

DISCUSSION PAPER SERIES

No. 3459

WHITE ELEPHANTS

James A Robinson and Ragnar Torvik

PUBLIC POLICY



Centre for **E**conomic **P**olicy **R**esearch

www.cepr.org

Available online at:

www.cepr.org/pubs/dps/DP3459.asp

WHITE ELEPHANTS

James A Robinson, University of California, Berkeley and CEPR
Ragnar Torvik, Norwegian University of Science and Technology

Discussion Paper No. 3459
July 2002

Centre for Economic Policy Research
90–98 Goswell Rd, London EC1V 7RR, UK
Tel: (44 20) 7878 2900, Fax: (44 20) 7878 2999
Email: cepr@cepr.org, Website: www.cepr.org

This Discussion Paper is issued under the auspices of the Centre's research programme in **PUBLIC POLICY**. Any opinions expressed here are those of the author(s) and not those of the Centre for Economic Policy Research. Research disseminated by CEPR may include views on policy, but the Centre itself takes no institutional policy positions.

The Centre for Economic Policy Research was established in 1983 as a private educational charity, to promote independent analysis and public discussion of open economies and the relations among them. It is pluralist and non-partisan, bringing economic research to bear on the analysis of medium- and long-run policy questions. Institutional (core) finance for the Centre has been provided through major grants from the Economic and Social Research Council, under which an ESRC Resource Centre operates within CEPR; the Esmée Fairbairn Charitable Trust; and the Bank of England. These organizations do not give prior review to the Centre's publications, nor do they necessarily endorse the views expressed therein.

These Discussion Papers often represent preliminary or incomplete work, circulated to encourage discussion and comment. Citation and use of such a paper should take account of its provisional character.

Copyright: James A Robinson and Ragnar Torvik

July 2002

ABSTRACT

White Elephants

Underdevelopment is thought to be about lack of investment, and many political economy theories can account for this. Yet, there has been much investment in developing countries. The problem has been that investment growth has not led to output growth. We therefore need to explain not simply underinvestment, but also the misallocation of investment. The canonical example of this is the construction of white elephants – investment projects with negative social surplus. In this Paper we propose a theory of white elephants. We argue that they are a particular type of inefficient redistribution, which are politically attractive when politicians find it difficult to make credible promises to supporters. We show that it is the very inefficiency of such projects that makes them politically appealing. This is so because it allows only some politicians to credibly promise to build them and thus enter into credible redistribution. The fact that not all politicians can credibly undertake such projects gives those who can a strategic advantage. Socially efficient projects do not have this feature since all politicians can commit to build them and they thus have a symmetric effect on political outcomes. We show that white elephants may be preferred to socially efficient projects if the political benefits are large compared to the surplus generated by efficient projects.

JEL Classification: H20, H50 and O20

Keywords: development, investment and political economy

James A Robinson
Department of Political Science
University of California at Berkeley
210 Barrows Hall
Berkeley, CA 94720
USA
Tel: (1 510) 642 8407
Fax: (1 510) 642 9515
Email: jamesar@socrates.berkeley.edu

Ragnar Torvik
Norwegian University of Science and
Technology
Department of Economics
N-7491 Trondheim
NORWAY
Tel: (47 735) 91420
Fax: (47 735) 96954
Email: ragnar.torvik@svt.ntnu.no

For further Discussion Papers by this author see:
www.cepr.org/pubs/new-dps/dplist.asp?authorid=139245

For further Discussion Papers by this author see:
www.cepr.org/pubs/new-dps/dplist.asp?authorid=148460

Submitted 26 June 2002

1 Introduction

Developing countries seemed to be plagued by extreme resource misallocation. Evidence of this comes from both econometric work showing large gaps in TFP between rich and poor countries (Hall and Jones, 1999), and from numerous case studies of rent seeking, the rise of the informal sector and inefficient parastatals. Many of these distortions seem to be created by politicians and the state. Following Bates (1981) most scholars have seen such outcomes as politically rational, even while they are socially disastrous. For example, the most likely explanation of the types of restrictions on entry analyzed by de Soto (1989) and Djankov et al. (2002) is that they generate rents which can be redistributed to generate political support.

However, many aspects of politically induced resource allocation remain puzzling. For instance, there are now many political-economy models which can explain under-investment.¹ Nevertheless, developing countries seem to be plagued not simply by underinvestment, but by investment in the wrong things.

Nothing is as depressing in a developing economy as the presence of *white elephants*. We define a white elephant to be a project with a negative social surplus. Some classic examples come from the activities of INDECO the Industrial Development Corporation of Zambia. Documenting the failure of this institution to promote development in Zambia Tangri (199, p. 30) argues that this was because

“INDECO was subject to a series of ad hoc political directives on specific operational issues, including type and location of investments. Projects were undertaken on political considerations although, as in the case of Mansa batteries, the feasibility study concluded that the project based in Mansa would be uneconomic. Moreover, projects such as the Chinese maize mill at Chingola were started without any feasibility study being undertaken; the decision was a purely political one, which led to the already

¹This may be because politicians discount the future too much (North, 1981), because of redistributive taxation (Alesina and Rodrik, 1994, Persson and Tabellini, 1994), or because of the impact of investment on the future political equilibrium (Besley and Coate, 1998, Acemoglu and Robinson, 2002).

planned and evaluated maize mill in Kitwe being abandoned. Directives were also issued regarding the location of projects. The locations of the Livingstone Motor Assemblers, Kapiri Glass Products and Mansa Batteries, all subsidiaries of INDECO, were decided on the basis of providing employment outside the main urban areas. These and similar projects ran into difficulties for various reasons, partly because, being located in up-country centres, they were situated a long way from the main markets. Multi-million dollar brick factories were set up under official directive in the rural areas at Kalalushi and Nega Nega, but transporting the bricks long distances to the construction sites raised their costs to uneconomic levels, with the result that the construction industry switched to the use of concrete blocks. Because of the declining demand for its products, the brick works at Nega Nega was forced to close down in 1979 and the factory at Kalalushi incurred large losses.”

Why are such white elephants ever built? Tangri’s discussion of Zambian industrial policy suggests not only are white elephants built, but they are built when they are understood to be white elephants and, even worse, they crowd out socially desirable projects. Unfortunately, the incidence of white elephants is not limited to Zambia.

One of the most detailed study of white elephants is Killick’s book (1978) about development in Ghana. He discusses in great detail examples of how costs benefit calculations were ignored and inefficient investment projects undertaken. One example was a cattle-based industrial complex (Killick, 1978, p. 231),

“The footwear factory...would have linked the Meat factory in the North through transportation of the hides to the South (for a distance of over 500 miles) to a tannery (now abandoned); the leather was to have been backhauled to the Footwear factory in Kumasi, in the centre of the country and about 200 miles north of the tannery. Since the major footwear market is in the Accra metropolitan area, the shoes would then have to be transported an additional 200 miles back to the South.”

Killick somewhat understatedly remarks (p. 231) that this was an enterprise “whose viability was undermined by poor siting.” Another startling example is the construction of a fruit canning factory “for the production of mango products, for which there was recognized to be no local market, [and] which was said to exceed by some multiple the total world trade in such items” (Killick, 1978, p.229). The governments own report on this factory is worth quoting at some length (Killick, 1978, p. 233)

“Project A factory is to be erected at Wenchi, Brong Ahafo, to produce 7,000 tons of mangoes and 5,300 tons of tomatoes per annum. If average yields of crops in that area will be 5 tons per acre per annum for mangoes and 5 tons per acre for tomatoes, there should be 1,400 acres of mangoes and 1,060 acres of tomatoes in the field to supply the factory.

The Problem The present supply of mangoes in the area is from a few tress scattered in the bush and tomatoes are not grown on commercial scale, and so the production of these crops will have to start from scratch. Mangoes take 5-7 years from planting to start fruiting..How to obtain sufficient planting materials and to organize production of raw materials quickly become the major problems of this project.”

Killick’s comment is that “it is difficult to imagine a more damning commentary on the efficiency of project planning” stated a whole year before the factory was constructed.

As in Zambia, the motivation behind these decisions to misallocate resources was clearly political. Rimmer (1969, p. 195) argues that “Projects were begun without feasibility studies and without competitive tendering. New enterprises were distributed among party functionaries as private fiefs, enabling them to give patronage to relatives, friends, and supporters,” and Omaboe (1966, p. 460-461) concludes “In Ghana the politicians are always ahead of the civil servants and planners in the general consideration and implementation of economic and social projects.”

The Ghanaian case illustrates a key motivation of this paper. The problem under Nkrumah was not underinvestment. Indeed, the consensus view

is that the capital stock increased by 80% between 1960-1965 (Killick, 1978, p.69), 60% of which being by the public sector (80% of non-residential investment, Killick, 1978, p. 170). The problem was in the way this investment was allocated.²

The journalistic literature treats white elephants as the worst symptoms of the megalomania of rulers. Yet, a more plausible explanation is that they constitute some form of inefficient redistribution. They are basically an instrument used to raise the income of a particular constituency. Yet why raise incomes in such an inefficient way? The existing literature does not well account for this. For example, the theory of Coate and Morris (1995) rests on the postulate that a white elephant must be believed to be socially efficient with a sufficiently high probability if it is to be built. This does not seem plausible in this context. Similarly, the theory of Lizzeri and Persico (2001) suggests that white elephants might be desirable because they can be targeted at supporters. While this may be true their theory conceives of incomes as the good which is targeted and cannot explain why one would want to target supporters by building a project with negative social value added.

In this paper we build a theory of the construction of white elephants. Most importantly, we show that it is the very inefficiency of such projects that makes them politically appealing. This is so because it allows only some

²Another class of white elephants comes from oil exporters. Following the Arab embargo of October 1973 the sharp increase in oil prices produced large income gains to oil exporters. The bulk of the oil rents were invested in public projects but with no growth payoff (for OPEC as a whole GDP per capita on average decreased by 1.3 percent each year from 1965 to 1998, see Gylfason, 2001) In Nigeria, between 1973 and 1976 capital expenditure rose by a factor of more than nine (see Gavin, 1993) and Gelb (1988, p. 241) finds that “public capital spending accelerated rapidly from only 3.6 percent of non-mining GDP in 1970 to 29.5 percent by 1976. This acceleration was so strong that it alone absorbed *more* than the entire increase in oil income between 1970 and 1976.” Gelb (1988) finds that overall about half of the oil rents earned in the six oil exporting countries he studies were invested domestically. He finds a very disappointing growth performance among the countries. For instance (p. 122): “An outstanding case is Venezuela, which simply stopped growing in 1979 despite the largest investment program in its history.” Later researchers of the resource curse such as Sachs and Warner (1995), Gylfason (2001) and Auty (2001) have confirmed the weak growth performance of oil exporters. Gavin (1993, p. 216) echoes the consensus explanation when he notes “the tendency for governments to invest in projects with high prestige or political payoff, but with little economic rationale.”

politicians to credibly promise to build them and thus enter into credible redistribution. The fact that not all politicians can credibly undertake such projects gives those who can a strategic advantage. Socially efficient projects do not have this feature since all politicians can commit to build them and they thus have a symmetric effect on political outcomes.

Our theory builds on several key ideas, that white elephants are; (1) part of an exchange relationship between politicians and voters (a situation which political scientists call ‘clientelism’) where there are important advantages of incumbency,³ that (2) politicians face commitment problems in offering policy favors in exchange for votes (Alesina, 1988, Besley and Coate, 1997), and (3) this commitment problem may lead to inefficient forms of redistribution being chosen. As is evident from the above examples, the informal literature, though it does not explain why white elephants occur, certainly connects them to clientelistic policies. Also, the political science literature on clientelism is consistent with our emphasis on commitment since the informal, semi-legal character of the relation is recognized (Eisenstadt and Roniger, 1984, p. 48-49, for example argue that this is one of the four key elements of clientelism). This implies that patrons “cannot be sure that the ‘clientelistic deal’ will be honored, as no legal enforcement mechanism can be devised” Piattoni (2001, p. 7).

Our model features two groups each of whom is imperfectly represented by a politician. We capture this imperfect representation by assuming that politicians wish to maximize a weighted sum of their own welfare and the welfare of the group they represent.⁴ We assume that citizens within each group have heterogeneous political preferences and thus may vote for either politician - a politician representing a group cannot be certain of gaining the votes of members of his group. There are two periods with an election occurring at the end of the first period. One of the politicians is an incumbent who can initially decide on the levels of lump-sum taxes and transfers and how much and what sort of public sector investment to undertake. There

³Weingrod (1977, p. 42) argues that “Patrons are powerful since they can tap and distribute tangibles -government contracts, jobs loans and the like - and it is through the shrewd investment of these resources that they build and maintain their personal clientele.”

⁴See Persson and Tabellini, 2000 Chapter 13 for political economy models where politicians represent groups - ‘partisan politics’.

are two sorts of projects, one which raises the incomes of the incumbent's group and one which raises the incomes of the other group, and both types of project may be either socially efficient or white elephants. Investment projects started initially can be completed to abandoned after the election. In addition both politicians can make promises of taxes and transfers in order to win the election.

Consider first the incentives of politicians to tax and transfer. Since we assume that, despite their welfare functions, politicians always value their own consumption higher than that of their group, there is never an incentive to make transfers or lower taxes below the maximum feasible (determined by an informal sector) unless this can influence the outcome of the election. However, since we assume that there is no commitment, it is not credible for politicians to offer any transfers at all, or promise a reduced tax burden.

The situation with investment projects for the incumbent is different. He can build projects favoring his clients, or the clients of the challenger. These projects can be efficient or inefficient. In our model a project which generates negative profits is socially inefficient. Though this is not always true (particularly when there are externalities etc.) it seems a natural assumption to make and certainly interpretations of the evidence tend to associate negative profits with inefficiency. Consider the political cost benefit calculation of an efficient project which raises the income of the incumbent's group. This can be begun before the election and completed afterwards if the incumbent wins and has the benefit of generating positive revenues that the incumbent values. However, these revenues are also valued by the challenging politician who will thus also find it attractive to complete the project should he win the election. The fact that an efficient project will be completed by all politician implies that it does not increase the incentive of individuals to support the incumbent.

Consider then a white elephant. We demonstrate that such projects can be built by the incumbent because they favor members of its own group and they will be completed by the incumbent but not by the competing politician. They therefore generate large incentives to vote for the incumbent. We show not only that white elephants can be rational to build but that they can even be preferred to efficient projects. An incumbent trades off the electoral

benefits from white elephants against the expected revenues that would arise from an efficient project.

Our paper is most closely related to Robinson and Verdier (2002) who argue that public sector employment is a credible way of transferring rents to political supporters. Finally it is important to note that inefficient spending in our model does not result from a common pool problem as in e.g. Persson and Tabellini (1994b) or soft budget constraints as in e.g. Qian and Roland (1998). In our model the decision maker faces the full costs of his own spending and budget constraints are hard. Finally, our model is closely related to models where the incumbent chooses policy to bind the hands of his successor, as in the models of public debt by Alesina and Tabellini (1990) and Persson and Svensson (1989). As in these papers we study a dynamic model with partisan politicians. In addition however we study another problem, a main difference from these papers is that in our model the incumbent chooses policy to tie his own rather than his successors' hands.

2 A Simple Model

Our model is based on a simple version of probabilistic voting. We consider a society with two regional parties or politicians, labeled A, B . There are two groups of voters also labeled A, B . Voters with the same label as a politician belong to that politicians' group (party, clan, ethnic group etc.). Each politician cares about own utility and about the political outcome for agents in his region. The total mass of voters is normalized to unity, and each group A, B is of equal size $\frac{1}{2}$. The per period utility U_t^i of politician $i = A, B$ is given by

$$U_t^i = X_t^i + \frac{1}{2}\alpha Y_t^i \tag{1}$$

for $t = 1, 2$. Here X_t^i denotes the income of politician i in period t , Y_t^i income of each member in group i ($\frac{1}{2}$ being the number of members in group i), and α how the outcome for his own group is valued. We assume that a politician cares more about own income than the income of others in his group so $\alpha < 1$. The incumbent politician chooses policy before the election and the politician who receives most of the votes chooses policy after the election.

Per period income Y_t^i for each voter in group $i = A, B$ is given by

$$Y_t^i = W_t^i + \pi_t^i + T_t^i - \tau_t^i \quad (2)$$

Here W_t^i denotes wage income for each agent in group i , π_t^i profit income for each agent in group i , T_t^i transfers to each agent in group i , and τ_t^i taxes from each agent in group i .

Agents are endowed with one unit of labor that they supply in the market. Denoting L_t^i the number of private sector employees in region i , the wage in location i is equal to marginal productivity $M(L_t^i)$, with $M'(L_t^i) < 0$. Profits in location i are given by $\int_0^{L_t^i} M(L_t) dL - W_t^i L_t^i$. All agents of type i receive an equal share of the profits in region i . Agents can hide all income from taxation in the informal sector at cost δ . Thus the maximum tax that can be collected from each agent is δ , which due to the unit mass of agents is also the maximum possible tax income for a politician. Agents may migrate between regions at cost m .

There are two public projects (factories, parastatals etc.) that are labeled project A and B , respectively. In the first period the incumbent decides on whether to invest in the projects. In case he invest in project i this requires a fraction γ of the voters in region i as employees in the first period. The investment cost is thus $\frac{1}{2}\gamma W_1^i$. If the investment is undertaken in the first period, the project can be operated in the second period, while if the investment is not undertaken in the first period, the project cannot be operated in the second period. Given that the investment is undertaken, the politician in power decides whether or not to operate the project in the second period. In case he operates the project he maintains the workforce from the first period, while he fires them if the project is not operated. The second period gross income of a project is S , and second period profits from project i is thus given by $P^i = S - \frac{1}{2}\gamma W_2^i$.

If a public investment is made in the first period (or a project is operated in the second period) the wage income in that region increases while the profit income decreases. The total increase in the wage income is given by $\frac{1}{2}[M(\frac{1}{2}(1-\gamma)) - M(\frac{1}{2})]$ while the decrease in profit income is given by $\int_0^{\frac{1}{2}} M(L) dL - \frac{1}{2}M(\frac{1}{2}) - \int_0^{\frac{1}{2}(1-\gamma)} M(L) dL + \frac{1}{2}(1-\gamma)M(\frac{1}{2}(1-\gamma))$. The net increase in income in a region if an investment is undertaken (or a project is

operated) is thus $\frac{1}{2}\gamma M(\frac{1}{2}(1-\gamma)) - \int_{\frac{1}{2}(1-\gamma)}^{\frac{1}{2}} M(L)dL$ which is always positive since $M'(L) < 0$. Assume for simplicity that the marginal productivity of labor is linear, $b - cL^i$. Then the equilibrium wage without investment is (dropping time subscripts) $W^i = b - \frac{1}{2}c$ which we assume is positive; $\frac{b}{c} > \frac{1}{2}$, while the equilibrium wage with investment is $W^i = b - \frac{1}{2}(1-\gamma)c$.⁵ The total increase in private income in a region with investment in (or operation of) a public project is $\frac{1}{8}c\gamma^2$, or in per capita terms $\frac{1}{4}c\gamma^2$. We assume that the cost of migration $m > c\gamma$ so that no migration will take place in any equilibrium (the maximum possible wage differential between regions is $\frac{1}{2}c\gamma$ in each period, and there are two periods).

The incumbent, which we from now allow to be politician A faces the problem of initially choosing transfers and taxes, and whether to launch public investment projects in the first period. He also makes promises of taxes and transfers in order to win the election and if re-elected decides whether to operate already invested projects in the second period. Rents in terms of income from being in office equals R in each period. Letting Π denote the reelection probability (yet to be determined), and letting F^i be a variable that takes value $\frac{1}{2}\gamma W^i$ if the incumbent decides to invest in project i and zero otherwise, the incumbent faces the problem of

$$\max_{\tau_1^i, \tau_2^i, T_1^i, T_2^i, P^i, F^i} \left[\begin{array}{l} R + \sum_i (\tau_1^i - T_1^i - F^i) + \alpha \frac{1}{2} Y_1^i \\ + \Pi [R + \sum_i (P^i + \tau_2^i - T_2^i)] + \alpha \frac{1}{2} Y_2^i \end{array} \right], i = A, B \quad (3)$$

subject to (2) and the labor market equilibrium conditions. Politician B announces a policy which he promises to implement in case he wins the election.

Voters in the two groups have the same preferences. Post election income may depend on who wins the election. D^j denotes the difference in post election income for agent j if politician A instead of politician B wins the election. Each voter j has an ideological bias σ^j toward the incumbent politician A and there is also an aggregate preference shock θ . Voter j supports the incumbent if

$$D^j + \sigma^j + \theta > 0 \quad (4)$$

⁵We choose linear marginal productivity to yield simple solutions. In cases where results or mechanisms depend on the marginal productivity of labor being linear, we comment on that.

Alternatively

$$\sigma^j > -\theta - D^j \quad (5)$$

We assume that σ^j is uniformly distributed on the interval $[-\frac{1}{2s}, \frac{1}{2s}]$ with density $s > 0$, and that θ is uniformly distributed at the interval $[-\frac{1}{2h}, \frac{1}{2h}]$ with density $h > 0$.

2.1 Policies

Voters realize that for policies to be implemented they have to be ex post optimal for the chosen politician. Politicians cannot credibly commit to policies which are not in their own interest. To solve the model we thus apply backward induction. The politician who wins the election decides taxes, transfers and whether to operate eventual public projects.

As the chosen politician values own income higher than the income of others, he will impose the revenue maximizing tax $\tau_2^i = \delta$ on all agents and he will give no direct income transfers, $T_2^i = 0$, $i = A, B$. To save notation we set $\delta = 0$ in the remainder as this will not affect any of the mechanisms in the model. Promises of taxes or income transfers different from zero are not credible to any group, and the voters realize this.

It follows from above that the operation of either public project gives the politician in power in the second period the same profit, thus $P^A = P^B = P$. First consider project A in the second period. If invested before the election politician A operates the project in case he wins the election if his net gain in utility by doing so, $P + \alpha\frac{1}{8}c\gamma^2$, is positive. He thus operates the project if

$$P \geq -\alpha\frac{1}{8}c\gamma^2 \quad (6)$$

Politician B operates project A if

$$P \geq 0 \quad (7)$$

Similarly, politician A operates project B if $P \geq 0$, and politician B operates project B if $P \geq -\alpha\frac{1}{8}c\gamma^2$. Before the election the incumbent A optimally sets taxes and transfers equal to zero, and decides whether or not to invest in the projects.

It is useful to distinguish between two types of projects:

- The ex-post profit making projects; $P \geq 0$.
- The ex-post loss making projects; $P < 0$.

Note that among the ex-post profit making projects there are also projects that are loss making when viewed from the first period as the investment cost is sunk in the second period. Ex-post profit and loss making thus refer to whether the projects can cover the variable costs if operated. Note furthermore that an ex-post loss making project is always inefficient from the point of view of society. The cost of the project is the decrease in production because of decreased private employment in each period, which total $\gamma(b - \frac{1}{2}c + \frac{1}{4}c\gamma)$ for the two periods. The benefit of the project is $S = P + \frac{1}{2}\gamma W^A = P + \frac{1}{2}\gamma(b - \frac{1}{2}(1 - \gamma)c)$. The gain from the project from the view of the society is thus $P - \frac{1}{2}\gamma(b - \frac{1}{2}c)$ which is clearly negative when $P < 0$.⁶

Consider first project A in case this is ex-post profit making. It follows from (6) and (7) that both politicians will operate the project in the second period if the investment in the first period has been made. When the project is ex-post profit making post-election income for agents is independent of which politician that wins the election. This leads to the following proposition:

Proposition 1 *When project A is ex-post profit making, i) it can never be used to affect the election outcome and ii) it is launched and completed if $P > b\gamma - \frac{1}{2}c\gamma(1 - \gamma(1 - \frac{\alpha}{2}))$, i.e. if it is sufficiently efficient.*

⁶The result that the net gain for society is negative when ex-post profits are negative need not hold under all specifications of the marginal product of labor. In general there is one effect pulling in the direction that projects may have a positive rate of return for society even when ex-post profits are negative. Profits are valued at the wage which is again equal to the marginal productivity of the last employee that is transferred from the private to the public sector, while the cost for society is the average and not the marginal productivity of the labor transferred. Thus, there may exist cases where projects with ex-post negative profits are good for society. This occurs when the difference between the marginal and average productivity of the labor transferred is so large that this effect outweighs not only the negative ex-post profit but also the investment cost of the project in the first period. The linearity in the marginal product of labor rules out this possibility. In the remainder we assume that negative ex-post profits are sufficient to make projects inefficient from the point of view of the society.

Proof. Post-election income of all agents is independent of the election outcome both in the case where the investment in the project is undertaken before the election and in the case where it is not undertaken, i.e. $D^j = 0$ for all agents. By standard techniques the share of voters that vote for the incumbent from group A is given by $\frac{1}{2} + s\theta$ so that the number of group A voters that supports A , N_A , is given by

$$N_A = \frac{1}{2} \left(\frac{1}{2} + s\theta \right). \quad (8)$$

The number of group B voters that support politician A is given by

$$N_B = \frac{1}{2} \left(\frac{1}{2} + s\theta \right). \quad (9)$$

The probability that the incumbent wins the election, $\Pi = \Pr \{N_A + N_B \geq \frac{1}{2}\}$, is then found as $\frac{1}{2}$, which proves part i).

As the probability of re-election is $\frac{1}{2}$ whether the investment is undertaken or not, politician A compares the expected utility of the project with the expected cost. In case the investment is undertaken he gets the profit P with probability $\frac{1}{2}$ and agents A get an increase in income $\frac{1}{8}c\gamma^2$ with probability unity, which the politician values at α . The investment cost is $\frac{1}{2}\gamma(b - \frac{1}{2}(1 - \gamma)c)$. The condition in the proposition then follows. ■

Note that by the investment rule an ex-post profit making project with a positive social return may not be undertaken. The gain for the society from a project is $P - \frac{1}{2}\gamma(b - \frac{1}{2}c)$, while the gain for the politician is $\frac{1}{2}P + \alpha\frac{1}{8}c\gamma^2 - \frac{1}{2}\gamma(b - \frac{1}{2}(1 - \gamma)c) = \frac{1}{2}P - \frac{1}{2}\gamma(b - \frac{1}{2}c + \frac{1}{2}c\gamma(1 - \frac{\alpha}{2})) < P - \frac{1}{2}\gamma(b - \frac{1}{2}c)$ (when $P \geq 0$). There are three reasons for the political evaluation of a project to differ from the evaluation that is optimal for society. First, politicians value the expected increase profits rather than the actual increase. Second, they value the increase in income of agents in their group by less than the actual increase in utility. Third, they value the cost in terms of wages by more than the cost for society, since they value the cost at the marginal cost of the last employee withdrawn from the private sector, while the cost for society is the average productivity of the labor transferred from private to public employment. In the model with linear marginal productivity the two first effects dominate the third, which is the reason politicians may not invest even if a project has a positive social return.

Consider next project A in case this is ex-post loss making. We then have the following:

Proposition 2 *When project A is ex-post loss making (and thus inefficient) it can be used by the incumbent to increase his reelection probability provided $P \geq -\alpha\frac{1}{8}c\gamma^2$.*

Proof. When $0 > P \geq -\alpha\frac{1}{8}c\gamma^2$ it follows from (6) and (7) that politician A will operate the project in case elected while politician B will not. Politician A may then credibly promise to group A voters that their income will be higher in case he rather than politician B wins the election. The difference D between income when the incumbent A wins compared to when the opposition B wins is given by $D = \frac{1}{4}c\gamma^2$ for group A agents (and zero for group B agents). By standard calculations on the probabilistic voting model we find the reelection probability in this case as

$$\Pi = \frac{1}{2} + h\frac{1}{8}c\gamma^2 > \frac{1}{2} \quad (10)$$

■

Assume project A has $0 > P \geq -\alpha\frac{1}{8}c\gamma^2$ and consider the alternative of investing in the project versus not investing in the project. The expected net gain by investing compared to not investing is found by (3) and (10) as $h\frac{1}{8}c\gamma^2 R - \frac{1}{2}\gamma[b - \frac{1}{2}(1 - \gamma)c] + (\frac{1}{2} + h\frac{1}{8}c\gamma^2)(P + \alpha\frac{1}{8}c\gamma^2)$. The optimal strategy for the incumbent now satisfies:

Proposition 3 *When project A is ex-post loss making but has $P \geq -\alpha\frac{1}{8}c\gamma^2$ it will always be undertaken so as to increase the re-election probability of the incumbent provided the rents from of being in office R are sufficiently high.*

Proof. It follows from above that the strategy of biasing the election with the public project will dominate not launching the project when $R > \frac{4[b - \frac{1}{2}(1 - \gamma)c]}{hc\gamma} - (1 + \frac{4}{hc\gamma^2})(P + \alpha\frac{1}{8}c\gamma^2)$. ■

The higher the rents from being in office, the more likely is it that loss-making public projects are undertaken. Public projects, even if highly inefficient, may be an efficient political strategy to secure rents from being in office. The reason for this is that promises to use other more efficient forms

of redistribution such as taxes or transfers are not credible. Inefficient public investment projects, on the other hand, allow the incumbent to credibly commit before the election to transfer rents to his ‘clienteles’ after the election, given that he remains in office. The opposition politician does not have the possibility of credibly promising the same income to group A agents in case he wins the election. The incumbent is thus able to tie the continuation utility of some voters to his own political success.

The model thus provides an explanation why politicians in countries with large oil rents launched so many inefficient investment projects. The higher the rents from holding office, the more economically inefficient investment projects can be and still be politically efficient.

Can loss-making projects crowd out profit-making ones? Consider now the case where we have two competing public projects; a highly efficient project with ex-post profit $P^E > b\gamma - \frac{1}{2}c\gamma(1 - \gamma(1 - \frac{\alpha}{2}))$ and a highly inefficient project with negative ex-post profit and $P^I + \alpha\frac{1}{8}c\gamma^2 > 0$. Furthermore assume that the condition in the proof of Proposition 3 holds. Now the first project is feasible for the politician to undertake because it is expected to yield a gain in utility without affecting the re-election probability, while the second project is feasible for the politician to undertake to tilt the election outcome. We then have

Proposition 4 *When $R > \frac{4(P^E - P^I)}{hc\gamma^2} + \frac{\alpha}{2h} - P^I - \alpha\frac{1}{8}c\gamma^2$ it is politically more efficient to undertake the economically inefficient than the economically efficient public project.*

Proof. The proposition follows by comparing the expected utility of the incumbent of launching the loss-making project $h\frac{1}{8}c\gamma^2R - \frac{1}{2}\gamma[b - \frac{1}{2}(1 - \gamma)c] + (\frac{1}{2} + h\frac{1}{8}c\gamma^2)(P^I + \alpha\frac{1}{8}c\gamma^2)$ with the expected utility of launching the profit-making project $\frac{1}{2}P^E + \alpha\frac{1}{8}c\gamma^2 - \frac{1}{2}\gamma[b - \frac{1}{2}(1 - \gamma)c]$. ■

For the incumbent, the advantage of launching the highly inefficient public project compared to the highly efficient one is that the former increases his probability of re-election. If the rents by holding office are sufficiently high the economically inefficient project will therefore be the most politically efficient one. The politician ends up picking losers rather than winners.

Also note that the higher is h , the more likely is it that the loss-making investment project is the dominant political strategy. The more voters care

about economy relative to other factors, the more the incumbent can tilt the reelection probability by committing to a loss-making investment project. Thus, in this model, unlike many other models of electoral competition (see e.g. Persson and Tabellini 2000), when voters care much about economy, the economic outcome may actually be worse.

The same exercise as with project A can also be undertaken with project B . The important difference is, however, that when the incumbent operates the project in case he wins the election, politician B will also operate the project. Thus it is never possible for the incumbent to credibly promise group B voters higher income in case he rather than the opposition wins the election. As a consequence, only projects of type B that fulfill the condition in Proposition 1 is undertaken.

3 Concluding remarks

A central puzzle in the political economy of development is why investment is inefficiently allocated. In many cases this question is far more important than why there is underinvestment. Killick (1978, p. 207) despairingly concludes in the Ghanaian case that “much of the ‘investment’ in the first half of the sixties was actually a form of consumption yielding few, if any, returns in the longer run. The larger volume of ‘investment’..could not compensate for the low-productivity uses to which it was put.” The evidence suggests that this misallocation takes place even when its’ implications are understood. Thus it is not due to incompetence. Indeed, developing economies such as Zambia and Ghana had teams of economic advisers who undertook cost benefit analyses.

In this paper we have argued that the construction of white elephants should be seen as redistribution aimed at influencing the outcomes of elections. The political motivation behind white elephants is clearly recognized in the political science and development literatures, with Herbst (1989, p. 81) noting that “The Main reason why it is so difficult to reform, much less privatize, Africa public sector enterprises is because the central regime does not believe it is in its own political interests to reduce their size and scope....parastatals have traditionally been used as a way to distribute pa-

tronage.” Yet this literature has not been able to explain why redistribution should take place in such an inefficient form.

Our theory suggests that the reason why redistribution takes the form of socially inefficient projects is that only some politicians can commit to build such projects. All politicians value the revenues that efficient projects tend to generate and thus all politicians can credibly promise to maintain such projects. However, when politicians represent groups, a particular politician who values the welfare of the beneficiaries of a loss making project may find it optimal to keep operating it when a politician from a different group, who only values the revenues, cannot. In this case such loss making projects can be politically attractive because they affect voting behavior. There is then a trade-off between efficient projects which generate revenues and inefficient ones which influence political outcomes. In this trade-off inefficient projects can be more attractive, particularly when the value of being in power is large.

Killick asks of the Nkrumah government (1978, p. 208), “By what tortured logic did it continue to starve existing industries of materials and spares in order to import the capital equipment needed to create yet more industries?” In this paper we hope to have at least partially elucidated what we feel to be this ‘tortured logic.’

4 References

Acemoglu, Daron and James A. Robinson (2002) “Economic Backwardness in Political Perspective,” NBER Working Paper #8831.

Alesina, Alberto (1988) “Credibility and Policy Convergence in a Two-Party System with Rational Voters,” *American Economic Review*, 78, 796-805.

Alesina, Alberto and Guido Tabellini (1990) “A Positive Theory of Fiscal Deficits and Government Debt,” *Review of Economic Studies*, 57, 403-414.

Alesina, Alberto and Dani Rodrik (1994) “Distributive Politics and Economic Growth,” *Quarterly Journal of Economics*, 109, 465-490.

Auty, Richard M. (2001) *Resource Abundance and Economic Development*, Oxford; Oxford University Press.

Bates, Robert H. (1981) *Markets and States in Tropical Africa*, Berkeley; University of California Press.

Besley, Timothy and Stephen Coate (1997) “An Economic Model of Representative Democracy,” *Quarterly Journal of Economics*, 85-114.

Besley, Timothy and Stephen Coate (1998) “Sources of Inefficiency in a Representative Democracy: A Dynamic Analysis,” *American Economic Review*, 88, 139-156.

Coate, Stephen and Stephen Morris (1995) “On the Form of Transfers to Special Interests,” *Journal of Political Economy*, 103, 1210-1235.

de Soto, Hernando (1989) *The Other Path*; New York; Harper and Row.

Djankov, Simeon, Rafael LaPorta, Florencio Lopez-de-Silanes, Andrei Shleifer (2002) “The Regulation of Entry,” *Quarterly Journal of Economics*, 117, 1-37.

Eisenstadt, Shmuel and Luis Roniger (1984) *Patrons, Clients and Friends*, New York; Cambridge University Press.

Gavin, Michael (1993) “Adjusting to a Terms of trade Shock: Nigeria, 1972-88,” in Rudiger Dornbusch ed. *Policymaking in the Open Economy*, Oxford; Oxford University Press.

Gelb, Alan (1988) *Oil Windfalls: Blessing or Curse?* New York; Oxford University Press.

Gylfason, Thorvaldur (2001) “Natural resources, education, and economic development,” *European Economic Review*, 45, 847-859.

Hall, Robert E. and Charles I. Jones (1999) “Why Do Some Countries Produce so much More Output Per-Worker than Others?” *Quarterly Journal of Economics*, 114, 83-116.

Herbst, Jeffrey I. (1989) “Political Impediments to Economic Rationality: Explaining Zimbabwe’s Failure to Reform its Public Sector,” *The Journal of Modern African Studies*, 27, p. 67-84.

Killick, Tony (1978) *Development Economic in Action; A Study of Economic Policies in Ghana*, London; Heinemann.

Lizzeri, Alessandro and Nicola Persico (2001) “The Provision of Public Goods under Alternative Electoral Incentives,” *American Economic Review*, 91, 225-245.

Qian, Yingyi and Gerard Roland (1999) “Federalism and the Soft Budget Constraint,” *American Economic Review*, 88, 1143-1162.

Omaboe, E.N. (1966) “...” in Walter Birmingham, I. Neustadt and E.N. Omaboe eds. *A Study of Contemporary Ghana: Volume I The Economy of Ghana*, London; Allen and Unwin.

Persson, Torsten and Lars Svensson (1989) “Why a Stubborn Conservative would Run a Deficit: Policy with Time-inconsistency Preferences” *Quarterly Journal of Economics*, 104, 325-345.

Persson, Torsten and Guido Tabellini (1994a) “Is Inequality Harmful to Growth?” *American Economic Review*, 38, 765-773.

Persson, Torsten and Guido Tabellini (1994b) “Does Centralization Increase the Size of Government?” *European Economic Review*, 84, 600-621.

Persson, Torsten and Guido Tabellini (2000) *Political Economics: Explaining Economic Policy*, Cambridge MA; MIT Press.

Piattoni, Simona (2001) “Clientelism in Historical and Comparative Perspectives,” in Simona Piattoni ed. *Clientelism, Interests and Democratic Representation*, New York; Cambridge University Press.

Rimmer, Douglas (1969) “The Abstraction from Politics,” *Journal of Development Studies*, 5, 190-204.

Robinson, James A. and Thierry Verdier (2002) “The Political Economy of Clientelism,” CEPR Discussion Paper no. 3205.

Sachs, Jeffery D. and Andrew Warner (1995) “Natural Resource Abundance and Economic Growth,” Harvard Institute for International Development, Development Discussion Paper no. 517.

Tangri, Roger (1999) *The Politics of Patronage in Africa*; Oxford, James Currey.

Weingrod, Alex (1977) “Patronage and Power,” in Ernest Gellner and John Waterbury eds. *Patrons and Clients in Mediterranean Societies*, Duckworth & Co., London UK.