth and foreign assistance, a finding corroborated in several other analyses that followed (e.g., Dowling and Hiemenz 1982; Gupta and Islam 1983). By contrast,

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[10]For broad surveys of the literature on corruption, see Aidt (2003), Bardhan (1997), Jain (2001), Rose-Ackerman (1999) and Tanzi (1998). For a review of the empirical evidence on corruption, see Lambsdorff (2006).

[11]On the first direction of causation, see, for example, Gyimah-Brempong (2002), Keefer and Knack (1997), Knack and Keefer (1995), Li *et al.* (2000), Mauro (1995), Mo (2001) and Sachs and Warner (1997). On the second direction of causation, see, for example, Ades and Di Tella (1999), Fisman and Gatti (2002), Montinola and Jackman (1999), Paldam (2002), Rauch and Evans (2000) and Treisman (2000).

[12]There are many other excellent reviews of the literature, including Clemens *et al.* (2004), Hansen and Tarp (2001), McGillivray *et al.* (2006), Radelet (2006) and Temple (2010).

Mosley *et al.* (1987) detected no such correlation when applying more recent techniques to broader samples of data, and famously coined the term "micro-macro paradox" to describe the apparent contradiction between the microeconomic evidence in support of aid effectiveness and the macroeconomic evidence against it. The third generation of research, which continues to this day, has its origins in the work of Boone (1996) who is often credited with reinvigorating the aid controversy by exploiting further advances in econometric methods (in particular, panel data analysis) and further improvements in sample coverage. The main finding of that study - one of the most rigorous at the time - was that aid has no impact on growth. This result was subsequently challenged by Burnside and Dollar (2000) and Collier and Dollar (2002) whose research had earlier formed the basis of a World Bank (1998) report which concluded that aid has a positive effect on growth, though only in countries with "good" economic policies. There have been several attempts to replicate this finding (sometimes successfully and other times not) and several strong criticisms levelled against it (e.g., Easterly 2004; Roodman 2007).[13]

Radelet (2006) provides another three-fold classification of the literature which summarises the broad differences in views that have emerged. First, there is the view that foreign aid has no impact on growth due to a variety of reasons, such as bad quality governance, limited absorptive capacity and currency appreciation. Supporting evidence for this is found in the work of Boone (1996), Griffin and Enos (1970), Mosely *et al.* (1987) and Rajan and Subramanian (2008). Second, there is the view that aid has a positive effect on growth, though the effect diminishes as the amount of aid increases. Empirical support in this case is provided by Clemens *et al.* (2004), Dalgaard and Tarp (2004), Hansen and Tarp (2000, 2001), Lensink and White (2001). And third, there is the view that aid has a conditional positive effect on growth, meaning that the effect is context-specific and depends on particular circumstances. The evidence here begins with the influential study of Burnside and Dollar (2000) on the importance of "good" policies, followed by several subsequent contributions that identify various other conditioning factors, such as export price shocks (e.g., Collier and Dehn 2001), armed conflict (e.g., Collier and Hoeffler 2004), climatic shocks and the terms of trade (e.g., Guillaumont and Chauvet 2001), and tropical location (e.g., Dalgaard and Tarp 2004).[14]

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[13]For a detailed account of the issues involved, see McGillivray *et al.* (2006).

[14]Each of these studies uses an interaction term between aid and the conditioning variable under scrutiny. According to Roodman (2007), the results obtained need to be treated with caution as the statistical significance of this term tends to be rather fragile and not very robust.

Of the different approaches pursued and the different results obtained, the most pertinent to the analysis in this paper are those relating to the work on conditionality.[15] In their original contribution Burnside and Dollar (2000) sought to provide an indicator of good economic management by constructing a policy index using measures of fiscal policy (the budget surplus), monetary policy (inflation) and trade policy (the degree of openness). The key finding of that analysis (i.e., foreign aid is more effective in countries that score well on the index) has been particularly influential amongst donors of aid and accords with the presumption (shared by most practitioners) that aid works better in better managed economies. It is not surprising, perhaps, that the notion of good policies is often linked to the deeper and much broader concept of good governance.[16] In a more recent investigation Burnside and Dollar (2004) use the World Bank's set of governance indicators to test explicitly whether the impact of aid on growth depends on the quality of governance in the recipient country - a test that turns out be positive.[17] Dollar and Levine (2005) obtain a similar result using microeconomic data, presenting evidence of a strong positive relationship between institutional quality and the success of aid programmes financed by the World Bank.

In addition to the above, there is a good deal of evidence to suggest that foreign aid may, itself, affect the quality of governance in terms of the level of corruption. Thus several authors find that an increase in aid produces an increase in corruption (e.g., Alesina and Weder 2002; Bräutigam and Knack 2004; Economides *et al.* 2008; Knack 2001; Rajan and Subramanian 2007), whilst others observe a relationship which is non-monotonic such that aid tends to reduce corruption if it is supplied in small quantities but to increase corruption as the amounts become larger (e.g., Dalgaard and Olsson 2008).[18]

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[15]Radelet (2006) divides this work into three broad strands - studies that focus on the characteristics of recipient country, studies that focus on the practices and procedures of donors, and studies that focus on the types of activity supported by aid. Most empirical work to date has been directed towards the first of these.

[16]According to the World Bank, governance can be defined as "...the traditions and institutions by which authority in a country is exercised for the common good. This includes (i) the process by which those in authority are selected, monitored and replaced, (ii) the capacity of the government to effectively manage its resources and implement sound policies, and (iii) the respect of citizens and the state for the institutions that govern economic and social interactions among them." [http://go.worldbank.org/MKOGR258V0]

[17]The analysis is based on the very first version of these indicators, as developed by Kauffman *et al.* (1999). Nowadays, the indicators are in their seventh incarnation and are widely used across a range of empirical research.

[18]Svensson (2000) reports a positive relationship between aid and corruption, though only for sufficiently ethno-linguistically fractionalised societies. As an exception to the majority of findings, Tavares (2003) reports a negative relationship, though the results of Dalgaard and Olsson (2008) may offer an explanation for this.

As mentioned earlier, there has been growing recognition that the plight of many countries is symptomatic of endemic weaknesses in governance and institutions. The foregoing observations raise further concerns as they suggest that such weaknesses may not only create poverty traps in the first place, but may also thwart attempts to escape from these traps. Our analysis explains why this may be so.

1.3   Models of Aid and Corruption

There are relatively few theoretical investigations into the effects of foreign aid when the quality of governance is undermined by corruption. Of those that exist, the most relevant to the present paper are as follows.

Svensson (2000) presents a game-theoretic model of rent-seeking behaviour among different groups of agents competing over a pool of government resources. Rent-seeking is costly and all groups would be better off if they abstained from it and cooperated, instead. The problem is that each group has an incentive to deviate from cooperation which is therefore not sustainable unless sufficient penalties can be imposed. In considering how this might be achieved, the author identifies a critical level of government resources, below which cooperation is sustained and above which rent-seeking occurs. Against this background, it is argued that a windfall of foreign aid might be counter-productive if the level of resources is already close to its critical value.

Economides *et al.* (2008) and Hodler (2007) incorporate corruption into the Barro (1990) model of endogenous growth based on public goods provision. Corruption is introduced by assuming that agents allocate their time between productive (growth-promoting) and non-productive (resource-extracting) activities. In both analyses it is shown how foreign aid has both a positive effect on growth (by allowing for greater public expenditures) and a negative effect on growth (by encouraging a greater intensity of rent-seeking). The latter tends to dominate as the volume of aid increases such that the net result is an inverted U-shape relationship between aid and growth.

The foregoing contributions highlight some important considerations to take account of when evaluating the merits of foreign aid in the presence of corruption. We do the same in the present paper, though our treatment of the issue is distinct in a number of respects. First, our modelling of corruption is more explicit and more fully-articulated. The common approach taken above is to assume an anonymous population of agents, all of whom compete with each other in the extraction of rents from a given pool of resources in some unspecified way. In our case perpetrators of corrupt practices are identified specifically as public officials who ply their trade through the embezzlement

of public funds using costly methods of subterfuge and deception.[19] Second, the channel by which corruption affects growth in our model is also more fully-specified, as well as having empirical support. The mechanism appealed to in the foregoing analyses implies a direct effect of corruption on growth through a diversion of time away from productive towards non-productive activities. In our case the mechanism operates more indirectly through a reduction in public goods provision which reduces productive efficiency.[20] Third, and most fundamentally, our analysis is particularly concerned with the role of foreign aid in helping countries escape from poverty traps created by poor quality governance. As mentioned earlier, no other analysis of which we are aware (including those above) attends to this issue.

1.4 Outline of the Paper

Our basic objective in this paper is to explore the dynamic general equilibrium interactions between economic development, public sector corruption and international aid. The model that we use for this describes an economy in which civil servants, or bureaucrats, are delegated the task of administering public policy on behalf of the government. This task entails the provision of productive public goods and services using whatever public funds are available. Corruption may arise because of the opportunity for bureaucrats to embezzle these funds, the effect of which is to reduce capital accumulation and growth by reducing public goods provision. At the same time, the net gains from corruption decrease as capital accumulation takes place, and there is a critical (threshold) level of capital beyond which corruption disappears. This two-way causality between corruption and development gives rise to the possibility of multiple (history-dependent) equilibria, including a

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[19]As Svensson (2000) acknowledges, the simpler (short-cut) approach ought to be viewed as the reduced form of a more sophisticated framework in which corrupt behaviour is spelled out in greater detail. Our analysis may be seen, in part, as providing such a framework. At the same time, some of its implications are different from those based on the reduced form approach. For example, two notable features shared by all of the above models are the following. First, variations in the incidence of corruption reflect variations in the time spent on such activity by a fixed number of rent-seekers. In our case variations in the level of corruption reflect variations in the number of rent-seekers. Second, the amount of time spent rent-seeking increases with the amount of government revenue, which has the counter-factual implication that corruption is higher in richer economies. In our case the number of rent-seekers declines as an economy prospers, thereby producing a negative relationship between corruption and development.

[20]There are a number of empirical studies which provide evidence of how corruption reduces both the quantity and quality of growth-enhancing public expenditures, such as spending on infrastructure, health and education (e.g., Gupta *et al.* 2001; Lewis 2006; Mauro 1997; Rajkumar *et al.* 2001; Tanzi and Davoodi 1997).

poverty trap equilibrium.

The model is used to study the effects of foreign aid and its potential to help an economy break free from a corruption-induced poverty trap. We show how, in general, an injection of aid has ambiguous implications for economic performance: on the one hand, the government is able to finance more public expenditures which stimulates higher growth; on the other hand, bureaucrats are able to pocket more illegal income which strengthens their incentives to be corrupt. These conflicting effects are similar to those identified in other models (alluded to above), but there is an extra dimension to our analysis that makes it particularly distinct: by strengthening the incentives to engage in corruption, aid increases the threshold level of capital at which the lure of corruption disappears. This is another potential hurdle that can compromise the effectiveness of aid. It is also another source of interaction in the model as the effects of aid depend on the incidence of corruption which, in turn, is influenced by the inflow of aid.

The basic message of our analysis is that, in terms of fostering development and alleviating poverty, foreign aid works well if governance is good, but may not work so well (and may even be counter-productive) if governance is bad. In the case of the latter the economy may end up in an artificial aid-dependent equilibrium that disappears once aid is withdrawn. This is the sense in which aid can create "development illusions" - that is, the impression that an economy has reached a good equilibrium when the equilibrium is unsustainable as soon as aid is removed because there has been no improvement in the functioning of institutions. In short aid is not attacking the root cause of poverty - namely, poor quality governance.[21]

The remainder of the paper is organised as follows. In Section 2 we present the general framework for our analysis. In Section 3 we identify the outcomes that may transpire in the absence of aid. In Section 4 we do the same for the case in which aid exists. In Section 5 we study in detail the full implications of aid under various scenarios. In Section 6 we make a few concluding remarks.

2   The Basic Framework

We consider an economy in which there is a constant population of two-period-lived agents belonging to overlapping generations of dynastic families. Agents of each generation are divided at birth into two groups of citizens -

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[21] As Rajan and Subramanian (2007) put it, 'The sooner countries recognise that aid is no panacea, the less likely they are to postpone development indefinitely.'

private individuals (or households), and public servants (or bureaucrats).[22] The former work for firms in the production of output, whilst the latter work for the government in the administration of public policy. Households are differentiated according to differences in their skills which imply differences in their occupations and incomes. Bureaucrats are differentiated according to differences in their proclivities towards corruption.[23] All agents work only when young, being retired when old. Public policy consists of a programme of taxes and expenditures designed to make available public goods and services which contribute to the productivity of the less-skilled (poorer) members of the population. Corruption may arise because of the opportunity for bureaucrats to appropriate public funds for themselves.

2.1 The Private Sector

2.1.1 Firms

Output in the economy is produced in two sectors - a traditional (or subsistence) sector and a modern (or advanced) sector. These sectors are characterised by different production technologies that entail the use of different types of production input. Within each sector there is a unit mass of firms which hire these inputs in perfectly competitive markets.

Output in the traditional sector (sector 1) is produced using low-skilled labour, the productivity of which is augmented by the provision of various public goods and services that are targeted towards the poor (e.g., publicly-provided health-care, education and training). Formally, each firm in this

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[22]We assume that agents are differentiated at birth according to their abilities and skills. Households are individuals who lack the skills necessary to become bureaucrats. Bureaucrats are individuals who possess these skills and who are induced to take up public office by an allocation of talent condition established below. Thus, as in other analyses (e.g., Blackburn *et al.* 2006; Blackburn and Forgues-Puccio 2007; Sarte 2000), we abstract from issues relating to occupational choice. In doing so, we are able to simplify matters by not having to consider possible changes in the size of the bureaucracy and possible changes in the level of corruption that may result from this. Of course, we do not mean to undermine the importance of corruption in determining occupational choice. As indicated by others, an economy may well suffer as a consequence of this, with a misallocation of talent between productive (entrepreneurial) activities and non-productive (rent-seeking) activities (e.g., Acemoglu 1995; Murphy *et al.* 1991).

[23]Such differences may reflect differences in proficiencies at being corrupt or differences in moral attitudes towards being corrupt (e.g., Acemoglou and Verdier 2000; Besley and McLaren 1993; Blackburn *et al.* 2006). The main purpose of this assumption is to allow us to determine the wages of bureaucrats in a relatively straightforward way that does not demand additional assumptions about how public sector pay is determined. In fact, all we need for this purpose is that there be at least one bureaucrat who is non-corruptible - all other bureaucrats may well be potential transgressors.

sector employs l_{1t} units of labour to produce y_{1t} units of output according to

$$y_{1t} = l_{1t} G_t, \tag{1}$$

where G_t denotes government expenditures on public goods. Low-skilled labour is hired at the wage w_{1t}. Given this, profit maximisation implies $w_{1t} = G_t$.

Output in the modern sector (sector 2) is produced using high-skilled labour and capital, with positive production externalities arising from learning-by-doing. Formally, each firm in this sector combines l_{2t} units of labour with k_t units of capital to produce y_{2t} units of output according to

$$y_{2t} = l_{2t}^{\alpha} k_t^{1-\alpha} K_t^{\alpha}, \tag{2}$$

($\alpha \in (0,1)$) where K_t denotes aggregate capital (serving as the usual proxy for the stock of disembodied knowledge).[24] We assume that the government extracts revenue from this sector by imposing a constant proportional output tax of $\tau \in (0,1)$. High-skilled labour is hired at the wage w_{2t}, whilst capital is rented at the rental rate r_t. It follows that profit maximisation in this case requires $w_{2t} = (1-\tau)\alpha l_{2t}^{\alpha-1} k_t^{1-\alpha} K_t^{\alpha}$ and $r_t = (1-\tau)(1-\alpha)l_{2t}^{\alpha} k_t^{-\alpha} K_t^{\alpha}$.[25]

As elucidated below, there is a unit supply of labour to each sector so that $l_{it} = 1$ ($i = 1, 2$) in equilibrium. Since $k_t = K_t$ in equilibrium as well, the above optimality conditions may be written as

$$w_{1t} = G_t = y_{1t}, \tag{3}$$
$$w_{2t} = (1-\tau)\alpha k_t = (1-\tau)\alpha y_{2t}, \tag{4}$$
$$r_t = (1-\tau)(1-\alpha) = r. \tag{5}$$

2.1.2 Households

The population of households is divided into two cohorts that differ in terms of their endowment of skills. Specifically, there is a unit mass of low-skilled households (cohort 1) and a unit mass of high-skilled households (cohort 2). Each of the former supplies one unit of labour to firms in the traditional production sector, whilst each of the latter supplies one unit of labour to firms in the modern production sector.

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[24]The absence of G_t in (2) is a convenient abstraction that serves to emphasise the relative importance of public goods provision for different members of society. Thus it is the less wealthy, less-skilled and less educated members who tend to benefit the most from such provision (e.g., Anand and Ravallion 1993; Bidani and Ravallion 1997).

[25]Naturally, we assume that the wage of high-skilled labour is greater than the wage of low skilled labour, $w_{2t} > w_{1t}$. As we shall see later, this is ensured by the parameter restriction $\tau < 2(1-\tau)\alpha$.

A household of generation t in cohort i ($i = 1, 2$) derives lifetime utility, u_{it}^h, according to

$$u_{it}^h = \log[c_{it,t}^h + v(q_{it})] + \beta \log(c_{it,t+1}^h), \qquad (6)$$

($\beta > 0$) where $c_{it,t}^h$ denotes consumption when young, $c_{it,t+1}^h$ denotes consumption when old and q_{it} denotes bequests to offspring. We model altruism according to the simple 'warm-glow', or 'joy-of-giving', motive for making bequests, as reflected in the function $v(\cdot)$ which is assumed to be strictly concave and to satisfy the usual Inada conditions. Bequests are chosen by agents in the first period of their lives, being invested in the capital market as a trust fund which is transferred to children at birth.[26] Our particular specification of first period felicity implies that the marginal rate of substitution between consumption and bequests is independent of the level of consumption. As we shall see, this leads to the convenient result that bequests are constant across generations.[27]

Depending on its occupation, a household earns a total wage income of w_{it} when young. Added to this is its total inheritance, equal to the wealth bequeathed by its parent plus the interest earned on this: that is, $(1+r)q_{it-1}$. Given these resources, the household consumes, saves and makes bequests to its own offspring. On reaching old age, the household stops working and uses its savings to finance its retirement consumption. Denoting savings by s_{it}^h, the budget constraints facing the household are

$$c_{it,t}^h + s_{it}^h + q_{it} = w_{it} + (1+r)q_{it-1}, \qquad (7)$$

$$c_{it,t+1}^h = (1+r)s_{it}^h. \qquad (8)$$

Each household solves the problem of choosing $c_{it,t}^h$, $c_{it,t+1}^h$, s_{it}^h and q_{it} so as maximise (6) subject to (7) and (8). It does so, in part, by setting $v'(\cdot) = 1$, implying $q_{it} = q$ for all i and t: thus, as indicated above, the optimal size of bequest is the same for each household and is fixed from one generation to the next. Given this, the optimal level of savings is deduced as

$$s_{it}^h = \frac{\beta}{1+\beta}(w_{it} + Q), \qquad (9)$$

where $Q = rq + v(q)$.

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[26] Our results would not change if we were to assume, instead, that agents choose bequests in the second period of their lives. We adopt the present sequence of events merely to simplify the algebra.

[27] This property is true for any specification of first period utility of the form $u[c_{t-1,t}^h + v(b_t)]$. We choose a logarithmic formulation for simplicity and to save on notation. The precise role of bequests in the model is to serve as a technical device for ensuring the existence of non-degenerate steady state equilibria. For this reason, we appeal to the simplest of bequest motives.

2.2 The Public Sector

2.2.1 Government

The primary role of the government is to provide public goods and services for the purpose of fostering growth and reducing inequality by raising the productivity of the less-skilled members of the population. Such provision may cover a wide range of categories, including education, health, social infrastructure and the environment. To simplify matters, we consolidate these items into a composite measure of public goods, denoted earlier by G_t.

We consider the responsibility for public goods provision as laying in the hands of bureaucrats, some of whom may be tempted to exploit their positions of authority by engaging in corrupt practices. Given this, the government sets the salaries of bureaucrats in accordance with the following considerations. Any bureaucrat (whether corruptible or non-corruptible) can work for a firm in the modern production sector to receive an income equal to the wage paid to high-skilled households. Any bureaucrat who is willing to accept a salary less than this wage must be expecting to receive compensation through some form of malpractice and is therefore immediately identified as being corrupt. As in other analyses (e.g., Acemoglu and Verdier 1998; Blackburn *et al.* 2006; Blackburn and Forgues-Puccio 2007), we assume that a bureaucrat who is discovered to be corrupt is subject to the maximum fine of having all of his income confiscated (i.e., he is dismissed without pay). Consequently, no corruptible bureaucrat would ever reveal himself in the way described above. As such, the government can minimise its labour costs, whilst ensuring complete bureaucratic participation, by setting the salaries of all bureaucrats equal to the wage paid by firms to high-skilled households.[28]

The government runs a continuously balanced budget, using whatever public funds it has available to finance its expenditures on public goods. We denote by R_t the total revenue of the government, out of which w_{2t} is spent on total labour costs (i.e., the salaries of all bureaucrats): this reflects our foregoing observations, together with our subsequent description of bureaucratic behaviour which implies that there is a unit supply of labour to the public sector. It follows that the amount of public funds remaining to be distributed among bureaucrats for the procurement of public goods is

$$P_t = R_t - w_{2t} \tag{10}$$

We return to this expression in our subsequent analysis.

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[28]This has the usual interpretation of an allocation of talent condition. The government cannot force any of the potential bureaucrats to actually take up public office, but it induces all of them to do so by paying what they would earn elsewhere.

2.2.2 Bureaucrats

The population of bureaucrats is a measure of mass 1 which is divided into a fraction, $\nu \in (0,1)$, of corruptible bureaucrats and a remaining fraction, $1-\nu$, of non-corruptible bureaucrats. Each bureaucrat supplies one unit of labour to the government for the purpose of administering public policy. Specifically, each bureaucrat is given charge over p_t amount of public funds with which to procure public goods. It is because of this delegation of authority that corruption might arise as a bureaucrat may be tempted to appropriate these funds for himself.

Naturally, only a corruptible bureaucrat would ever abuse his powers of public office, whereas a non-corruptible bureaucrat always behave honestly. If the former does transgress, then he must undertake certain actions in order to escape detection by the authorities. In general, corrupt individuals may try to remain anonymous in a number of ways, such as hiding their illegal income, investing this income differently from legal income and altering their patterns of expenditure. Such activities typically entail costs in one form or another. For the purposes of the present analysis, we consider the following simple scenario, based on Blackburn and Sarmah (2008). A bureaucrat who is corrupt can avoid immediate detection by storing his illegal income in hiding (rather than investing it in capital) and by mimicing the behaviour of a non-corrupt bureaucrat (rather than risking conspicuous consumption). The bureaucrat can then evade subsequent arrest by taking flight with his wealth and consuming in secrecy elsewhere. The implications of these actions are captured formally as follows.[29]

Assume, for simplicity, that bureaucrats are non-altruistic.[30]. Like before, let $c_{t,t}^b$ and $c_{t,t+1}^b$ denote, respectively, consumption when young and consumption when old by a bureaucrat of generation t. The lifetime utility of this bureaucrat is given by

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[29]Our description of events can be likened to the case in which corrupt public officials prefer to wait until they leave office (when they are subject to less scrutiny and cannot loot any more funds) before enjoying most of their ill-gotten gains that they previously stashed away somewhere (such as the underground sector and overseas bank accounts). In our version of this an official faces the prospect of avoiding any risk of being caught. As argued by others (e.g., Shleifer and Vishny 1993), this risk is likely to be negligible when the political will, public pressure and institutional framework for combatting corruption are relatively weak, which is generally the case in developing countries. In any event, we indicate shortly how our analysis can be reinterpreted or reformulated to accommodate the case in which corrupt bureaucrats stand a chance of being apprehended.

[30]This assumption is inconsequential for our results. As indicated earlier, the fact that households make bequests to their offspring is sufficient for the purposes of our analysis.

$$u_t^b = \begin{cases} \log(c_{t,t}^b) + \beta \log(c_{t,t+1}^b) & \text{if non-corrupt,} \\ \log(c_{t,t}^b) + \delta\beta \log(c_{t,t+1}^b) & \text{if corrupt.} \end{cases} \tag{11}$$

The parameter $\delta \in (0,1)$ is meant to capture the idea that, for reasons given above, corruption is not entirely costless for an individual, but entails some disutility.[31] For example, a bureaucrat may need to spend effort on secretly absconding with his income, may derive less satisfaction from consuming in hiding than consuming at home, and may feel some moral shame, or social stigma, from abusing his privileged position. In all of these cases it is plausible to imagine that the cost incurred is greater the larger is the scale of the subterfuge, as measured by the total amount of income that the bureaucrat takes flight with and consumes elsewhere. In each case, as well, it is the utility from old-age consumption that is affected since it is during old-age when the bureaucrat makes off with his ill-gotten gains.[32]

Each bureaucrat earns a salary of w_{2t} when young. For a non-corrupt bureaucrat, this is the only source of income. For a corrupt bureaucrat, there is also p_t, the amount of public funds that he steals. As indicated above, these funds must be stored away in hiding and are therefore unavailable for consumption and (productive) savings. On reaching old-age, a bureaucrat retires and consumes all of his remaining wealth. Denoting savings by s_t^b, the budget constraints facing a bureaucrat are

$$c_{t,t}^b + s_t^b = w_{2t}, \tag{12}$$

$$c_{t,t+1}^b = \begin{cases} (1+r)s_t^b & \text{if non-corrupt,} \\ (1+r)s_t^b + p_t & \text{if corrupt.} \end{cases} \tag{13}$$

According to our description of events, a bureaucrat who is corrupt can avoid immediate detection if he not only hides his illegal income, but also imitates the first period consumption and savings behaviour of a non-corrupt bureaucrat.[33] The latter type of individual chooses $c_{t,t}^b$, $c_{t,t+1}^b$ and s_t^b so as

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[31]Following footnote 23, one may think of non-corruptible bureaucrats as incurring prohibitively high levels of disutility from corruption.

[32]As a precise example, suppose that a corrupt bureaucrat's utility function is $\log(c_{t,t}^b) + \theta[\log(c_{t,t+1}^b) - \gamma \log(e_{t+1})]$, where e_{t+1} denotes effort spent on avoiding detection. Suppose also that this effort is proportional to the amount of income with which the bureaucrat absconds. Since this income is equal to (old-age) consumption, then $e_{t+1} = \epsilon c_{t,t+1}^b$ ($\epsilon \in (0,1)$). It follows that the bureaucrat's utility may be written as in (11), where $\delta = 1 - \gamma$. One could think of other resource costs (expenditures of income) associated with concealing corruption (e.g., Blackburn et $al.$ 2006; Blackburn and Forgues-Puccio 2007). The disutility cost specified in (11) is sufficient for our purposes.

[33]If a corrupt bureaucrat was free to make optimal decisions, then his behaviour would be different from this. The fact that he has an extra amount of (illegal) income during old-age means that, compared to a non-corrupt bureaucrat, he would optimally consume more and save less during middle-age.

to maximise his utility in (11) subject to his budget constraints in (12) and (13). Solving this problem yields

$$s_t^b = \frac{\beta}{1+\beta} w_{2t}. \tag{14}$$

The consumption profiles of corrupt and non-corrupt bureaucrats are determined by inserting (14) into (12) and (13). The utility of each type of bureaucrat is then found by appropriate substitution in (11). This payoff is

$$u_t^b = \begin{cases} \log\left(\frac{1}{1+\beta} w_{2t}\right) + \beta \log\left[\frac{\beta(1+r)}{1+\beta} w_{2t}\right] & \text{if non-corrupt,} \\ \log\left(\frac{1}{1+\beta} w_{2t}\right) + \delta\beta \log\left[\frac{\beta(1+r)}{1+\beta} w_{2t} + p_t\right] & \text{if corrupt.} \end{cases} \tag{15}$$

2.3 The Incentive to be Corrupt

A bureaucrat who is corruptible will abuse his position of authority if his utility from doing so is no less than his utility from not doing so. From (15), we may state this condition as $\delta \log\left[\frac{\beta(1+r)}{1+\beta} w_{2t} + p_t\right] \geq \log\left[\frac{\beta(1+r)}{1+\beta} w_{2t}\right]$, or $\left[\frac{\beta(1+r)}{1+\beta} w_{2t} + p_t\right]^\delta \geq \frac{\beta(1+r)}{1+\beta} w_{2t}$. The bureaucrat decides on his preferred course of action by trading off the benefit and cost of corrupt behaviour: the benefit is the extra income obtained from his looting of public funds, whilst the cost is the lower utility from having to consume his income in hiding. This trade-off changes with changes in circumstances. In particular, for any given p_t, the bureaucrat is more likely to transgress when wages are low than when they are high. At low levels of wages, the extra income from corruption yields additional utility that more than compensates the costs of concealing this income. But as wages increase, utility increases by less when the bureaucrat is corrupt than when he is not corrupt because of his costly subterfuge. This suggests that there is some critical level of wages, below which corruption will occur and above which corruption will not occur.

Evidently, the fact that wages are endogenous in the model means that corruption is endogenous as well. By virtue of (4), the driving force is capital accumulation. In this way, we establish the first direction of causation between corruption and development that runs from the latter to the former.[34] We return to this in our subsequent analysis when we the provide the

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[34] As indicated in footnote 29, it is possible to re-work our analysis under the assumption that corrupt bureaucrats face a risk of being caught and punished. To illustrate, suppose that there is some finite probability of corruption being detected, in which case a bureaucrat foregoes some or all of his planned consumption (e.g., because his income is confiscated, or because he is imprisoned). For comparison with our main analysis, as-

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appropriate expression for p_t. In preparation for that, we make use of (4) to re-write the above incentive condition as

$$\left[\frac{\beta(1+r)(1-\tau)\alpha}{1+\beta}k_t + p_t\right]^{\delta} \geq \frac{\beta(1+r)(1-\tau)\alpha}{1+\beta}k_t \qquad (16)$$

2.4 Aggregate Outcomes

The final component in our description of the economy is the process by which development takes place. This process is summarised by the dynamic path of capital accumulation, obtained from the equilibrium condition that the total demand for capital by firms is equal to the total supply of capital by agents. The former is given by k_{t+1}, whilst the latter comprises the savings and bequests of all households, $s_{1t}^h + s_{2t}^h + 2q$, plus the savings of all bureaucrats, s_t^b, where the relevant expressions for these are given in (9) and (14). Using (3) and (4), it follows that capital accumulation is described by

$$k_{t+1} = \frac{\beta}{1+\beta}[G_t + 2(1-\tau)\alpha k_t] + \frac{2\beta(Q+q)}{1+\beta}. \qquad (17)$$

As we shall see, the way that corruption takes effect on the economy is through G_t, the provision of public goods and services. A precise expression for this is given shortly. For now, we note that the appearance of it in (17) means that corruption has an impact on capital accumulation and growth. In this way, we establish the second direction of causation between corruption and development that runs from the former to the latter.

In the remainder of the paper we determine the aggregate outcomes in the economy under various scenarios which differ according to the presence or absence of foreign aid, and the presence or absence of corruption. We use superscripts on variables to denote each of the possible cases - either a or na (aid or no aid), and either c or nc (corruption or no corruption). In situations where corruption exists, its incidence is measured by νP_t, the amount of public funds that are embezzled.

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sume that it is only final period consumption that is foregone (the loss of first period consumption can be trivially added). Under such circumstances, the expected utility of a corrupt bureaucrat is given by (11), with δ re-defined as the probability that detection is avoided. All of the above results remain unchanged and the only difference is a question of interpretation. According to the new description of events, the reason why corruption is less likely to occur at higher levels of development is that bureaucrats are less willing to risk losing higher wages, rather than less willing to incur higher disutility costs. Of course, it is true that this risk is not entirely absent from our analysis, but features implicitly as the factor that motivates bureaucrats to engage in costly subterfuge.

3 The Economy Without Aid

In the analysis that follows we consider our model economy as being isolated from the rest of the world such that the only source of development finance is the savings of its own citizens. In other words, we assume that the economy is completely closed to any form of international transaction or overseas assistance that might influence its development prospects. Our interest is in what outcomes may transpire in this environment when there exists the possibility of corruption.

We begin by returning to the expression in (10) which determines the amount of public funds available for public good procurement. Since the only source of revenue for the government is the tax on firms in the modern production sector, we have $R_t^{na} = \tau Y_{2t}$, where Y_{2t} denotes aggregate output in that sector. Using (4), together with the fact that $Y_{2t} = y_{2t} = k_t$, we may re-write (10) as

$$P_t^{na} = [\tau - (1 - \tau)\alpha]k_t \equiv \pi k_t, \tag{18}$$

where we assume that $\tau - (1 - \tau)\alpha > 0$.

A bureaucrat who is corruptible will embezzle the public funds allocated to him, p_t^{na}, if the condition in (16) is satisfied. Since $p_t^{na} = P_t^{na}$, we may use (18) to express this condition solely in terms of capital. When holding with equality, the condition is then understood to determine a critical level of capital, κ^{na}, below which the bureaucrat will transgress and above which he will not transgress. That is,

$$\kappa^{na} = (1 + \beta)\left\{\frac{[\beta(1 + r) + \pi(1 + \beta)]^\delta}{\beta(1 + r)(1 - \tau)\alpha}\right\}^{\frac{1}{1-\delta}}. \tag{19}$$

As anticipated earlier, therefore, corruption is more likely to occur at lower levels of development.

Recall that the fraction of corruptible (non-corruptible) bureaucrats is ν $(1 - \nu)$. If $k_t > \kappa^{na}$, then corruption does not exist and all of the public funds allocated to bureaucrats find their way into public goods provision. Under such circumstances, $G_t^{na,nc} = P_t^{na}$. Conversely, if $k_t \leq \kappa^{na}$, then corruption exists and only a fraction, $1 - \nu$, of public funds are spent on public goods (the remaining fraction, ν, being pocketed by those engaged in corruption). In this case $G_t^{na,c} = (1 - \nu)P_t^{na}$. From (17) and (18), it follows that capital accumulation in a non-corrupt environment is described by

$$k_{t+1}^{na,nc} = \frac{\beta[\pi + 2(1 - \tau)\alpha]}{1 + \beta}k_t + \frac{2\beta(Q + q)}{1 + \beta} \equiv T^{na,nc}(k_t), \tag{20}$$

whilst capital accumulation in a corrupt environment is given by

$$k_{t+1}^{na,c} = \frac{\beta[(1-\nu)\pi + 2(1-\tau)\alpha]}{1+\beta}k_t + \frac{2\beta(Q+q)}{1+\beta} \equiv T^{na,c}(k_t). \qquad (21)$$

Under an appropriate parameter restriction, each of the transition paths in (20) and (21) exhibits a stationary point - defined by $\widehat{k}^{na,nc} = T^{na,nc}(\widehat{k}^{na,nc})$ in the case of the former and $\widehat{k}^{na,c} = T^{na,c}(\widehat{k}^{na,c})$ in the case of the latter - associated with a unique steady state level of capital.[35] Evidently, $\widehat{k}^{na,c} < \widehat{k}^{na,nc}$ which follows from the fact that, for any given k_t, $T^{na,c}(\cdot) < T^{na,nc}(\cdot)$. Accordingly, capital accumulation is lower under corruption than under non-corruption, which is to say that corruption has an adverse effect on economic development. This is due to the reduction in provision of public goods ($G_t^{na,c} < G_t^{na,nc}$) as a result of the embezzlement of public funds.

The two-way causality between corruption and development that exists in our model can have important implications for the long-run outcome of the economy. Specifically, one observes the existence of multiple development regimes and, with this, the possibility of multiple, history-dependent long-run equilibria. As we have seen, corruption is present (absent) for any level of capital, k_t, below (above) the critical level, κ^{na}. Under such circumstances, the economy is in a low (high) development regime, evolving along the low (high) transition path $T^{na,c}(\cdot)$ ($T^{na,nc}(\cdot)$). For a given initial capital stock of $k_0 < \kappa^{na}$, the final outcome of the economy depends crucially on whether $\kappa^{na} < \widehat{k}^{na,c}$ or $\kappa^c > \widehat{k}^{na,c}$. We illustrate this in Figure 1. Suppose that $\kappa^{na} < \widehat{k}^{na,c}$. Then the economy evolves along $T^{na,c}(\cdot)$ until it reaches κ^{na}, at which point it jumps to $T^{na,nc}(\cdot)$ and subsequently converges to $\widehat{k}^{na,nc}$. This chain of events describes a process of transition from the low development regime with high corruption to the high development regime with low corruption. But suppose, conversely, that $\kappa^{na} > \widehat{k}^{na,c}$. Then the economy is locked forever on $T^{na,c}(\cdot)$, converging irrevocably to $\widehat{k}^{na,c}$. In this case there is no transition and the economy remains permanently poor and corrupt. To the extent that $\widehat{k}^{na,nc}$ could be achieved if $k_0 > \kappa^{na}$, the model now presents a situation in which limiting outcomes depend fundamentally on initial conditions, with one such outcome being a poverty trap equilibrium.

4   The Economy With Aid

Our primary interest is in the way that foreign aid might alter the course of a country's development and, with this, its prospects for long-run prosperity. To study this, we consider the case in which our model economy is

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[35]The parameter restriction is $\frac{\beta[\pi^{na}+2(1-\tau)\alpha]}{1+\beta} \in (0,1)$.

injected with additional funds from overseas that are targeted towards public goods provision. A common approach in other analyses is to assume that these funds are given as a proportion of the recipient country's income (e.g., Economides *et al.* 2008; Hodler 2007). This assumption can obviously be questioned, but it is useful for analytical purposes and it also avoids having to make other arbitrary judgements about when aid may be reduced or withdrawn. In addition, it accords with the view that donors should reward recipients for good economic performance and that what concerns both parties is the intensity, rather than the absolute value, of aid (meaning aid as a share of national income). For these reasons, we maintain the assumption, or rather a modified version of it, by specifying the amount of foreign aid, denoted F_t, to be a fixed proportion of the economy's capital stock: that is, $F_t = \phi k_t$ $(\phi > 0)$.[36]

As in the previous analysis, we begin by considering the state of public finances. The total amount of resources available to the government comprises tax revenues and aid donations: that is, $R_t^a = \tau Y_{2t} + F_t$. Proceeding as before, and using $F_t = \phi k_t$ from above, the expression in (10) may be written as

$$P_t^a = [\tau - (1 - \tau)\alpha + \phi]k_t \equiv (\pi + \phi)k_t, \qquad (22)$$

The incentive for a corruptible bureaucrat to be corrupt is still determined according to (16), but the amount that the bureaucrat is able to embezzle is now given by $p_t^a = P_t^a$ in (22). Again, combining these expressions yields a critical level of capital, κ^a, below which corruption occurs and above which corruption does not occur. That is,

$$\kappa^a = (1 + \beta) \left\{ \frac{[\beta(1 + r) + (\pi + \phi)(1 + \beta)]^\delta}{\beta(1 + r)(1 - \tau)\alpha} \right\}^{\frac{1}{1-\delta}}. \qquad (23)$$

In the absence of corruption - that is, when $k_t > \kappa^a$ - all public funds allocated to bureaucrats are used for the procurement of public goods so that $G_t^{a,nc} = P_t^a$. In the presence of corruption - that is, when $k_t \leq \kappa^a$ - a fraction, v, of these funds goes missing so that $G_t^{a,c} = (1 - \nu)P_t^a$. From (17) and (22), it follows that capital accumulation in a non-corrupt environment is given by

$$k_{t+1}^{a,nc} = \frac{\beta[\pi + \phi + 2(1 - \tau)\alpha]}{1 + \beta}k_t + \frac{2\beta(Q + q)}{1 + \beta} \equiv T^{a,nc}(k_t), \qquad (24)$$

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[36]Following Economides *et al.* (2008), we can motivate this specification in a slightly different way that relates aid to the degree of inequality, or development gap, between countries. Specifically, suppose that $F_t = \mu(\overline{k}_t - k_t)$ $(\mu > 0)$, where $\overline{k}_t$ denotes the worldwide average stock of capital. Assuming that $\overline{k}_t = \lambda k_t$ $(\lambda > 1)$, we then have $F_t = \mu(\lambda - 1)k_t$, an expression that is identical to ours with $\mu(\lambda - 1) = \phi$

whilst capital accumulation in a corrupt environment is described by

$$k_{t+1}^{a,c} = \frac{\beta[(1-\nu)(\pi+\phi)+2(1-\tau)\alpha]}{1+\beta}k_t + \frac{2\beta(Q+q)}{1+\beta} \equiv T^{a,c}(k_t). \qquad (25)$$

With a similar parameter restriction as before, each of the transition functions in (24) and (25) imply convergence to a fixed point outcome - determined as $\widehat{k}^{a,nc} = T^{a,nc}(\widehat{k}^{a,nc})$ in the case of the former and $\widehat{k}^{a,c} = T^{a,c}(\widehat{k}^{a,c})$ in the case of the latter - corresponding to a unique steady state level of capital. Like the situation without aid, $\widehat{k}^{a,c} < \widehat{k}^{a,nc}$ since $T^{a,c}(\cdot) < T^{a,nc}(\cdot)$ for any given k_t. Thus corruption continues to depress capital accumulation and growth by reducing the provision of productive public goods and services. For the opposite reason, aid has a positive effect on growth. Note, however, that this effect is mitigated when corruption exists as some of the donations are syphoned off into bureaucrats' hands.

Evidently, the introduction of foreign aid does not alter the negative, two-way causal relationship between corruption and development. As such, the evolution of the economy and its final destination depend on the same considerations as those that apply when aid is absent. In particular, there are multiple development regimes with the possibility of multiple, long-run equilibria. For any capital stock, k_t, below (above) the critical level, κ^a, the economy is in a low (high) development regime, being located on the low (high) transition path $T^{a,c}(\cdot)$ ($T^{a,nc}(\cdot)$) and displaying a high (low) incidence of corruption. Transition between regimes may or may not be feasible depending on whether $\kappa^a < \widehat{k}^{a,c}$ or $\kappa^a > \widehat{k}^{a,c}$. In the event of the latter, initial conditions determine limiting outcomes, one of which is a poverty trap equilibrium. These implications can be illustrated diagrammatically by a simple re-labelling of Figure 1.

In preparation for our subsequent analysis, we note that foreign aid has three main effects in our model. The first, and most obvious, is that the amount of funds potentially available for public goods provision is increased ($P_t^a > P_t^{na}$). The second is that a corruptible bureaucrat can embezzle more of these funds ($p_t^a > p_t^{na}$) so that the incentive to do so is strengthened and the aggregate incidence of corruption is higher ($\nu P_t^a > \nu P_t^{na}$). And the third is that, because of the stronger lure of corruption, the critical level of capital is raised ($\kappa^a > \kappa^{na}$). These effects have a number of important implications, one of which is the following. For any given level of capital, three possible scenarios exist - namely, $k_t > \kappa^a > \kappa^{na}$, $k_t < \kappa^{na} < \kappa^a$ and $\kappa^{na} < k_t < \kappa^a$. Under none of these circumstances is the level of corruption lower when the economy receives aid than when it does not receive aid: in the first instance corruption is absent in both cases; in the second instance

corruption is present in both, but is higher in the former since $\nu P_t^a > \nu P_t^{na}$; and in the third instance corruption is present only in the former.

5 Aid, Corruption and Growth: An Evaluation

The results obtained so far indicate how bureaucratic corruption and international aid may impact on the economy and may also interact with each other. The interaction arises because the incidence of corruption depends on whether or not aid is received, and the effects of aid depend on whether or not corruption exists. We have also seen a similar mutual dependence between corruption and development, each one both influencing and being influenced by the other. These features imply that an analysis of the consequences of foreign aid can be quite complicated. In what follows we seek to identify these consequences, establishing conditions under which aid is most likely to either foster or impede economic performance.

The donation of foreign aid has two main implications for how the economy might develop. First, by allowing a greater provision of public goods, it causes the transition function to become steeper, irrespective of whether or not corruption exists (i.e., $T^{na,nc}(\cdot) > T^{a,nc}(\cdot)$ and $T^{a,c}(\cdot) > T^{na,c}(\cdot)$): this is conducive to development. Second, by strengthening the incentives of bureaucrats to engage in corrupt practices, it causes the critical level of capital to increase (i.e., $\kappa^a > \kappa^{na}$): this is not conducive to development. These competing influences give rise to a number of possible outcomes that may be visualised using Figures 2, 3 and 4. For illustrative purposes, we suppose that $\kappa^{na} < \widehat{k}^{na,c}$ (implying that transition between development regimes is feasible when the economy is initially without aid) and that $\widehat{k}^{a,c} < \widehat{k}^{na,nc}$ (meaning that the long-run equilibrium of an aided, but corrupt, economy is worse than the long-run equilibrium of a non-aided, but non-corrupt, economy).[37] Assuming otherwise may produce one or two other possible outcomes to which we refer later. We denote by k^A the level of capital, or stage of development, at which aid is first received. From our earlier observations, there are three possible scenarios - $\kappa^{na} < \kappa^a < k^A$, $\kappa^{na} < k^A < \kappa^a$ and $k^A < \kappa^{na} < \kappa^a$. We consider each in turn.

For the case in which $\kappa^{na} < \kappa^a < k^A$ (Figure 2), corruption is not really

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[37]The latter of these assumptions amounts to the parameter restriction $(1-\nu)(\pi+\phi) < \pi$, which implies that the slope of $T^{a,c}(\cdot)$ is less than the slope of $T^{na,nc}(\cdot)$. This is the case when the pilfering of public funds mitigates the influx of aid to an extent that public goods provision is lower than it would be in the absence of corruption and aid.

an issue since the incentive for bureaucrats to engage in corrupt behaviour vanishes before any aid is received and remains that way afterwards. Under such circumstances, the sole effect of aid is to raise capital accumulation. Evolving initially along the transition path $T^{na,c}(\cdot)$, the economy jumps to the higher path $T^{na,nc}(\cdot)$ at κ^{na} and then makes a final jump to $T^{a,nc}(\cdot)$ on receiving aid. Thereafter, it converges to the steady state equilibrium at $\widehat{k}^{a,nc}$. This result shows that, in the absence of corruption, aid is unambiguously good for development.

For the case in which $\kappa^{na} < k^{A} < \kappa^{a}$ (Figure 3), corruption is not an issue before aid is received but becomes an issue subsequently as the incentives of bureaucrats change. This has effects which conflict with those arising from greater public goods provision. As above, the economy is initially located on $T^{na,c}(\cdot)$ before jumping to $T^{na,nc}(\cdot)$ at κ^{na}, the point at which corruption disappears. But this is short-lived as the injection of aid lures bureaucrats back into corrupt behaviour, causing the economy to descend onto $T^{a,c}(\cdot)$. The final destination depends on whether $\kappa^{a} < \widehat{k}^{a,c}$ or $\kappa^{a} > \widehat{k}^{a,c}$: if the former, then there is a further stage of transition as the incentives of bureaucrats change again such that the economy jumps back up to $T^{a,nc}(\cdot)$ at κ^{a} and converges to $\widehat{k}^{a,nc}$; if the latter, then the economy remains on $T^{a,c}(\cdot)$ and becomes saddled forever with a corrupt bureaucracy at the poverty trap equilibrium $\widehat{k}^{a,c}$. These results demonstrate that, in the presence of corruption, aid can be costly, perhaps very costly, for development. At best, any gains that accrue are realised only in the long-run after losses have been incurred. At worst, there are only losses as the poverty trap would not occur in the absence of aid.

Finally, for the case in which $k^{A} < \kappa^{na} < \kappa^{a}$ (Figure 4), corruption is an issue both before and after aid is received as bureaucrats have the incentive to engage in corrupt behaviour at both times. As above, the effect of this competes with the greater provision of public goods. Starting on $T^{na,c}(\cdot)$ again, the economy jumps up to $T^{a,c}(\cdot)$ at the point that aid is received with subsequent events being dependent on whether $\kappa^{a} < \widehat{k}^{a,c}$ or $\kappa^{a} > \widehat{k}^{a,c}$ in the manner described above: if the former, then there is a further jump at κ^{a} as corruption disappears and the economy proceeds along $T^{a,nc}(\cdot)$ towards $\widehat{k}^{a,nc}$; if the latter, then the economy remains on $T^{a,c}(\cdot)$ and converges to $\widehat{k}^{a,c}$, being mired permanently with corruption and poverty. These results, like those previously, show that, in the presence of corruption, aid can have ambiguous implications for long-term development.

A scenario not captured in the above discussion is the case in which $\kappa^{na} > \widehat{k}^{na,c}$ (so that transition between development regimes is never possible when the economy is without aid). If $\kappa^{a} > \widehat{k}^{a,c}$ as well, then transition is

also not possible when aid is received and the limiting outcome is the poverty trap equilibrium at $\widehat{k}^{a,c}$. Aid does little to foster development in this instance. Conversely, if $\kappa^a < \widehat{k}^{a,c}$, then transition is made feasible with the injection of aid and the final destination is $\widehat{k}^{a,nc}$. This is really the only instance where aid produces such a radical turn of events that the quality of governance and development of the economy are so dramatically improved.

The foregoing analysis leads us to conclude that governance and corruption can be vital factors in determining the merits of international aid programmes. Good quality governance provides assurance that the potential of these programmes to improve economic performance is fully realised. Bad quality governance implies that this potential may be seriously compromised, if not completely undermined. Since the quality of governance is, itself, related to economic performance, then we can also understand how the effects of aid are liable to depend on an economy's stage of development: the poorer, less developed is an economy, the more ambiguous are these effects with the possibility that aid could do more harm than good. Finally, the prediction that corruption may rise (at least initially) with aid would certainly find sympathy in some quarters. It is one of the main arguments put forward by critics and sceptics of international aid programmes.

6   Conclusions

Much ink has been used in disputing the merits of international development aid programmes. To some observers, there is little doubt that such programmes have done much to alleviate the plight of many countries around the world. To others, there is little evidence to show that the billions of dollars spent on these programmes over many years has made any significant in-roads to alleviating poverty. This lack of consensus has been a persistent fixture in debates amongst both academics and practitioners, and there is nothing to suggest that it is likely to disappear in the near future.

This paper has meant to offer a theoretical contribution to the foreign aid controversy. Our objective has been to analyse in detail how the injection of aid might affect the long-run development of an economy in which the quality of governance is undermined by corruption. What makes this particularly non-trivial (and interesting) is the mutual dependence amongst variables: on the one hand, corruption both impedes development and compromises the effectiveness of aid; on the other hand, both development and aid influence the incidence of corruption. These interactions create the possibility of corruption-induced poverty traps and aid-dependent threshold effects. Against this background, we sought to identify circumstances under

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which aid may either help or hinder an economy's development prospects. The basic message is that aid is good for these prospects if governance is good, but may be bad (perhaps very bad) for them if governance is bad.

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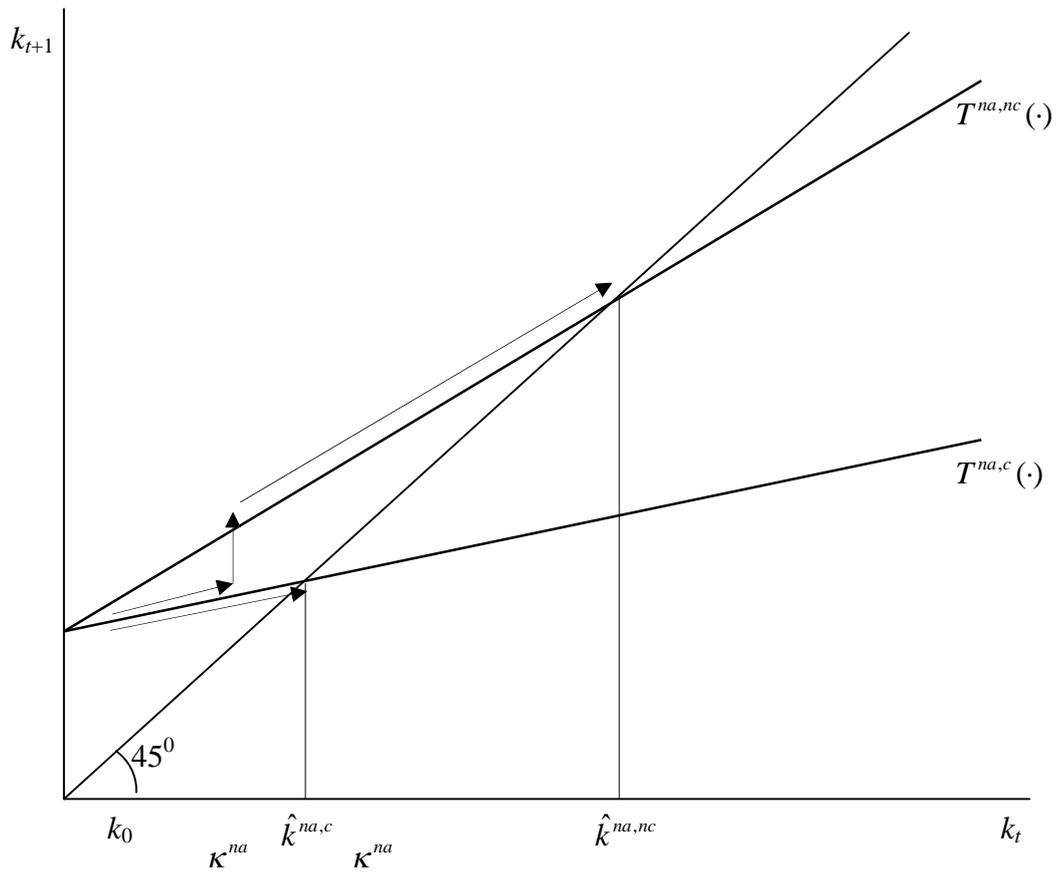
Figure 1
Corruption and Development

Figure 2
Aid and Development
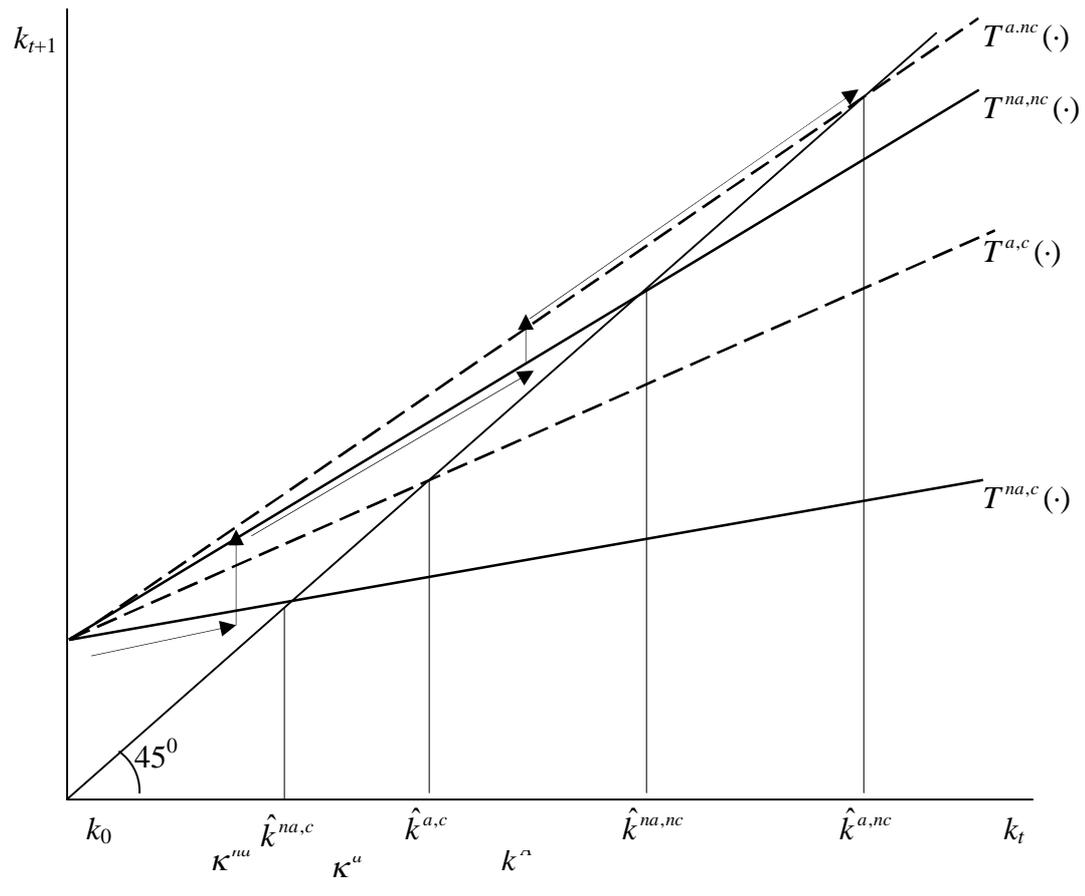$$(\kappa^{na} < \kappa^{a} < k^{A})$$

Figure 3
Aid and Development
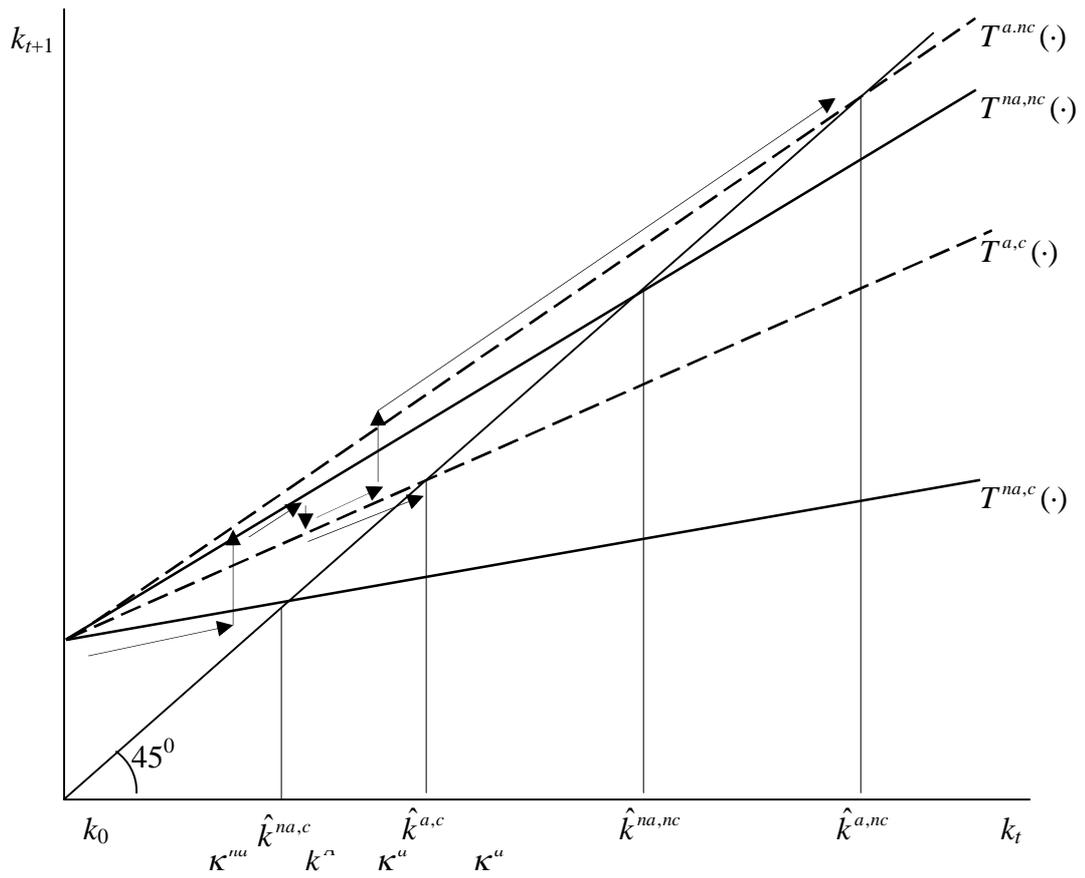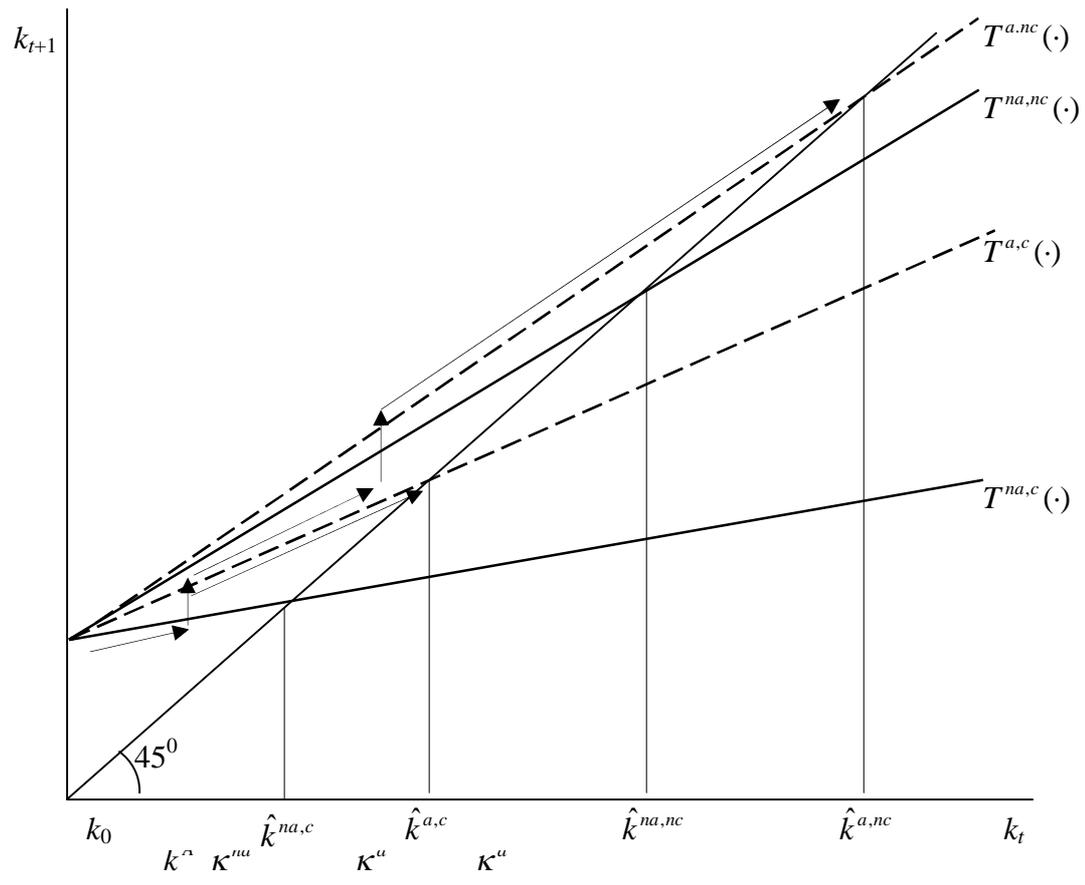$$(\kappa^{na} < k^A < \kappa^a)$$

Figure 4
Aid and Development
$$(k^{A} < \kappa^{na} < \kappa^{a})$$

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