WPS5884

Policy Research Working Paper 5884

Avoiding the Fragility Trap in Africa

Noro Aina Andrimihaja
Matthias Cinyabuguma
Shantayanan Devarajan

The World Bank
Africa Region
Chief Economist's Office
November 2011

Policy Research Working Paper 5884

Abstract

Not only do Africa's fragile states grow more slowly than non-fragile states, but they seem to be caught in a "fragility trap". For instance, the probability that a fragile state in 2001 was still fragile in 2009 was 0.95. This paper presents an economic model where three features—political instability and violence, insecure property rights and unenforceable contracts, and corruption—conspire to create a slow-growth-poor-governance equilibrium trap into which these fragile states can fall. The analysis shows that, by addressing the three problems, fragile countries can emerge from the fragility trap and enjoy a level of sustained economic growth. But addressing these issues requires resources, which are scarce because external aid is often tailored to the country's performance and cut back when there is instability, insecurity, and corruption. The implication is that, even if aid is seemingly unproductive in these weak-governance environments, it could be hugely beneficial if it is invested in such a way that it helps these countries tackle the root causes of instability, insecurity, and corruption. Empirical estimations corroborate the postulated relationships of the model, supporting the notion that it is possible for African fragile countries to avoid the fragility trap.

This paper is a product of the Chief Economist's Office, Africa Region. It is part of a larger effort by the World Bank to provide open access to its research and make a contribution to development policy discussions around the world. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The authors may be contacted at nandriamihaja@worldbank.org, matthias@umbc.edu, sdevarajan@worldbank.org.

Avoiding the Fragility Trap in Africa

Noro Aina Andrimihaja, Matthias Cinyabuguma, Shantayanan Devarajan*

JEL classification numbers: P36, O55, O43, O11

Keywords: Fragility, Traps, Sub-Saharan Africa, Economic growth.

---

*Noro Aina Andrimihaja is an Economist in the World Bank's Africa Region; Matthias Cinyabuguma is an Assistant Professor of Economics at the University of Maryland-BC; and Shantayanan Devarajan is the Chief Economist of the World Bank's Africa Region. We thank Habib Fetini, Ian Bannon, Eric Bell, Bernard Harborne, Haleh Bridi, Sauraubh Shome, Punam Chuhan-Pole, and Gary Milante for helpful comments on an earlier draft. We also thank the Diagnostic Facility for Sustainable Growth for financial support. Corresponding authors: nandriamihaja@worldbank.org, Matthias@umbc.edu, and Sdevarajan@worldbank.org.

1 Introduction

Twenty-two of Sub-Saharan Africa's 48 countries are classified by the World Bank as "fragile and conflict-affected states", countries where policies and institutions—or governance, broadly defined—are so weak that the state's ability to guarantee security to its citizens and deliver basic public services is severely limited.[1] More disturbing than the large number of these states is the fact that, since the late 1990s, their performance has been lagging behind that of non-fragile states, with the gap widening over time (*Figure* 1). Furthermore, fragility seems to be persistent: the probability that an African fragile state in 2001 remained fragile in 2009 was 0.95. Globally speaking, 35 countries defined by the World Bank as fragile in 1979 were still fragile in 2009 (European Report on Development, 2009).

In this paper, we build on these observations to show that, because of their weak policies and institutions, some of these countries could be caught in a low-growth-poor-governance equilibrium trap, while others risk falling into the trap with a small shortfall in resources. We develop an analytical model where weak governance is reflected in three economic features: (*i*) instability and violence destroy part of the country's capital stock; (*ii*) insecurity of property rights and unenforceable contracts undermine the productivity of labor; and (*iii*) corruption and other forms of capture limit government tax revenues. These features, combined with a minimum level of consumption below which people would starve, result in an economy that can collapse or is at risk of collapsing into a low-investment, slow-growth equilibrium. If however the economy has access to sufficient resources that can be spent on addressing the three problems mentioned above, it will emerge from the trap—or avoid falling into one–and enjoy sustained growth. Empirical estimates corroborate the main relationships of the model. In particular, we find that aid to fragile states is more productive than aid in general. In short, this fragility trap is not just a theoretical construct but could be a feature of the real world.

The results of this paper have important implications for aid policy towards fragile states. For the same features that contribute to the existence of fragility trap—instability, insecurity of contracts and corruption—also lead donors to cut back aid to these countries, fearing that it will be "wasted." The analysis in this paper shows that, if the aid can be channeled to addressing these problems of the economy, it could help these countries avoid the fragility trap, in which case the external resources would have been extremely productive.

[1] The technical criterion is that the state's Country Policy and Institutional Assessment, the World Bank's rating of policies and institutions in 16 areas, has an overall score of 3.2 or below on a scale of 1-6 (World Bank, 2002).

The plan of the paper is as follows: for the rest of this introduction, we briefly survey the economic literature that motivated our model. In section 2, we present the analytical model and its main results. Section 3 presents the preliminary empirical estimates of the model. Section 4 concludes

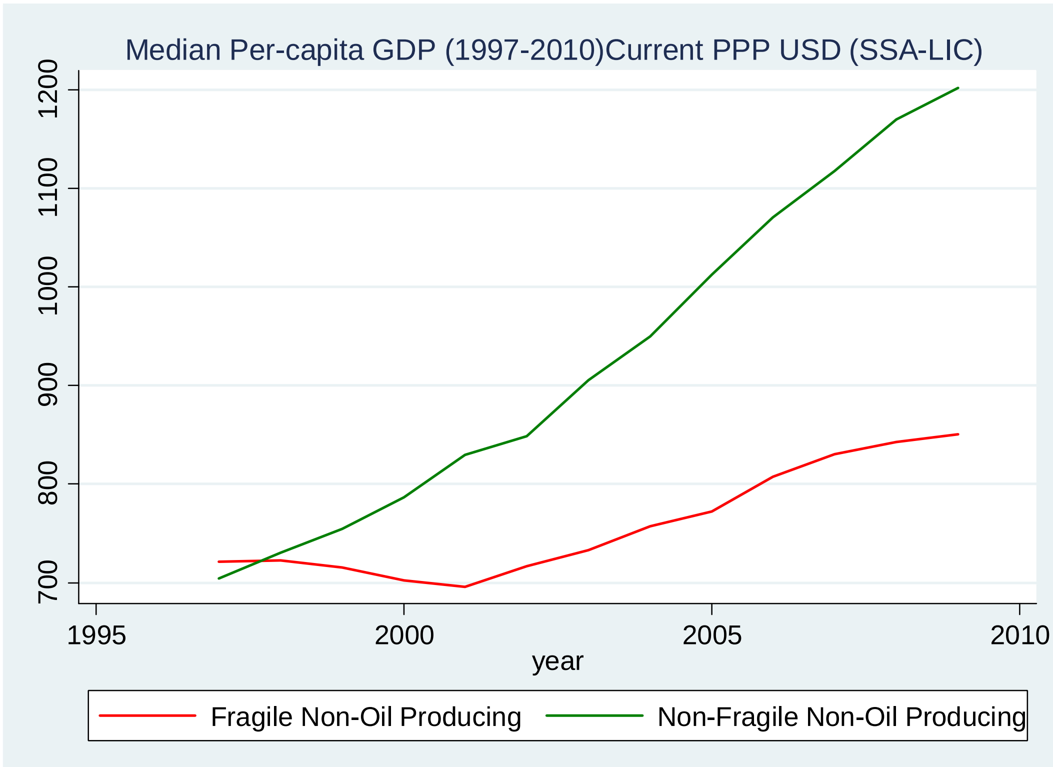

Figure 1: Median per capita GDP (1997-2010)

Each of the three features of our model—political instability and violence, insecure property rights and unenforceable contracts, and corruption—has been analyzed in previous papers. However, we are not aware of any formal model that combines all three features. For instance, there is a large literature on the effects of political instability and violence on economic development (Barro, 1991; Alesina and Perotti, 1996; Alesina, Ozler, Roubini and Swagel, 1996; Zack, 2000), and on private investment (Svensson, 1999; Alesina and Perotti, 1996; Campos and Nugent, 2002). Likewise, Barro (1990), Barro and Sala-i-Martin (1992), Benhabib et al. (2001) have emphasized the role of public goods (including property rights) in economic growth, while Macit (2011) focuses directly on institutions such as employment protection legislation in driving labor productivity growth. And Feng, Kugler and Zak (2000), among others, have emphasized how a falling tax base (often due to high levels of corruption) undermines government's ability to implement policies of any type, including some of the basic functions of the state, such as security

(USAID, 2005).

This paper also builds upon a large literature on poverty traps in general, and fragility traps in particular. The theoretical foundations of such traps were laid out by Azariadis (1997), and Lopez and Serven (2009) provide some recent empirical tests. Stewart and Brown (2009) portray fragile countries as countries characterized by dysfunctional institutions and conflict situations. Sachs (2007) introduced the idea that, because some developing countries are caught in a poverty trap, they will need significant amounts of aid to emerge. Collier (2007) broadened the concept to include the "conflict trap", a notion that Zoellick (2008) linked back to the original poverty trap in a way that comes closer to what we develop here.

Finally, the idea that the widely-used performance-based allocation (PBA) method for aid may not be appropriate for fragile states has been raised by Guillaumont et al. (2010), who argue that "vulnerability" should be a criterion. Barungi and Davies (2010) suggest that the PBA formula does not take into account the special features of fragile states. For example, a 2005 study by the World Bank concluded that fragile states "received 40 percent less aid than their policy and institutional performance and poverty would predict."

2 The basic structure of the model

This paper presents a formal equilibrium model in which political instability, insecure property rights, and corruption interact with minimum level of consumption to explain why Africa's fragile states are caught in a low-level equilibrium trap. We start with a general equilibrium model in which three types of agents interact, namely: households, firms and the government. Population is exogenous, and development, which is endogenously determined, depends on institutional and political factors, and government policies. We consider an economy with a large number of individuals who live three periods in overlapping generations. At each point in time, children, young adults and older adults are alive. For simplicity we posit individuals within a generation (t) to be identical. In each period (t) the economy produces a single good that can be used for consumption or investment in physical capital, K_t.

Agents maximize lifetime utility during the two periods of adulthood, subject to a budget constraint in each period. During young adulthood, individuals work for firms, pay a proportion of their labor income $\tau_t \in (0, 1)$ to the government as taxes, and use the remaining income to fund their own and their children's consumption, and savings for retirement. Households do not work during their retirement and consume the principal and interest on their savings. In addition to choosing consumption in young adulthood therefore, households choose their consumption in old age. Output is produced with a Cobb Douglas technology in which both institutional factors and political instability are accounted for.

Every government has at its goal political stability, economic growth, and the provision of basic services to its citizens (McGuire and Olson, 1996). We refer to economic growth as a natural goal because it helps raise individuals' income while sustaining government by increasing tax revenues and its ability to implement new policies. Policies are chosen to contribute directly to production and to raise government resources. We define and refer to political instability, λ_t, as the proportion of an economy's physical capital destroyed in violence or civil wars. While political instability is endogenous, we do not model the incentives for instability.[2]

2.1 Preferences

All agents have identical logarithmic and temporally separable preferences. Agents maximize lifetime utility. The utility maximization problem for an individual born at $(t-1)$ can be written as follows:

$$Max_{[c_t;\ c_{t+1}]} \ln(c_t - \overline{c}) + \gamma \ln c_{t+1} \tag{2.1.1}$$

$$\begin{aligned} & s.t. \\ & \quad s_t = w_t(1-\tau_t) - c_t \\ & \quad c_{t+1} = R_{t+1} s_t \\ & \quad c_t > \overline{c};\ \ c_{t+1} > 0, \end{aligned} \tag{2.1.2}$$

where $\gamma \in (0,1)$ denotes preferences for consuming when middle-aged versus old-aged, c_t is first-period consumption, and $\overline{c}$ reflects a minimum consumption requirement in the first period; c_{t+1} indicates consumption in the second period.

The first equation in (2.1.2) is the budget constraint in youth; it equates savings, s_t, to after-tax labor income $w_t(1-\tau_t)$, after c_t have been spent for first period consumption. The second equation in (2.1.2) is the budget constraint faced by a retiree; it shows that old-age consumption, c_{t+1}, is funded by savings from the young adult, plus any accrued interests, $R_{t+1}s_t$. Individuals take political instability and violence, λ_t, insecure property rights and unenforceable contracts, G_t, and the tax rate, τ_t, as given in dealing with the maximization problem in (2.1.1-2.1.2).

Combing 2.1.1 and 2.1.2, we write down the following unconstrained maximization:

$$Max_{\ c_t} \ln(c_t - \overline{c}) + \gamma \ln R_{t+1} \left[w_t(1-\tau_t) - c_t \right].$$

[2] See Easterly and levine (1997) for recent discussions on political instability.

For a sufficiently large value of labor income, i.e., $I_t > \bar{c}$, and as a result of log preferences, the model in (2.1.1-2.1.2) produces a unique and strictly positive solution for both first-period consumption and savings, c_t^* and s_t^*, respectively. However, for a low level of labor income, i.e., $I_t \leqslant \bar{c}$, the model exhibits corner solutions for both consumption and savings:

$$c_t^* = \begin{cases} \dfrac{\gamma}{(1+\gamma)} \left(\dfrac{I_t}{\gamma} + \bar{c} \right) & if \quad I_t > \bar{c} \\ I_t & if \quad I_t \leqslant \bar{c} \end{cases}, \tag{2.1.3}$$

and

$$s_t^* = \begin{cases} \dfrac{\gamma}{(1+\gamma)} (I_t - \bar{c}) & if \quad I_t > \bar{c} \\ 0 & if \quad I_t \leqslant \bar{c} \end{cases}, \tag{2.1.4}$$

where $w_t(1-\tau_t) \equiv I_t$ is net income. For simplicity's sake we assume that the tax rate, τ_t, is determined by the government and depends on its ability to control corruption (see Besley and Persson, 2009; Acemoglu, 2005, for similar formulations where the government places an equilibrium constraint on taxation). However, due to corruption, taxpayers are forced to pay more than the required tax rate and the real fiscal revenue from taxes and other fines are correspondingly lower.

Equation (2.1.3) shows that an individual's optimal first-period consumption is positively related to after-tax labor income $w_t(1-\tau_t)$, negatively related to the tax rate, τ_t, and positively related to the minimum subsistence consumption, $\bar{c}$.

Equation (2.1.4) shows that optimal savings is a constant proportion of after-tax labor income, with this proportion increasing with the preference for old age consumption. Savings decrease with the tax rate. Further, as in Galor and Moav (2004), this saving function captures the Kaldorian-Keynesian saving behavior, i.e., the marginal propensity to save is an increasing function of wealth.[3]

2.2 Production technology and fragility

As discussed earlier, political instability $\lambda_t \in [0,1]$ is the proportion of physical capital stock that is destroyed during political conflicts, violence or war. If $\lambda_t = 1$, instability or violence is so high that the entire physical stock is destroyed, the state is not able to collect tax revenue

[3] Galor and Moav (2004) assert that long-run inequality, and hence poverty traps, could emerge because of differences in income.

and it fails (fragile state).[4] Firms produce output, Y_t, with a modified constant returns to scale Cobb-Douglas production function that takes into account the effects of instability and insecure property rights. In aggregate we derive the following production technology,

$$Y_t = (K_t (1 - \lambda_t))^{\alpha} [G_t L_t]^{1-\alpha}, \tag{2.2.1}$$

where $\alpha \in (0, 1)$ represents the marginal productivity parameter (capital share), G_t denotes the level of institutions (e.g., the degree of law and contract enforcement among private citizens) at time t. G_t is known at time t and depends on investment made by government at time $t-1$, *i.e.*, $\theta_{G,t-1}$, suggesting that a certain degree of state investment in political stability and absence of violence is necessary for private citizens to function productively. Improvement in G_t helps increase production (see Barro, 1990; Barro and Sala-i-Martin, 1992; Benhabib et al., 2001 for formulations of the role of public goods in economic growth). L_t is the number of working people; it grows at a constant rate n.

Equation (2.2.1) indicates that absence of stability in the form of civil wars affects production by reducing the stock of productive capital. Arguments in this area assert that lack of security imposes negative shocks on the economy and raises security costs and inefficiencies of physical capital. High costs on security, in turn, lead to misallocation of resources toward lower productive activities.[5]

Assuming perfect competition, a representative firm chooses physical capital per unit of labor, $k_t \equiv K_t/L_t$ to maximize its profits, that is

$$Max_{\ k_t} (y_t - r_t k_t), \tag{2.2.2}$$

where r_t is the interest rate (or cost of financing capital investment), and $y_t \equiv Y_t/L_t$ is the output per effective unit of labor. Substituting (2.2.1) in (2.2.2) and solving the above maximization problem produces the firm's demand functions for capital and labor.

Given these demand schedules made by firms and supply decisions made by consumers, the market clearing conditions in terms of wage (w_t) and return to savings ($R_t \equiv 1 + r_t - \delta$) are

[4] Absence of state authority in fragile countries create opportunities for rent-seekers to engage in violent activities such as criminality, conflict and terrorism. The resulting political environment makes lawful investment extremely risky, hence reduces productive capacities of the economy and shrinks government income.

[5] Another category of costs relates to increased uncertainty and its impact on consumer and investor's behavior. Increased uncertainty usually increases market volatility, thereby boosting risk premiums. This affects producers' and consumers' behaviors; it induces investors, for example, to move out of riskier assets (such as stocks) toward safer, more liquid, and shorter-term assets (such as cash). It, hence, adversely impacts commitments for long-term investments and purchases and increases demand for short-term liquidity, which, in turn, works to lower spending.

found. $\delta \in [0,1]$ is the rate of depreciation of physical capital. We assume complete depreciation, i.e., $\delta = 1$.

Following (2.2.1) and (2.2.2), factor prices w_t and r_t are marginal products of labor and capital, respectively; they are given as follows:

$$w_t = (1-\alpha)\left(K_t\left(1-\lambda_t\right)\right)^{\alpha} G_t^{1-\alpha} L_t^{-\alpha}, \tag{2.2.3}$$

$$r_t = \alpha\left(K_t\left(1-\lambda_t\right)\right)^{\alpha-1}\left(G_t L_t\right)^{1-\alpha}. \tag{2.2.4}$$

Note that $(\partial w_t/\partial\lambda_t) < 0, \partial R_t/\partial\lambda_t > 0$; $((\partial w_t/\partial G_t), \partial R_t/\partial G_t) > 0$. Political instability reduces the equilibrium wage; it increases the cost of financing capital investment. Improvement in G_t, however, raises both the wage and return to savings. Likewise, the enforcement of property rights provides great incentives for production as it raises both wage and interest rate.

Substituting (2.2.3) and (2.2.4) into (2.1.3) and (2.1.4) produces optimum levels for consumption and savings:

$$c_t^* = \begin{cases} \dfrac{\gamma}{(1+\gamma)}\left(\dfrac{1}{\gamma}(1-\alpha)(1-\tau_t)\left(k_t(1-\lambda_t)\right)^{\alpha} G_t^{1-\alpha} + \overline{c}\right) & if \quad k_t > \overline{k}_L \\ (1-\alpha)(1-\tau_t)\left(k_t(1-\lambda_t)\right)^{\alpha} G_t^{1-\alpha} & if \quad k_t \leqslant \overline{k}_L \end{cases}, \tag{2.2.5}$$

with $\partial c_t^*/\partial\lambda_t < 0$, $\partial c_t^*/\partial G_t > 0$, and $\partial c_t^*/\partial\tau_t < 0$, for all $k_t \geqslant 0$. Following (2.2.5), first-period consumption (c_t) depends negatively on λ_t & τ_t, and positively on G_t. Likewise, the optimal level of savings depends on λ_t, τ_t and G_t; it is given by:

$$s_t^* = \begin{cases} \dfrac{\gamma}{(1+\gamma)}\left[(1-\tau_t))(1-\alpha)\left(k_t(1-\lambda_t)\right)^{\alpha} G_t^{1-\alpha} - \overline{c}\right] & if \quad k_t > \overline{k}_L \\ 0 & if \quad k_t \leqslant \overline{k}_L \end{cases}, \tag{2.2.6}$$

with $\partial s_t^*/\partial\lambda_t < 0$, $\partial s_t^*/\partial G_t > 0$, and $\partial s_t^*/\partial\tau_t < 0$, for $k_t > \overline{k}_L$.[6] As for equation (2.2.5), the savings function is negatively related to both λ_t and τ_t. Campos and Nugent (2003) argue that political instability can delay investment, destroy the existing capital stock, resulting in harmful political uncertainty. In this case, political instability may harm an individual's prospects towards savings by destroying the stock of existing capital on which both wages and savings are based.

Following equation (2.2.6) and the fact that aggregate stock of physical capital is given by the following capital market equilibrium condition:

$$K_{t+1} = s_t L_t,$$

[6] $\overline{k}_L \equiv \left[\frac{\overline{c}}{(1-\alpha)(1-\tau_t)(1-\lambda_t)^{\alpha} G_t^{1-\alpha}}\right]^{1/\alpha}$. Details on how this condition was derived will be given later.

with $k_{t+1} = K_{t+1}/L_{t+1}$,

$$(2.2.7) \qquad k_{t+1} = \begin{cases} \dfrac{\gamma}{(1+\gamma)n}\left((1-\tau_t)(1-\alpha)\left[(k_t(1-\lambda_t))^{\alpha} G_t^{1-\alpha}\right] - \bar{c}\right) & if \quad k_t > \overline{k}_L \\ 0 & if \quad k_t \leqslant \overline{k}_L \end{cases},$$

where $(1-\alpha)\left[(k_t(1-\lambda_t))^{\alpha} G_t^{1-\alpha}\right] = (1-\alpha)y_t = w_t,\ k_t$ is physical capital per labor and $\overline{k}_L$ is the threshold level of capital per labor below which the economy falls into a fragility trap. Equation (2.2.7) is a standard stock accounting relationship for capital accumulation; it is represented in Figure 2. It defines the long-run steady state as a function of factors such as political instability and violence, insecure property rights and unenforceable contracts, and the tax burden due to poor fiscal capacity.

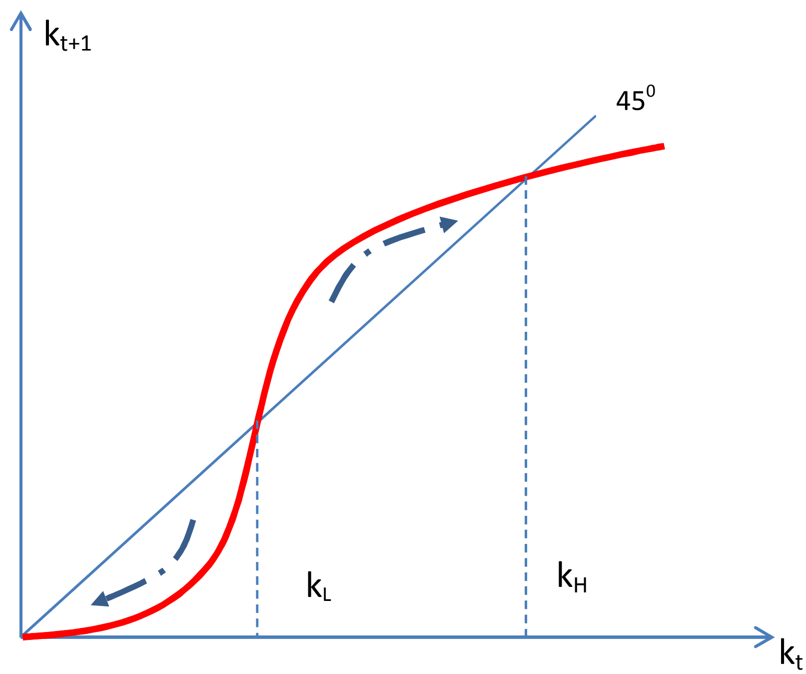

Figure 2: A time path of an economy with two equilibria

This equation indicates that for a low level stock of physical capital, $k_t \leq \overline{k}_L$, the economy converges to a poverty trap. As in Collier (2007), the economy described above will be caught in one or more of the following traps: the political instability and conflict trap, the insecurity of property rights trap, and the corruption trap. When all three factors co-exist, the economy is caught in a vicious circle, referred to as the "fragility trap" in this model (see also Zoellick, 2008).

From equation (2.2.7) we first derive the condition for fragility traps to occur, and then we discuss the transitional dynamic path of the above mentioned economy. For given values of $\lambda_t,\ \tau_t$

and G_t, the economy is at risk of falling into a fragility trap when the stock of physical capital falls below the modified subsistence constraint, $\overline{k}_L$:

$$\overline{k}_L \equiv \left[\frac{\bar{c}}{(1-\alpha)(1-\tau_t)(1-\lambda_t)^{\alpha} G_t^{1-\alpha}}\right]^{1/\alpha}, \tag{2.2.8}$$

where $\overline{k}_L$ is inversely related to G_t and positively related to λ_t and τ_t. There are two nontrivial stationary equilibria for this economy. Given λ_t, τ_t and G_t, and $k_0 \leq \overline{k}_L$, the economy is simply trapped in the lower equilibrium. If however $k_0 > \overline{k}_L$, then the economy will converge to a balanced growth path.

2.3 Government problem and fragility

Government's stability and viability depend on its ability to collect resources from the working population. These resources are needed to fund government programs, to build institutions and to provide basic services to citizens. Hence, a government that is unable to collect tax revenues will not be able to assure stability, promote growth, build strong and efficient institutions, and provide basic services needed by its citizens. Building an efficient infrastructure to collect tax resources and to combat tax expropriation becomes a key priority for the government. In the absence of tax enforcement provisions, selfish government officials will extract a rent from government resources, also know as tax leakage. Tax leakage by causing a revenu drain may adversely affect the fiscal sustainability of the state's economy.

The total taxes paid is equal to a fraction τ_t of wages paid to the L_t working individuals, i.e;

$$\tau_t w_t L_t, \tag{2.3.1}$$

where $w_t L_t = (1-\alpha)\overline{Y}_t$ is the fixed proportion of output paid in form of aggregate wage to labor. Of these taxes paid, a fraction $d_t \in (0, \overline{\tau}_t)$ evaporates through tax leakage or corruption, and only $\overline{\tau}_t$ is received by the government.[7] In addition, the government receives $\overline{Z}_t \geq 0$ in the form of foreign aid. In sum, the government receives for its activities and programs, including those aimed at assuring peace and stability, the following amount of resources:

$$\overline{\tau}_t(1-\alpha)\overline{Y}_t + \overline{Z}_t.$$

where, as noted earlier, $\overline{Z}_t$ is the amount of foreign aid received by a given country at time t. The traditional view of foreign aid is that it provides macroeconomic opportunities and benefits that

[7] d_t could parametrize the extent to which a government is unable to collect tax revenues, maybe because of tax evasion and/or informal and underground practices in most fragile states. d_t can be also thought of as parametrizing the absence of tax authority and infrastructure to combat tax evasion and income tax expropriation.

might result in positive multipliers effects. Most notably it boosts investment, and stimulates economic growth. In this paper, the focus is that foreign aid should not be used simply to temporarily respond to shocks and fill gaps; it should be used for investment in state capacity, i.e., promoting political stability, ensuring secure property rights, policing corruption, and building fiscal capacities. Arguments relating to aid effectiveness in fragile states indicate that a strategic approach should encompass a range of policy options such as political stability, rule of law, and regional programs (Radelet, 2004). In this regard, foreign aid can serve not only to promote stability and security, but it can increase production by shifting the production possibility frontier outward.

As a rule of thumb for resource management in fragile states, the government budget must balance in each period t. That is, spending must equal total income, that is:

$$\theta_{dt} + \theta_{Gt} + \theta_{\lambda t} = \overline{\tau}_t(1-\alpha)\overline{Y}_t + \overline{Z}_t, \tag{2.3.2}$$

where θ_{Gt} is government spending on building secure property rights, $\theta_{\lambda t}$ is government spending on ensuring stability and absence of violence, and θ_{dt} is government spending on policing corruption. We asume that political instability and violence, institutional quality (i. e., secure property rights), and the rate of tax leakage are respectively given by λ_t, G_t, and d_t such that $\lambda_t = f(\theta_{\lambda t}),\ f'(\theta_{\lambda t}) < 0$; $G_t = f(\theta_{Gt}),\ f'(\theta_{Gt}) > 0$; and $d_t = f(\theta_{dt}),\ f'(\theta_{dt}) < 0$.[8] We further impose restrictions on government policies, *i.e.*, $(\theta_{dt},\ \theta_{Gt},\ \theta_{\lambda t}) > 0$.[9]

In many cases, consumers evaluate governments and their policies solely on output growth (Logan, 1986; Oates, 1988). Hence, policy makers have incentives to invest in growth enhancing institutions such as stability and absence of violence, secure property rights and enforceable contracts, and absence of corruption. Given all the benefits from growth, the primary goal of any government should be to maximize aggregate income growth.[10]

In this model, a government policy is defined as a triplet $P = \{\theta_{Gt},\ \theta_{\lambda t},\ \theta_{dt}\}$, which is a set of government expenditures on political stability , secure property rights, and anti-corruption; all of which are funded by a lump-sum tax on wage income, τ_t, and external aid, $\overline{Z}_t \geq 0$. The

[8] $\theta_{\lambda t}$ raises growth by preventing the destruction of productive capital; θ_{Gt} raises labor productivity growth, which in turn, raises output and consumption. In case of fiscal capacity, this investment can be tought of as developing a tax authority, its compliance structures and infrastructure to enforce an income tax. Specifically, θ_{dt} is expected to raise the potential ability of the governments to raise revenue.

[9] These restrictions follow from the functional form of the government's objective function.

[10] There is extensive empirical evidence showing that politiciens are more likely to be re-elected when the economy is growing. For example, Lewis-Beck (1990, p. 157) argues that economic issues are the most important factors affecting choices in elections. Fiorina (1981) indicates that politiciens set policies presuming that voters care about the health of the economy.

government's optimization problem at time t can now be formulated as:([11])([12])

$$Max_{\{\theta_{Gt},\ \theta_{dt},\ \theta_{\lambda t}\}} \frac{K_{t+1}}{K_t} \tag{2.3.3}$$

subject to

$$K_{t+1} = \frac{\gamma}{(1+\gamma)} \left\{ (1-\alpha)(1-\tau_{t+1}) \left[(K_t(1-\lambda_{t+1}))^{\alpha} (G_{t+1}L_t)^{1-\alpha} \right] - \bar{c}L_t \right\}, \tag{2.3.4}$$

and

$$\overline{Z}_t + \overline{\tau}_t(1-\alpha)\overline{Y}_t = \theta_{dt} + \theta_{Gt} + \theta_{\lambda t} \tag{2.3.5}$$

$$\lambda_{t+1} = 1 - \varphi\theta^{\sigma}_{\lambda,t}; \tag{2.3.6}$$

$$G_{t+1} = \theta_{G,t}, \tag{2.3.7}$$

$$d_{t+1} = \overline{\tau}_{t+1} - \upsilon\theta_{dt}, \tag{2.3.8}$$

---

[11] Following Ghate et al. (2002), maximizing aggregate income growth is equivalent to maximizing capital deepening or investment rate. This formulation does not require government to know consumers' utility functions; instead it needs only obesrve the state of the economy, K_t, when making policy choices at time t (see also Lindblom, 1993 for details).

[12] Alternatively, the government could have maximized the welfare function as follows:

$$\begin{aligned} &Max_{\{\theta_{Gt},\ \theta_{dt},\ \theta_{\lambda t}\}} W = \ln(c_t - \bar{c}) + \gamma \ln c_{t+1} \\ &s.t. \\ &\theta_{dt} + \theta_{Gt} + \theta_{\lambda t} = \overline{\tau}_t(1-\alpha)\overline{Y}_t + \overline{Z}_t \end{aligned}$$

To be able to obtain explicit solutions from the above maximization, we need to assume that the interest rate is exogenous, so that $c_{t+1} = R_{t+1}s_t \equiv \overline{R}s_t$. However, in this model of fragile states, endogenous interest rate has some benefit in its own. To avoid complications that might arise with endogenous interest rate, we redefine the welfare function and assume that in each period t, that can be considered as an election cycle, policy makers choose their spendings to combat corruption, promote secure property rights, and ensure political stability so as to maximize the current consumption of both young adults and old people. Therefore they define the welfare function over consumption by young adults in period t, c^y_t, and consumption by old people in period t, c^o_t. With this in mind, we set the government maximization problem as follows:

$$\begin{aligned} &Max_{\{\theta_{Gt},\ \theta_{dt},\ \theta_{\lambda t}\}} W = \ln(c^y_t - \bar{c}) + \gamma \ln c^o_t \\ &s.t. \\ &\text{government budget constraint given in (2.3.2)} \end{aligned}$$

Using equations (2.1.3) and (2.1.4), we simplify the above maximization to:

$$\begin{aligned} &Max_{\{\theta_{Gt},\ \theta_{dt},\ \theta_{\lambda t}\}} W = (1+\gamma)\ln(I_t - \bar{c}) + \Gamma \\ &s.t. \\ &\text{equation (2.3.2)}\ , \end{aligned}$$

where

$$\Gamma \equiv (1+\gamma)\ln\frac{1}{1+\gamma} + \gamma(\ln\gamma + \ln n),$$

and n is the exogenous rate of population growth. Solving the problem stated above yields exactly the same solutions as solving the problem stated in equations (2.3.3)-(2.3.7).

where $\sigma \in (0,1)$, and $\overline{\tau}_{t+1}$ is the exogenous maximum rate of tax leakage.[13] The government chooses policies to maximize aggregate growth income at time t, subject to five constraints. The resource constraint (equation 2.3.5) equates tax revenue, $\overline{\tau}_t(1-\alpha)\overline{Y}_t$, plus foreign aid, $\overline{Z}_t$, to government expenditures on policies $\theta_{\lambda t}$, θ_{Gt}, and θ_{dt}. Equation (2.3.7) implies also full depreciation of G_t for the sake of tractability. Plugging equations (2.3.4), (2.3.5), (2.3.6), (2.3.7) and (2.3.8) into (2.3.3) yields the following Lagrangian maximization problem, where q is the Lagrangian multiplier:

$$(2.3.9) Max_{\{\boldsymbol{\theta}_{dt},\ \boldsymbol{\theta}_{\lambda t},\ \boldsymbol{\theta}_{Gt}\}} \frac{\gamma}{(1+\gamma)K_t}\left\{(1-\alpha)\left(1-2\overline{\tau}_{t+1}+\upsilon\theta_{d,t}\right)\left[K_t^{\alpha}\varphi\theta_{\lambda,t}^{\sigma\alpha}\theta_{G,t}^{\mathbf{1-\alpha}}L_t^{1-\alpha}\right]-\overline{c}L_t\right\}+$$

$$+q\left\{\overline{Z}_t+\overline{\tau}_t(1-\alpha)\overline{Y}_t-\theta_{d,t}-\theta_{G,t}-\theta_{\lambda,t}\right\}$$

Taking the derivative with respect to $\theta_{d,t}$; $\theta_{\lambda,t}$; $\theta_{G,t}$ & q, respectively, yields the first order conditions for an interior solution:

$$(2.3.10) \qquad \frac{\gamma}{(1+\gamma)K_t}(1-\alpha)\,\upsilon\left[K_t^{\alpha}\varphi\theta_{\lambda,t}^{\sigma\alpha}\theta_{Gt}^{1-\alpha}L_t^{1-\alpha}\right]=q$$

$$(2.3.11) \qquad \frac{\gamma}{(1+\gamma)K_t}\sigma\alpha(1-\alpha)\left(1-2\overline{\tau}_{t+1}+\upsilon\theta_{d,t}\right)\left[K_t^{\alpha}\varphi\theta_{\lambda,t}^{\sigma\alpha-1}\theta_{Gt}^{1-\alpha}L_t^{1-\alpha}\right]=q$$

$$(2.3.12) \qquad \frac{\gamma}{(1+\gamma)K_t}(1-\alpha)^2\left(1-2\overline{\tau}_{t+1}+\upsilon\theta_{d,t}\right)\left[K_t^{\alpha}\varphi\theta_{\lambda,t}^{\sigma\alpha}\theta_{Gt}^{-\alpha}L_t^{1-\alpha}\right]=q$$

$$(2.3.13) \qquad \overline{Z}_t+\overline{\tau}_t(1-\alpha)\overline{Y}_t-\theta_{d,t}-\theta_{G,t}-\theta_{\lambda,t}=0$$

These first order conditions confirm standard intuitions. Equations (2.3.10) to (2.3.12) govern the decisions of government investment in policies. They all equate the left hand side marginal benefit of investing in a given policy to the utility cost of doing so or the shadow price, q. Notice that in each equation (2.3.10-2.3.12) this cost is constant and equals q, whereas the benefits are variable and depend on each policy elasticity of output, government spending on policing corruption, $\theta_{d,t}$, and on $\overline{\tau}_{t+1}$. Further, in all three equations, marginal benefits are increasing in the degree of tax enforcement, υ. Plugging equation (2.3.12) into (2.3.11) and (2.3.10) implies that the ratio of government investment in property rights and contracts enforcement to investment in peace and stability is constant as the economy grows, and equals to the ratio of marginal products of the two investment policies, i.e.,

$$(2.3.14) \qquad (\theta_{G,t}/\theta_{\lambda,t})=\frac{(1-\alpha)}{\sigma\alpha},\ \Rightarrow \boldsymbol{\theta}_{\mathbf{G,t}}=\frac{(1-\alpha)}{\sigma\alpha}\theta_{\lambda,t},$$

[13] The function d used here refers to an expropriation when relating to consumers and a tax leakage when relating to government. It affects both consumer and government in the sense that the first ends up pays more in terms of taxes, while the second ends up receives less compared to the amount of revenue raised from tax. $\nu \in (0,\ \overline{\tau}/\theta_d)$.

and

$$\theta_{Gt} = \frac{(1-\alpha)}{\upsilon}\left(1 - 2\overline{\tau}_{t+1}\right) + (1-\alpha)\,\theta_{d,t}, \tag{2.3.15}$$

Combining equations (2.3.14) and (2.3.15) yields:

$$\theta_{\lambda,t} = \frac{\sigma\alpha\left(1 - 2\overline{\tau}_{t+1}\right)}{\upsilon} + \sigma\alpha\theta_{d,t} \tag{2.3.16}$$

Using equation (2.3.13) in combination with (2.3.14) and (2.3.16) yields the explicit optimal government investment policies discussed below:

$$\theta^{*}_{\lambda,t} = \sigma\alpha\left[\frac{\overline{Z}_t + \overline{\tau}_t(1-\alpha)\overline{Y}_t + \dfrac{(1-2\overline{\tau}_{t+1})}{\upsilon}}{(2-\alpha\,(1-\sigma))}\right] \tag{2.3.17}$$

$$\theta^{*}_{G,t} = (1-\alpha)\left[\frac{\overline{Z}_t + \overline{\tau}_t(1-\alpha)\overline{Y}_t + \dfrac{(1-2\overline{\tau}_{t+1})}{\upsilon}}{(2-\alpha\,(1-\sigma))}\right] \tag{2.3.18}$$

$$\theta^{*}_{d,t} = \frac{\overline{Z}_t + \overline{\tau}_t(1-\alpha)\overline{Y}_t - \dfrac{(1-2\overline{\tau}_{t+1})}{\upsilon}\,(1-\alpha\,(1-\sigma))}{(2-\alpha\,(1-\sigma))} \tag{2.3.19}$$

And since $\tau_{t+1} = \overline{\tau}_{t+1} + d_{t+1} = \overline{\tau}_{t+1} + \overline{\tau}_{t+1} - \upsilon\theta_{dt} = 2\overline{\tau}_{t+1} - \upsilon\theta_{dt}$,

$$\tau^{*}_{t+1} = \frac{(1-\alpha\,(1-\sigma) + 2\overline{\tau}_{t+1}) - \upsilon\left[\overline{Z}_t + \overline{\tau}_t(1-\alpha)\overline{Y}_t\right]}{(2-\alpha\,(1-\sigma))} \tag{2.3.20}$$

Note first that the structure of equations (2.3.17) and (2.3.18) is quite similar. The only difference is that each expression is multiplied by the exponent of the corresponding investment policy. The numerator in both (2.3.17) and (2.3.18) is the potential government revenue, which includes revenue from tax, revenue from foreign aid, and the fraction of each dollar income saved. The common denominator is the sum of all policy shares; it reflects the cost of increasing government investment policies. Each of these policy variables depends on the tax base (or any of its components), $\overline{\tau}_t(1-\alpha)\overline{Y}_t$, the degree of tax enforcement, υ, and the share of government resources allocated to political stability, σ. Notice, also, that an increase in the degree of tax enforcement, υ, has a negative effect on both $\theta^{*}_{\lambda,t}$ and $\theta^{*}_{G,t}$. However, an increase in the share of resources allocated to political stability, σ, yields an increase in $\theta^{*}_{\lambda,t}$ and a decrease in $\theta^{*}_{G,t}$.

Unlike the two first government policy functions above, equations (2.3.19) and (2.3.20) display different structures. The numerator in (2.3.19) is the total amount of government revenues minus the cost of government policies, whereas the numerator in (2.3.20) is the cost of government policies minus the degree of tax enforcement weighted by total government revenue. Thus, an increase in the degree of tax enforcement, υ, is associated with a high increase in resources for policing corruption, and leads to a decrease in optimal tax rate, τ^*_{t+1}. In addition, an increase in the share of government resources allocated to political stability, σ, is associated with an increase in $\theta^*_{d,t}$, suggesting some degree of complementarity between government policies as regards to political stability and anti-corruption measures. As noted earlier, promoting political stability and absence of violence demands resources; thus, an increase in σ is associated with high levels of government investment in political stability, and requires continued increases in optimal tax rate τ^*_{t+1}.

More importantly, notice that all investment policies–$\theta^*_{\lambda,t}$; $\theta^*_{G,t}$; and $\theta^*_{d,t}$– are positively related to the level of tax base, $\overline{Y}_t$, and the level of foreign aid, $\overline{Z}_t$. In particular, $\partial\theta^*_{\lambda,t}/\partial\overline{Z}_t > 0$; $\partial\theta^*_{G,t}/\partial\overline{Z}_t > 0$; and $\partial\theta^*_{d,t}/\partial\overline{Z}_t > 0$. However, as we look at equation (2.3.20), we note that the optimal tax rate is negatively related to $\overline{Y}_t$ and $\overline{Z}_t$. Henceforth, this model predicts that better tax codes that contain provisions for tax enforcement are associated with lower optimal tax rates and, in turn, would stimulate production and growth. Furthermore, the fact that $\partial\tau^*_{t+1}/\partial\overline{Z}_t < 0$ suggests that tax income and foreign aid can be regarded as substitute policy instruments. Consequently, increases in foreign aid can allow poor states to sustain lower tax rates, and could exert positive shocks on income growth through the promotion of physical capital accumulation.

Following equation (2.3.4), the dynamic equation with optimal government policy when external aid is zero is displayed in Figure 3 . For any $k_0 \leq \overline{k}_L$ the economy will converge to zero, and for any $k_0 > \overline{k}_L$ the economy will converge to k_H. $\overline{k}_L$ is defined as below and provides an important fragility condition when there is no external aid:

$$\overline{k}_L = \left[\frac{\overline{c}\left[(2-\alpha(1-\sigma))\right]^{(2-\alpha(1-\sigma))}}{\alpha\upsilon\sigma(1-\alpha)^2\varphi\left\{\left(\overline{\tau}_t(1-\alpha)\overline{Y}_t + \dfrac{(1-2\overline{\tau}_{t+1})}{\upsilon}\right)\right\}^{(2-\alpha(1-\sigma))}} \right]^{1/\alpha}, \tag{2.3.21}$$

where $\overline{Z}_t = 0$, and $\overline{Y}_t$ is the tax base known at time t. Condition (2.3.21) describes the fragility environment when $\overline{Z}_t = 0$. It indicates that the "fragility trap" depends on the degree of tax enforcement, υ, the share of government resources allocated to political stability, σ, the productivity of resources allocated to assuring political stability, φ, and the level of tax base, $\overline{Y}_t$. Increases in tax base relax the fragility constraint and reduce the risks of falling into fragility traps for a given country. Likewise, increases in the degree of tax enforcement, v, leads to same conclusions as above. However, increases in the cost of government policies, $(2 - \alpha(1 - \sigma))$, are associated with high risks of falling into fragility traps.

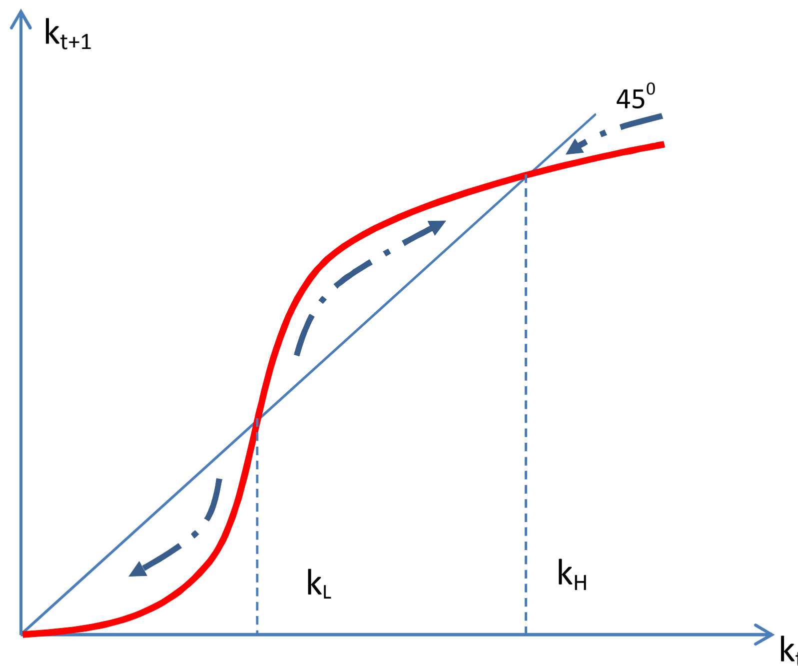

Figure 3: Time path of an economy when $\theta's$ are optimal & ($\overline{Z}_t = 0$)

As noted before, foreign aid can be very helpful for weak governments, provided that it is invested to tackle the root causes of instability, insecurity and corruption. Below we present a dynamic equation of our fragile economy when foreign aid is strictly positive, ($\overline{Z}_t > 0$).

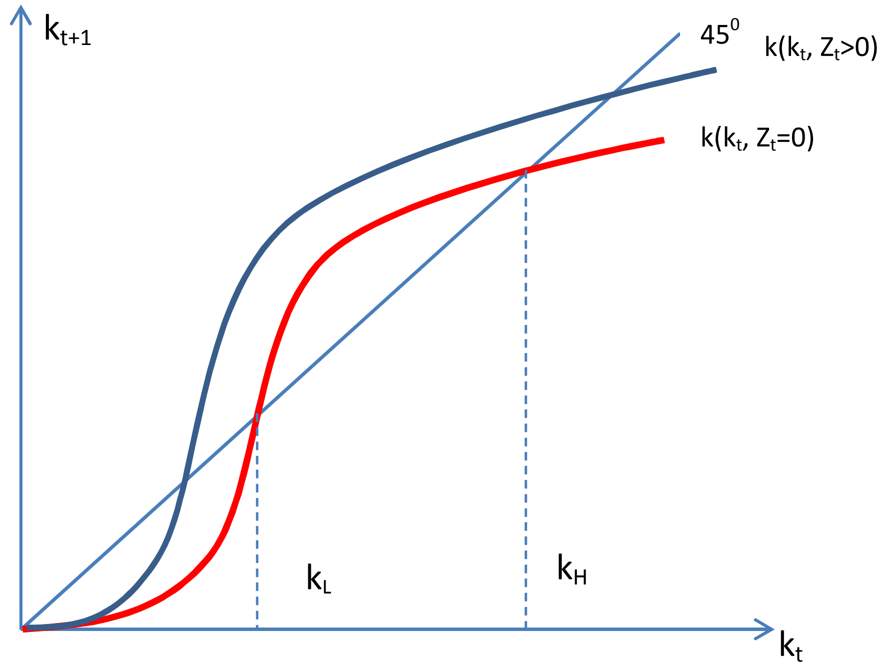

Figure 4: Time path of an economy when $\theta's$ are optimal & $\left(\overline{Z}_t \in \left(0,\ \overline{Z}_t^*\right)\right)$ [14]

However, when $\overline{Z}_t \in \left(0,\ \overline{Z}_t^*\right)$, the fragility condition is a function of external aid $\overline{Z}_t$, and is given by:

$$\text{(2.3.22)} \qquad \overline{k}_L = \left[\frac{\overline{c}\left[(2-\alpha(1-\sigma))\right]^{(2-\alpha(1-\sigma))}}{\alpha\upsilon\sigma(1-\alpha)^2\varphi\left\{\left(\overline{Z}_t + \overline{\tau}_t(1-\alpha)\overline{Y}_t + \frac{(1-2\overline{\tau}_{t+1})}{\upsilon}\right)\right\}^{(2-\alpha(1-\sigma))}}\right]^{1/\alpha},$$

with

$$\text{(2.3.23)} \qquad \frac{\partial\overline{k}_L}{\partial\overline{Y}_t} < 0, \quad \frac{\partial\overline{k}_L}{\partial\overline{Z}_t} < 0.$$

Figure (4) above and equation (2.3.23) indicate that external aid can reduce the chance that a country falls into a "fragility trap" or increase the chance that a country reaches sustained, balanced economic growth. Building on the insights from (**??**), it is appropriate to think that, conditional on the fundamentals of each economy, there should exist a level of $\overline{Z}_t$, say $\overline{Z}_t^*$, such that fragile economies can rise from a lower level equilibrium defined by the dynamic equation $k(k_t,\ \overline{Z}_t)$ to a higher level of equilibrium defined by the dynamic equation $k(k_t,\ \overline{Z}_t^*)$.

Note that $\overline{Z}_t^*$ is more than simply a "big push"; it combines the idea of big push with an optimal allocation strategy that tackles the root causes of instability, insecurity, and corruption.

Figure 5 below summarizes and displays geometrically the impact of $\overline{Z}_t^*$ on the growth path of a fragile economy.

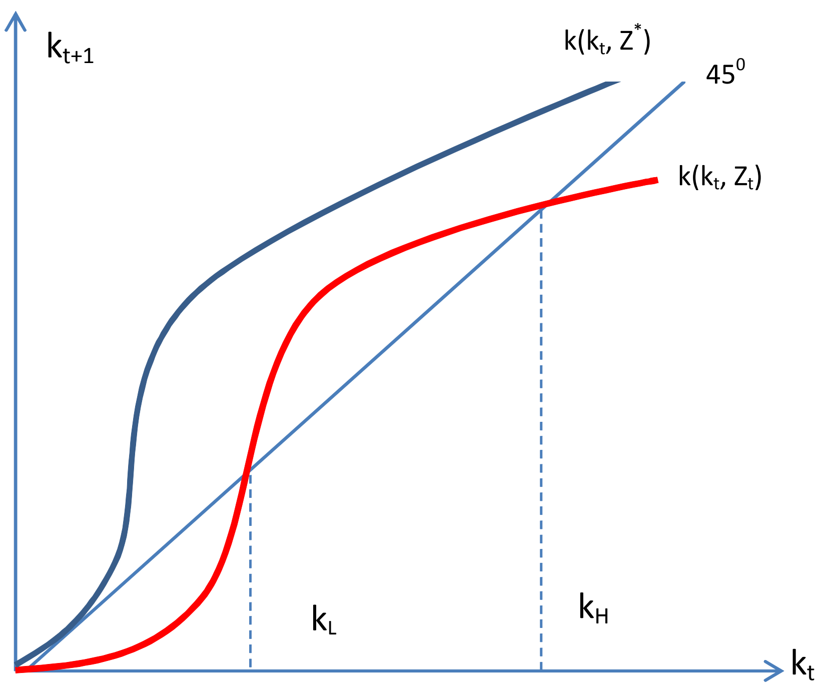

Figure 5: Time path of economy with optimal $\overline{Z}_t$, $\overline{Z}_t \geq \overline{Z}_t^*$

3 Empirical corroboration of the model

In our fragility model, saving is the key element that connects the three features of political stability and absence of violence, secure property rights and enforceable contracts, and absence of corruption, with long-run economic growth. As a result, our empirical strategy will emphasize the model's implications for the growth rate of GDP per capita. (See equation (2.2.6) or equivalently (2.2.7). The theoretical model identifies implications that are examined in our estimations. The main prediction for capital accumulation from equation (2.2.7) are that physical capital increases when (i) political stability, $(1 - \lambda_t)$, rises; (ii) corruption, d_t, decreases, (iii) the tax rate decreases; and (iv) property rights and contract enforcement, G_t improve. The most important prediction of this model is that government investment in state capacity such as political stability, property rights and absence of corruption depends on its tax base, its ability to collect revenue, and the level of external aid received. Furthermore, the model predicts that external aid affects the growth rate of GDP per capita through its effects on political institutions and state capacity. Empirical confirmation of these effects have important implications for aid policies towards fragile countries.

3.1 Growth regressions

First, we assume that I_t is large relative to $\overline{c}$, and $k_t > \overline{k}_L$. Second, we apply a log transformation on both sides of equation (2.3.4) to derive an empirical model that is used to test our fragility hypothesis. [15]

$$
\begin{aligned}
(3.1.1)\quad \ln\left(K_{t+1}/K_t\right) &= \beta_0 + \beta_1 \ln G_{it} + \beta_2 \ln(1-\lambda_{it}) + \beta_3 \ln(1-d_{it}) + \beta_4 \ln(I_{it}/Y_{it}) \\
&\quad + \beta_5 \ln Z_t + \beta_6 \ln(T_{it}/Y_{it}) + \beta_7 \ln X_{it} + \varepsilon_{it},
\end{aligned}
$$

where subscript i indicates country, and t indicates year. The dependent variable is $\ln(K_{t+1}/K_t)$; and the independent variables are property rights, G_{it}; political stability and absence of violence, $(1-\lambda_{it})$; absence of corruption, $(1-d_{it})$; investment ratio (to proxy the stock of physical capital), (I_{it}/Y_{it}); tax ratio, (T_{it}/Y_{it})); and various control variables. Because some of our variables contain zero values, we keep all variables in level form; hence we test the following simple linear model:

$$
(3.1.2)\qquad g_{it} = \beta_0 + \beta_1 y_{t-1} + \beta_2 (I_{it}/Y_{it}) + \beta_3 (T_{it}/Y_{it}) + \beta_4 Z_t + \beta_5 (1-\lambda_{it}) + \beta_6 X_{it} + \varepsilon_{it},
$$

where one of the control variables is the initial GDP per capita (I_GDPpc), y_{t-1}.

We organize our data on growth rates and on the other variables for which measures are available into six half-decade observation periods, for 1980-84, 1985-89, etc. The data span from 1980 through 2010 for about 120 countries. All data are from the World Bank (WDR 2011). In all regressions, we use the growth rate of real GDP per capita as our dependent variable and a set of independent variables in which we include initial GDP (IGDP), investment ratio (I/GDP), tax ratio (T/GDP), total Official Development Aid (ODA), Political stability and absence of violence (Polit. Stab.), Latitude, Latitude Square, and a set of dummies, including intercept and slope

[15] We assume that $\overline{c}$ is very small relative to I_t and can be droped from equation (2.3.4).

dummy variables. Table 1 reports the OLS results of a panel data analysis of equation (3.1.1).

Table 1: OLS with robust standard errors

Variables	1	2	3	4	5
I_GDPpc	-0.000036 (0.00002)	-0.00004* (0.00002)	-0.000037 (0.00003)	-0.00004* (0.00002)	-0.000038 (0.00003)
I/GDP	0.129*** (0.029)	0.125*** (0.029)	0.129*** (0.029)	0.123*** (0.029)	0.123*** (0.029)
Tax Rate	-0.071*** (0.019)	-0.074*** (0.020)	-0.071*** (0.020)	-0.074*** (0.019)	-0.077*** (0.022)
Tot. ODA	0.0006** (0.0003)	0.0006** (0.0003)	0.0006** (0.0003)	0.0006** (0.0003)	0.0005* (0.0003)
Politic. Stab	0.289 (0.20)	0.219 (0.21)	0.291 (0.20)	0.221 (0.21)	0.192 (0.229)
Latitude	0.009 (0.0077)	0.01 (0.0078)	0.009 (0.0077)	0.010 (0.0078)	0.010 (0.0078)
Lat. Squ.	0.0009*** (0.0004)	0.0009** (0.0004)	0.0009*** (0.0004)	0.0008** (0.0004)	0.0009** (0.0004)
D_Fragile		-0.428 (0.468)			
D_Africa			-0.047 (0.312)		
D_AF_Frag.				-0.547 (0.473)	-0.502 (0.466)
D_AF_Non.Fr.					0.215 (0.401)
constant	0.204 (0.725)	0.497 (0.798)	0.2352 (0.733)	0.539 (0.759)	0.503 (0.755)
	$N = 245$ $R^2 = 0.263$	$N = 245$ $R^2 = 0.266$	$N = 245$ $R^2 = 0.263$	$N = 245$ $R^2 = 0.268$	$N = 245$ $R^2 = 0.269$

Note: Entries for variables in this table, and all susequent tables, are estimated coefficients followed by standard errors in parentheses, and *, ** & *** indicate significance at the 10, 5 and 1% levels respectively.

Turning to the estimates, we begin with OLS with robust standard errors as our baseline. We find that all coefficients on initial GDP per capita (I_GDPpc) are negative and statistically significant at 10 percent only in specifications where a dummy variable for fragility has been included (See columns 2 and 4 of Table 1). The investment share of GDP (I/GDP) is highly significant ($p < 0.001$) in all specifications, with an average positive coefficient of about 0.125. We have two variables of interest in this study, namely political stability and absence of violence

(Polit. Stab.) and Official Development Aid (ODA).

Table 2: Fixed effects (within) regressione with intercept dummies

Variables	1	2	3	4	5
I_GDPpc	-0.00003 (0.00002)	-0.00004* (0.00002)	-0.000035 (0.00002)	-0.00004* (0.00002)	-0.00004* (0.00002)
I/GDP	0.120*** (0.022)	0.115*** (0.023)	0.119*** (0.022)	0.114*** (0.023)	0.113*** (0.023)
Tax Rate	-0.072*** (0.020)	-0.075*** (0.020)	-0.071*** (0.020)	-0.074*** (0.020)	-0.078*** (0.021)
Tot. ODA	0.0007** (0.0003)	0.0007** (0.0003)	0.0007** (0.0003)	0.0007** (0.0003)	0.0007** (0.0003)
Politic. Stab	0.352* (0.191)	0.278 (0.202	0.356* (0.192)	0.282 (0.198)	0.256 (0.204)
Latitude	0.010 (0.0077)	0.011 (0.0077)	0.010 (0.0078)	0.011 (0.0078)	0.011 (0.0078)
Lat. Squ.	0.001*** (0.0003)	0.0009*** (0.0003)	0.0009*** (0.0003)	0.0009*** (0.0003)	0.0009*** (0.0003)
D_Fragile		-0.455 (0.404)			
D_Africa			-0.069 (0.310)		
D_AF_Frag.				-0.579 (0.423)	-0.540 (0.431)
D_AF_Non.Fr.					0.188 (0.375)
constant	0.366 (0.568)	0.685 (0.633)	0.413 (0.606)	0.727 (0.626)	0.695 (0.629)
	$N = 245$ R^2= 0.262	$N = 245$ R^2= 0.265	$N = 245$ R^2= 0.262	$N = 245$ R^2= 0.266	$N = 245$ R^2= 0.267

Polit. Stab. has the predicted signs, but was never significant in any of the OLS specifications, maybe because of reverse causality or unobservable heterogeneity. ODA is statistically significant at 5% in all specifications, except column 5's specification where the level of significance drops to 10%. Unlike specifications in columns 1-4, specification in column 5 includes dummies for African fragile and non fragile states. In Tables 2 and 3 we use FE regression models to correct for possible unobservable heterogeneity, while Table 4 and 5 use IV-2SLS models to address issues of possible endogeneity.

Across all specifications in Tables 2 & 3, I_GDPpc, I/GDP, and Tax rate are statistically significant with the predicted signs. Coefficients on ODA are positive and statistically significant at 5% in all specifications, with considerable increases in Table 3's coefficients. For example, in Table 2 where we use intercept dummy variables, a one unit increase in ODA leads to an average of 0.0005 increase in GDPpc growth, while GDPpc growth increases by almost two-fold (about 0.0009) in Table 3 where slope-dummy variables are controlled for. Hence, consistent with our model, increase in external aid is strongly associated with increase in the growth rate of GDP per capita.

Turning to the impact of political stability, unlike Table 1, Tables 2 & 3 present much more improved cases, with the coefficient on Polit. Stab. increasing by 20% in Table 2 (see columns 1 & 3), and by 30% in all specifications of Table 3. In both cases the significance level on Polit. Stab is at 10%. However, when slope dummies involving ODA and African fragile and non fragile states dummies are accounted for, Polit. Stab and ODA become insignificant (See column 5, Table 3). Globally speaking, results in Table 2 & 3 suggest that a one-point increase in Polit. Stab. will increase the growth rate of GDP per capita by about 0.35 to 0.41 points.

Controlling for fragile states in African countries provides additional insights about the link between ODA and growth in African countries. To test our model that external aid has a different and independent impact on African fragile countries compared to the rest of the countries, we create an intercept dummy variable "Dummy Africa Fragile" that takes the value of one for African fragile countries and zero otherwise. We also create a slope dummy variable "ODA_Afr. Fragile", which represents African Fragile countries times Official Development Aid. This variable is used to determine whether the effect of ODA on growth differs between African fragile countries and the rest of the countries, including African non fragile states.

As shown in Table 3, the statistical evidence supports the prediction of our fragility model. First, the intercept dummy variable is negative and statistically significant. African fragile countries have lower growth rates. Second the interaction variable is positive and significant. ODA has a positive impact on growth for African fragile countries. Third, once ODA_Afr_Fragile (ODA for African frigile countries) is set apart, total ODA becomes insignificant; implying that all the significance power observed in this variable was simply driven by the fact that African fragile countries were not controlled for in all specifications but specification 5 of Table 3. Finally, setting apart ODA-Afr_Fragile weakens the impact of political stability on growth to the point that it too becomes insignificant.

Table 3: Fixed effects (within) regressions with slope dummies

Variables	1	2	3	4	5
I_GDPpc	-0.00003 (0.00002)	-0.00002 (0.00002)	-0.00003 (0.00002)	-0.00004* (0.00002)	-0.00005** (0.00002)
I/GDP	0.114*** (0.023)	0.120*** (0.022)	0.121*** (0.022)	0.115*** (0.023)	0.113*** (0.022)
Tax Rate	-0.071*** (0.020)	-0.072*** (0.020)	-0.072*** (0.020)	-0.068*** (0.020)	-0.078*** (0.020)
Tot. ODA	0.001** (0.0004)	0.0007** (0.0003)	0.0007** (0.0003)	0.001*** (0.0004)	0.0005 (0.0003)
Polit. Stab.	0.378* (0.194)	0.359* (0.199	0.366* (0.195)	0.415** (0.199)	0.279 (0.196)
Latitude	0.010 (0.0077)	0.010 (0.0077)	0.010 (0.0077)	0.010 (0.0077)	0.011 (0.0077)
Latitude Sq.	0.001*** (0.0003)	0.001*** (0.0003)	0.001*** (0.0003)	0.001*** (0.0003)	0.0009*** (0.0003)
D_Africa	0.144 (0.386)				
ODA_Africa	-0.0004 (0.0004)				
ODA_Fragile		0.00006 (0.0005)			
ODA_AF_Frag.			0.0002 (0.0007)	0.0001 (0.0007)	0.002** (0.001)
ODA_AfNFrag.				-0.0004 (0.0004)	
Dmy_Af_Frag.					-1.483** (0.615)
constant	0.400 (0.607)	0.352 (0.581)	0.316 (0.586)	0.391 (0.590)	0.882 (0.626)
	$N = 245$ $R^2 = 0.264$	$N = 245$ $R^2 = 0.262$	$N = 245$ $R^2 = 0.262$	$N = 245$ $R^2 = 0.265$	$N = 245$ $R^2 = 0.278$

To summarize, the most striking result is found in column 5 of Table 3; it indicates that ODA does not exert an independent effect on growth once African fragile countries are properly accounted for. In addition, Polit. Stab. ceases to exert an independent effect on growth once African fragile countries are controlled for (column 5 of Table 3). This suggests that ODA has a direct effect on growth as well as an indirect effect which runs through political stability. However, all these results are based on the strong assumption that all regressors are exogenous.

In the following section we check the robustness of our results against possible endogeneity of some institutional variables like political instability and violence.

3.2 2SLS and IV regression

All the policy and institutional variables in (3.1.1) are endogenous to economic growth and should receive appropriate treatment. These variables might provide new insights as regard to the implications of our fragility model. One of the shortcoming of the methods used in the previous section (OLS & FE) is that it fails to distinguish between variables that are clearly exogenous and variables that may be endogenous. We follow the empirical growth literature and consider that political instability and violence is endogenous to economic development. In this section we estimate a set of two-stage least-squares regression models in which geographical (Latitude, Tropical, Longitude, landlock) and historical (Legal_German, Legal_French) variables are used as instruments to predict political instability and violence. We present results that are consistent with tests for both endogeneity and over-identifying restrictions.

Tables 4 and 5 show second-stage regressions for political instability and violence. Each specification, represented by a different column in each Table is the growth equation that includes the predicted value of political instability and violence. In each column we control for a different dummy or set of dummy variables to be able to assess the consistency and robustness of our results. In particular Table 4 uses intercept dummy variables while Table 5 uses slope dummy variables.

In Table 4 we estimate the same regression models as in Table 2, except that Table 4 controls for the endogeneity of the institutional variable, Politic_Stab.[16] Globally speaking, IV models obtain much better results than simple FE models and confirm the impact of geographical and historical factors on economic development through political instability (see also Cinyabuguma et al., 2011). For example, in the IV models I_GDPpc increases by about 280%, Tax Rate by 20%, while I/GDP decreases by 20% (all changes refer to coefficients in absolute terms and compare results from Table 3 and Table 4). In particular, ODA improves by about 30% while Polit. Stab.

[16] In the regressions for political stability and absence of violence (not shown in this paper, but available upon request), both Landlock and Tropical obtain positive and statiscally significant coefficients, with the expected signs. Latitude and Latitude square, which cannot be excluded from any of the second-stage regressions, obtain positive coefficients on the square term and negative coefficients on the level term, with the positive coefficients becoming dominant for high values of Latitude. This implies a positive relationship between latitude and political stability for high values of Latitude. Legal_German, Legal_French, and Longitude all are insignificant.

increases by 360%. This suggests that our OLS/FE estimators are in fact inconsistent and biased.

Table 4: Second-stage regressions for IV models with intercept dummies

Variables	1	2	3	4	5
I_GDPpc	-0.00009** (0.00004)	-0.0001*** (0.00004)	-0.00009** (0.00004)	-0.00009** (0.00004)	-0.0001** (0.00004)
I/GDP	0.096*** (0.030)	0.093*** (0.031)	0.094*** (0.030)	0.097*** (0.029)	0.098*** (0.029)
Tax Rate	-0.096*** (0.025)	-0.099*** (0.027)	-0.093*** (0.025)	-0.096*** (0.026)	-0.087*** (0.024)
Tot. ODA	0.001** (0.0004)	0.001** (0.0005)	0.001** (0.0004)	0.001** (0.0004)	0.001** (0.0005)
Polit. Stab.	1.585** (0.705)	2.161** (0.969)	1.579** (0.708)	1.682** (0.834)	1.702* (0.912)
Latitude	0.019* (0.010)	0.020* (0.011)	0.018* (0.010)	0.019* (0.010)	0.017* (0.010)
Latitude_Sq.	0.0008** (0.0004)	0.0009** (0.0004)	0.0008** (0.0004)	0.0009** (0.0004)	0.0009** (0.0004)
D_Fragile		0.851 (0.785)			
D_Africa			-0.214 (0.356)		
D_AF_Frag.				0.285 (0.662)	0.160 (0.623)
D_AF_Non.Fr.					-0.478 (0.588)
constant	1.988* (1.118)	2.008* (1.049)	2.109* (1.189)	1.898* (1.024)	1.937* (1.095)
	$N = 245$ $R^2_{adj} = 0.10$	$N = 245$ $R^2_{adj} = ...$	$N = 245$ $R^2_{adj} = 0.10$	$N = 245$ $R^2_{adj} = 0.07$	$N = 245$ $R^2_{adj} = 0.07$
Sargan (χ^2)	4.26 (0.37)	2.78 (0.59)	4.37 (0.36)	4.12 (0.39)	4.38 (0.36)
Basmann (χ^2)	4.12 (0.39)	2.66 (0.62)	4.21 (0.38)	3.98 (0.41)	4.21 (0.38)
W-H (χ^2)	4.47 (0.035)	6.03 (0.015)	4.36 (0.038)	4.10 (0.04)	3.62 (0.06)
DWH (F)	4.56 (0.033)	6.12 (0.013)	4.47 (0.035)	4.20 (0.04)	3.73 (0.05)

Note: Over-identifying restrictions are conducted through Sargan(χ^2) and Basmann (χ^2) tests, and Endogeneity tests are conducted through W-H (F) test and DWH (χ^2). DWH refers to Durbin–Wu –Hausman $\chi^2 - test$, and WH refers to Wu–Hausman F-test. Entries in parentheses are p-values. List of Instrucments: Latitude, Latitude Sq, Legal_French, Legal_Geram, Tropical, Logitude, Landlock.

All ODA coefficients remain statistically significant at 5% with the predicted signs and support the intuition that external aid helps growth. However, unlike Table 2, Polit. Stab. is now statistically significant at 5% in all specifications with a strong positive effect on economic growth. Accounting for various intercept dummies–including dummy for Africa, dummy for fragile states, dummy for African fragile states and dummy for African non fragile states–does not affect the qualitative result on both ODA and political stability.[17]

In Table 5 we test the robustness of our conclusions from Table 3 regarding the effect of ODA on growth in fragile African countries when IV models are used. We apply the same testing strategy as for Table 3. Results from Table 4 indicated that adding intercept dummy variables does not change our conclusions about the relationship between ODA, Polit. Stab. and growth. Unlike Table 4, specifications in Table 5 control for two types of dummy variables: intercept dummy variables and slope dummy variables. In particular, specification in column 5 includes both a dummy variable for African fragile countries and an interaction between ODA and a dummy variable for African fragile countries (this is given by ODA_Afr_fragile) to determine whether the effect of ODA on growth continues to differ between African fragile countries and the rest of the world, even after controlling for endogeneity of the institutional variable.

First, as shown in Table 5, the dummy variable for African fragile countries has a negative and insignificant direct effect on growth. However, the indirect effect, given through political stability, is statistically significant with the predicted sign.[18] This suggests that African fragile countries are less stable, and hence have lower growth. Second, the interaction term (known as slope dummy variable) is positive and statistically significant. It indicates that a one unit increase in ODA for African fragile countries would increase growth by 0.002; this is indeed an indication that ODA continues to exert an independent effect on growth in African fragile countries. Third, even when the interaction term between ODA and a dummy for African fragile countries is controlled for, total ODA continues to be statistically significant, but with a much smaller effect than before (having both a smaller coefficient and a lower significance level). Additionally, and finally, when African fragile countries are set apart, political stability displays the smallest coefficient and drops its significance power from 5% to 10%. The negative and statistically significant coefficient on the interaction term between ODA and a dummy for African non fragile countries suggests that

[17] Most of these dummies exert indirect effects on growth through political stability and absence of violence. For example, in a series of first stage regressions not shown in this paper we find that african fragile countries tend to be more politically unstable, while african non fragile countries are more stable and at peace.

[18] This result was found in a first stage regression not shown in this paper but available upon request.

aid's productivity is mainly through fragile rather than non-fragile states.

Table 5: Second-stage regressions for IV models with slope dummies

Variables	1	2	3	4	5
I_GDPpc	-1.E-04** (4.E-05)	-9.E-05** (4.E-05)	-9.E-05** (4.E-05)	-1.E-04** (4.E-05)	-9.E-05** (3.E-05)
I/GDP	0.082** (0.033)	0.097*** (0.030)	0.101*** (0.029)	0.085*** (0.033)	0.100*** (0.028)
Tax Rate	-0.095*** (0.026)	-0.098*** (0.026)	-0.096*** (0.025)	-0.091*** (0.025)	-0.097*** (0.025)
Tot. ODA	0.001*** (0.0005)	0.0009** (0.0004)	0.0009** (0.0004)	0.001*** (0.0005)	0.0008* (0.0004)
Polit. Stab.	1.769** (0.743)	1.924** (0.825)	1.632** (0.737)	1.934** (0.801)	1.528* (0.812)
Latitude	0.020* (0.010)	0.019* (0.010)	0.018* (0.010)	0.020* (0.010)	0.019* (0.010)
Latit._Sq.	8.E-04** (0.0004)	8.6E-04** (0.0004)	9.5E-04*** (0.0004)	9.4E-04*** (0.0004)	9.E-04** (0.0004)
Dmy_Africa	0.161 (0.438)				
ODA_Afr.	-0.0007 (0.0005)				
ODA_Frag.		0.0012 (0.0008)			
ODA_Afr. Fragile			0.001 (0.0009)	0.0009 (0.0009)	0.002* (0.001)
ODA_Afr Non_Frg				-0.001* (0.0005)	
Dmy_Afr. Fragile.					-0.665 (0.823)
constant	2.293* (1.219)	1.998* (1.110)	1.735 (1.059)	2.121* (1.140)	1.912* (1.00)
	$N = 245$ $R^2_{adj} = 0.06$	$N = 245$ $R^2_{adj} = 0.03$	$N = 245$ $R^2_{adj} = 0.09$	$N = 245$ $R^2_{adj} = 0.04$	$N = 245$ $R^2_{adj} = 0.11$
Sargan (χ^2) Basman (χ^2)	3.00 (0.56) 2.86 (0.58)	3.18 (0.52) 3.05 (0.54)	4.44 (0.35) 4.28 (0.37)	2.83 (0.59) 2.70 (0.61)	4.78 (0.31) 4.60 (0.33)
W-H (χ^2) DWH (F)	5.31 (0.02) 5.44 (0.02)	5.43 (0.02) 5.53 (0.02)	4.30 (0.04) 4.41 (0.04)	5.50 (0.02) 5.62 (0.02)	3.34 (0.07) 3.45 (0.06)

Note: Over-identifying restrictions are conducted through Sargan(χ^2) and Basmann (χ^2) tests, and Endogeneity tests are conducted through W-H (F) test and DWH (χ^2). DWH refers to Durbin–Wu –Hausman $\chi^2 - test$, and WH refers to Wu–Hausman F-test. Entries in parentheses are p-values.
List of Instrucments: Latitude, Latitude Sq, Legal_French, Legal_Geram, Tropical, Logitude, Landlock.

4 Conclusion

In this paper, we set out to explore whether the particular characteristics of Africa's fragile states—instability and violence, insecure property rights, and high levels of corruption—led them to be caught in a low-growth equilibrium trap. Using an analytical model that captures the effect of these features on savings, investment and economic growth, we showed that the economy had two possible equilibria: one of sustained growth, and the other of continuous decline and eventual collapse. Countries could escape the low-level equilibrium, or avoid falling into it, by addressing the problems of instability, insecure property rights and corruption, but this requires resources. And the problem facing many of Africa's fragile states is that donors hold back external aid precisely because these countries suffer from issues of corruption, violence and insecure property rights. The analysis shows that the above issues may relegate these countries to remaining trapped in a low-level equilibrium. Conversely, additional resources, provided they are used to tackle the problems identified above, can help countries escape from the fragility trap.

Empirical results corroborate the model and its conclusions. First, a growth regression based on the model and using a panel data set of all developing countries found the salient variables to be statistically significant with the predicted sign. In particular, foreign aid is positively related to economic growth. Next, we separated out Africa's fragile states. We found that, not only do these countries grow more slowly, but the effect of additional foreign aid is significantly higher. To make these estimates closer to a complete test of the model, we take into account the endogeneity of the policy variables, such as investments in improving stability and avoiding violence. Results using instrumental variables (Tables 4 and 5) strongly support our model's predictions.

Taken together, the analytical and empirical results lend support to the propositions of Collier, Sachs, Zoellick and others, synthesized in the 2011 World Development Report, that fragile states are qualitatively different from non-fragile states. The difference is the possibility of falling into a low-level equilibrium trap. The existence of this possibility, and these states' proximity to the "tipping point", has important implications for aid policies towards African fragile countries. If aid can be used to help these countries escape the fragility trap, the benefits of aid could be enormous—and dwarf the usual considerations of low aid-productivity because of weak policies and institutions. Confirmation of the importance of external aid suggests that studying its impact at the sectoral level and looking at interactions among policies and institutions constitutes an important direction for future research.

References

[1] Alesina, Alberto, Sule Ozler, Nouriel Roubini, and Phillip Swagel, (1996), "Political Instability and Economic Growth," *Journal of Economic Growth*, 1: 189-212

[2] Alesina A., S. Ozler, N. Roubini and P. Swagel, (1992), "Economic Instability and Economic Growth." NBER.

[3] Alesina, A. and R. Perotti, (1996), "Income distribution, political instability and investment," *European Economic Review* 40:1203-1228.

[4] Azariadis, C., (1997), "The Economics of Poverty Traps, part one: Complete Markets", *Journal of economic growth,* 1(4), 449-486.

[5] Barro Robert, J., (1990), "Government spending in a simple model of endogenous growth", *Journal of Political Economy* 98, 103–125.

[6] Barro Robert J., (1991), "Inequality and Growth in a Panel of Countries," *Quarterly Journal of Economics* 106:407-443

[7] Barro, R. and X. Sala-i-Martin, (1992), "Public finance models of economic growth". *Review of Economic Studies* 59, 645–661.

[8] Barungi Barbara and Victor Davies, (2010), "African Development Bank's experience in Fragile States", African Development Bank.

[9] Birdsall, N., (1988), "Economic Approaches to Population Growth", In Handbook of Development Economics, Vol. 1, edited by H. Chenery and T.N. Srinivasan, New York: Elsevier Science.

[10] Benhabib, J., Rustichini, A., Velasco, A., (2001), "Public spending and optimal taxes without commitment". *Review of Economic Design* 6, 371–396.

[11] Besley, Timothy, and Torsten Persson. (2009) , "The Origins of State Capacity: Property Rights, Taxation, and Politics." *American Economic Review*, 99(4): 1218–44.

[12] Campos N. and F. Nugent, (2002), "Who is Afraid of Political Instability?" *Journal of Development Economics*, 67(1), 157-172.

[13] Cinyabuguma M. and Louis Putterman, (2011), "Sub-Saharan Growth Surprises: Being Heterogeneous, Inland and Close to the Equator Does not Slow Growth Within Africa", *Journal of African Economies*, 20 (2): 217-262.

[14] Collier Paul, (2006), "African Growth: Why a 'Big Push'?", *Journal of African Economies*, Vol. 15(2): 188-211.

[15] Collier, P., (2007), The Bottom Billion: Why the Poorest Countries are Failing and What can be Done About it, Oxford University Press, Oxford

[16] Campos, N. F. and J. B. Nugent, (2003), "Who is afraid of political instability?" *Journal of Development Economics*, 67 (1): 157-172.

[17] De Haan J. and C. L. Siermann, (1996), "Political Instability, Freedom and Economic Growth: Some Further Evidence." *Economic Development and Cultural Change*, 44, January.

[18] Easterly, William and Ross levine, (1997), "Africa's Growth Tragedy: Policies and Ethnic Divisions," *Quarterly Journal of Economics*, 112: 1203-1250.

[19] European Report on Development, 2009, "Overcoming Fragility in Africa: Forging a New European Approach", European University Institute.

[20] Feige, Edgar, (1997) , "Underground Activity and Institutional Change: Productive, Protective, and Predatory Behavior in Transition Economies" in Charles Tilly, Joan Nelson and Lee Walker (eds.) Transforming Communist Political Economies, pp. 21- 34. Washington DC: National Academy Press.

[21] Fiorina, M.P., (1981), Retrospective voting in America National Elections. Yale University Press.

[22] 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.

[23] Lewis-Beck, M.S., (1990), Economics and Elections: The Major Western Democraties, University of Michigan Press.

[24] Macit, Fatih, (2011), "Labor Market Institutions and Labor Productivity Growth", MPRA Paper No. 31727, http://mpra.ub.uni-muenchen.de/31727/

[25] Feng, Yi, Kugler, Jacek, and Paul J. Zak, (2000), "The Politics of Fertility and Economic Development," International Studies Quarterly 44: 667-693.

[26] Frances Stewart and Graham Brown, (2010), Center for Research on Inequality, Human Security and Ethnicity, No. 3.

[27] Guillaumont, Patrick, S. Guillaumont and L. Wagner, (2010), "Augmenting IDA Performance Based Allocation: The Vulnerability Issue". Paper presented to the Annual Bank Conference on Development Economics, Stockholm. FERDI, May 17.

[28] Helman, G., and R. Ratner, (1993), 'Saving Failed States', Foreign Policy, No. 89.

[29] Hjertholm, Peter and Jytte Laursen, (2000), "Macroeconomic issues in foreign aid," University of Copenhagen, Institute of Economics, Discussion Paper No. 00-05.

[30] Galor O, and Omar Moav, (2004), "From Physical to Human Capital AccumulationI: inequality and the Process of Development", *Review of Economic Studies*, Vol. 71, 1001-1026.

[31] Kaufmann, D., Kraay, A. & Zoido-Lobaton, P., (1999), "Governance Matters". Policy Research Working Paper, 2196.

[32] Lindblom, E. E., (1993), The Policy-Making Process, second ed. Prentice-Hall.

[33] McGuire Martin C. and Olson Mancur Jr., (1996), "The Economics of Autocracy and Majority Rule: The Invisible Hand and the Use of Force", *Journal of Economic Literature*, 72-96.

[34] Olson M., (1991), Autocracy, Democracy and Prosperity. Strategy and Choice, Cambridge/MA, 131-157.

[35] Torres, M., and M. Anderson, (2004), "Fagile States: Defining Difficult Environments for Poverty Reduction", Policy Division, Department for International Development (DFID), London.

[36] King, Robert G. and Ross Levine, (1993), "Finance and Growth: Schumpeter Might Be Right", *Quarterly Journal of Economics* 108, 717-37.

[37] Rotberg, R., (2003), State Failure and State Weakness in a Time of Terror, Brookings Institute Press, Washington DC.

[38] Rotberg, R., (2002),'The New Nature of Nation-State Failure', Washington Quarterly, No. XXV.

[39] Sachs, Jeffrey D., (2006), 'The End of Poverty'. Penguin Press, 2006. Pg. 244

[40] Sanín Francisco Gutiérrez, (2011), "Evaluating State Performance: A Critical View of State Failure and Fragility Indexes", *European Journal of Development Research* 23, 20-42.

[41] Radelet, Steven, (2004), "U.S. Foreign Assistance After September 11th," Testimony for the House Committee on International Relations, February 26. http://www.cgdev.org/doc/commentary/Radelet%20HIRC%20Testimony.pdf

[42] U.S. Agency for International Development, (2005), Fragile States Strategy, available at www. usaid. gov

[43] World Bank, (2002), World Bank Group Work in Low-Income Countries Under Stress: A Task Force Report. World Bank.

[44] World Bank Operations Policy and Country Services, (2005), "Low Income Countries Under Stress: Update," December 1.

[45] World Bank, (2006) , Engaging with Fragile States – An IEG Review of World Bank Support to Low-Income Countries under Stress, World Bank, Washington.

[46] Yi Feng, Kugler Jacek and Paul J. Zak, (2000), "The Politics of Fertility and Economic Development", *International Studies Quarterly*, Vol. 44, 667-693.

[47] Stewart, F. and G. Brown, (2009), "Fragile States", Working Paper No. 51. Oxford: Centre for Research on Inequality, Human Security and Ethnicity.

[48] Zak, Paul J., (2002), "Institutions, Property Rights, and Growth", *Recherches économiques de Louvain*, Vol. 68, 55-73.

[49] Zablotsky E. E., (1996), "Political Stability and Economic Growth". CEMA Working Paper, 109.

[50] Zoellick, R., (2008), 'Fragile States: Securing Development', Survival, Vol 50, No. 6, pp. 67-84