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Title	Public investment under ethnic diversity and political uncertainty
Author(s)	Bohn, Frank
Publication Date	2005-01
Series	UCD Centre for Economic Research Working Paper Series; WP05/01
Publisher	University College Dublin. School of Economics
Link to publisher's version	http://www.ucd.ie/economics/research/papers/2005/WP05.01.pdf
This item's record/more information	http://hdl.handle.net/10197/1288

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2005

Public Investment under Ethnic Diversity and Political Uncertainty

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WP05/01

January 2005

**DEPARTMENT OF ECONOMICS
UNIVERSITY COLLEGE DUBLIN
BELFIELD DUBLIN 4**

Public Investment under Ethnic Diversity and Political Uncertainty

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Abstract

This paper addresses the puzzle that public services in some developing countries, especially in Africa, are poor despite large public expenditure. The intertemporal model here studies a government's optimal choice between redistribution and public investment. Ethnic diversity and political uncertainty reinforce one another in producing myopic government behaviour which results in underinvestment. Above some critical value of political instability, it is optimal for the government not to invest at all.

JEL classification: E62, O23

Keywords: political instability, myopic behaviour; public finance, corruption; political economy, developing countries.

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I am grateful for comments by participants at the Royal Economic Society Meetings in Swansea, 2004, and the European Public Choice Society Meetings in Berlin, 2004.

All remaining errors are mine. – Comments most welcome.

1 Introduction

Despite large public expenditure many developing countries, especially in Africa, suffer from poor public services in health, education, infrastructure, etc. (Pradhan, 1996) as well as from high levels of corruption (Widner, 1999). A theoretical explanation for this puzzle, this paper relates to three literatures. First, the empirical developing country growth literature hints at causes, but explanations remain verbal without providing the formal mechanisms. Much of that literature is reviewed in Collier and Gunning's "Why has Africa Grown Slowly?" (JEP, 1999). Second, more rigorous explanations are few and far between. Robinson and Torvik's model in "White Elephants" (JPubE, 2004) offers such a formal mechanism, but the analysis focuses on investment while excluding public consumption. Third, the model-theoretic background for this paper is provided by the public choice literature on political instability, for instance Cukierman, Edwards, and Tabellini (AER, 1992). For all three literatures, the ensuing analysis can be seen as an extension.

This paper addresses the intertemporal public finance decision problem of a government (henceforth also policymaker) under political instability. In this context, political instability is defined to comprise both political uncertainty (probability of the incumbent government losing power next period) and political polarisation (due to ethnic or social diversity). In a parsimonious model framework, the incumbent can choose between (efficient) public investment and redistribution from one of two groups in society to the other. Ethnic or social diversity produces myopic government behaviour, but only if there is at least some political uncertainty at the same time. For the incumbent government, it is perfectly rational not to invest when beneficial effects of her policies may not accrue to her in the future. Thus there is underinvestment in efficient public undertakings. There is, however, a political instability threshold below which the government is so myopic that it does not want to invest at all. Going above the threshold leads to a strong increase in public investment, at first, because additional political stability effectively increases the discount factor for the future. However, the additional investment increments (for more and more political stability) become smaller because marginal investment profitability goes down.

The link to the growth literature is obvious since investment in health, education, infrastructure, anti-corruption measures, etc. typically creates preconditions for output growth. However,

Collier and Gunning (1999) explain why this is not always true, especially in Africa. They argue that ethnic diversity promotes ethnic favouritism, i.e. diverting public spending to ethnic groups instead of creating better conditions for the whole of society. In fact, Easterly and Levine (1997) find that, empirically, ethnic diversity is the most important single cause of slow growth in Africa. Collier (1999) claims, however, that this is only true in undemocratic countries. By contrast, this paper argues that social and ethnic diversity exhibits its negative effect only, if there is political uncertainty at the same time. The government behaves myopically because losing power means that the other clan's or ethnicity's objectives, not the own, will be realised next period.¹ That is why it is important to study both ethnic diversity and political uncertainty in one and the same model. Their combined effect on government myopia seems to have been ignored as a cause of lower investment and growth in the literature thus far.²

In their recent paper "White Elephants" Robinson and Torvik (2004) offer another theoretical explanation for poor public services. Similar to this paper, there is a rationale for the government to do what it does. In a 2-period setting, they argue that credible commitment to an inefficient public investment project raises the incumbent government's chances to stay in power.³ They focus exclusively on investment (not public consumption) and address the (related) puzzle that there is underdevelopment in many developing countries despite a large amount of investment. They argue that the problem is not underinvestment, but "extreme resource misallocation". In their model, they distinguish between efficient investment projects and "projects with a negative social surplus" (which are often prestige projects called "white elephants").⁴

Some of the main features of this paper are best understood by comparing to Robinson and Torvik's (2004) approach. First, efficient public investment is beneficial for everybody in both

¹ Notwithstanding the distinction between the characteristics "undemocratic" and "political uncertainty", there may be a link between the two: autocratic regimes favouring a clan or ethnic group may be more likely to be overthrown by a government with radically different objectives.

² Another effect of ethnic diversity, more frequent civil wars, was suggested in the literature, but rejected in a study by Collier and Hoeffler (1999) – as quoted in Collier and Gunning (1999).

³ This is so, if the policymaker's second period loss from the project is smaller than her utility derived from increased benefits of the project extending to one of the two (ethnic or social) groups in society.

⁴ Arguably, Robinson and Torvik (2004) offer the most convincing theoretical explanation for white elephants. For empirical papers on resource misallocation, other theoretical models on white elephants and some striking historical examples confer their paper.

papers. However, Robinson and Torvik (2004) also model *inefficient public investment* projects which actually serve as a redistribution device. Instead, this paper captures the redistribution aspect of white elephants more directly by modeling favouritism or tribal affiliation in terms of *redistributive public goods* which are only beneficial to one of the two groups. However, in both papers, these groups could be construed as vested interest groups and the redistribution could also be interpreted as state capture or nepotism. Second, Robinson and Torvik (2004) model publicly financed (efficient or inefficient) *private investment projects* (like profit or loss-making manufacturing plants), whereas the concept of *efficient public investment* in this paper is much more general. It includes publicly financed private investment, but also infrastructural investment (e.g. building bridges), structural investment (e.g. reorganising governmental structures or developing new industries) and anti-corruption investment. The latter comprises measures to improve the protection of property rights or the criminal prosecution of bribery, but does not include fighting corruption by increasing public consumption (i.e. raising the pay of public officials). Irrespective of the type of public investment, it is assumed throughout, that it is efficient and beneficial to society as a whole.

Third, Robinson and Torvik (2004) consider *probabilistic voting*, i.e. a vote-maximising government. But white elephants or social/ethnic redistribution do also occur in less democratic societies with much less predictable causes for a policymaker to loose power. Examples are a coup d'état, a revolution or a terrorist attack as in Spain in March 2004. These are more or less exogenous events reflecting inherent instability in a country. Therefore, they are captured by an exogenous probability of loosing power similar to Cukierman, Edwards and Tabellini (1992), Devereux and Wen (1998), Svensson (1998) or Bohn (2000 and 2004). Those papers represent a strand of the public choice literature which could be termed "exogenous political instability". As in this paper, a parsimonious model framework is used to illustrate the impact of political instability under various scenarios.⁵ Alternative aspects of a government's public

⁵ Typically, taxation is modeled as simply as possible. Cukierman, Edwards and Tabellini (1992) capture seigniorage and a structural parameter to show that it is optimal for the government to raise more seigniorage and refrain from structural reform under political instability. Modeling domestic debt and taxation, the outcome in Devereux and Wen (1998) is high public activity and low growth. Bohn (2000 and 2004) discusses the (in-)effectiveness of debt conditionality when foreign debt and seigniorage are alternative sources of revenue. As in this paper, Svensson (1998) also models public investment, but he interprets it as property rights investment and studies its impact on *private* investment.

finance decision are considered, but there is a common mechanism: economic outcomes are determined by myopic behaviour which is caused by inherent political instability.

Sections 2 and 3 present the intertemporal framework of the theoretical model. The government maximisation problem is summarised and simplified in sections 4 and 5. Sections 6 and 7 present interior and corner solutions describing the finding of public underinvestment. Section 8 discusses the significance and combined effect of ethnic diversity and political uncertainty. Section 9 concludes.

2 Government Preferences and Political Instability

The model consists of two periods: period 1 (current period) and period 2 (next period). There are two sectors in the economy: (i) the government and (ii) the private sector. The model is specified in real terms. Government preferences over periods 1 and 2 are given by the following utility function:

$$W = V_1(C_1) + H_1(G_1, F_1) + E\{\rho(V_2(C_2) + H_2(G_2, F_2))\}. \quad (1)$$

The $V(\bullet)$ functions are concave and twice continuously differentiable utility functions of the government in private sector consumption C . The $H(\bullet)$ functions are the utility functions in the government provision of amounts G and F of the two public goods. G is beneficial only for one of two groups in society and F exclusively for the other. G and F could also be interpreted as vested interest rents due to state capture. E is the expectation operator and $\rho < 1$ is the government's discount factor. Total government utility is additively separable in two senses: first, with respect to periods; and second, with respect to utility derived either from private consumption or from public goods provision.

Assuming two types of governments political instability comprises two features: (i) the probability of government change and (ii) political polarisation. After the first period the incumbent government may lose office to the other set of policymakers with a fixed probability π ; it stays in power with probability $(1 - \pi)$.⁶ Both ethnic or social groups (or, indeed, vested interest

⁶ In a multi-period setting, this random change of government at fixed intervals would be referred to as

groups) benefit only from either one of the two public goods. However, each of the two types of government provides both types of public goods, but to differing degrees. Political polarisation then depends on the differences of policymakers' preferences with respect to their public good provision. The government utility function H is specified for one type of government (for the other type, α must be replaced by $(1 - \alpha)$):

$$H(G, F) = \frac{1}{\alpha(1 - \alpha)} \min\{\alpha G, (1 - \alpha)F\}. \quad (2)$$

For simplicity, their disagreement in public goods provision is parameterised symmetrically by α which is exogenous. The denominator in equation (2) is a normalisation such that the public goods utility equals the sum total X of spending on both public goods:

$$H(G, F) = F + G =: X. \quad (3)$$

Then the marginal public goods utility is unity (confer appendix A). Without limiting the general validity of the analysis, it is assumed that $1 \leq \alpha \leq \frac{1}{2}$. When α equals half, the two types of government have identical preferences; the more distant α is from half, the more they disagree on how much to spend on each of the two public goods. If preferences of both policymaker types are very dissimilar, political polarisation is large. Political polarisation measured by α contributes to political instability because it accounts for the extend of preference changes given a change in government. For α equals half, the instability effect of a government change is eliminated.

3 Budget Constraints

The government budget constraints in real terms for both model periods (1 and 2) are:

$$I + G_1 + F_1 \leq \tau \bar{Y}. \quad (4)$$

Markov switching (or Markov chain). If several time periods were considered and their lengths were fixed, for instance, at six months, some governments would only be in power for half a year, fewer would last for a year, and fewer yet for any longer period of time. This is a simple way of describing government change, but it matches the situation in many developing or transition countries. In Russia, for instance, there were 5 changes of government in 1998 and 1999 despite the fact that no Duma or presidential elections were held. President Yeltsin alternately replaced representatives of the nomenclature (Chernomyrdin, Primakov, Putin) with so-called reformist Prime Ministers (Kirienko, Stepashin) in arbitrary and irregular intervals.

$$G_2 + F_2 \leq \tau Y(I).$$

Government expenditure consists of two kinds: public investment I ; and consumptive spending F and G which is spent on the two types of public goods. To keep the revenue side as simple as possible, government revenue is modeled at a rudimentary level only. As, for instance, in Aghion and Bolton (1990) tax revenues are calculated from constant tax rate τ and income as tax base. The tax rate and first period income \bar{Y} (an endowment) are exogenous, but second period income $Y(I)$ depends on public investment I in the previous period. We assume an increasing function, i.e. efficient investment, but decreasing marginal returns: $Y'(I) > 0$, $Y''(I) < 0$. Public investment may be interpreted in terms of standard infrastructure investment or investment in any type of structural change leading to more efficiency and hence higher private sector production and income levels. It could, however, also be interpreted as publicly financed private investment or anti-corruption measures with similar effects on production and income.⁷

The private sector budget constraints in real terms for both periods are simply:

$$C_1 \leq (1 - \tau)\bar{Y}. \tag{5}$$

$$C_2 \leq (1 - \tau)Y(I).$$

Each period real private consumption depends on real income net of non-distortionary taxes. The model could be interpreted in per capita terms, but the private sector is passive in the sense that it cannot take optimising decisions on labour, savings or private investment. Thus, the two private sector budget constraints are not directly linked intertemporally. In that regard the model is similar to the model in Cukierman, Edwards, and Tabellini (1992). Income growth is only generated by public investment, not by private sector activity. These assumptions allow us to focus on the government and its decision problem. They may be justified in two ways: first, this is a short run model; and, second, growth in developing countries is not so much

⁷ The latter interpretation requires the assumption that corruption does always have a negative effect on output as confirmed in convincing empirical studies by Mauro (1995), Méon and Sekkat (2004) and others, but previously contested by Huntington (1968), Lui (1985), Beck and Maher (1986), Lien (1986) and others. The vicious cycle of corruption and slow growth is captured theoretically in Mauro (2004).

determined by the private sector, but more by other factors like (infra-) structural or other public investment (as modeled here) or foreign direct investment (which is not captured in the model). As there is no private investment in the model, the terms "public investment" and "investment" are henceforth used interchangeably.

4 Government Maximisation Problem

As shown in appendix A, the government has two types of instruments to increase its utility: public investment in period 1 and public spending on each of the two public goods in both periods. Increasing this period's public spending raises contemporaneous public goods utility H . Higher investment this period increases future private sector income (and thereby private sector utility) as well as tax revenues (and thereby public goods spending and utility) in the following period. In principle, there is private consumption smoothing because private consumption utility is concave. However, the amount of smoothing depends on the effective discount factor (which also includes the effect of political instability as shown in equation 8) and how profitable public investment is (i.e. the shape of the $Y(I)$ function). These factors also determine the intertemporal distribution of public goods spending, even though its utility is unity in both periods due to the assumption made in equation (2).

The government decision problem is made tractable because of three assumptions: (i), public goods spending F and G does not appear in the private sector budget constraints (5); (ii), government objective function (1) is additively separable; (iii), the functional format of the polarisation assumption embedded in equation (2) guarantees $H(G, F) = F + G$ (equation 3). Due to assumptions (i) and (ii) the government optimisation problem can be decomposed into two problems: first, the optimal distribution of the total public goods spending between F and G (**distribution problem**); and second, the fundamental revenue and expenditure problem of the government (**fundamental problem**). The (optimal) distribution problem is not really interesting since its results hinge on specific (though quite sensible) assumptions for public goods utility H (assumption (iii)). Indeed, the mathematical solution of the distribution problem for public goods spending (confer appendix A) is only required for being able to solve the fundamental revenue and expenditure problem of the government. Due to assumption

(iii) the fundamental problem of the government is independent of the actual government in power (see next paragraph). Nonetheless, the fact that there are two potential governments does have crucial implications for any government decision on the total amount of public goods spending as well as on public investment. In fact, the model is constructed that way to allow for the analysis of political instability by itself (as, for instance, in Devereux and Wen (1998) or Svensson (1998)) as opposed to analysing the effect of different types of government with different objectives (as, for instance, in Aghion and Bolton (1990) or Tabellini and Alesina (1990)).

We proceed as follows. In the next paragraph, the solution for the optimal public goods **distribution problem** is used to simplify total government utility and, thereby, make the government maximisation problem tractable. Then both the interior and the corner solution for the **fundamental problem** of government revenue and expenditure are discussed.

5 Simplifying Total Government Utility

As shown in appendix A, aforementioned assumption (iii) (equation 6), which refers to the functional format of utility function H , has three specific implications. First, the optimal distribution of the total partial interest spending between F and G is crosswise symmetrical for both types, say i and k , of governments (when in power). Second, government utility H derived from type i 's choice of F and G (when in power) is equal to government utility derived from type k 's choice (when in power):

$$H^i(G^i, F^i) = G^i + F^i = X^i = X = X^k = G^k + F^k = H^k(G^k, F^k). \quad (6)$$

In either case, the marginal utility of public goods spending is unity. Third, the (real) total value of public goods spending H is normalised - for each government - by the sum of its arguments ($F + G$), when chosen optimally by any incumbent government. For i and k representing different governments and $\alpha > \frac{1}{2}$ being assumed (without loss of generality), note, however, that government k 's optimal choice for F and G is, of course, suboptimal for government i : $X^i = H^i(G^i, F^i) > H^i(G^k, F^k) = \frac{1-\alpha}{\alpha} X^i$.

On this basis, the government utility function (1), can be simplified. For each period separately, utility derived from private consumption and from partial interest spending is considered for the government in power in period 1 only. Superscripts are only used for the other government (marked by k). In period 1, this government's optimal choice for F and G results in $H(G_1, F_1) = X_1$. Thus first period utility is

$$V(C_1) + H(G_1, F_1) = V(C_1) + X_1 \quad (7)$$

If this government is still in power in period 2 (with probability $(1 - \pi)$), it will choose F and G such that $H(G_2, F_2) = X_2$. If, however, this government loses power in period 2 (with probability π), it has to put up with the public goods spending chosen by the other government, i.e. $H(G_2^k, F_2^k) = \frac{1-\alpha}{\alpha}X_2$. Hence its second period total expected utility is:

$$\begin{aligned} E \{ & \rho (V(C_2) + H(G_2, F_2)) \} & (8) \\ = & \rho \left((1 - \pi) (V(C_2) + X_2) + \pi (V(C_2) + \frac{1 - \alpha}{\alpha}X_2) \right) \\ = & \rho (V(C_2) + \beta(\alpha, \pi)X_2) \end{aligned}$$

Thus government utility in period 2 depends on the effective discount factor which comprises three exogenous parameters: discount factor ρ , political polarisation α and the probability of losing power π . The latter two parameters are subsumed under quasi-exogenous parameter β , which is to represent political instability:

$$0 \leq \beta(\alpha, \pi) = (1 - \pi) + \pi \frac{1 - \alpha}{\alpha} \leq 1. \quad (9)$$

Note that political instability augments the effect of the discount factor: it lowers the valuation for the second period, i.e. it increases government myopia. Obviously, $\beta = 1$ if both governments have identical preferences ($\alpha = \frac{1}{2}$) or if the government stays in power with certainty ($\pi = 0$). For $\alpha = 1$ and $\pi = 1$, $\beta = 0$. In other words, β decreases with more political diversity (polarisation $\alpha \uparrow$) and/or more political uncertainty (probability of government change $\pi \uparrow$).

6 Interior Solution

The fundamental revenue and expenditure problem of the government can now be specified on the basis of government preferences as stated in (1) and equations (7) and (8). Government budget constraints (4) and private sector budget constraints (5) can be substituted into equations (7) and (8) for X_t and C_t , $t = 1, 2$, respectively. Then the government objective function is:

$$\max_I \quad V((1 - \tau)\bar{Y}) + \tau\bar{Y} - I + \rho V((1 - \tau)Y(I)) + \rho\beta(\alpha, \pi)\tau Y(I) \quad (10)$$

The first order condition (FOC) with respect to the (remaining) policy variable I is as follows:

$$-1 + \rho V'((1 - \tau)Y(I))((1 - \tau)Y'(I)) + \rho\beta(\alpha, \pi)\tau Y'(I) = 0 \quad (11)$$

The FOC requires that the marginal utility of (giving up 1 unit of) public good provision in period 1 (which is unity due to assumption 2 on public goods utility H) must be equal to the marginal utility derived from (i) additional second period consumption (due to the after-tax income effect of increased investment) *and* (ii) additional public goods provision in period 2 (due to the tax effect of increased investment). Note that the discount rates for marginal utilities (i) and (ii) are different. As for (i), marginal utility V' is discounted by discount factor ρ . As for (ii), unity marginal utility of the public goods provision is discounted by $\rho\beta$ (because the valuation of the public goods provision in period 2 is different for the two types of policymakers).

The FOC is, of course, only a necessary condition. The sufficient condition for a maximum is that the second derivative of (10) must be negative. In appendix B, it is shown that this is only true for β above a threshold value, $\beta > \beta^*$, where β^* is the value for which the second derivative equals 0. Ultimately, we are interested in the perturbation effect of political instability β on optimal public investment I . Remember that political instability parameter β introduced in equation (8) represents both the probability of government change π and political polarisation α . Remember also that both π and α are negatively related to β , which takes values between 0 (complete instability) and 1 (perfect stability). Assuming now that (10) is a well-defined maximisation problem (i.e. $\beta > \beta^*$), applying total differentials leads to

Proposition 1 (Interior Solution)

For $\beta > \beta^*$, the following perturbation results hold at the equilibrium:

$$(i) \quad \frac{dI}{d\beta} > 0$$

$$(ii) \quad \frac{d \frac{dI}{d\beta}}{d\beta} < 0.$$

Appendix C outlines the derivation of proposition 1. Point (i) states that increasing β , i.e. less political instability, at the equilibrium leads to more public investment (as long as $\beta > \beta^*$). As the government becomes less myopic, it is optimal to invest more into the future. Additional political stability effectively increases the discount factor for the future. This is intuitive and straightforward. However, point (ii) of proposition 1 asserts that the (positive) marginal effect on investment of more political stability decreases. This is so because the marginal investment profitability goes down. Conversely, proposition 1 means that a marginal increase in political instability at the equilibrium leads to a depletion of public investment which accelerates for higher values of instability (up to β^*).

7 Corner Solution

For two reasons, this is not the full story: first, β could be smaller than β^* ; and second, public investment cannot be reduced at an ever increasing rate for increasing political instability (β decreased). The rest of the story is simple. For β below β^* , public investment must be zero. To see this consider the government's optimal choice problem for $\beta < \beta^*$. Formally, the government problem becomes a minimisation problem as the second order condition turns positive. If, however, public investment is constrained to zero in this two period model, the optimal choice of the government is the corner solution.

Proposition 2 (Corner Solution)

For $\beta < \beta^*$, it is optimal for the government not to invest.

The proposition appears obvious from first inspection of the problem, but can be formally proved by using the Kuhn-Tucker conditions. The intuition is also simple. For small β , the

government values the present much more than the future. Given such myopia, the government does not want to move resources from today to tomorrow. Hence there is no investment. In the real world, disinvestment (like the sale of infrastructure, e.g. train coaches) might actually result from large myopia.

The perturbation results could be summarised in two graphs depicting the optimal values for I and its derivative as a function of β for its entire range ($0 \leq \beta \leq 1$). For small values of β , optimal I and $\frac{dI}{d\beta}$ are zero. However, from $\beta = \beta^*$ onwards, it is optimal for the government to invest more and more for increasing β . Optimal I is continuous, but non-differentiable at β^* . It is concave thereafter. For $\frac{dI}{d\beta}$, there is a discontinuity at $\beta = \beta^*$. It jumps to infinity and decreases thereafter, but remains positive .

8 Ethnic Diversity versus Political Uncertainty

So far, the probability of loosing power (political uncertainty π) and social/ethnic diversity (measured by political polarisation α) were subsumed by the parameter for political stability, β (where β is inversely related to its underlying parameters and $\beta = 1$ means total stability). This was convenient for the mathematical derivation of the two propositions. To further exploit the findings, it is, however, useful to disentangle α and π , the components of β . We proceed in two steps: first, we study their marginal effect on β ; and second, we interpret the propositions in terms of ethnic diversity and political uncertainty.

The partial derivatives of β (equation 9) with respect to α and π are as follows:

$$\frac{\partial \beta}{\partial \pi} = -2 + \frac{1}{\alpha} \tag{12}$$

$$\frac{\partial \beta}{\partial \alpha} = -\frac{\pi}{\alpha^2} \tag{13}$$

We already know from section 5 that there is a negative marginal effect of π on β , unless $\alpha = 1$ (when $\frac{\partial \beta}{\partial \pi} = 0$). However, equation (12) also shows that the negative marginal effect increases in α . Remember that lower β (more political instability) reduces the discount factor, which means more myopia. Thus more social/ethnic diversity accelerates the effect of political uncertainty

on government myopia. According to equation (13), the reverse is also true: more political uncertainty magnifies the impact of social/ethnic diversity on myopic government behaviour.

In terms of our finding that increasing government myopia leads to more and more dramatic reductions in public investment, we can now interpret the underlying causes. If the government faces some chance of losing power and there is some social/ethnic diversity, then an increase in either of them exacerbates the shortfall of public investment. The effect is, however, magnified, if both of them deteriorate at the same time. Then, the negative effect on marginal investment becomes dramatic. This is so, until the political instability threshold β^* is reached. When that happens, a rational government chooses not to invest at all, because second period benefits from investment are discounted too heavily.

9 Conclusion

This paper captures the government decision problem between efficient public investment and redistribution in a parsimonious model of political instability. The chance of another government being in power and taking undesirable decisions in the future produces a negative spill-over onto today's government. This is the basis for the result of myopic government behaviour in the literature. In this paper, it is actually optimal for the current government to totally refrain from spending on public investment, if enough myopia is produced by political instability. As we increase political stability, we reach a threshold above which it is optimal to increase investment. At first, marginal investment is strong, because additional political stability effectively increases the discount factor for the future. Then, however, the additional investment increments become smaller, because marginal investment profitability goes down.

Political instability has two causes: social or ethnic diversity and political uncertainty about the future government. Loosely speaking, their effect on government myopia is multiplicative. According to the model, underinvestment in infrastructure, health, or education is particularly severe in a country with a legacy of ethnic strife combined with a history of coup d'états or revolutions. Therefore, the paper offers an explanation for appalling levels of efficient public investment in some developing countries, especially in Africa.

However, the model results may also be interpreted, more specifically, as a rationalisation of governments' unwillingness to invest in the fight against corruption. Social/ethnic diversity and political uncertainty combined produce so much myopia that it is rational for governments not to engage in anti-corruption investment, even if policymakers do not directly benefit from corruption. If interpreted in this way, it is important to note that the negative transmission of corruption on output or growth is not modeled here.⁸ It is, however, assumed implicitly, that corruption has an overall negative impact on growth.⁹ Hence public investment directed at fighting corruption is modeled to have a positive effect on output.

For several reasons, the modeling approach is particularly relevant for certain developing countries. First, political uncertainty in some of these countries is inherent to the political structure of the country rather than caused by electoral uncertainty as in Western democracies. Second, the disregard for private sector decisions on labour, consumption and investment would certainly not be suitable simplifications for industrialised countries, but may be seen as a first approximation in some developing countries, where there is either no economic growth or it depends on external factors (like foreign direct investment).

However, relaxing these assumptions offers scope for future research, whereas going empirical may prove impossible, because efficient and inefficient investment would have to be disentangled. As for theoretical modeling, it may be worth while exploring if there are any trade-off effects when other sources of government revenue are included. Another possible extension would be to model the effect of public investment on growth, when the private sector optimises its investment and consumption decisions. A further extension might be to capture the interaction between growth and political instability. It is obvious, that better economic conditions reduce the chance of, say, a revolution. For many developing countries, it is more appropriate to capture the feedback of government actions on growth and political instability instead of modeling the interaction between government decisions and voting.¹⁰

⁸ There are many alternative explanations. For instance, Mauro (1995) contends that red tape occasions bribes and hampers private investment. Hillman and Krausz (2004) argue, more specifically, that corruption is particularly damaging in reducing financial intermediation, if the bribe has to be paid upfront irrespective of the success of a private investment project.

⁹ Mauro (1995) and Méon and Sekkat (2004) show convincingly that corruption does not "grease the wheel", even if there is a lot of regulation in the economy.

¹⁰ For instance, Robinson and Torvik (2004) use probabilistic voting, whereas Tabellini and Alesina (1990)

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A Optimal Public Goods Spending

The following exposition draws on Cukierman, Edwards, and Tabellini (1992). The same approach is also used in Svensson (1998). For convenience, polarisation assumption (2) which is embedded in the government utility function H for public goods spending is restated for the type i government:

$$H^i(G^i, F^i) = \frac{1}{\alpha(1-\alpha)} \min\{\alpha G^i, (1-\alpha)F^i\}. \quad (\text{A.1})$$

Since (A-1) contains a minimum function, optimality can only be achieved for

$$(1-\alpha)F^i = \alpha G^i. \quad (\text{A.2})$$

As the utility function H for the type k government is symmetrical according to its definition in section 2, so is the optimal distribution between F^k and G^k : $(1-\alpha)G^k = \alpha F^k$.

Government i 's optimal total public goods spending X^i can be written as

$$X^i := F^i + G^i = \frac{G^i}{1-\alpha} = \frac{F^i}{\alpha}. \quad (\text{A.3})$$

By reinserting into utility function (A-1) the optimal values for F and G in terms of X ($G^i = (1-\alpha)X^i$, $F^i = \alpha X^i$) a simple result for total public goods utility H is obtained:

$$\begin{aligned} H^i(G^i, F^i) &= \frac{1}{\alpha(1-\alpha)} \min\{\alpha(1-\alpha)X^i, (1-\alpha)\alpha X^i\} \\ &= X^i = F^i + G^i. \end{aligned} \quad (\text{A.4})$$

We can now see that the denominator in equation (A-1) was chosen as a normalisation such that the marginal public goods utility is unity. Furthermore, given that utility function (A-1) is symmetrical for both types of government, the optimal values for F and G are crosswise identical ($F^i = G^k$ and $G^i = F^k$) and

$$H^i(G^i, F^i) = X^i = X = X^k = H^k(G^k, F^k). \quad (\text{A.5})$$

B Second Order Condition

For (10) to be a well-specified maximisation problem, the second derivative with respect to I must be smaller or equal to 0:

$$\rho * V''((1 - \tau)Y(I)) * ((1 - \tau) * Y'(I))^2 \quad (\text{B.1})$$

$$+ \rho * V'((1 - \tau)Y(I)) * ((1 - \tau) * Y''(I)) \quad (\text{B.2})$$

$$+ \rho * \beta(\alpha, \pi) * \tau * Y''(I) \leq 0$$

\Leftrightarrow

$$\underbrace{(\rho * V''((1 - \tau)Y(I)))}_{-} * \underbrace{(((1 - \tau) * Y'(I))^2)}_{+} \quad (\text{B.3})$$

$$+ \underbrace{(\rho * Y''(I))}_{-} * \underbrace{(\tau * \beta(\alpha, \pi) - (1 - \tau) * V'((1 - \tau)Y(I)))}_{?} \leq 0$$

A sufficient condition for this to hold is:

$$\tau * \beta(\alpha, \pi) \geq (1 - \tau) * V'((1 - \tau)Y(I)). \quad (\text{B.4})$$

Given that the marginal utility of H is normalised at unity, the condition could be rewritten as:

$$\tau * \beta(\alpha, \pi) * H'(G_2, F_2) \geq (1 - \tau) * V'((1 - \tau)Y(I)). \quad (\text{B.5})$$

If we ignore the tax rate for a moment (set $\tau = .5$), condition (B.4) requires the effective marginal public goods utility in period 2, $\beta * H'_2$, to be greater or equal to second period marginal private sector utility V'_2 . Given some political instability ($\beta < 1$) this means that, at the margin, the policymaker must attribute less importance to private consumption than to total public goods provision.

Equation (B.2) does, however, hold for weaker conditions as well. The marginal private sector utility V'_2 could also be greater than the effective marginal public goods utility $\beta * H'_2$, as long

as $\beta * H'_2$ is sufficiently close to V'_2 . For V'_2 above (but close to) unity, β must be relatively close to 1, where 1 signifies perfect political stability (no polarisation and/or no chance of government change). For V'_2 below unity, the following holds: the farther V'_2 from unity (i.e. the less important private consumption is relative to public consumption), the more political instability is permitted.

In fact, equality in (B.2) defines β^* , a threshold level for β . For $\beta > \beta^*$ the government choice problem (10) is a well-defined maximisation problem producing an interior solution for the optimal level of public investment I .

C Perturbation Results

Proposition 1 (i) – given $\beta > \beta^*$:

$$\frac{dI}{d\beta} = -\frac{\frac{\partial W_I}{\partial \beta}}{\frac{\partial W_I}{\partial I}} = -\frac{\overbrace{\rho * \tau * Y'(I)}^+}{\underbrace{\frac{\partial W_I}{\partial I}}_-} > 0 \quad (\text{C.1})$$

Proposition 1 (ii) – given $\beta > \beta^*$:

$$\frac{d\frac{dI}{d\beta}}{d\beta} = \frac{\overbrace{\left(-\rho * \tau * Y''(I) * \frac{\partial W_I}{\partial I}\right)}^- - \overbrace{\left(-\rho * \tau * Y'(I) * \rho * \tau * Y''(I)\right)}^+}{\underbrace{\left(\frac{\partial W_I}{\partial I}\right)^2}_+} < 0 \quad (\text{C.2})$$