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# DRIVERS OF GROWTH IN FRAGILE STATES:

# HAS THE HIPC PROCESS HELPED FRAGILE COUNTRIES GROW?

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## I. Introduction

1. Fragile states are a group of Low Income Countries (LICs) with a score of below 3.2 on the World Bank Country Policy and Institutional Assessment (CPIA) rating with common characteristics such as low per capita income, a poor record of economic growth, predominantly young populations, and rapid rates of population growth.[2] Fragile countries are farthest away from reaching the UN's Millennium Development Goals, with over 300 million poor people living on less than a dollar a day, displaying the highest concentration of extreme poverty and accounting for more than a third of the extreme poor in the world. A majority of fragile states have been affected by wars in recent years, and many remain at a high risk of conflict or political instability. All fragile states have suffered periods of prolonged contraction, usually around the time of conflict and political instability.

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[2] For a comprehensive review of characteristics and economic policy in fragile states see Favaro, E. (2008) "Fragility and Beyond: The World Bank Economic Growth Agenda in Fragile States." World Bank (mimeo); and Lluch, C. (2008). "Economic Policy Issues in Fragile States: Where Does the Bank Stand?" World Bank (mimeo)

**Box 1: Alternative definitions of 'fragile states'**

There are many different approaches to defining and responding to the complex development situation referred to under such diverse names as 'weak and failing states', 'poor performers', 'low-income countries under stress', 'countries at risk of instability' or 'fragile states'. The various lists include 30-40 countries depending on the definition used and the lists are not necessarily totally overlapping.

Difficult environment countries matter, for different reasons, to a wide range of development actors, including NGOs, bilateral donors and international organizations, as well as government agencies such as foreign and defense ministries. It is important to state at the outset that existing terminology, in English and in other languages, does not necessarily refer to states that are unresponsive to the poor. Some may be simply poor performers, some may be autocratic and some may be conflict-ridden. An in-depth review of existing definitions suggests they are organized around three broad categories, based on their central themes or assumptions:

1) Fragile, failed, or crisis states: These definitions are based on the assessment of a state's strength around issues of capability, sovereignty and conflict. The USAID's Fragile States Strategy is an example of this approach.

2) Poor performing countries: Most of the international financial institutions (IFIs) focus their approach to difficult environments around how well a country performs in terms of development outcomes, taking into account the quality of governance and policy choices. The World Bank's Low Income Countries Under Stress is the best-known example of this approach.

3) Difficult aid partners: In this approach the emphasis is placed on the poor aid relationships between donors and recipient states, due to a combination of: a) lack of political interest in poverty reduction, andb) weak state and non-state institutional capacity to implement policy.

The OECD's Development Assistance Committee (DAC) and DFID have been pioneers of this approach.

*Source*: Bourguignon et al. 2008 "Millennium Development Goals at Midpoint: Where do we stand and where do we need to go?" European Report on Development.

2. Twenty of the 34 identified fragile states, in addition to the characteristics above, are heavily indebted. The Heavily Indebted Poor Countries (HIPC) Initiative and the Multilateral Debt Relief Initiative (MDRI) have helped qualifying countries reduce extreme external debt burdens, and have contributed to creating fiscal space for channeling resources into poverty-reducing activities and economic development. Fragile HIPCs as a group demonstrate stark differences from the fragile states that are not highly indebted: their income per capita is less than one half that of the non-HIPC fragile states, and social indicators across the board are, on average, lower. Their annual economic growth rates remained negative until the mid-1990s, and notably lower than those of non-HIPC fragile states, and total investment growth has been substantially lower and real exchange rate volatility higher than in non-HIPC fragile countries.

3. Apart from being consistently at the bottom of the fragile states group, the twenty fragile HIPCs are not homogeneous. They are at different stages of the HIPC Initiative: four countries (the Gambia, Mauritania, Sao Tome and Principe, and Sierra Leone) have reached the completion point and received irrevocable HIPC Initiative and MDRI debt relief; ten have reached the decision point and have started to receive interim assistance, and another six have yet to reach the decision point. In addition, three HIPCs that at the time of reaching the HIPC Initiative decision point were fragile states according to the CPIA-based definition (Niger, Cameroon, and Ethiopia), have lost their fragile-state status in the following years (Figure 4).

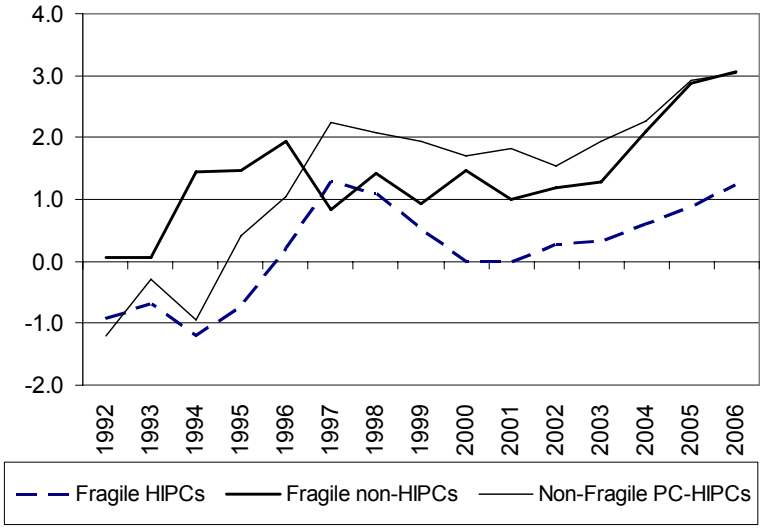
4. Does the difference among the various groups of fragile states suggest that there are fundamental differences in the drivers of economic prosperity in these countries? And if so, has the HIPC Initiative process helped countries improve their prospects for growth? The paper aims to explain the economic growth differentials in fragile states and analyze variables that appear to be robust determinants of economic growth in these countries during the last twenty-four years. Using Bayesian Model Averaging (BMA) to assess and identify model uncertainty, we explore the factors affecting the growth of fragile HIPCs and compare them to the robust determinants of income growth both in non-fragile HIPCs and in other non-HIPC fragile countries.

5. The rest of the paper is structured as follows. In section II, we test the proposition that the very dimension of large debt stock and its macroeconomic consequences makes the group of fragile HIPCs significantly worse off in terms of economic growth prospects compared to the rest of the fragile states. In section III, we present the methodology in addressing the issue of relevant determinants to growth in these countries. Section IV reports the results of the BMA analysis for the various groups of countries considered. Section V concludes.

## II. Characteristics of Fragile States

6. There are stark differences among the subgroups of fragile states. Fragile HIPCs are worse off in economic and social aspects of development, compared to the other fragile states and HIPCs. Average income per capita in fragile-HIPCs over the last 15 years has been half of those in fragile non-HIPCs. Fragile HIPCs exhibits much lower growth of per capita income compared to non-fragile post completion point HIPCs (henceforth, CP-HIPCs) and fragile non-HIPC countries (Figure 1).[3] The gap has widened in recent years, and non-HIPC fragile states with income per capita of $1,079 are currently almost three times richer than their HIPC counterparts.

Figure 1. Annual Growth of Income per Capita in Fragile States and HIPCs




Source: GDF, World Bank

7. The headcount of the poor as a share of the population in fragile HIPCs (70 percent on average) has been twice the size of that in non-HIPC fragile states (35 percent on average) over the last 15 years. Persistent poverty is also revealed in aspects of human development such as health and education. While in all fragile states, under-five mortality has declined over the period 1990-2006, it is on average 41 percent higher in fragile HIPCs than the non-HIPC fragile states. Primary school completion rates have been about 37 percent lower in fragile HIPCs (40 percent in HIPCs vs. 70 percent in non-HIPCs) on average over the last 15 years. Similarly, primary school enrolment in fragile states on average over the same period was 57 percent in non-HIPCs vs. 78 percent in HIPCs. Such differences remain over time. The group of fragile-HIPCs ranks lower along a variety of human development indicators compared to the CP-HIPCs (Table 1).

[3] The list for non-fragile completion-point HIPCs (i.e. CP-HIPCs) includes: Benin, Bolivia, Burkina Faso, Cameroon, Ethiopia, Ghana, Guyana, Honduras, Madagascar, Malawi, Mali, Mozambique, Nicaragua, Niger, Rwanda, Senegal, Tanzania, Uganda, and Zambia.

8. There are important differences along human development indicators that distinguish the CP-HIPCs from the rest of the fragile stages, and partly explain their gains on the development front. HIPC debt relief, and especially the cancelation of debt stocks under the MDRI, aims to increase the fiscal space for the beneficiary governments and allow them to direct expenditures into poverty-reducing activities. Indeed, the HIPC Initiative frequently includes education and/or health completion point triggers, negotiated at the decision point. While the overall effects of such measures come about with a few years lag, the CP-HIPCs exhibit on average the largest drop in poverty rates and significant advances in school enrollment. Additional evidence of significant decrease in primary schooling drop-out rates exists for HIPCs after reaching the completion points.[4] However, gains are less pronounced in other areas of human development (Table 1).

Table 1 .Human Development Indicators in Fragile States and HIPCs

| | Fragile HIPCs | Fragile Non-HIPCs | Non-Fragile CP-HIPCs |
|---|---|---|---|
| | *Average 1990-2006* | | |
| Poverty headcount ratio at national poverty line (% of population) | 56.4 | 35.9 | 50.7 |
| School enrollment, primary (% net) | 57.6 | 76.7 | 65.4 |
| Primary completion rate, total (% of relevant age group) | 40.0 | 69.6 | 47.1 |
| Life expectancy at birth, total (years) | 23.3 | 26.9 | 25.2 |
| Mortality rate, under-5 (per 1,000) | 158.3 | 112.3 | 147.4 |
| | *Last available year* | | |
| Poverty headcount ratio at national poverty line (% of population) | 70.2 | 35.0 | 28.5 |
| School enrollment, primary (% net) | 60.6 | 81.1 | 77.6 |
| Primary completion rate, total (% of relevant age group) | 54.9 | 82.1 | 59.8 |
| Life expectancy at birth, total (years) | 50.8 | 58.4 | 55.6 |
| Mortality rate, under-5 (per 1,000) | 146.8 | 96.3 | 130.7 |

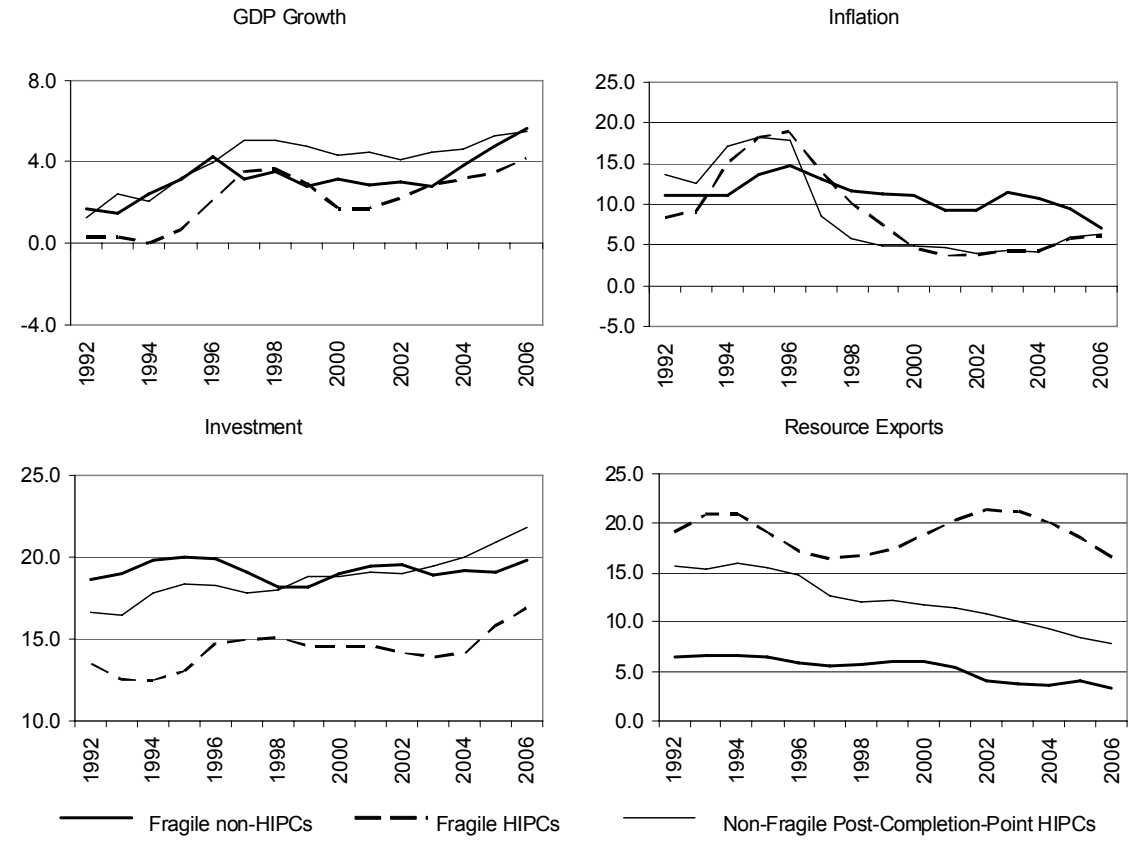
Source: GDF, World Bank

9. A snapshot of macroeconomic indicators also places consistently fragile HIPCs at an inferior position to non-HIPCs fragile states. Growth rates of fragile states are highly volatile compared to CP-HIPCs. Half of the fragile HIPCs experienced negative growth until mid-1990s. All fragile states have undergone through periods of prolonged contraction usually around the time of conflict and political instability. Importantly, however, the growth rate of countries that have gone through the HIPC Initiative has been on average higher over the last two decades than the one in fragile states, especially noting their comparatively lower dependence on recourse exports. Resource rich primary commodity exporters have benefited from high commodity prices, fueling their output growth. Similarly, total investment as a share of output

[4] Crespo Cuaresma, J and G. A. Vincelette. 2008. "Debt Relief and Education in HIPCs." World Bank (mimeo).

have been roughly 50 percent lower in fragile HIPCs compared to other fragile countries and CP-HIPCs.

Figure 2. Selected Macroeconomic Indicators in Fragile States and HIPCs
(3 year moving average of annual median)




Source: GDF

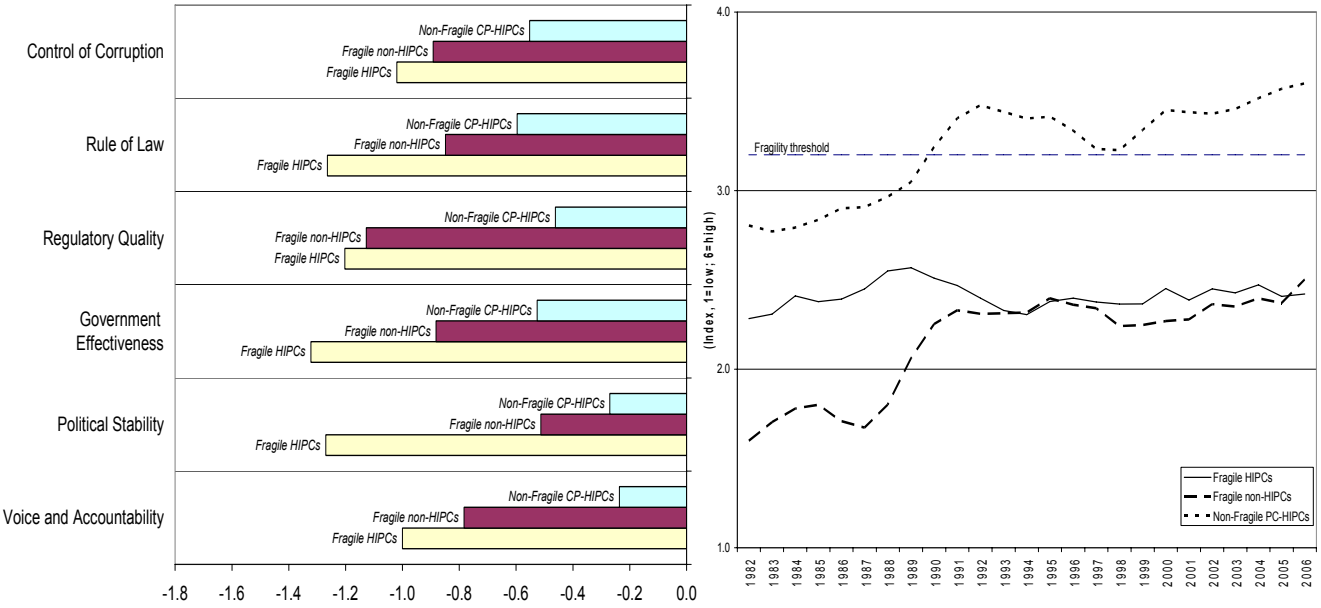
10. Bearing in mind that all fragile states are with a CPIA score of 3.2 or lower, non-HIPCs have demonstrated on average a relatively stronger improvement of their institutional environment compared to fragile HIPCs, whose CPIA rating has remained on average unchanged in the past 25 years. The CPIA ratings of fragile states stay remarkably below that of CP-HIPCs (Figure 3)

11. Fragile HIPCs as a group also exhibit lower quality of governance institutions as compared to the non-HIPC fragile states. On average, along all six dimensions of the WB governance indicators, non-HIPC fragile states fare better than the fragile HIPCs. The largest differences (also carrying statistical significance) are prevalent on the indicators of political stability and government effectiveness. No significant differences are found on the dimension of control of corruption hinting at the complexity of removing patronage and vested interests of groups frequently linked to lucrative opportunities in the extractive industry.

12. While governance quality in HIPCs has not played a significant role in the decision of creditor countries to forgive debt in the 1990s, CP-HIPCs fare notably better than any either one group of fragile states.[5] This is to suggest that on the one hand, the presence of fragility is associated with lower quality of governance. On the other hand, however, alleviation of the debt burden in poor developing countries has been associated with improving not only the availability of financial resources of these countries, but also has contributed to improving governance institutions. Put differently, conditionality imbedded in the triggers of the HIPC Initiative has helped graduating countries improve governance.

Figure 3. CPIA and Governance in Fragile States: HIPCs and Non-HIPCs

*Governance Indicators 2007* | *CPIA Index, 1982-2006 (3-year moving average)*




Source: World Bank Governance Indicators, www.worldbank.org/wbi/governance

13. In sum, fragile HIPCs exhibits lower per capita growth and investment, a stronger reliance on resource exports, lower human development indicators and poorer quality of policies and institutions compared to CP-HIPCs and fragile non-HIPCs. In the following section we examine whether these differences imply variance of growth determinants in fragile HIPCs compared to other HIPCs and other fragile states. If so, we consider whether the HIPC Initiative helps those countries improve their prospects for growth.

[5] Freytag, A., & Pehnelt, G. 2008. "Debt Relief and Governance Quality in Developing Countries," World Development (forthcoming)

## III. Methodology

14. We quantify differences between fragile and non-fragile HIPCs to identify group-specific determinants of income growth. We collect data for the countries shown in Table 1 over the period 1984-2004, and conduct an analysis based on pooled data for the five resulting four-year non-overlapping subperiods. Growth rates are therefore defined over these four-year subperiods, and the variables are evaluated at the beginning of each four-year period to address eventual endogeneity problems.

15. The potential growth determinants considered in the analysis are shown in Table 2. They include some standard determinants implied by neoclassical growth theory such as the initial level of GDP per capita and the physical capital investment rates as well as other variables, deemed important economic growth covariates for developing countries, including private credit to GDP ratio, life expectancy, openness, macroeconomic stability, among others. Given the presence of high levels of external debt burden in HIPCs, we include also the present value of debt to output ratio as a covariate in the growth regression. We analyze which variables appear to be robust determinants of economic growth in different group of developing countries using Bayesian model averaging (BMA) techniques, which have recently become a workhorse of empirical economic growth research.[6]

16. BMA aims at assessing explicitly the issue of model uncertainty when estimating parameters of a model whose specification is not perfectly known. This is usually the setting in empirical economic growth research: we have many (partly complementary) theories that lead to different variable choices for the model specification. The main idea behind BMA is to estimate the parameters of interest in our model as weighted averages of parameter estimates from individual models, where the weights are obtained as the posterior probability of the corresponding models.

17. Consider a model relating the growth rate of GDP per capita (y) to some covariates,

$$\mathbf{y} = \alpha + \mathbf{X}_k \beta + \varepsilon$$

where $\mathbf{X}_k = (x_1 x_2 \ldots x_k)$ is a subset formed by $k$ variables corresponding to elements of $\mathbf{X}_K = (x_1 x_2 \ldots x_K)$, which contains all possible regressors ($K$ of them), and $\beta = (\beta_1 \ldots \beta_k)'$ is a vector of parameters and ε a vector of independently and normally distributed error terms. We can assess the issue of model uncertainty by averaging over all the alternative models implied by the combinations of variables among those in the set of $K$ covariates. Given a prior structure on model size and the model parameters, Bayes factors can be used to compare models with different variables. Inference about a quantity of interest, Δ, can then be based on its posterior

[6] See Fernández, Ley and Steel, 2001, or Sala-i-Martin, Doppelhofer and Miller, 2004, for two of the most influential contributions in this branch of the literature.

distribution taking into account uncertainty about model size through the use of posterior model probabilities as weights[7],

$$\mathrm{P}(\Delta \mid \mathbf{Y}) = \sum_{m=1}^{2^K} \mathrm{P}(\Delta \mid \mathbf{Y}, M_m)\mathrm{P}(M_m \mid \mathbf{Y}),$$

where $Y$ is a given set of data and a model $M_m$ is defined by the choice of independent variables. The posterior model probability, $\mathrm{P}(M_s \mid \mathbf{Y})$, is given by

$$\mathrm{P}(M_s \mid \mathbf{Y}) = \frac{\mathrm{P}(\mathbf{Y} \mid M_s)\mathrm{P}(M_s)}{\sum_{m=1}^{M} \mathrm{P}(\mathbf{Y} \mid M_m)\mathrm{P}(M_m)},$$

which is, in turn, the normalized product of the integrated likelihood for each model $\mathrm{P}(\mathbf{Y} \mid M_k)$ and the prior probability of the model $\mathrm{P}(M_k)$. This implies that, for a given prior on the model space, the posterior distribution of $\Delta$ can be obtained as a weighted average of the model-specific estimates using posterior probability of the respective models as weights. We can simplify this expression by using the BIC approximation (Leamer, 1978, Schwarz, 1978),

$$\mathrm{P}(M_s \mid \mathbf{Y}) = \frac{\exp(-\frac{1}{2}\mathrm{BIC}(M_s))\mathrm{P}(M_s)}{\sum_{m=1}^{M} \exp(-\frac{1}{2}\mathrm{BIC}(M_m))\mathrm{P}(M_m)}.$$

where the BIC is given by

$$\mathrm{BIC}(M_k) = -2\log(\mathit{Likelihood} \mid M_k) + k\log(NT),$$

and *Likelihood* is the value of the likelihood function evaluated at its maximum and $k$ is the number of estimated parameters. If the cardinality of the model space is computationally tractable, these expresions can be obtained directly.[8] The posterior mean and variance of the parameters of interest can be used to make inference on the quantitative effect of changes in the covariates on economic growth explicitly taking into account the existence of model uncertainty. In the same fashion, we can evaluate posterior inclusion probabilities for the different variables proposed, which can be obtained by summing the posterior probability of models containing each individual variable (or groups of it). This measure captures, thus, the relative importance of the different covariates as determinants of economic growth and can be interpreted as the probability that a given variable belongs to the true specification.

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[7] See Hoeting, Madigan, Raftery and Volinsky (1999) for a formal treatment of Bayesian model averaging technique.

[8] When the cardinality of the model space makes the problem intractable, several methods have been proposed for approximating the posterior model probability. Raftery (1995) proposes the use of a leaps and bounds algorithm, Fernández, Ley and Steel (2001) use a simple Markov Chain Monte Carlo Model Composite algorithm to evaluate the posterior distribution based on the work of Madigan and York (1995) and Sala-i-Martin, Doppelhofer and Miller (2004) use a particular type of importance sampler.

## IV. Results

18. For the BMA exercise, we assume a uniform prior over the model space, which results in a 0.5 prior inclusion probability for each potential explanatory variable. In the results presented in Table 4, we consider fixed country effects, but include in the specification global subperiod fixed effects common to all countries in the sample. This implies that we obtain our estimates by extracting information from the variation within countries instead of between countries. We describe the variables used for the BMA analysis in Table 2.

19. Table 4 presents the analysis for three partially overlapping groups: (i) the full set of fragile states, (ii) the entire group of HIPCs and (iii) the group of fragile HIPCs. The posterior inclusion probabilities for the full set of fragile states reveal a great deal of heterogeneity among these countries with respect to determinants of their economic growth. For only two variables the BMA presents greater evidence that they actually belong to the model after observing the data as compared to their prior inclusion probabilities: the initial level of income and the physical capital formation. These results indicate that along with convergence dynamics, it is the differences in the initial level of physical capital investment that matter most when explaining the growth experience of fragile states in the last two decades. The estimated coefficient of growth to investment in physical capital of fragile states is around 0.4, relatively close to the standard value of 1/3 which tends to be assumed in Cobb-Douglas specifications based on aggregate data on income paid to the capital factor.

20. The heterogeneity is even bigger within the group of fragile HIPCs and within the broader group of HIPCs. In these two groups of countries, economic growth does not seem responsive to investment in physical capital. Instead, only the recurrence of armed conflict explains robustly growth differences within the HIPCs, including the fragile ones among them. Given the ambiguity of such results, concentrating on more homogenous sub-groups of countries is warranted.

21. To account for some of the heterogeneity which appears to be driving the results for the broad groups of fragile states and the HIPCs, we reassess the robustness of economic growth determinants, focusing on subsamples of fragile states and HIPCs with debt-to-GDP ratios below the median for each of the evaluated groups. We label each of these subgroups as countries with low debt burden. The results in Table 5 present estimates for the full set of fragile states and for the entire group of HIPCs. The analysis based on within-country variation and period effects is able to identify a broader set of robust growth covariates in these three low debt burden subgroups of countries.

22. For fragile states with low debt burden, economic growth responds strongly to investment in physical capital. In fact, the estimated coefficient of growth to investment appears large in the group of fragile states where debt stocks are low relative to output, brining support to the debt overhang theory. The convergence

speed to the country-specific equilibrium income level is also notably faster when compared with the entire group of fragile states. In addition, the results reveal the importance of health improvements (measured through changes in life expectancy) and positive changes in the share of mineral exports-to-GDP and agricultural value added as variables contributing economic growth in the low-debt fragile states.

23. Table 5 also presents the results for the subgroups of HIPCs with low debt burden. The findings for low-debt HIPCs are similar to those for the group of low-debt fragile states. The low-debt HIPCs seem to be responsive to improvements to health, investment, and mineral exports. The speed of convergence to country-specific equilibrium level of income seems also similar to the one of low-debt fragile states. The results for low-debt HIPCs point also to the importance of macroeconomic stability (as captured in the inflation rate) as an extra driver of economic growth. Interestingly, however, the effect of armed conflict on economic growth, while negative, loses its significances for this sub-group of HIPCs This finding implies (by inference) that the negative effect of armed conflict for the full set of HIPCs are strongly driven by the devastating effect of wars and political instability for the economic prosperity of HIPCs with high levels of debt. For these countries none of the variables which were considered as potential growth covariates appears robustly related to growth. In particular, there is no robust link between economic growth and physical capital accumulation, brining even stronger evidence in support of the debt overhang hypothesis. Put differently, high debt burden have decreased the quantity or efficiency of investment in this group of countries.

24. Has fragility negatively affected economic growth in HIPCs? To address this issue, we concentrate on exploiting determinants of growth within countries that have graduated from the HIPC Initiative and have benefitted from irrevocable debt relief. While it would be valuable to reveal the determinants of growth in the group of fragile CP-HIPCs, the small number of observations (only four countries) does not allow us to run a BMA. Hence, we infer information about the graduated fragile HIPCs by revealing the results for the group of CP- HIPCs (i.e. excluding the four fragile states).

25. The posterior inclusion probabilities in Table 6 reveals that as a broad group post-completion-point HIPCs (including the four fragile countries) are not generally different from HIPCs, with the notable exception that they experience a faster speed of convergence to their country-specific steady state level of income compared to the full group of HIPCs. However in non-fragile completion-point HIPCs, convergence is faster, conflict hurts growth marginally less, and mineral exports contribute significantly to growth. Importantly, decreases in overall level of debt burdens (proxied by the present value of debt stock-to-GDP) tend to be associated with higher economic growth in CP-HIPCs.

26. These results are further reinforced in the group of CP-HIPCs with low debt burdens, for which a low level of debt, coupled with stronger policies and institutions positively contribute to growth, in addition to macroeconomic stability, investment,

agricultural value added, and mineral exports and health improvements. This finding suggests that fragility does hinder progress under the HIPC Initiative. Moreover, fragility in HIPCs prevents the receipt of the extra growth bonus from debt relief.

## V. Conclusions

27. Interpreting the growth experience of the 54 developing countries falling into the group of fragile states and/or HIPCs in the twenty-year period under consideration is not straightforward. Overall, the analysis reveals that their drivers of growth are widely heterogeneous and uncertain. Economic growth responds to the differences in the initial level of physical capital investment and initial level of income in fragile states. However, economic growth in the groups of HIPCs, including fragile HIPCs, seem to respond robustly only to the recurrence of armed conflict, with none of the other factors systematically helpful in explaining economic growth differences.

28. To overcome the issue of heterogeneity, we split the groups and look at countries within the sample with debt-to-GDP ratios below and above the respective group median. For the group of countries with low debt burdens in the fragile states and HIPCs subgroups, we find that economic growth responds to common factors. Namely, improvements to health, investment, and primary exports play an important role in explaining growth differences among these two subgroups of countries. The speed of convergence to country-specific equilibrium level of income in each of the two groups also appears similar. The results for low-debt HIPCs bring about the importance of macroeconomic stability as an extra driver of economic growth.

29. In addition, the results on the determinants of the economic growth process in fragile states give us an important insight into the HIPC process. Overall, we find that fragility has hindered progress of HIPCs through the HIPC Initiative process. Fragile HIPCs have suffered from the highest reduction in economic growth incurred by armed conflict; have had the lowest volume of investment and returns to it; and are converging the slowest to their long-run equilibrium level as compared to non-fragile HIPCs. Despite that, fragile HIPCs that have passed the completion point tend to exhibit on average fastest growth rates compared to the other groups of fragile states. Moreover, convergence is faster, conflict hurts growth marginally less, and mineral exports contribute significantly more to growth in non-fragile completion-point HIPCs compared to the group of fragile states.

30. Importantly, we find evidence of decreases in overall level of debt stock-to-GDP ratio associated with higher economic growth in non-fragile completion-point HIPCs. As the debt overhang theory would imply, investment is positively associated with growth in the presence of low debt burden. As expected, this link revealed the strongest in low debt post-completion HIPCs, where the quality of policies and institution is on average the highest, compared to other HIPCs and fragile states.

31. This finding suggests that fragility has hindered progress under the HIPC Initiative, while the staggered debt relief structure of the HIPC process does not seem to have aggravated fragility. For the broad group of fragile state, i.e. countries with a poor quality of policies and institutions, there seem to be no link between debt burden and growth. Also, most standards growth covariates are not found to contribute to economic prosperity in the presence of fragility, independently from the level of debt. Countries that instead benefited from debt relief while improving the quality of their policies and institutions seem to have also benefitted from economic growth after receiving debt relief.

Figure 4. Groups of Fragile States and HIPCs

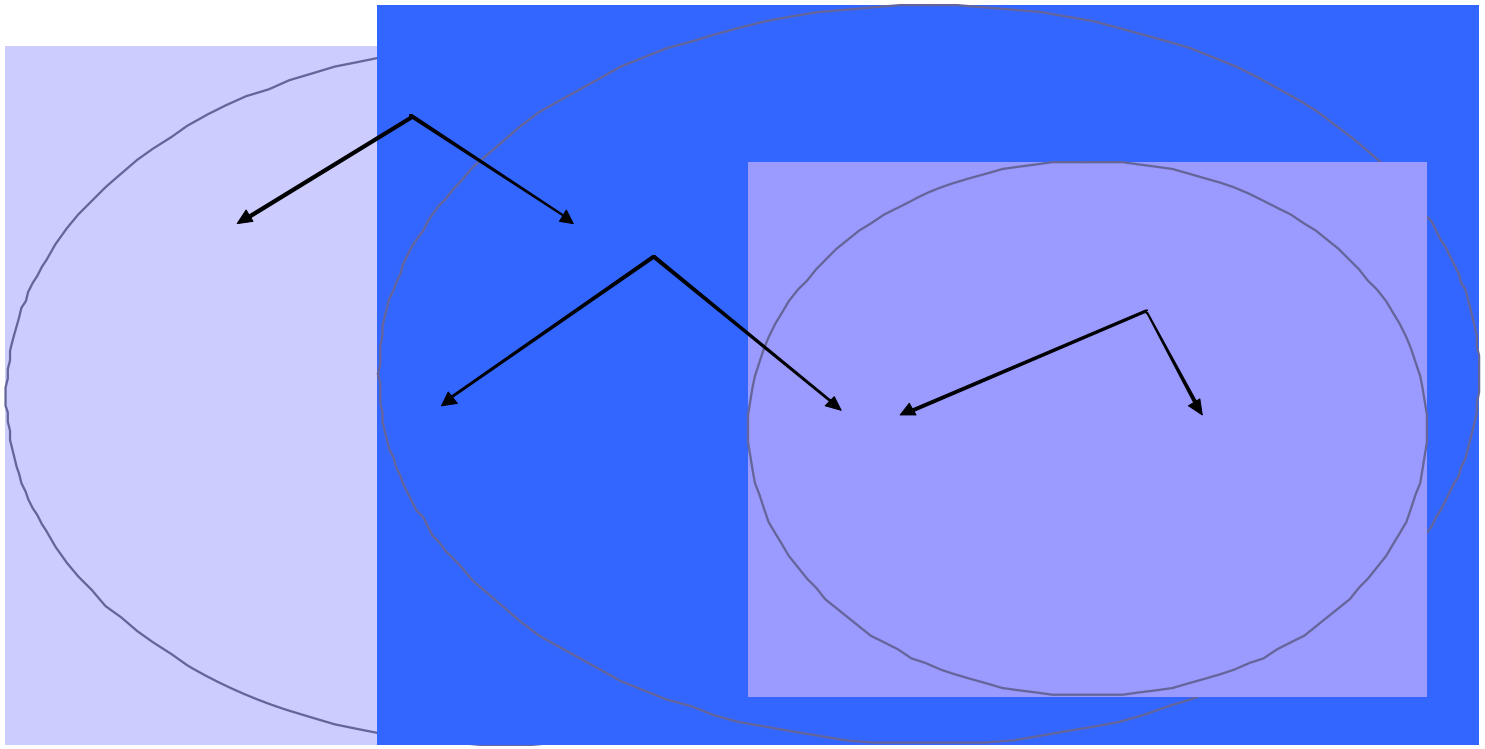

Table 2. Countries in the samples

| Countries | Fragile States | HIPCs | CP-HIPCs |
|---|---|---|---|
| Afghanistan | 1 | 1 | 0 |
| Angola | 1 | 0 | 0 |
| Benin | 0 | 1 | 1 |
| Bolivia | 0 | 1 | 1 |
| Burkina Faso | 0 | 1 | 1 |
| Burundi | 1 | 1 | 0 |
| Cambodia | 1 | 0 | 0 |
| Cameroon | 0 | 1 | 1 |
| Central African Republic | 1 | 1 | 0 |
| Chad | 1 | 1 | 0 |
| Comoros | 1 | 1 | 0 |
| Congo, DR | 1 | 1 | 0 |
| Congo, Rep. | 1 | 1 | 0 |
| Cote d'Ivoire | 1 | 1 | 0 |
| Djibouti | 1 | 0 | 0 |
| Eritrea | 1 | 1 | 0 |
| Ethiopia | 0 | 1 | 1 |
| Gambia | 1 | 1 | 1 |
| Ghana | 0 | 1 | 1 |
| Guinea | 1 | 1 | 0 |
| Guinea-Bissau | 1 | 1 | 0 |
| Guyana | 0 | 1 | 1 |
| Haiti | 1 | 1 | 0 |
| Honduras | 0 | 1 | 1 |
| Kosovo | 1 | 0 | 0 |
| Kyrgyz Rep. | 0 | 1 | 0 |
| Lao PDR | 1 | 0 | 0 |
| Liberia | 1 | 1 | 0 |

| Countries | Fragile States | HIPCs | CP-HIPCs |
|---|---|---|---|
| Mauritania | 1 | 1 | 1 |
| Mozambique | 0 | 1 | 1 |
| Myanmar | 1 | 0 | 0 |
| Nepal | 0 | 1 | 0 |
| Nicaragua | 0 | 1 | 1 |
| Niger | 0 | 1 | 1 |
| Nigeria | 1 | 0 | 0 |
| Papua New Guinea | 1 | 0 | 0 |
| Rwanda | 0 | 1 | 1 |
| Sao Tome and Principe | 1 | 1 | 1 |
| Senegal | 0 | 1 | 1 |
| Sierra Leone | 1 | 1 | 1 |
| Solomon Islands | 1 | 0 | 0 |
| Somalia | 1 | 1 | 0 |
| Sudan | 1 | 1 | 0 |
| Tanzania | 0 | 1 | 1 |
| Timor-Leste | 1 | 0 | 0 |
| Togo | 1 | 1 | 0 |
| Tonga | 1 | 0 | 0 |
| Uganda | 0 | 1 | 1 |
| Uzbekistan | 1 | 0 | 0 |
| Vanuatu | 1 | 0 | 0 |
| Zambia | 0 | 1 | 1 |
| Zimbabwe | 1 | 0 | 0 |
| Total | 34 | 41 | 23 |

Table 3Variables used in the BMA exercise

| Dependent variable | Details |
|---|---|
| Growth rate of GDP per capita | Annual average GDP per capita growth (PPP corrected), WEO database. |
| Potential covariates | |
| Initial level of GDP per capita (log) | GDP per capita (PPP corrected), WEO database |
| Gross fixed capital formation (as % of GDP) | WDI database |
| Trade over GDP | WDI database |
| Domestic credit to private sector (% of GDP) | WDI database |
| Population growth | WDI database |
| Country size (log of total population) | WDI database |
| Inflation rate | WEO database |
| Agricultural output (% of total value added) | WDI database |
| Life Expectancy | WDI database |
| Mineral exports (% of total exports) | UNCTAD statistics |
| Armed conflict | UCDP/PRIO Armed Conflict Dataset |

Table 4:BMA results: pooled data with country fixed effects

| | All Fragile States | | | All HIPCs | | | All fragile HIPCs | | |
|---|---|---|---|---|---|---|---|---|---|
| Variable | Post. Inc. Prob | Post. E(b) | Post. SD(b) | Post. Inc. Prob | Post. E(b) | Post. SD(b) | Post. Inc. Prob | Post. E(b) | Post. SD(b) |
| Initial income | **0.9846** | **-0.1163** | **0.0420** | 0.3786 | -0.0149 | 0.0243 | 0.3879 | -0.0260 | 0.0442 |
| Gross fixed capital formation | **0.9914** | **0.4121** | **0.1360** | 0.1314 | 0.0090 | 0.0405 | 0.4444 | 0.1058 | 0.1581 |
| Openness | 0.2749 | -0.0169 | 0.0389 | 0.1535 | -0.0041 | 0.0146 | 0.2395 | -0.0147 | 0.0398 |
| Agricultural VA | 0.1138 | 0.0001 | 0.0369 | 0.0964 | 0.0021 | 0.0159 | 0.1535 | 0.0097 | 0.0618 |
| Inflation | 0.4491 | -0.0071 | 0.0104 | 0.0975 | 0.0000 | 0.0001 | 0.1783 | -0.0014 | 0.0055 |
| Life expectancy | 0.4430 | 0.0012 | 0.0017 | 0.1439 | 0.0002 | 0.0006 | 0.1370 | 0.0001 | 0.0012 |
| Mineral exports | 0.2102 | -0.2360 | 0.7213 | 0.0997 | 0.0299 | 0.2467 | 0.1692 | -0.1312 | 0.6033 |
| Conflict | 0.1368 | -0.0019 | 0.0108 | **0.9899** | **-0.0459** | **0.0147** | **0.5186** | **-0.0227** | **0.0290** |
| Present value of debt over GDP | 0.1235 | -0.0003 | 0.0094 | 0.2037 | -0.0034 | 0.0092 | 0.1440 | -0.0017 | 0.0111 |
| CPIA | 0.1693 | -0.0012 | 0.0047 | 0.0860 | 0.0000 | 0.0015 | 0.1270 | -0.0001 | 0.0035 |
| Obs. | | 66 | | | 123 | | | 53 | |

Note: Variables in bold have posterior inclusion probabilities larger than their 50% prior probability of model inclusion.

Table 5: BMA results: pooled data with country fixed effects for countries with low present value of debt

| | All Fragile States | | | All HIPCs | | |
|---|---|---|---|---|---|---|
| Variable | Post. Inc. Prob | Post. E(b) | Post. SD(b) | Post. Inc. Prob | Post. E(b) | Post. SD(b) |
| Initial income | **1.0000** | **-0.2800** | **0.0646** | **1.0000** | **-0.2552** | **0.0469** |
| Gross fixed capital formation | **1.0000** | **0.8766** | **0.1606** | **0.9819** | **0.5041** | **0.1615** |
| Openness | **0.8103** | **-0.1019** | **0.0863** | 0.1959 | 0.0188 | 0.0647 |
| Agricultural VA | **0.6133** | **0.1307** | **0.1662** | 0.1567 | -0.0113 | 0.0586 |
| Inflation | 0.2071 | -0.0092 | 0.0607 | **0.9274** | **-0.0504** | **0.0272** |
| Life expectancy | **0.9301** | **0.0039** | **0.0022** | **0.9758** | **0.0062** | **0.0022** |
| Mineral exports | **0.9740** | **4.1919** | **1.9270** | **0.9408** | **3.4151** | **1.5887** |
| Conflict | 0.1850 | 0.0013 | 0.0188 | 0.1605 | -0.0023 | 0.0110 |
| Present value of debt over GDP | 0.2714 | -0.0157 | 0.0493 | 0.1150 | -0.0002 | 0.0183 |
| CPIA | 0.1711 | -0.0003 | 0.0095 | 0.1383 | -0.0001 | 0.0038 |
| Obs. | | 33 | | | 61 | |

Note: Variables in bold have posterior inclusion probabilities larger than their 50% prior probability of model inclusion.

Table 6: BMA results: pooled data with country fixed effects for CP-HIPCs

| | All CP-HIPCs | | | Non-Fragile CP-HIPCs | | | CP-HIPCs with Low PV of Debt | | |
|---|---|---|---|---|---|---|---|---|---|
| Variable | Post. Inc. Prob | Post. E(b) | Post. SD(b) | Post. Inc. Prob | Post. E(b) | Post. SD(b) | Post. Inc. Prob | Post. E(b) | Post. SD(b) |
| Initial income | **0.7652** | **-0.0424** | **0.0322** | **0.9751** | **-0.0860** | **0.0339** | **1.0000** | **-0.2022** | **0.0500** |
| Gross fixed capital formation | 0.1186 | -0.0018 | 0.0365 | 0.1377 | 0.0056 | 0.0407 | **0.9815** | **0.2617** | **0.1218** |
| Openness | 0.1252 | 0.0009 | 0.0109 | 0.1445 | 0.0018 | 0.0130 | 0.3888 | 0.0295 | 0.0637 |
| Agricultural VA | 0.1839 | 0.0074 | 0.0245 | 0.2335 | 0.0109 | 0.0297 | **0.9931** | **0.3147** | **0.1379** |
| Inflation | 0.1118 | 0.0000 | 0.0001 | 0.1176 | 0.0000 | 0.0001 | **0.9982** | **-0.0523** | **0.0164** |
| Life expectancy | 0.1032 | 0.0000 | 0.0004 | 0.1411 | 0.0001 | 0.0005 | **0.9997** | **0.0085** | **0.0017** |
| Mineral exports | 0.5059 | 0.7612 | 0.9764 | 0.7960 | 1.4988 | 1.0864 | **0.9887** | **3.5910** | **1.4015** |
| Conflict | **1.0000** | **-0.0754** | **0.0179** | **0.9905** | **-0.0660** | **0.0215** | 0.1617 | 0.0011 | 0.0148 |
| Present value of debt over GDP | 0.3796 | -0.0096 | 0.0161 | **0.8137** | **-0.0290** | **0.0200** | **0.9184** | **-0.0683** | **0.0461** |
| CPIA | 0.1551 | -0.0006 | 0.0025 | 0.1245 | 0.0001 | 0.0020 | 0.1591 | 0.0000 | 0.0035 |
| Obs. | | 77 | | | 65 | | | 37 | |

Note: Variables in bold have posterior inclusion probabilities larger than their 50% prior probability of model inclusion.