

State Fragility: Towards a Conceptual Framework

Aliona Cebotari, Enrique Chueca-Montuenga, Yoro Diallo,
Yunsheng Ma, Rima Turk, Weining Xin and Harold Zavarce

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ABSTRACT: The paper proposes a general conceptual framework for state fragility that aims to disentangle the identification of fragility from its underlying drivers. It reduces the identification state fragility to the responsiveness of its economic or political systems to shocks. In an extension of Taleb's work, fragility is thus defined as a disproportionate (supra-linear) response to negative shocks and an underwhelming (sub-linear) response to positive shocks or to time. Consequently, the framework distinguishes between *fragility to stress* as breakdowns in political or economic systems in response to negative shocks and *chronic fragility* as the inability of economies to generate growth over time. The framework can be applied to both manifested fragility (where the list of fragile states it produces closely aligns with classifications by international organizations) and to latent fragility (where underlying drivers can offer a probabilistic proximity to a fragile response). We illustrate how latent fragility can be identified by focusing on coups d'état as reflective of political fragility: we use machine learning to examine coup drivers and their nonlinear interactions, and to derive implied coup probabilities across all countries. The paper parses out lessons for engagement with fragile states, especially on the importance of prioritizing the elimination of sources of fragility through strengthened structural fundamentals and the mitigation of stressors through stronger policies, both of which have higher returns in chronically fragile environments.

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WORKING PAPERS

State Fragility: Towards a Conceptual Framework

Prepared by Aliona Cebotari, Enrique Chueca-Montuenga, Yoro Diallo, Yunsheng Ma, Rima Turk, Weining Xin and Harold Zavarce¹

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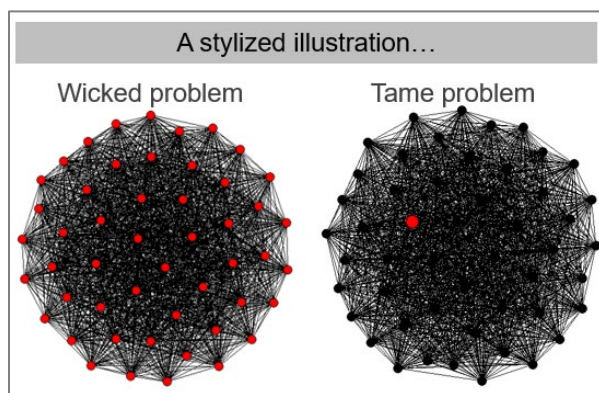
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1. Introduction

State fragility is constraining the development of about a third of the world’s countries, yet there is no common understanding of fragility nor how best to address it. About 65 countries in the world are considered fragile by the World Bank, IMF or OECD as of 2024, a good part of them in Africa. These states are home to close to a quarter of the world population and this share is expected to grow to a third by 2050 due to their rapidly growing population. Fragility is, however, as complex a phenomenon as it is widespread. It manifests as a myriad of weaknesses across the economic, political and social systems of a country that amplify each other and that constrain its development (Chami et al, 2021). Consequently, most concepts of fragility are framed in terms of these multifaceted manifestations or in terms of the factors that are believed to keep fragile states behind. This makes it difficult to converge on a common concept of fragility or to disentangle the concept from the symptoms of fragility or from its underlying drivers, clouding most discussions. The paper proposes a conceptual framework that makes it easier to identify a fragile system, in turn facilitating a focus on the complex drivers of fragility and how to address them.

Due to its complexity, fragility seems to be the quintessential “wicked problem” as originally coined by Rittel and Webber (1973). Wicked problems are systemic problems that do not have definitive formulations and hence definitive solutions, given that it is impossible to identify—in the complex network of social, economic and political interactions—those nodes where the trouble lies (as opposed to “tame problems” where it is possible to point to the problem and identify the solution). As a result, definitions, frameworks and diagnoses of fragility remain profuse: more than 35 frameworks are currently being used by the international community to assess fragility in practice (Bosetti, Ivanovic, and Munshey, 2016), and the theoretical and empirical literature on fragility is equally vast (for an overview see Chami et al, 2021).



The paper does not purport to find solutions to this “wicked problem”, but rather to make its elusive identification more tractable. As a first objective, we offer a parsimonious conceptual framework to identify state fragility as revealed by the response of economic or political systems to shocks, while remaining agnostic—for identification purposes only—to its root causes or the multiple ways in which fragility can manifest itself. This conceptual framework can help us bypass the need to define fragility through its core traits or characteristics, which is what most current approaches do, and which could lead us to the fallacy of composition, i.e. confounding these traits with fragility itself. The second objective of the paper is to show that, once we identify realized fragility, it is possible to investigate its drivers and therefore predict (and ultimately try to prevent) fragile responses to shocks.

Our conceptual framework for fragility builds on a mathematical definition of fragility by Taleb (2012, 2013), who views it as a disproportionate (supra-linear) response to adverse shocks. In this case, fragile states are those that break down in the face of large negative shocks to economic or political systems, akin to a plane that breaks down during flight when confronted with some disturbance. We call this type of breakdowns *stress-induced fragility* and apply it to economic and political systems. In addition, we extend this definition to the realm of positive shocks based on Bar-Yam’s comments in Taleb (2012), whereby fragility is also the lack of responsiveness (sub-linear response) to positive shocks or to time. In this case, fragile states are those where the economy is incapable of taking off altogether, or—to continue the plane analogy—fragile systems

are akin to a plane that cannot take off. We call this type of fragility *chronic fragility*. Countries can exhibit both chronic and stress-induced fragility, which can in turn interact.

We apply this framework to identify countries where responses to shocks or time are fragile, producing a list that is aligned with classifications of fragile states by international organizations. To assess the fragility of economic systems — whether chronic or stressed-induced — the framework compels a focus on economic growth, as best measuring how an economy responds to time or to another stressor. Namely, we identify chronically fragile countries as having experienced growth historically below the median of their peers, while countries that showed economic fragility to stress as those that had the steepest recessions in response to recent shocks. This simple identification is more intuitive compared with the more sophisticated—but harder to reproduce—methods that rely on a myriad of indicators to identify fragility. In the case of political fragility, we consider instances of internal conflicts and coups d'état as evidence of breakdowns in the political systems. Overall, the list of states that have revealed either chronic fragility (measured over decades) or stress-induced fragility (measured over the most recent years) overlaps strongly with other classifications that rely on more complex methods for identifying state fragility. This suggests that a simple framework that measures fragility through a response of its economic or political systems could capture well the underlying complexity of fragility.

The proposed framework can be applied not just to manifested fragility but also to latent fragility. The simplicity and the agnosticism with which we identify manifested fragility need not detract from the complexity of the factors behind it. On the contrary, separating the identification of fragility from the diagnostic of its drivers allows a clearer understanding of its drivers, as well as their complex interactions. We show this in the case of political fragility by using machine learning techniques adapted to such complexities. By focusing on coups d'état as symptomatic of political fragility, we identify both conjunctural drivers of fragility (i.e. stressors in the runup to coups) and the more structural determinants of fragility that create an environment propitious to coups (which we refer to as sources of fragility), as well as their nonlinear interactions.

The paper finds that the drivers of fragility are rooted in both structural and conjunctural factors, which interact in nonlinear and complex ways to create fragile responses. In the case of economic fragility, we find that the main sources behind growth collapses include high concentration of economic activity and underlying macroeconomic imbalances such as high debt, which can amplify even moderate shocks. In the case of political fragility, we find that: (i) the main conjunctural stressors that increase coup probabilities are a destabilized economic, political, and security situation; (ii) the structural drivers are the main sources of political fragility and these are usually weak structural fundamentals including poverty, low economic, social or political inclusion (high inequality, low literacy rates, high ethnic fractionalization, and weak democratization), poor governance, and a more recent and higher incidence of coups; (iii) these structural drivers act as double-sided amplifiers of stressors and of policy shocks: they increase the probability of coups when stressors are present or when policies deteriorate but also reduce the probability of coups faster when the stressors recede or policies improve, pointing to the increased benefits of maintaining macroeconomic and socio-political stability in countries where structural fundamentals are generally weak; (iv) both stressors and weak structural fundamentals compound each other's effect, suggesting chronically fragile states that usually face multiple structural weaknesses are more prone to political breakdowns.

The analysis of the drivers of fragility allows us to transition from an ex-post assessment of fragility — i.e., revealed fragility — to identifying latent fragility, which is more relevant for policymaking. We use the drivers of coups identified in the machine learning exercise to estimate the probabilities of coups breaking out during our out-of-sample period 2020-22, successfully, with 9 out of 10 countries that had experienced a coup during this period featuring among our top 25 countries with highest coup probabilities. The drivers that contribute to heightened coup probabilities are different for each country (we illustrate the case of Niger and Gabon) and can be used to parse out the policy interventions that could mitigate fragility.

From the analysis of drivers, we also draw lessons on how best to address fragility, despite its often-intractable nature. These include, based on the findings in the paper and insights from Taleb (2012): (i) when structural fundamentals are weak (i.e. sources of fragility are present) they amplify macroeconomics stressors and increase the probability of breakdowns in economic or political systems; (ii) therefore, priority should be given to eliminating the sources of fragility, especially when these pose an existential threat (e.g. excessive concentration of activities, fiscal and external vulnerabilities that can plunge countries in severe crises) or when they constrain growth; (iii) in chronically fragile states, where multiple structural weaknesses overlap, the payoffs from a more stable macroeconomic environment and strengthening policies are particularly high; and (iv) given such enhanced payoffs, engagement of multilateral institutions and donors is likely to yield particularly high dividends in fragile situations as financial and program support can address multiple fragility drivers.

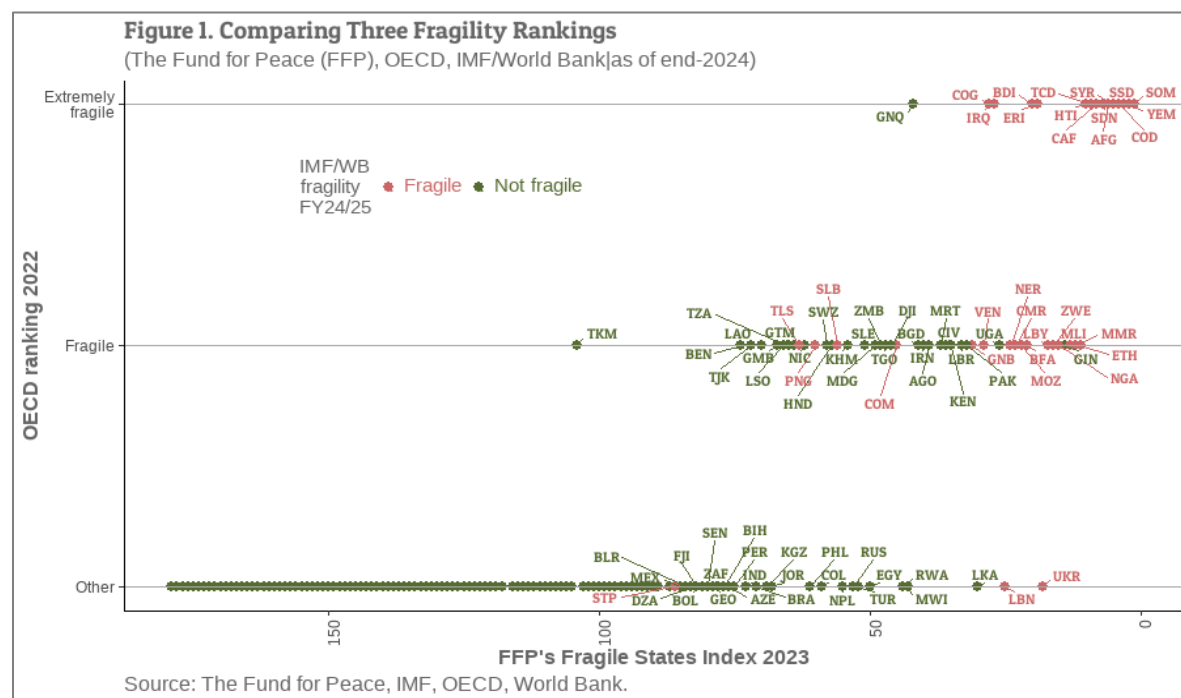
The remainder of the paper is structured as follows. Section 2 discusses the proposed conceptual framework for fragility and the fragility typology that it implies. Sections 3, 4 and 5 operationalize the framework by examining which countries would be considered fragile under the three types of fragility—chronic fragility, economic fragility to stress and political fragility to stress—and investigate their drivers. Section 6 discusses how this set compares with other existing lists of fragile states, and section 7 concludes with policy implications and lessons for engagement with fragile states.

2. A Conceptual Framework for Fragility

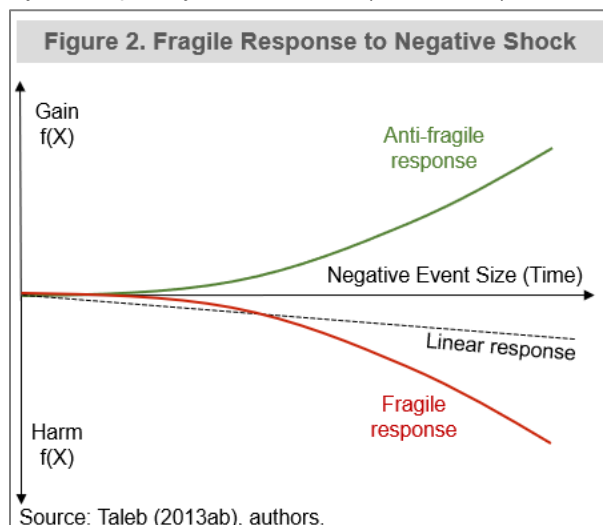
As wicked problems go, there is no universal definition of fragility. Fragility is usually defined based on the understanding of where the main problems and their solutions might lie. It can also be defined based on symptoms generally agreed as qualifying for signs or manifestations of fragility. For example, the [LSE-Oxford Commission on State Fragility, Growth and Development](#) describes fragility as a syndrome of interlocking characteristics which make it hard to make sustained progress, including a society fractured into competing groups of opposing identities, lack of state legitimacy and hence plundering of the state for personal gains, and lack of state capacity to perform basic functions, such as service delivery, citizen security, taxation and infrastructure – each a symptom of another. The [OECD’s fragility framework](#) defines fragility as the combination of exposure to risk (economic, environmental, political, security, societal) and insufficient coping capacity of the state to manage, absorb or mitigate those risks. The [World Bank](#) — and since 2022 the International Monetary Fund in its new Strategy for Fragile and Conflict-Affected States — define fragile situations as weak institutional capacity in low-income countries and/or conflict situations. The [Fund for Peace’s “Fragile States Index”](#) captures trends in political, economic and social pressures that could be conflict drivers (fractionalization of elites, demographic pressures, displacements, etc.) and ranks all countries by combining these with media contents and judgement. [Brookings’ “Index of State Weakness in the Developing World”](#), assesses developing nations according to their relative economic, political, security and social welfare performance to identify weaker states and therefore the security risks these may pose to the advanced economies through cross-border proliferation of security threats (terrorism, weapons, organized crime, infectious disease, environmental degradation, and civil conflicts). The [State Fragility Index of the Center for Systemic Peace](#) focuses on the nexus between governance, conflict and development as determining state fragility, with eight subindices tracking state security, political, economic, and social performance in terms of their effectiveness and legitimacy.

Most of the frameworks mentioned above try to map the definition of fragility to an empirical index of fragility (Annex III). Given the multidimensionality of fragility, and the difficulty of disentangling its causes and manifestations, the indicators used to identify fragility are plentiful. They also require complex combinations of a large array of indicators (including on state capacity, institutional, social and economic development), many of

which are hard to replicate. Figure 1 illustrates some of the differences in fragility classifications between the IMF/World Bank, OECD and the Fund for Peace: whereas there is good convergence on which countries are extremely fragile, there is less agreement on the less extreme fragility spectrum.



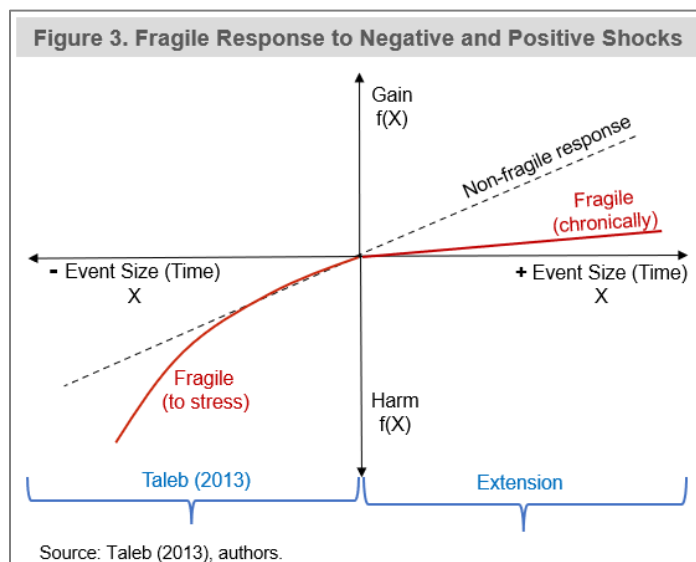
The conceptual framework proposed in this paper is simple but general enough to capture various facets of fragility. We start with the concept of fragility developed by Nassim Taleb (2012, 2013), where fragility is defined as a mathematical concept – namely, as an accelerating sensitivity to a specific harmful stressor or to time (as another stressor). As illustrated in Figure 2, a fragile system's response to shocks takes the form of a concave (red) curve, with larger shocks such as Black Swann events having disproportionately (i.e., non-linear) negative effects. The opposite response to shocks—one of accelerating benefit to large stressors (the convex green curve) is what Taleb defines as antifragility. An antifragile response is stronger than simple “resilience” or “robustness”, which could mean either a fast recovery from a negative shock or ability to resist the shock, respectively.



We extend Taleb's framework to the realm of positive shocks, by adding to it the notion of fragility as “lack of sensitivity to positive shocks” or to time (Bar-Yam and Epstein, 2004, as interpreted by the authors in Taleb, 2012, p.458). This type of fragility—illustrated in Figure 3 as the red line in the north-east quadrant—would describe economies that are unable to take off in a meaningful way or unable to take advantage of positive shocks due to a sublinear response to such shocks. This definition would fully align with

that in the LSE-Oxford Commission report, namely of “fragility as a syndrome of interlocking characteristics which *makes it hard to make sustained progress*” (italics are the authors’).

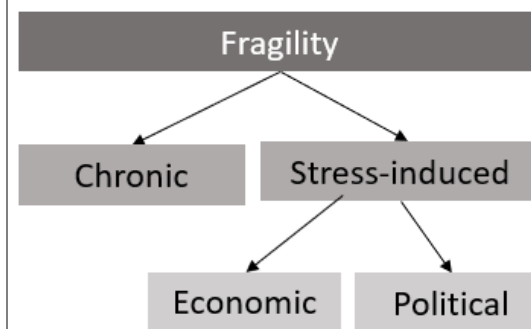
Combining the two notions of fragility offers an overall view of fragility as either a sub-linear response to positive shocks (or over time) or a supra-linear response to large negative shocks. In simpler terms, fragility can be seen as the inability to generate or sustain growth over time or the disproportionate adverse response to negative shocks. Collier (2007) labels the former as the difficulty to mount the ladder of economic development and the latter as the snakes of economic collapse.



This conceptual framework largely determines our typology of fragility (Table 1). We refer to **chronic fragility** as the inability of countries to sustain per capita growth over a long period of time (more in the next section), and to **stress-induced fragility** as the inability of economic or political systems to cope with large adverse shocks:

- In the case of economic systems, a fragile response (economic collapse) could be caused by wars, fiscal or financial crises, among others. These patterns of collapses are called either cliffs or implosive declines (Pritchett 1998, 1997) or “meltdowns” (Ben-David and Papell, 1995). Economies can also lose a disproportionate amount of physical or human capital due to natural disasters, such as large hurricanes that could inflict disproportionate damage on small island states.¹
- Fragile political responses can be defined as breakdowns in the traditional political or constitutional order through civil wars, revolutions, coups d’état or other irregular transfers of power (e.g. the Arab Spring in Tunisia and Egypt in 2011, or the wave of military coups in West Africa in 2020-23). Although political events are less amenable to the mathematical quantification above than economic shocks, the concept of a system being shocked till it breaks applies well to these situations.

Table 1. Fragility: Resulting Taxonomy



In the sections that follow we discuss how these fragility concepts could be operationalized to identify countries that are fragile and what drivers are behind state fragility. In the case of stress-induced fragility — either economic or political — we will generally focus on revealed fragility, measured ex-post as an actual response at a point in time. However, we will show later how the empirical methods used in this paper to identify the sources of fragility and other similar investigations from the literature can be applied to produce

¹ For example, the 2017 hurricane Maria inflicted 374 percent of GDP in damages on Dominica, and the 2004 hurricane Ivan caused 184 percent of GDP in damages in Grenada, few among many other examples of damages above 100 percent of GDP in small states.

estimates of predictive fragility – admittedly more relevant as it allows a preemptive response to deal with the sources of fragility.

3. Chronic Fragility and its Drivers

The “mathematical” definition of fragility we discussed above compels a focus on *growth* as best measuring how an economy responds (or not) to stressors. You may recall that our conceptual framework for fragility focuses on how the economy functions overall as a system—rather than how its constituent markets, agents, or institutions behave. As such, chronic fragility—defined as the inability of an economy to generate growth — captures the essence of a system that is not functioning properly. One might argue that a focus on growth is overly simplistic to capture the many social, institutional, and distributional dimensions of fragility. However, a metaphor can help here. Imagine that physicians came together to develop a common understanding of what it means to be sick, whether sickness is chronic or a temporary acute manifestation. To define sickness, they could draw a list of known diseases and their symptoms and agree that if a person has some of these symptoms, then the person is sick. But such an approach could lead them astray because the list of symptoms will never be exhaustive, or it may be too long as a helpful identification tool, or the symptoms may lead to a disease only when sufficiently pronounced or when combined or interacting with other symptoms (for example, a headache could be harmless or could be a symptom of a serious disease). In contrast, a general and simple definition of sickness as “body or mind not functioning properly for a person to carry out their normal activities” would capture the state of being sick, while still allowing for a complex set of symptoms and causes behind it. It is in the same sense that our simple and general definition of chronic fragility as the inability of an economy to take off grasps the essence of a system that is not functioning well, while bypassing the need to define fragility through its countless symptoms and while still allowing for a complexity of drivers behind it.

The literature provides some arguments as to why growth responses may be sufficient to capture the multidimensionality of fragility. Pritchett and Lewis (2022), for example, show that GDP per capita has very strong association with improvements in all measures of the basics of human material wellbeing, such as nutrition, access to water and sanitation, shelter, health, education, and natural environment— indicators that are frequently used in the literature to illustrate performance gaps in fragile states. In fact, they find that, for any general measure of the basics of human material wellbeing, there is a strong, empirically sufficient and necessary relationship with per capita GDP—or, to quote the title of the paper “economic growth is enough, and only economic growth is enough” for the basics—and this relationship is much stronger at lower levels of development. The two reasons discussed above allow us to forgo using more complex identification methods that are used in the literature, such as cluster analysis and principal components analysis that employ a very large array of indicators² but may be harder to replicate.

Which countries have shown chronic fragility?

The focus on growth as a metric for chronic fragility thus helps to keep the framework simple. To identify chronically fragile countries, we use criteria that seem plausible evidence of a failure to take off in a sustainable way – namely very low growth throughout history and no recent evidence of an intrinsic and sustained pickup:

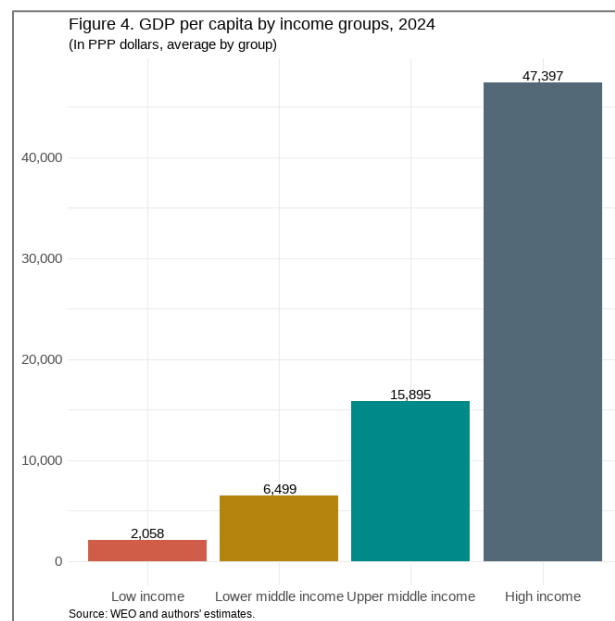
- *First, for chronic fragility only we focus on low and lower middle-income countries (LIC and LMIC, respectively) as potentially chronically fragile, leaving out upper-middle-income and high-income countries.*

² For example, the Fragile States Index of the FFP uses 12 indicators and OECD’s fragility index 57 indicators (see Annex III).

The latter would have already achieved a reasonable level of development and growth is generally expected to be lower than in countries that are still catching up. For example, per capita income in upper middle-income countries — the lowest income group that we exclude from our definition—was about 2½ times the income in LMIC and almost eight times the one for LICs in 2024 (Figure 4). This criterion reduces the number of countries we would consider potentially chronically fragile from 193 to 81.³

- *We define chronic fragility as a feature of countries where average growth per capita falls under the 50th percentile of the LIC and LMICs growth over three historical periods.* Measuring growth relative to other countries helps us pin down a threshold for what we could consider to be a “low growth” in absolute terms, which coincidentally aligns well with what some literature considers low growth. We measure this threshold dynamically as the median per capita growth for each year, since growth rates vary significant across time, including due to global factors that induce notable co-movement across countries.^{4,5} We classify countries as chronically fragile if their per capita growth is below our threshold, on average, during each of the three periods of 1970-2023, 1980-2023 and 1990-2023⁶; we use these three criteria in order to capture the persistence of low per capita growth and ensure a robust classification. The median per capita growth averaged 1.5 percent during 1970-2023 and 1980-2023 and 1.8 percent during 1990-2023, values that are consistent with what the literature views as low per capita growth (e.g. 1.5 percent in [Pritchett, 1998](#)). For a sense of perspective, a country growing at 1.5 percent a year can double its GDP per capita in about 47 years — which means that, if its income per capita were equal to the LIC average income, it would reach the current LMIC average income in about 78 years. This appears to leave little doubt that per capita growth rates at 1.5 percent or below are indeed very low.

By way of illustration, Figure 5 below shows two country cases. The one on the left is the Republic of Congo, whose average historical growth is negative, and it has spent most of its history below the threshold—a clearly fragile case. The case on the right is Bangladesh, whose growth has been above the threshold for most of its history—clearly not a chronically fragile case. Of course, most cases are not as clear cut as these two countries, and we will discuss this below. Annex I provides such illustrations of growth developments vs the threshold (median) for all 81 LICs and LMICs.

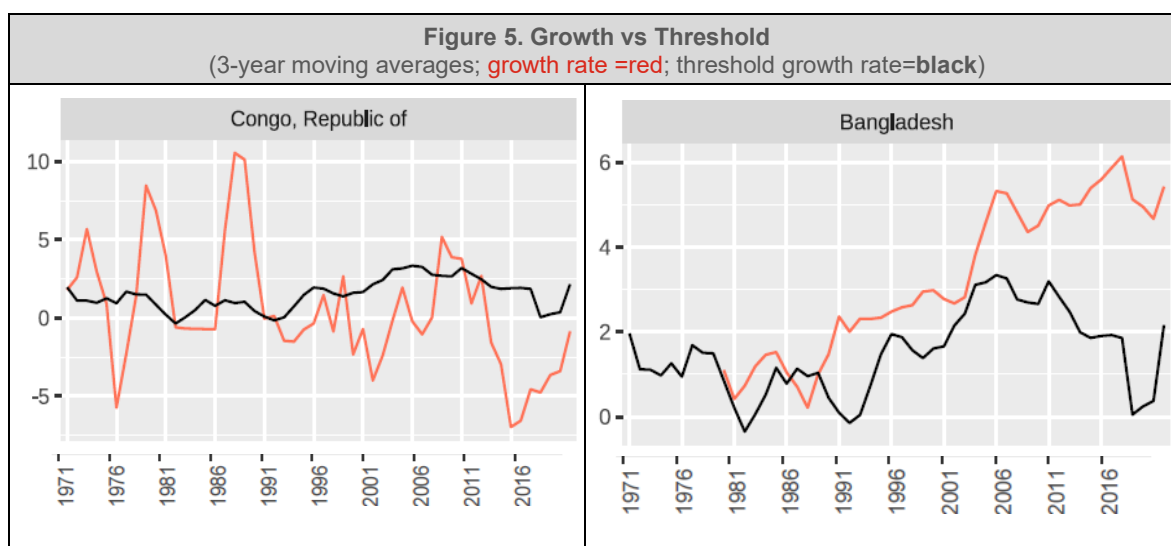


³ We classified Venezuela as lower middle income, [following IDB](#).

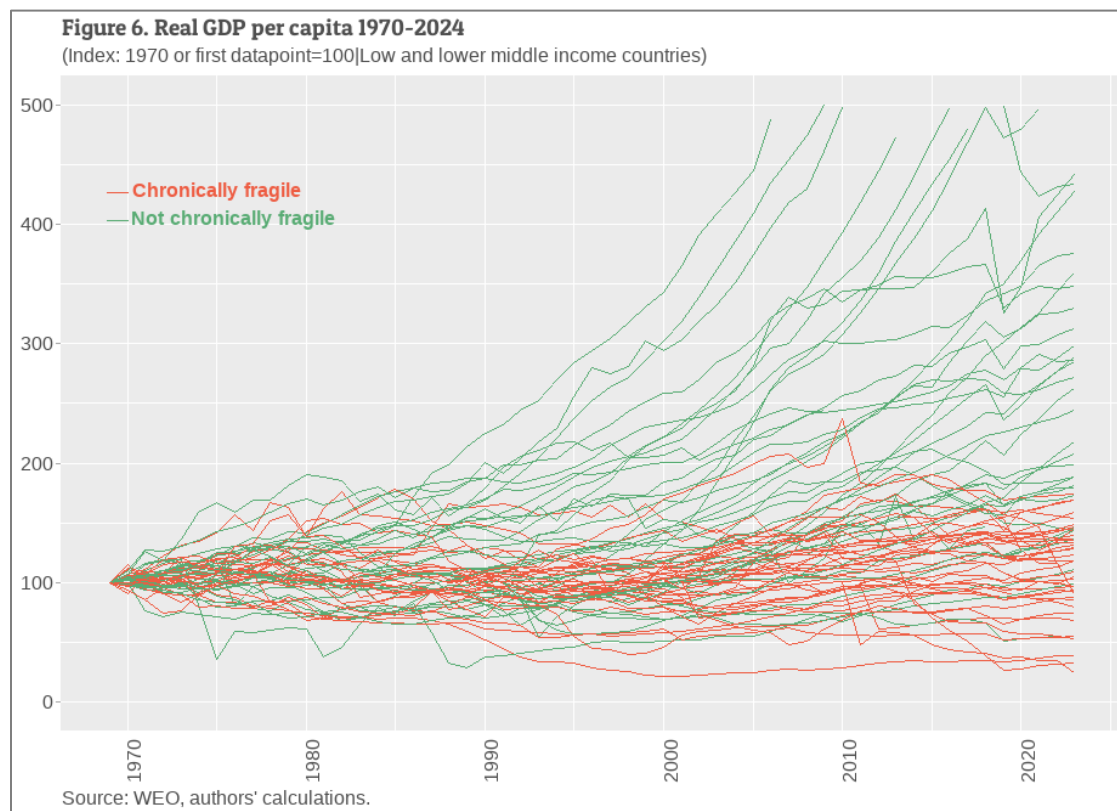
⁴ We use the IMF's WEO measures of real GDP per capita in national currency.

⁵ This dynamic threshold also helps in benchmarking growth for countries that have much shorter historical data, such as Afghanistan, Somalia, and South Sudan. Note that we also exclude the first five years of growth for countries that broke-off economically from the countries to which they originally belonged (South Sudan and former Soviet Union countries).

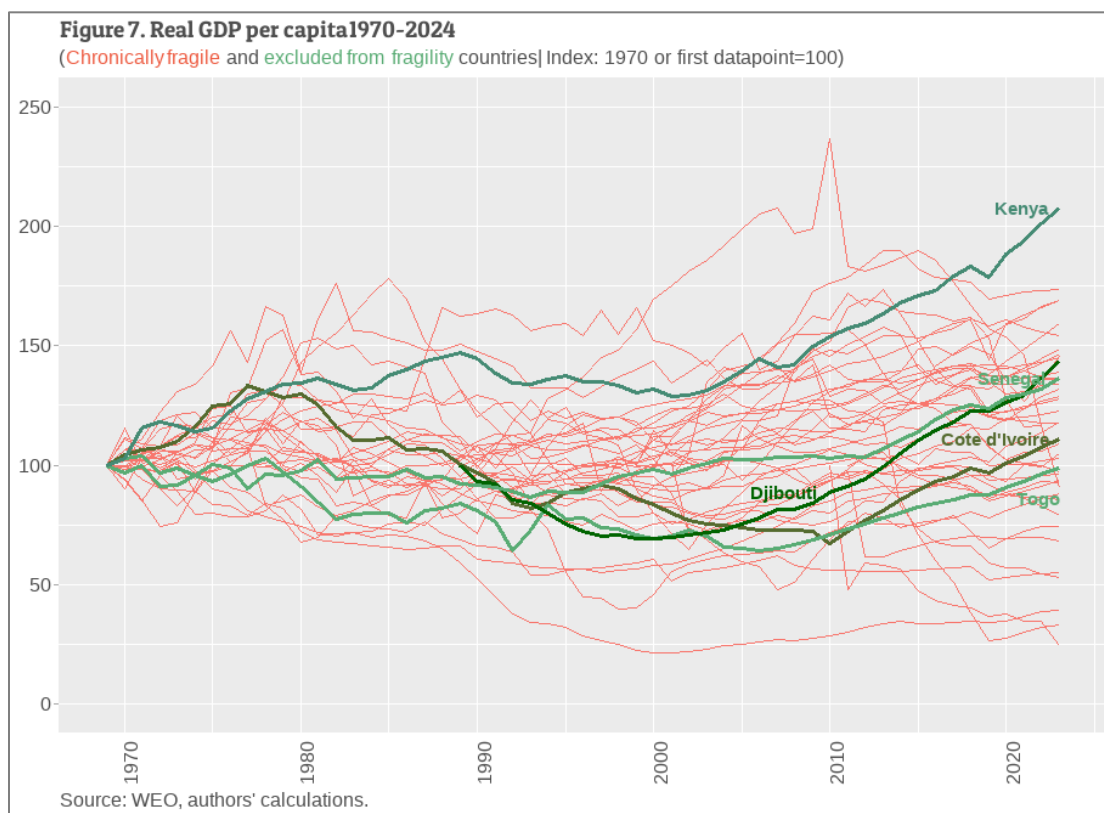
⁶ To account for more recent growth developments over the last decade 2014-2023, we apply an exclusion criterion as discussed below.



According to this below-median growth criterion, 43 countries are considered as fragile. Their growth trajectories over time are illustrated with the red lines in Figure 6, compared with the green lines of the remaining LICs and LMICs. Several countries escaped the fragility classification because—despite overall weak historical growth—they sustained stronger growth rates later in history and placed above the threshold after the 1980s or 1990s (*Angola, Bolivia, Burkina Faso, Ghana, Lebanon, Lesotho, and Uganda*). Another marginal case that escaped chronic fragility is *Kyrgyz Republic*, which would have been counted as chronically fragile had we not excluded the first five breakaway years.

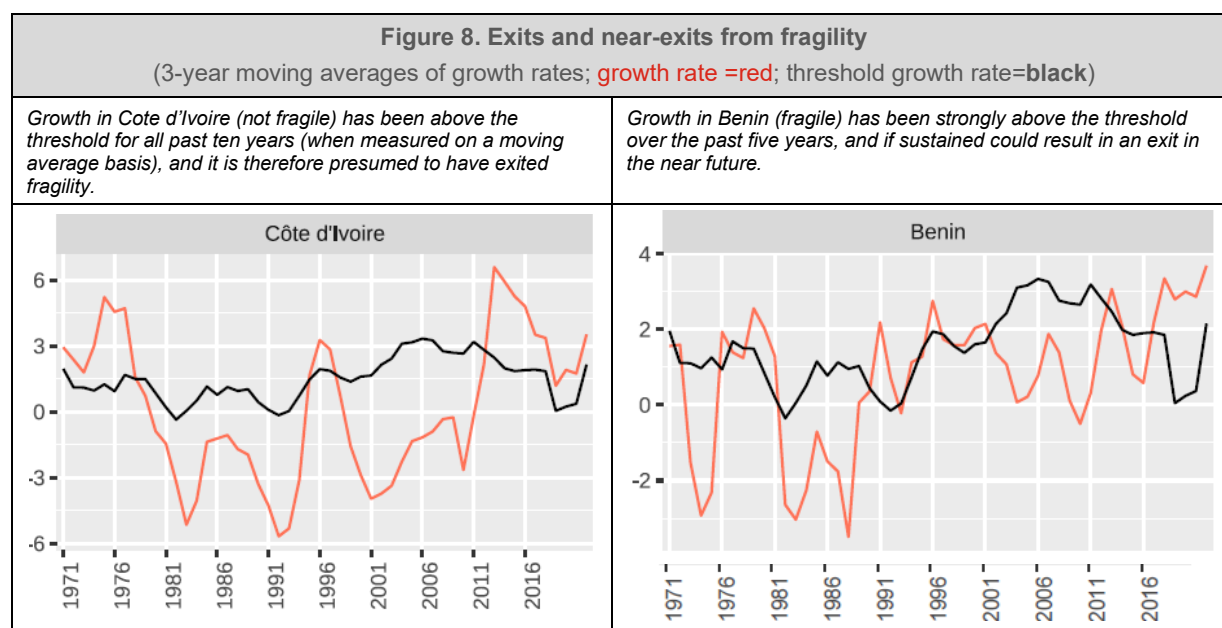


- Finally, we allow for the fact that some countries may have had recent “structural breaks” from fragility, even if they had very weak growth over the last 35, 45 and 55 years. We introduce such an exclusion criterion but make it relatively strict: we do not consider as fragile those countries that, despite weak historical growth, have shown intrinsic and sustained pickup in growth over the past ten years (2015-2024). In practical terms, we consider countries as having “exited” fragility if their growth remains above the threshold for the entire ten-year window, as measured by the trailing three-year moving averages (3yma) to abstract from year-to-year shocks. This exclusion criterion counts five countries as having exited fragility: *Cote d’Ivoire*, *Djibouti*, *Kenya*, *Senegal*, and *Togo*; the dynamics of their real GDP per capita relative to other chronically fragile countries is illustrated in Figure 7.



The list of countries we exclude from fragility is probably the least robust to how we measure their performance, as it relies the least on clear historical evidence and depends most on what one views as “sufficient evidence” of an intrinsic and sustained strong performance. Since we measure fragile performance in terms of growth, the most robust choices are *Cote d’Ivoire* and *Djibouti*, as these have grown above the threshold for each of the past eleven years (at least) and not just on a 3yma. The least robust case is *Senegal* whose growth weakened significantly in 2022-23, signaling a potential loss in momentum that often befalls fragile states. There were a number of other marginal cases that did not result in exits from fragility but may soon do so if good performance is sustained for a few more years – these include *Benin* and *Kiribati* which grew on average above the threshold over the past ten years, but they did not meet our stricter criterion of sustaining growth above the threshold for *all* ten years on a 3yma basis.⁷ The growth of all countries vis-à-vis the 50th percentile threshold can be seen in Annex I, while Figure 8 illustrates two cases.

⁷ *Guinea* and *Guinea-Bissau* are also marginal cases due to strong performance over the past eight years on a 3yma, although in the case of the former the strong performance was due to its oil discovery hence was not “intrinsic” to the system, and in the case of the latter the strength of the performance is marginal.



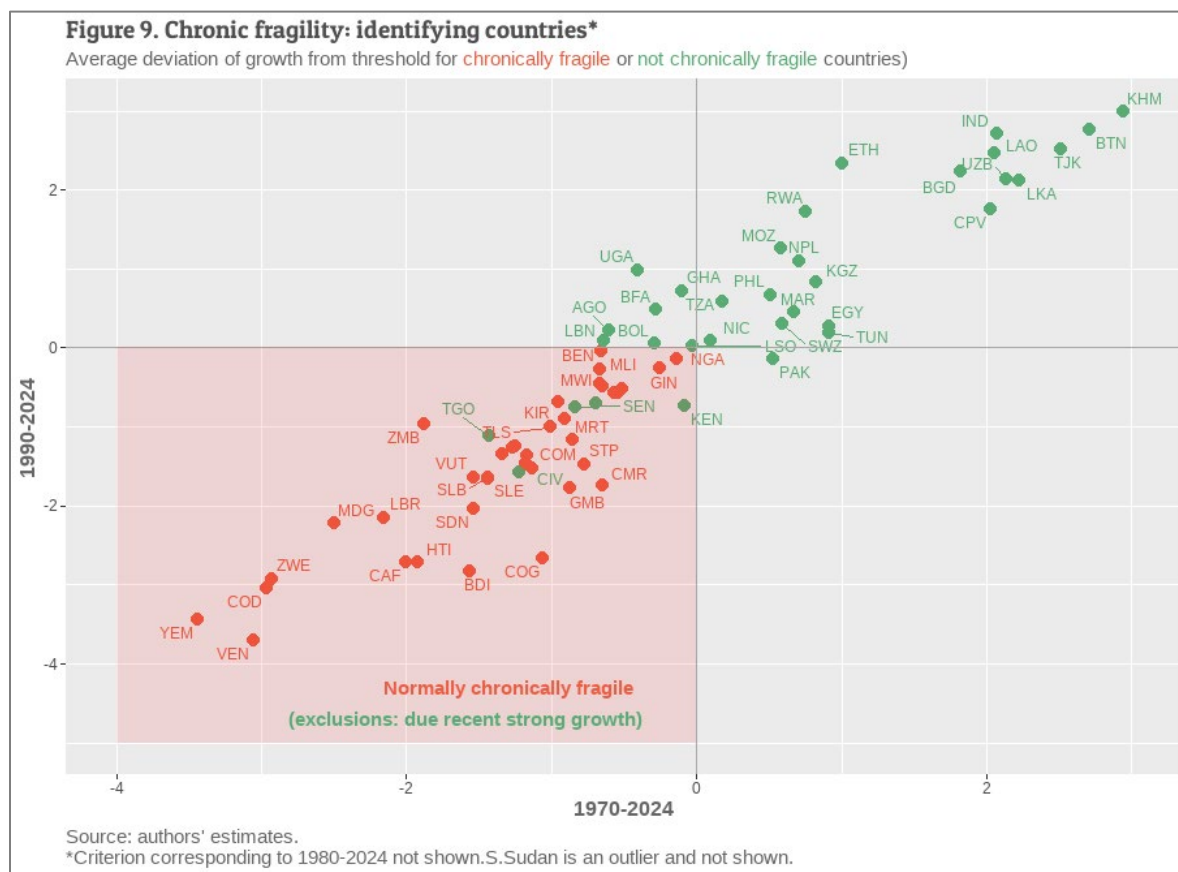
All in all, applying the exclusion criterion results in 38 countries identified as chronically fragile (Table 2). Figure 9 summarizes the application of the growth criteria across time periods (only two periods are shown, rather than three) and illustrates how we identify chronic fragility as countries in the bottom left quadrant where average growth has been below the thresholds in the two periods illustrated – with only five countries excluded due to the recent strong growth.

Table 2. Countries identified as chronically fragile ¹			
1. Afghanistan	10. Gambia, The	20. Mali	30. South Sudan
2. Benin	11. Guinea	21. Mauritania	31. Sudan
3. Burundi	12. Guinea-Bissau	22. Micronesia	32. São Tomé and Príncipe
4. Cameroon	13. Haiti	23. Niger	33. Timor-Leste
5. Central African Republic	14. Honduras	24. Nigeria	34. Vanuatu
6. Chad	15. Jordan	25. Papua New Guinea	35. Venezuela
7. Comoros	16. Kiribati	26. Samoa	36. Yemen
8. Congo, Republic of	17. Liberia	27. Sierra Leone	37. Zambia
9. Congo, DR	18. Madagascar	28. Solomon Islands	38. Zimbabwe
	19. Malawi	29. Somalia	

¹ Assessment based on end-2024 data as reported in IMF's April 2025 WEO.

Despite its focus on persistent low growth, chronic fragility is not restricted to low-income countries nor are low-income countries associated only with low growth. Of the 38 countries we identify as chronically fragile, only 17 are low income and the remaining 21 are lower middle income. It is also worth noting that many other countries have low growth rates—e.g. advanced economies, given the diminishing returns to production factors, or oil-dependent economies given the poor diversification—but as we mentioned above, these have already achieved high enough standards of living through higher growth earlier in their development, which we are not capturing. If we were to include all countries in our analysis of chronic fragility, with the same below-median growth criterion, we would have added to our list a third of the upper-middle-

income countries (of which oil producers like Algeria, Gabon and Libya) and about half of the advanced economies.



Finally, our focus on identifying chronic fragility as revealed by historical performance allowed reliance on criteria that are relatively robust and in line with the literature. However, as with any identification criteria, one cannot avoid an element of arbitrariness. As Figure 9 above makes clear, there are several countries that are close to the growth thresholds and, on the margin, the resulting list of chronically fragile countries would have been somewhat different if we considered alternative thresholds or time frames. The list may also be different if we focused on *predictive* or *latent* fragility instead: in this case, some countries may be showing improvements in their overall economic and policy environment that could be precursors to growth takeoffs and hence could signal impending exits from fragility. We will discuss in later chapters how our fragility list can be used for predictive fragility and how it compares to other classifications.

Drivers of Chronic Fragility

Our priors on the drivers of chronic fragility derive from the extensive development literature on constraints to growth. Recall that chronic fragility results from the inability to generate or sustain growth over time. Since the early growth literature that focused on the accumulation of physical and human capital and technological advancement (Solow 1956; Romer 1986; Lucas 1988), contributions have underscored that factors affecting the efficiency of savings and investment can be important constraints to economic growth (Easterly and Wetzel 1989; Fischer 1992). These constraints can be broadly grouped under two main

categories: macroeconomic vulnerabilities⁸ and institutional constraints⁹ for markets to clear efficiently (political, governance, regulatory, and social set-up).¹⁰ Constraints to growth also interact to produce a compounding effect on economic development. For instance, [Henisz \(2000\)](#) shows that political constraints influence business decisions, thereby affecting macroeconomic outcomes and explaining variations in growth rates. [Gründler and Potrafke \(2019\)](#) also show that the effect of corruption on economic growth is especially pronounced in autocracies and transmits to growth by decreasing FDI and increasing inflation.

A major risk to development also comes from civil war ([Collier, 2007](#)). The typical civil war is enormously costly for both an economy and its neighbors; it lasts a long time; even once it's over, the risk of reversion to conflict is high; and the costs of civil war are not confined to the country at war. The risk of internal and external conflict reduces the incentives to invest in state capacities and can explain patterns of development and growth ([Besley and Persson, 2010](#)).

Of course, the binding constraints on growth differ from setting to setting. [Rodrik \(2006\)](#) argues that “there are no confident assertions here of what works and what doesn’t—and no blueprints for policymakers to adopt”. Rodrik’s approach consists of three sequential elements, from (i) diagnosing the most significant constraints on economic growth in a given setting, to (ii) developing creative and imaginative policy design to target the identified constraints, and (iii) institutionalizing the process of diagnosis and policy response to ensure dynamism in the economy. In terms of the constraints to growth, [Hausman, Rodrick and Velasco \(2005\)](#) and [Rodrick \(2010\)](#) consider growth constraints associated with low return to economic activity (including due to low human capital, bad infrastructure, government failure) and high cost of finance (including due to high risks, poorly functioning markets).

4. Economic Fragility to Stress and its Drivers

Let us recall that our definition of economic fragility to stress was grounded in Taleb’s notion of fragility as a disproportionate response to large adverse shocks, i.e. economic meltdowns. A GDP decline proportional to (or linear in) the size of the shock would not be a fragile response, whereas an increasingly steeper decline as the size of the shock increases would be indicative of fragility. Figure 10 provides a stylized illustration: the steeper the decline (dotted red line in the figure), the more concave the GDP response would be if we applied Taleb’s heuristic measure of fragility as the concavity of the curve. There are different ways in which fragility, as defined above, can be identified.

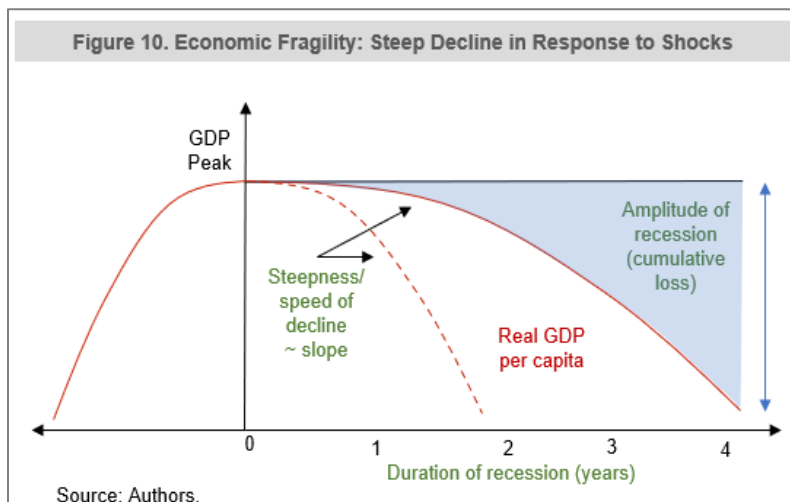
One way of detecting the fragility of a system is to measure its likely response to a specific stressor, i.e. predicting whether the shock will induce a fragile response. For example, [Taleb et al. \(2012\)](#) measure directly the concavity of the response of bank capital and of public debt to specific macroeconomic stressors (growth) to detect latent fragilities, through a simple-to-implement “fast-and-frugal, model-free, probability free heuristic”. These fragilities arise from nonlinearities and feedback loops between the stressor and the variable of interest that generate disproportionately larger responses as the size of the stressor increases. Empirical

⁸ Key macroeconomic determinants of economic growth include foreign aid, foreign direct investment, fiscal policy, investment, trade, credit constraints, financial vulnerabilities, demographics, monetary policy, and natural resources.

⁹ Many studies underscored the importance of the quality of institutions (e.g., [Acemoglu, Johnson, and Robinson \(2001\)](#) and [Easterly and Levine \(2003\)](#)), though the literature has not established a strong causal link between any particular design feature of institutions and economic growth ([Rodrik, 2006](#)). The relative importance of institutions as a determinant of long-run growth and prosperity remains an open question ([Lloyd and Lee, 2018](#)).

¹⁰ The literature also offers other types of constraints to growth. For example, [Collier \(2007\)](#) contends that two distinctive geographical characteristics and their interaction present acute problems for development in Africa. The geographical characteristics are physical (natural resource endowment and land-locked vs coastal nature of a country) and socio-political (small population and high ethnic diversity).

models could also be used to detect past nonlinearities in responses to specific shocks — albeit with significant identification complexity— where again nonlinearities could come either from the size of the negative shock or from the amplification of smaller shocks by latent fragilities (see, for example, Forni et al, 2024). In these examples, the identification of fragility is linked to the choice of a specific shock and its propagation through the systems of interest, which can help unveil latent fragilities.



Our approach is similar in substance but starts with the detection of already manifested fragility and discusses how the subsequent identification of its drivers could be used to uncover latent fragility. To identify episodes of economic meltdowns, we first identify all recessions during 1970-2024 and then measure their steepness by either (i) averaging the cumulative decline in GDP between peak and end of recession over the number of years in recession; or (ii) taking the largest annual decline during the recession. We define recessions as periods of consecutive years—or a single year—of negative real GDP growth, with GDP measured as a three-year moving average to smooth out temporary recoveries. We then consider as a fragile episode those recessions that had the steepest declines, namely those that were steeper than one standard deviation away from the mean, either as measured by the average decline or by the fastest annual decline. Certainly, moving the threshold away from one standard deviation would change on the margin the list of recessions that qualify as the steepest, but our interest lies more in studying the drivers behind such fragile responses and these are highly robust to the identification of recessions. Finally, in keeping with our definition of fragile responses being “disproportionate” relative to the shock, we do not consider recessions caused by conflicts or by breakoffs into independent states as fragile.^{11,12} As a result, our thresholds for what is a fragile response are determined on the basis of those recessions that are not associated with conflict or breakoffs.

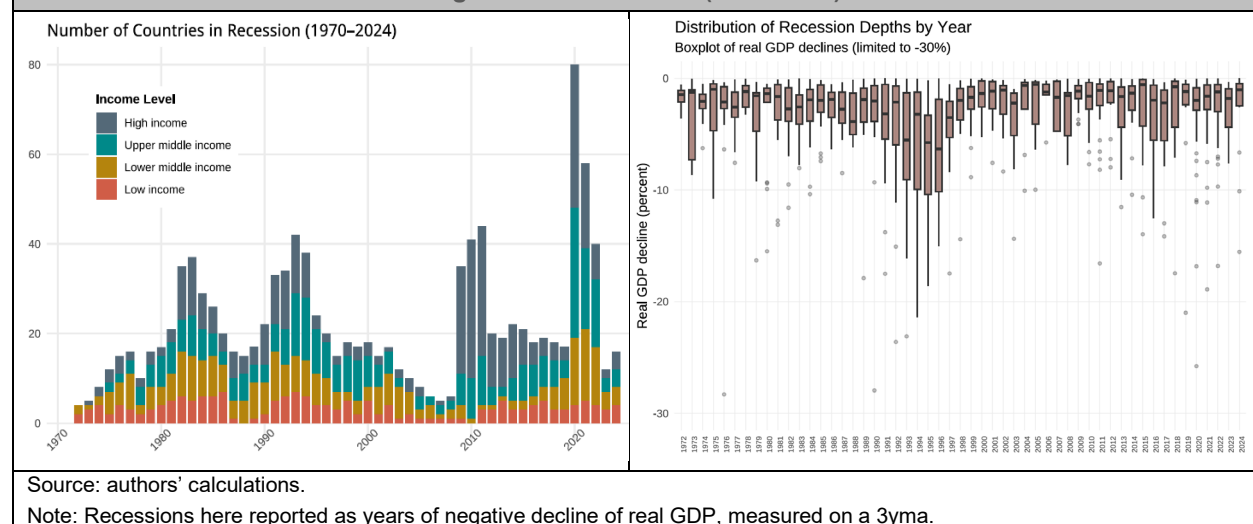
Which countries have shown recent economic fragility to stress?

We start by first investigating all recessions during the past five and half decades, to help us identify the steepest declines. We identify 448 recessionary episodes during 1970-2024 window. These lasted on average 2.6 years, with cumulative declines in real GDP during the recessions of 8.3 percent on average. Global events such as the pandemic, the global financial crisis or the oil crisis in early 1980s intensify the incidence and depth of recessions, as latent fragilities are revealed by shocks (Figure 11).

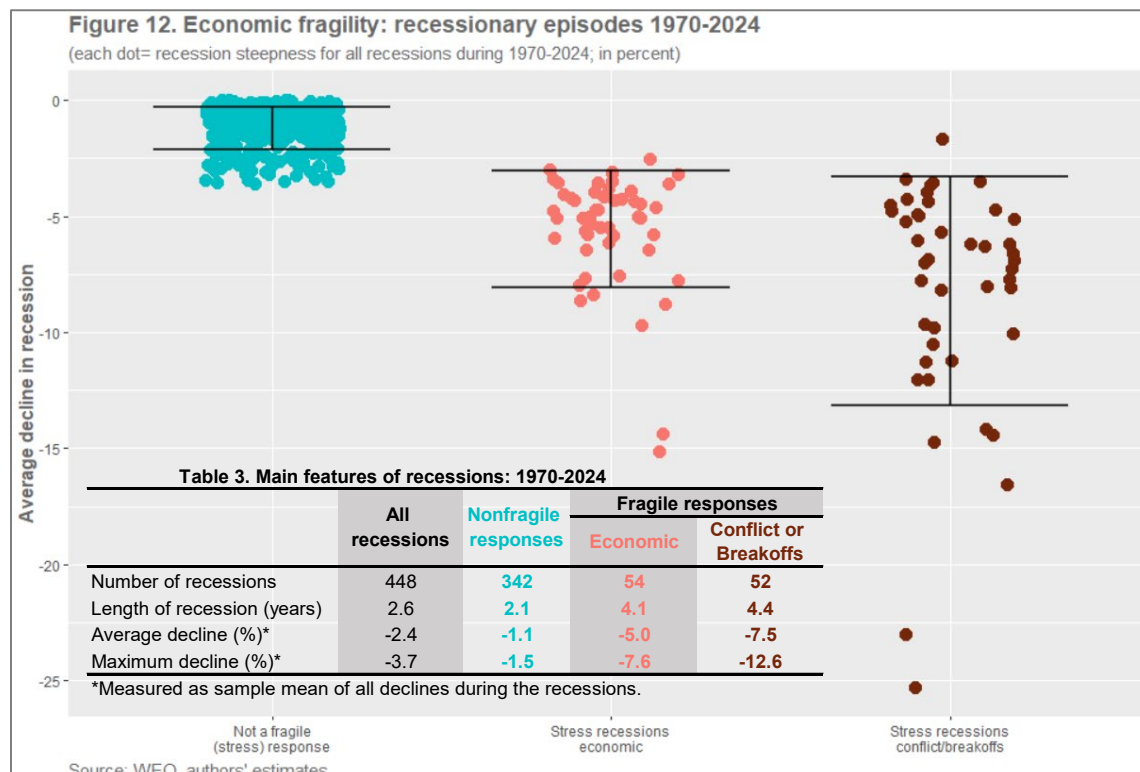
¹¹ To identify recessions associated with conflicts, with use the Uppsala Conflict Data Program (UCDP) database on conflict intensity (Gleditsch et al., 2002; latest update) for 1940-2023 and match the years of recessions with years of conflict of any intensity (either 1, i.e. less than 1000 deaths, or 2, i.e. more than 1000 deaths). In the case of disputed territories, we assigned the war to both sides reflecting that both countries had a conflict on their territory on that year. Finally, if a country had a conflict late in the recession, such that more than half of the cumulative decline during the recession happened before the conflict, we counted these as recessions due to economic stress rather than due to conflict (there are three such cases: the Democratic Republic of Congo (1990-2002), Libya (1981-88), and Trinidad and Tobago (1983-1990)).

¹² To identify recessions associated with state breakoffs, we focused on those that started in 1989-1993 in the former Soviet republics and other countries in the socialist bloc (Albania, Bulgaria, Croatia, Czech Republic, Hungary, North Macedonia, Montenegro, Poland, Romania, Serbia and Slovenia), as well as the South Sudan and Sudan recessions of 2011-12.

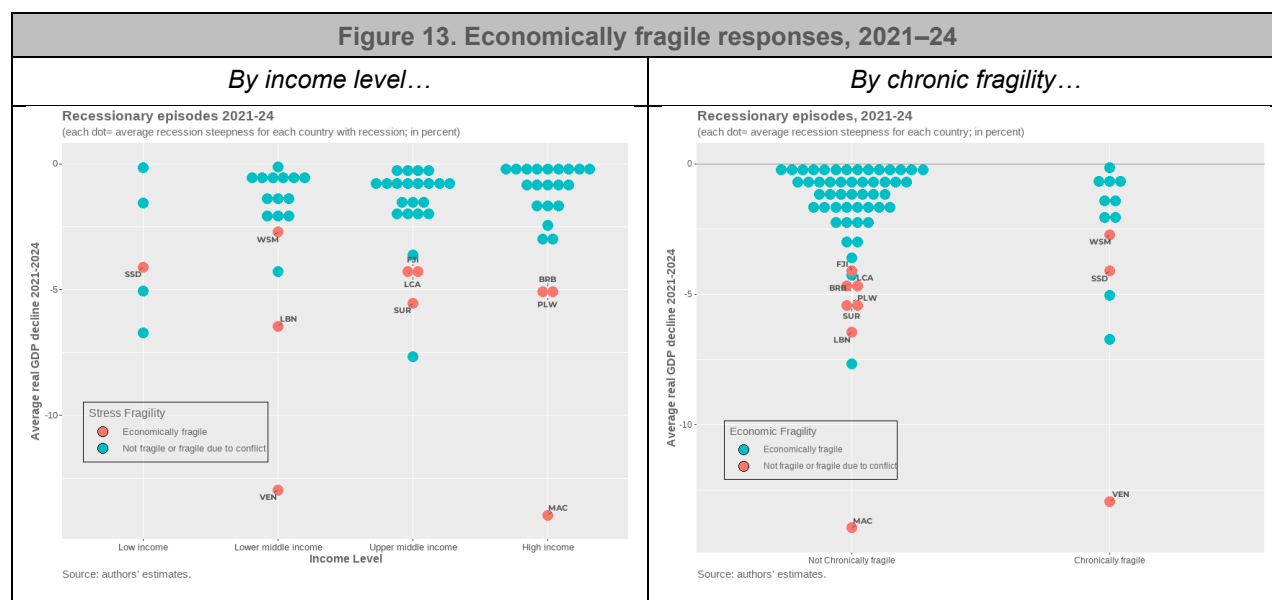
Figure 11. Recessions (1970-2024)



Fragile responses accounted for about a quarter of all recessions. Of all recessions, those that were steeper than -3.5 percent on average during the recession or had a one-year decline steeper than -5.1 percent—in all cases measured on a three-year moving average basis— were considered as fragile or stress responses. We have identified 106 such stress episodes or about 24 percent of the total (Figure 12, Table 3). Of the stress episodes, 52 reflected economic collapses due to conflict, state breakoffs or both, hence we do not consider these as reflective of economic fragility and the remaining 54 episodes were what we would qualify as economically fragile responses (these recessions are listed in Annex II). During these episodes of economic fragility, GDP losses averaged 5 percent a year, compared with 1.1 percent for non-fragile responses. The average length of the stress recessions was also longer, at 4.1 years, compared with 2.1 years for non-stress episodes.



To identify the most recent manifestations of economic fragility, we focus on the stress recessions of the last four years. In our case, the last four years cover 2021-2024. We isolate stress responses by using the thresholds derived above for the full sample and identify ten countries as having had stress recessions during these years: Barbados, Fiji, Lebanon, Macao SAR, Palau, Samoa, South Sudan, St. Lucia, Suriname, and Venezuela. From the nature of their downturn, we can glean the drivers behind these fragile responses as (i) highly concentrated activities, which either hindered a stronger recovery from the pandemic (Barbados, Fiji, Macao SAR, Palau, Samoa, St. Lucia) or caused severe downturns in response to disruptions in oil pipelines (South Sudan); or (ii) debt-triggered crises and/or general economic mismanagement (Lebanon, Suriname, Venezuela). It is worth noting that most of the countries that showed economic fragility to stress are neither low income nor chronically fragile, corroborating the distinction between the chronic and stress fragility (Figure 13).



Drivers of Economic Fragility

The episodes of economic fragility identified above can point to the potential drivers behind steepest growth declines, i.e. the sources of fragility. First, highly concentrated economic activity has been the main factor behind more than forty percent of all stress recessions (Table 4). These responses were triggered by shocks that affect squarely the main activity that the country relies on (e.g. oil, tourism, gaming). The second largest driver of steep recessions were economic mismanagement or underlying macroeconomic vulnerabilities, such as high debt or other internal or external imbalances; these account for close to forty percent of all stress recessions. Political instability is the third most prevalent driver and finally a few cases reflect severe drought episodes (esp. in the Sahel region).

Table 4. Sources of economic fragility	
<i>Percent of steepest recessions with main vulnerability due to:</i>	
Concentrated activity (oil, tourism)	42.6
Debt, mismanagement, vulnerabilities	38.9
Political instability	14.8
Natural disasters (drought)	3.7

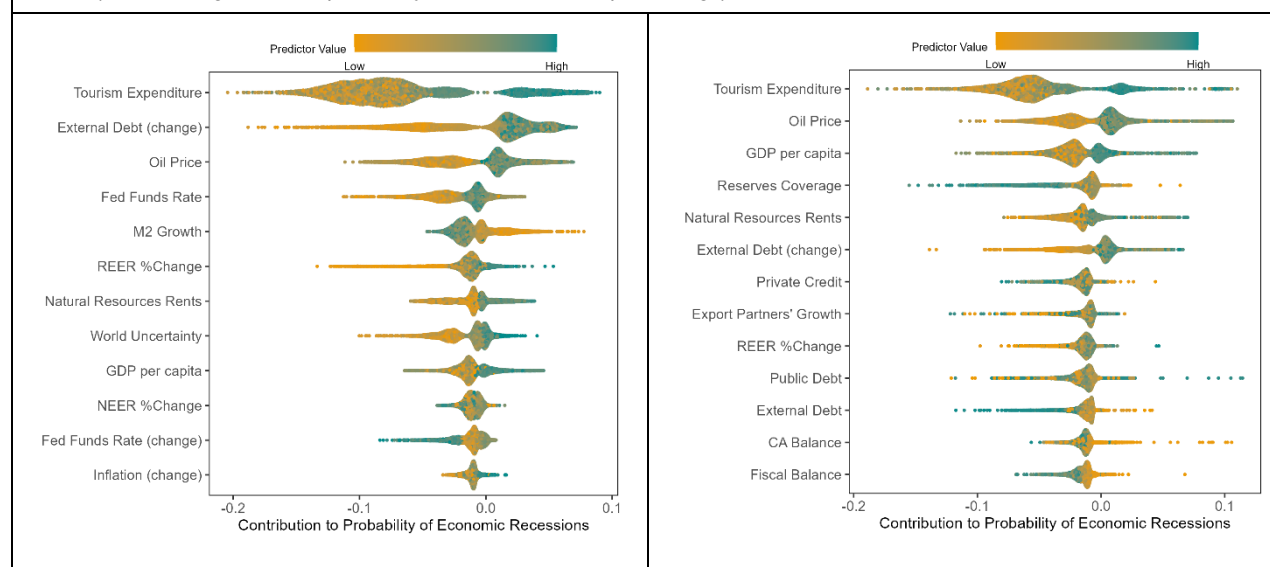
Since many stress recessions have a confluence of interacting drivers, we use machine learning to identify the ultimate contribution of these drivers. The machine learning exercise looks at various macroeconomic, social and political factors that can contribute to the probability of seeing a steep economic recession (i.e. not a conflict-driven recession) within two to three years (it is described in more detail in Annex V and in the next section 5). The identified drivers are broadly consistent with our observations above.

Concentrated economic activity (a high share of natural resource rents or tourism expenditures in GDP) is one of the most important drivers of stress recessions (Figure 14). On the macroeconomic side, conjunctural external shocks such as high oil prices, higher Federal funds rate or heightened world uncertainty increase the probability of a steep recession, and these are amplified by underlying weak external positions (large current account deficits, increases in external debt, or low reserves) or fiscal vulnerabilities (large deficits or higher public debt, up to a threshold depending on the debt carrying capacity). It is worth noting that higher incomes per capita are more strongly associated with economic recessions than lower incomes, likely because deep economic recessions occur in more complex or more financially developed economies. A more detailed analysis of the drivers of economic fragility and their interactions is left for future work.

Figure 14. Drivers of Economic Fragility

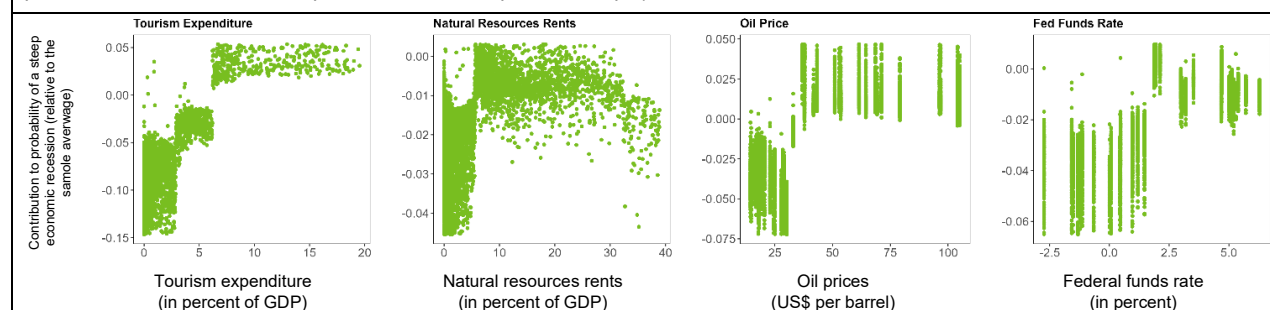
Top Drivers for Economic Recessions within Two (Left Figure) and Three (Right Figure) Years

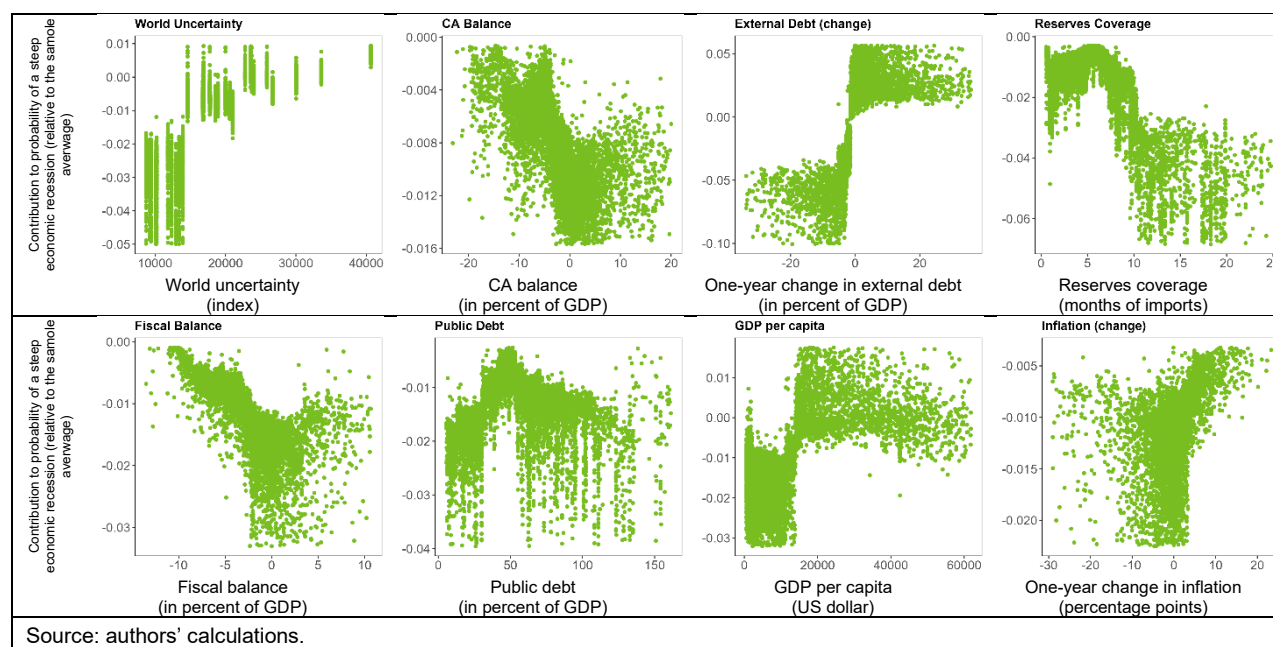
The figures show the contribution to the probability of a steep economic recession within two (left) or three (right) years (as measured by the Shapley value) for those drivers that together account for 60 percent of the contributions to the probability for the sample. Each dot represents one observation (one country-year pair), and its color indicates the predictor value, with orange being low and green high. Therefore, the value of the contribution (and its negative or positive sign) and color together illustrate how the predictor value affects the probability of a steep economic recession, relative to the sample average. For example, for the share of tourism expenditure in GDP, the top predictor in both exercises, most green dots (observations with higher tourism expenditure) are to the right (i.e., increasing recession probability, relative to the sample average) and orange dots (observations with lower tourism expenditure) are to the left (i.e., reducing recession probability, relative to the sample average).



Relationship between Contribution to Probability of Economic Recessions and the Predictor Value

The figures below illustrate how different values of predictors contribute to recession probabilities. The y-axis shows the contribution to estimated recession probability—relative to the sample average—as measured by the Shapley value, and the x-axis shows the value of the predictor. To better illustrate the trend, outliers (observations with predictor value or Shapley value below the 2.5th percentile or above the 97.5th percentile of the respective sample) are not shown.





While we considered conflict-induced recessions as being reflective of political rather than economic fragility, it is clear that conflict is a strong driver of severe economic disruptions. Of the 106 stress recessions, about a third were due to conflict. These recessions were significantly steeper (with an average decline of 7.1 percent) than those due to economic fragility (5 percent), given the severe disruptions to the economy's supply chains and productive capacity. Fragility in the political systems can therefore directly affect the economy and—as we will see later—economic disruptions can in turn be a driver of political fragility. These interdependencies can be captured when we assess the latent fragilities of economic or political systems based on the dominant drivers.

These findings on the drivers of economic fragility are broadly consistent with the literature. Cerra & Saxena (2008) find that most recessions coincide with financial or currency crises, regime changes (political instability), civil war, or some combination of these. In turn, the IMF's "Vulnerability Exercise" (IMF, 2021)—a cross-country exercise that identifies near-term macroeconomic risks in the external, fiscal, financial, real sectors using supervised machine learning—finds that the sources of fragility or the amplifiers of the recession and crisis probabilities are found to be global financial conditions, weak growth, financial depth (in the case of financial crises) and – especially for the lower income countries – weaker fiscal and external positions. These drivers are also consistent with the findings on the drivers of political fragility in our examination of coups d'état (see below).

Before moving away from economic fragility, it is worth checking whether it might be at the roots of chronic fragility. This is recasting—in the context of our framework—the question from Cerra & Saxena (2008) on whether frequent or deep recessions could account for the lack of convergence of lower income countries towards higher incomes because of frequent setbacks from which recovery is only partial. We look at the association between economic fragility (in the broader sense of the steepness, duration, and frequency of recessions) and chronic fragility (Figure 15). Overall, we find no evidence that economic fragility prevents countries from sustaining growth over time through either more frequent or longer lasting meltdowns (although we do not investigate the differences in recoveries from recessions). The average steepness of economic stress recessions is around 5 percent for both chronically fragile and non-chronically fragile countries, with the difference not statistically significant. While, on average, stress recessions last longer in chronically fragile countries (4.9 years vs. 3.9 years in non-chronically fragile countries), the difference is again not statistically

significant. Finally, the frequency of the recessions is also similar (at about 1 stress recession per country) during 1970-2024.

Figure 15. Economic Fragility vs Chronic Fragility: Severity and Length of Recessions



5. Political Fragility and its Drivers

The discussion so far focused on the fragility of the economic systems; we now turn to the application of the same conceptual framework to political systems. Recall that we view political fragility, i.e.

“breakdowns” in political systems in response to stress, as the inability to resolve sociopolitical grievances by constitutional or non-violent means. Underlying this definition is the implicit assumption that political institutions are not adequate or inclusive enough to assure the population that their grievances can be resolved constitutionally and peacefully through existing systems.

Clear manifestations of political fragility are coups d’état and internal conflicts among various groups in society, such as communal violence or civil wars.¹³ We do not consider countries that are in an externally-induced conflict—such as external invasions—as fragile. While external conflicts are associated with disastrous economic outcomes and are a clear problem for economic development, they are not a direct result of internal political fragility, and the resulting economic outcomes cannot be deemed as a “disproportionate” response to the shock brought onto the system (in line with our definition of fragility). This is consistent with the [Besley and Torsten \(2011\)](#) or [Besley and Persson \(2008\)](#) treatment of internal conflict as indicative of extreme redistributive struggles across groups that can weaken state capacity, and the observation that external conflict can even be a force for effective state building. A clear recent example of this would be the Russian invasion of Ukraine, which, despite the human, economic, and financial fallout, has only shown the resilience of Ukraine rather than its fragility. In the case of jihadist insurgencies, it is less clear whether these should be classified as external or internal conflict because the jihadist movement often infiltrates the local population even if it starts externally (as in the case of Mali and other Sahel countries since the 2012 crisis in Libya). For now, we count Jihadist insurgencies as part of internal conflict.

Operationally, we define countries as politically fragile if they had a coup d’état (successful or attempted) or were in civil war or communal conflict that claimed over 10 lives per million of population in any of the past four years (in our case 2020-2023).¹⁴ This conflict threshold is of course somewhat arbitrary, but has been chosen both (i) for convenience, as a simplified version of the World Bank and IMF criterion for identifying fragile and conflict-affected states,¹⁵ and (ii) because it captures more consistently conflicts that have had a significant macroeconomic fallout, like those in the Sahel region. This threshold, however, is relatively low compared to the literature that often focuses on larger conflicts (usually more 100 deaths per million as in [Novta and Pugacheva, 2021](#)). For example, our threshold would exclude about 54 percent of country-years of conflict during the four-year window of interest, while the larger thresholds (above 50 or 100 deaths per million) would exclude about 75 and 83 percent of the conflict data, respectively (see Annex V Table 1 for a comparison of the countries in conflict under different thresholds).

¹³ Civil wars are usually defined as a struggle between the state and one or more armed groups that seek political goals and results in significant loss of life. They include wars for territorial independence, ideological wars, ethnic wars and often coups d’état. Coups d’état can in principle be treated as a form of civil war, but an operational definition of a civil war often involves a high sustained level of fatalities (with a threshold 500-1000 deaths often used in the literature), whereas several coups, especially the more recent ones, have been bloodless.

¹⁴ For coups, we use the Powell and Thyne (2011) database, with annual coverage up to 2024, de facto covering the last five years. For internal conflict, we use the Uppsala database, with annual coverage up to 2023, and exclude the extra-systemic conflicts (group 1 in the database, defined as a conflict between a state and a non-state group outside its own territory, where the government side is fighting to retain control of a territory outside the state system) and interstate conflicts (group 2).

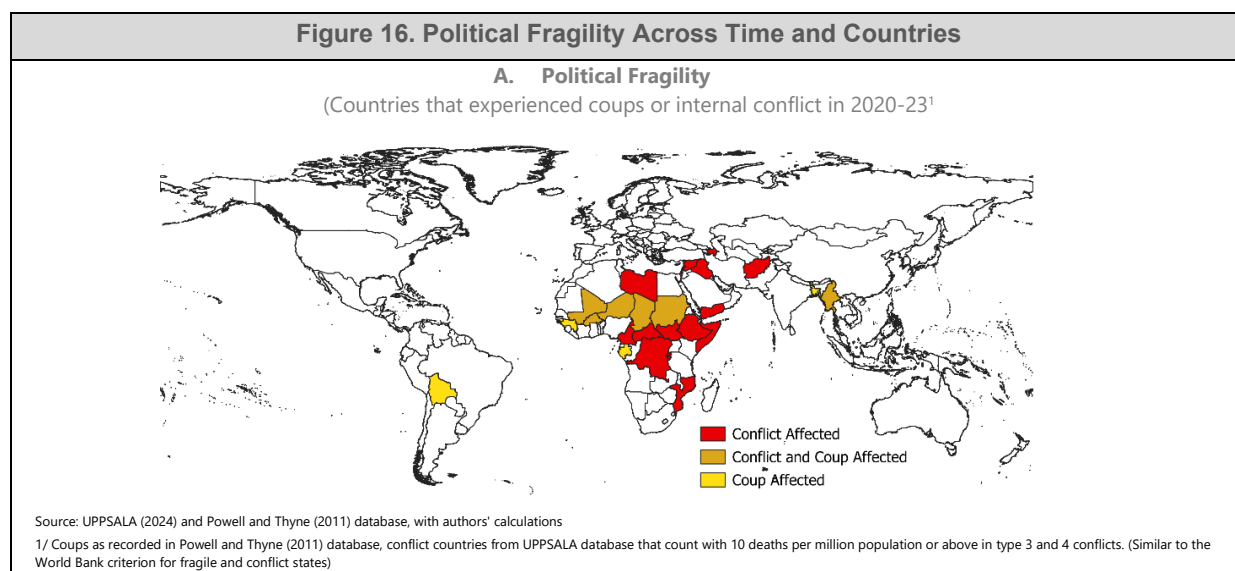
¹⁵ In the current (2022-24) World Bank and IMF classification, countries are fragile due to conflict are those with (a) an absolute number of conflict deaths above 250 according to ACLED and 150 according to UCDP; and (b) above 2 per 100,000 population according to ACLED and above 1 per 100,000 population (i.e. 10 per million) according to UCDP; or (c) countries with a rapid deterioration of the security situation, as measured by (a) an absolute number of conflict deaths above 250 according to ACLED and 150 according to UCDP; (b) a lower number of conflict deaths relative to the population between 1 and 2 (ACLED) and 0.5 and 1 (UCDP) and (c) more than a doubling of the number of casualties in the last year.

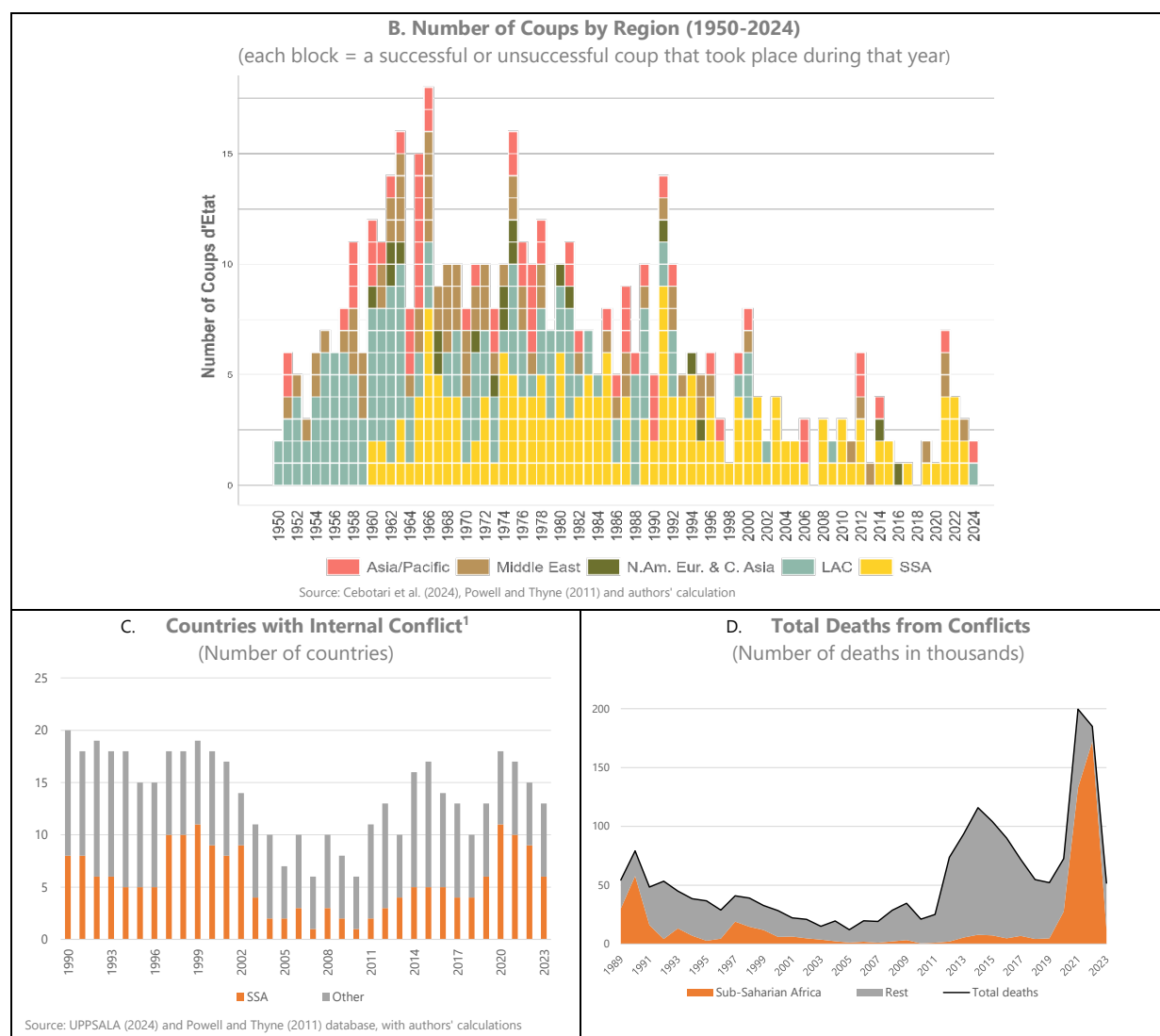
The definition we use focuses on already manifested fragility, but political fragility of course could also be latent, with vulnerabilities not yet brought to the surface by various pressures and disturbances. Identifying countries that are at risk of a breakdown in political system is most relevant for policy and prevention purposes. In the case of conflict, there are several sources that estimate and report the risks of large conflicts occurring: notably, [Mueller and Rauh \(2022\)](#) use machine learning methods to predict armed conflict, with the risk results for over 180 countries updated on a monthly basis at [conflictforecast.org](#); ACLED [ACLED CAST](#), and Violence & Impacts Early-Warning System ([ViEWS](#)) generate monthly forecast of violent conflict up to three years ahead. In the case of coups d'état, we discuss below the results from [Cebotari et al \(2024\)](#) that identify drivers of political fragility and estimate the risks of a coup occurring based on the presence of these drivers. While for sensitivity reasons we will not be reporting the forward-looking results of this exercise, we show how predicted probabilities stack against coup realizations.

Political fragility across time and countries

Since the beginning of the decade, more than one in 10 countries in the world and almost four in ten countries in sub-Saharan Africa (SSA) have had a coup d'état or were affected by internal conflict (Figure 16A). Not only does political fragility affect a large number of SSA countries, but it has also increased notably across the continent in the last four years, bucking the trend in the rest of the world.

- In the case of coups, their secular decline around the world was interrupted by a surge in 2020–24, which stands out both in terms of sheer number of coups and concentration in SSA: of the seventeen military takeovers or takeover attempts that took place during this period, all but six were in SSA (Figure 16B).
- In the case of internal conflict, the number of countries that experienced conflict has been hovering between 10–18 over the past decade, but with the upward trajectory in SSA offsetting the decline of in-conflict countries elsewhere (Figure 16C). Similarly, SSA has seen a particularly large increase in fatalities since 2021 both due to conflict in Ethiopia and the intensity of the conflict in the Sahel (Figure 16D).





Which countries are currently politically fragile? Twenty-eight countries had a coup or coup attempt or had experienced internal conflict in any of years since 2020, over half of them in sub-Saharan Africa (Table 5). Six of the countries had both coups and internal conflict (Burkina Faso, Chad, Mali, Myanmar, Niger, and Sudan). Given our fragility definition, the list of politically fragile countries excludes many countries with known conflicts—Mexico, Nigeria, Pakistan, Turkey, Ukraine—because the conflicts are either external or fatalities have been limited relative to population size.

Drivers of Political Fragility

What explains the recent surge and regional concentration of political fragility? In this section, we take an in-depth look at the driving forces behind fragility, focusing on coups d'état, and using machine learning to sift through the potential complexities behind their drivers. The full account of this work is included in our companion paper on "[Political Fragility: Coups d'État and their Drivers](#)" (Cebotari et al, 2024); herein we report the main findings.

By way of technical background:

- In terms of data, we relied on the [Powell and Thyne \(2011\)](#) database that reports coups in all countries during for the period 1950–2024 (for a total of 493 coups that occurred in 97 countries) and on a cross-database collection of 86 variables to capture the drivers of fragility. The latter include demographic, development, inclusion, governance, macro stability, policy, and sociopolitical stability characteristics of countries during the period 1970–2019 that are associated with interpretable channels from the literature.
- In terms of methodology, we used event studies to identify factors that exhibit significantly different dynamics in the runup to coups, and machine learning to identify both stressors and more structural determinants of fragility, as well as their nonlinear interactions. In the case of machine learning, we use the Area Under the Curve (AUC) score to identify the best model (random forest) and to estimate the tuning parameters (see Annex IV for a summary of the methodology). Finally, we ran several robustness checks by applying the event study and the machine learning models to our entire sample and to regional, time and income subsamples.

Cebotari et al (2024) find that both conjunctural and structural drivers are behind political fragility, showing that their interactions also shape the probabilities of a fragile response:

- The most important drivers of coups are **structural** in nature and include young demographics and weak structural fundamentals, such as low levels of development, inequality, lack of inclusion, weak governance, and dependence on natural resources (Annex VI, Figure 1 illustrates the impact of these factors on coup probabilities). These factors explain why the probability of coups is higher in certain environments but not in others and are in this sense a source of fragility. Fragile or low-income countries, where multiple weak structural fundamentals amplify each other's effect, would be especially prone to coups, consistently with their historical incidence.
- But **conjunctural** drivers also matter. The destabilization of a country's economic, political or security environment sets the stage for a higher likelihood of coups. In particular, declines in growth, high inflation, weak external positions, political instability, security challenges, as well as weaker macroeconomic policies act as *stressors* of political systems (Annex VI, Figure 2). These stressors strain incomes, affect lives and livelihoods, and stoke discontent that weaker political and economic systems are unable to handle well, leading to higher risks of political breakdowns through unconstitutional power changes. This risk is further increased in the case of overlapping stressors as they amplify each other's effects. The global shocks of 2020–23—including the covid pandemic, the war in Ukraine and commodity price surges— have indeed produced a cocktail of lower growth, higher food, energy and overall inflation, and weaker external positions for food or oil price importers—all factors increasing coup probabilities.
- Breakdowns are also more likely to occur when **policies are weaker**, especially the fiscal position (Annex VI, Figure 3). Higher resource rents, as during times of higher oil prices, also increase the benefits of being

Table 5. Identifying Political Fragility

	Internal Conflict 2020- 23 ¹	Coups d'Etat 2020-24 ¹
Afghanistan		
Azerbaijan		
Bangladesh		
Bolivia		
Burkina Faso		
Burundi		
Cameroon		
Central African Republic		
Chad		
DR Congo		
Ethiopia		
Gabon		
Guinea		
Guinea-Bissau		
Iraq		
Israel		
Libya		
Mali		
Mozambique		
Myanmar		
Niger		
Sao Tome and Principe		
Rwanda		
Somalia		
South Sudan		
Sudan		
Syria		
Yemen		

Source: UPPSALA (2024) and Powell and Thyne (2011) database, with authors' calculations

¹ Conflict countries are those that recorded at least 10 deaths per million population in any year during 2020-23. Red means it coup/conflict took place during the period.

in power—the surest way of securing access to resources in many lower income countries—and with them the likelihood of coups.

- Additional insights derive from nonlinear **interactions between structural and conjunctural drivers**, including policies. While many countries face destabilizing shocks, stressors—be they economic, political or policy-related—do not significantly affect coup probabilities in countries with strong structural fundamentals. Countries with weaker fundamentals, on the other hand, are more sensitive to both negative and positive shocks, with structural weaknesses acting as double-sided amplifiers of stressors: they increase the probability of coups when stressors are present but also reduce the probability of coups faster when the stressors recede (Figure 17 and Annex VI, Figures 4-5). The main takeaway from this latter finding is that strengthened structural fundamentals—across macroeconomic, institutional, political, and social fronts—have higher returns in structurally fragile environments in terms of staving off political breakdowns than they do in structurally more robust environments.¹⁶

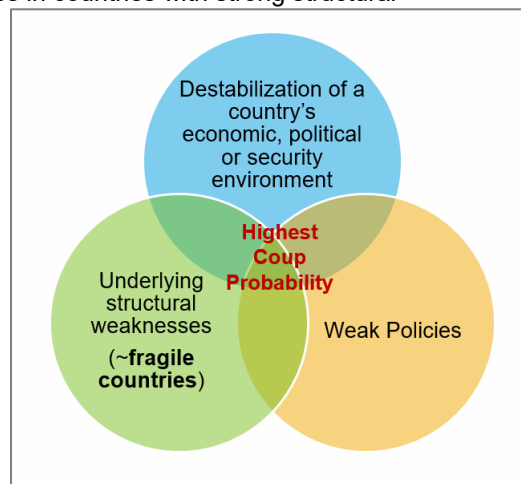
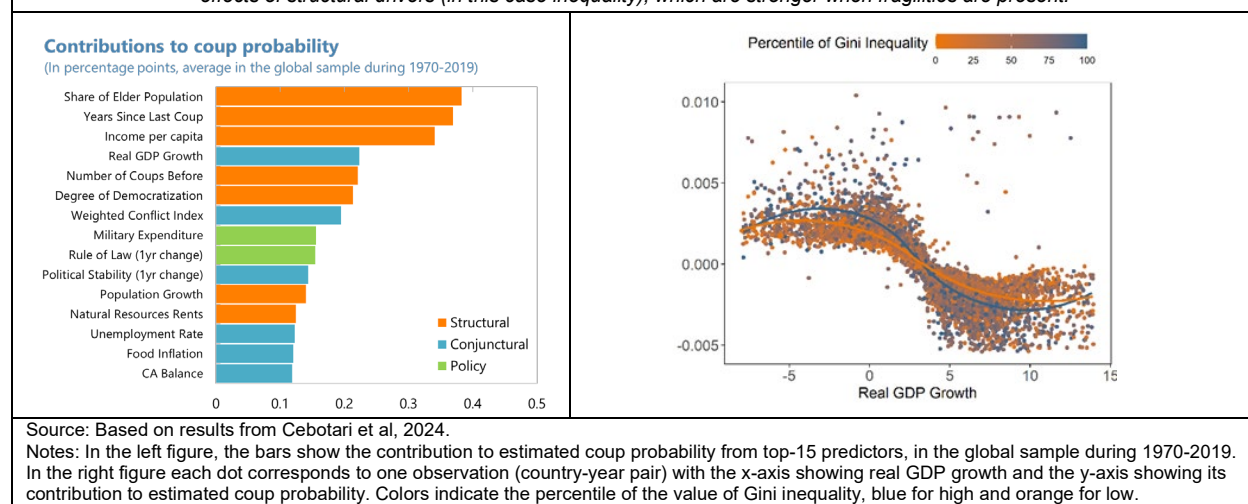


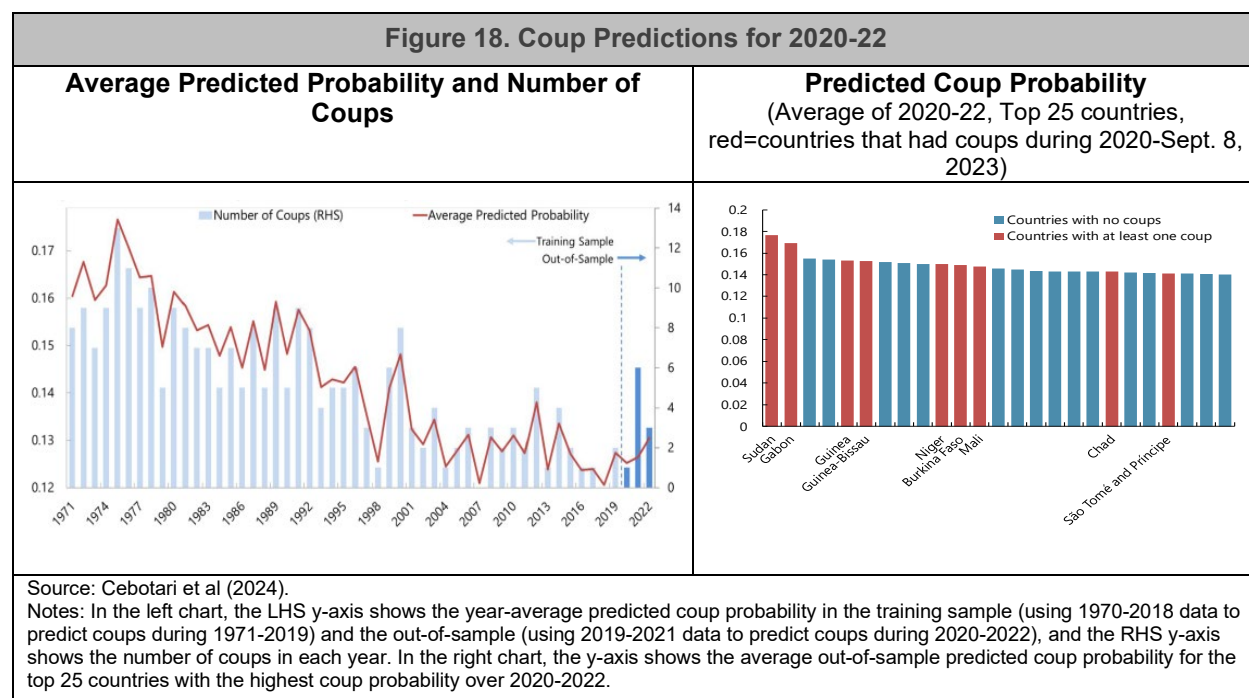
Figure 17. Drivers of Coups, Their Nonlinear Effects and Interactions – An Illustration

Drivers of coups vary across time and regions: left chart illustrates main drivers of coups in the global sample during 1970-2019. The nonlinear effects of these drivers and their interactions are illustrated in the right chart: e.g. the overall trend formed by the dots (country-coup cases) show significantly higher coup probabilities when growth rates are below 2-4 percent, and the colors show the amplifying effects of structural drivers (in this case inequality), which are stronger when fragilities are present.



¹⁶ The identified drivers of coups d'état are not dissimilar from those discussed in the literature on conflict—of which coups are often a subset, while the interactions among drivers shed new light. For conflict, many authors identify *low-income per capita levels* and *growth rates* as robust correlates of civil wars (Alesina et al., 1996; Blattman and Miguel, 2010; Bazzi and Blattman, 2014; Muchlinski et al., 2016; Ray and Esteban, 2017; Redl and Hlatshwayo, 2021). Also, Collier and Hoeffler (2004, 2005, 2007 and 2009)—surveyed in Collier (2007, chapter 2)—study the links between poverty, stagnation and conflict, and argue that countries in a state of fragility could be trapped in conflict patterns with events that are either persistent (civil wars) or swift (coup d'état). Their research shows that risks of civil war and of coups are affected by *low growth* (hopelessness), *low income* (poverty), *low state capacity* and *past conflict events*. This literature also suggests that in addition to economic downturns, other poor economic conditions—such as *high unemployment* and *high inflation*—can contribute to a sense of discontent, create grievances, erode public support, and increase the likelihood of conflict. Recent contributions (Chami et al., 2021; Rohner and Thoenig, 2021; Leepitapiboon, 2023; and Mueller et al., 2024) also underline the role of macroeconomic policies in ensuring long-term stability and supporting key state capacities through strong fiscal positions and reforms that foster economic and political inclusiveness; these policies can also play a preventive role in reducing conflict risk at a reasonable cost.

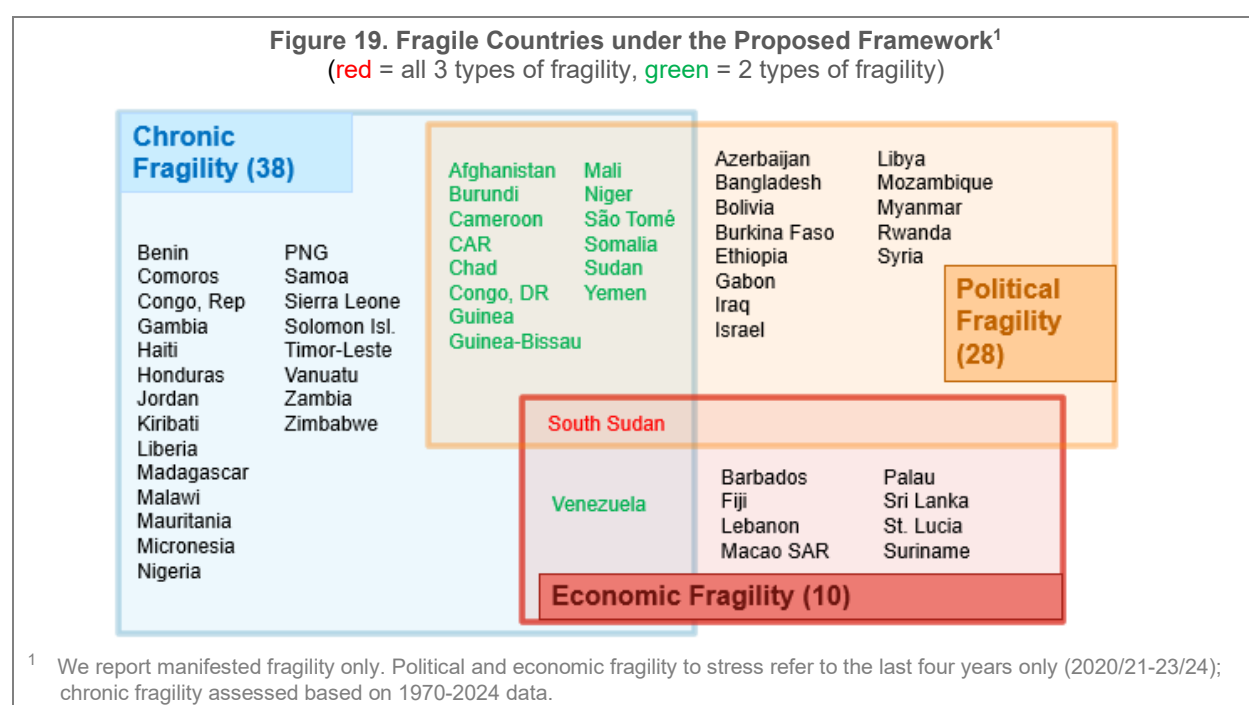
The analysis of the drivers of fragility can be used to assess latent fragility, as well as its scale. As we mentioned, while we focus on already manifested fragility for sensitivity reasons, fragility is best assessed predictively, before it manifests. We use the machine learning model, which was trained on the data from 1970 to 2019, to predict coups d'état for the out-of-sample period 2020–22, a period of high coup incidence. The model performs relatively well at predicting coups, assigning a high probability of coup to all SSA countries that have experience military takeovers during 2020–23, including Mali, Burkina Faso, Niger, Gabon, among others, picking up on the cross-country structural fundamentals more than time-bound stressors (Figure 18).¹⁷ Such probabilities could be used, if needed, to rank the degree of fragility to stress.



¹⁷ Under a traditional metric that evaluates a model's predictive performance—the area under the ROC curve or AUC, where a score of 0.5 represents random guessing ability and a score of 1 perfect prediction—the out-of-sample AUC for 2020-22 in our model is estimated at 0.878, which also suggests an overall good model prediction performance.

6. Taking Stock: What Countries are Fragile?

The fragility framework proposed in this paper produces a list of 59 countries that have revealed recent fragility, some exhibiting overlapping types of fragility (Figure 19). Only one country (*South Sudan*), exhibited all three types (chronic, economic, and political), while thirteen countries (those in green font in Figure 18) display two types of fragility. Note that there are surprisingly few overlaps between chronic and economic fragility, largely because of the clear conceptual distinction between what they measure (ability to generate growth over time vs presence of specific macroeconomic vulnerabilities that have amplified recent shocks) and between their drivers, which is also why their economic systems have also not shown significant differences in how they responded to stress. On the other hand, the overlaps between chronic fragility and political fragility are significant and would be even larger if chronic fragility covered upper middle-income countries.



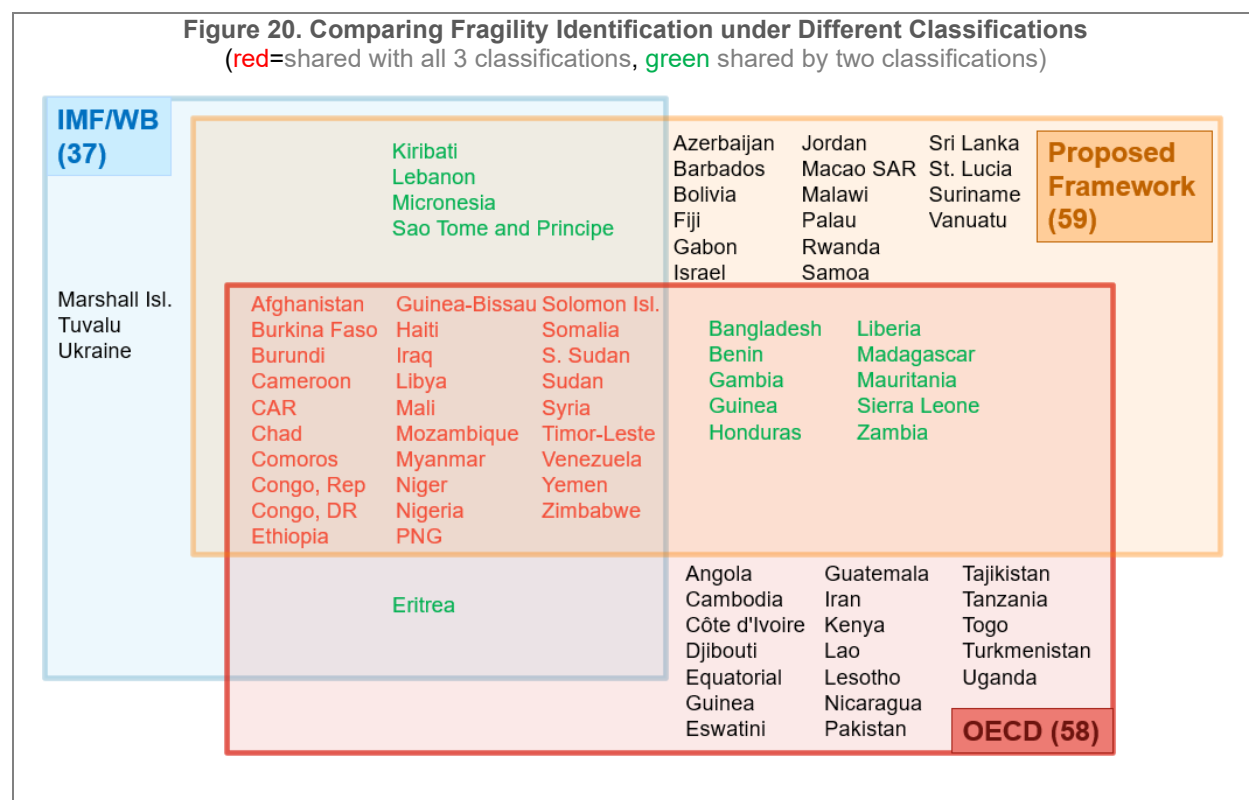
The resulting list of fragile states presents significant overlap with existing fragility lists by IFIs. We compare our list with other existing fragile states lists, especially that of the IMF/ World Bank (FY25) and the OECD (2022), the latter covering extremely fragile and fragile countries (Figure 20). Of the 81 countries on the three lists, 29 are considered fragile by all three classifications (countries in red font in Figure 20) and our list shares another 14 fragile states with either the OECD or the IMF/WB classification only. The remaining 16 countries on our list that do not figure on the other lists are those that (a) display economic fragility to stress, which is not a concept that is captured in the other two frameworks (Barbados, Fiji, Macao SAR, Palau, Sri Lanka, St. Lucia, Suriname); (b) had recent coups or coup attempts (Bolivia, Gabon), which are considered politically fragile in our framework; (c) exhibiting chronic fragility in our framework (Jordan, Malawi, Samoa, Vanuatu); and (d) have experienced internal conflict (Azerbaijan, Israel, Rwanda).

The proposed conceptual framework can be equally used to produce a list of countries that show latent, rather than realized, fragility, i.e. where prevailing drivers signal a high probability of a stress response. Reporting latent fragility would affect largely the list of economically and politically fragile countries

rather than those that are chronically fragile, since the latter is a longer-term concept. It would also be more sensitive to report such results publicly, and they are more likely to be used for internal purposes, as in the case of the IMF vulnerability exercise.

Figure 20. Comparing Fragility Identification under Different Classifications

(red=shared with all 3 classifications, green shared by two classifications)



7. Conclusions and Lessons for Engagement with Fragile States

The paper proposes a general conceptual framework for thinking about state fragility. The intention was to answer a simple question: how do we know when a country—or its economic and political system—is fragile, even if we do not know what is driving this fragility? The answer we propose is based on Taleb's (2012) work on fragility and the paper's extension of it, namely that a system is fragile when it shows a supra-linear (disproportionate) response to negative stressors and a sub-linear (underwhelming) response to positive stressors or to time as a stressor. This mathematical concept allows us to simplify the identification of fragility to a system's response to shocks, positive or negative, and to separate it from the diagnosis of the drivers of fragility.

The responses to stress underlying our conceptual framework suggest a simple typology for fragility.

We distinguish between *fragility to stress* as breakdowns in political or economic systems in response to negative shocks and *chronic fragility* as inability of economic systems to generate growth across time. In the case of economic systems, whose responses are more amenable to quantification, we measure these by growth alone, a significant simplification relative to more complex identification methods. In the case of political systems, coups d'etat and conflict are considered as symptomatic of the inability of the system to resolve grievances by peaceful or constitutional means.

The simplicity and agnosticism of the framework that identifies fragility facilitates a focus on its drivers, which are key to mitigating fragility, and on its prediction. The ability to use the framework to better understand the driving forces behind fragility is particularly helpful at a time when fragility is becoming increasingly widespread across the world and many international organizations are developing strategies on how to better address or prevent fragility in the context of their mandates.

- **Manifested fragility.** The paper applied the framework to first identify historical incidences of fragility – later used for the analysis of its drivers – while focusing on the last few years for evidence of recently manifested fragility. The list of countries that have recently experienced fragility has a strong overlap (80 percent) with other fragility classifications, largely by capturing chronic and political fragility, which suggests that with a simple identification framework it is possible to capture many of its manifestations. The bulk of the differences with other classifications stem from our focus on economic fragility to stress that is not captured in those classifications. In this regard, our concept of fragility captures (i) many *small developing states* that are either highly dependent on tourism or are highly exposed to natural disasters and therefore face systemic damage from a single shock, and (ii) countries where high debt levels (or general economic mismanagement) fragilize economic performance—whereas they are not considered fragile under many classifications.
- **Fragility drivers.** The benefit of the initial focus on manifested fragility is that it can be used to investigate the drivers of fragility, which can be complex and whose nonlinear interactions can cause the type of disproportionate responses to shocks that generate fragility. Since the growth literature already provides ample insights into the sources of chronic fragility, the paper focused on understanding the drivers behind fragility to stress. Our machine learning exercise on the drivers of coups d'etat suggests that destabilized economic, political or security situation, as well as weaker policies—the conjunctural drivers— increase the likelihood of political breakdowns. While most countries are exposed to destabilizing shocks or weaker policies, not all experience breakdowns in their political systems. Rather, countries with underlying structural weaknesses— such as poverty, poor inclusions, weak governance, and high political and security risks— are more likely to have a fragile response because these structural drivers (sources of fragility) act as shock amplifiers. This is also the case for *economic systems*, where underlying fragilities such as high concentration of economic activity or macroeconomic imbalances (e.g. high debt) amplify economic, political or security shocks.
- **Latent fragility.** Drivers of fragility, in turn, can be used to assess the degree of latent fragility in the system at a particular time, which is of most interest to policymakers. The paper has done this for political fragility, using machine learning to assess coup probabilities for all countries in 2021-23 based on the drivers present at the time, with the fragility ranking capturing well countries that, in the event, experienced coups during this period. Similar exercises are being increasingly developed in the literature for the prediction of conflict; applying a comparable framework to latent economic fragility and to exit from chronic fragility remains a task for future research. Finally, it is worth mentioning that while the paper reports the list of fragile countries based on manifested fragility only, this was done for sensitivity reasons and not as an intrinsic feature of the proposed framework.

The analysis of the drivers of fragility provides the most insights into how policies could mitigate fragility:

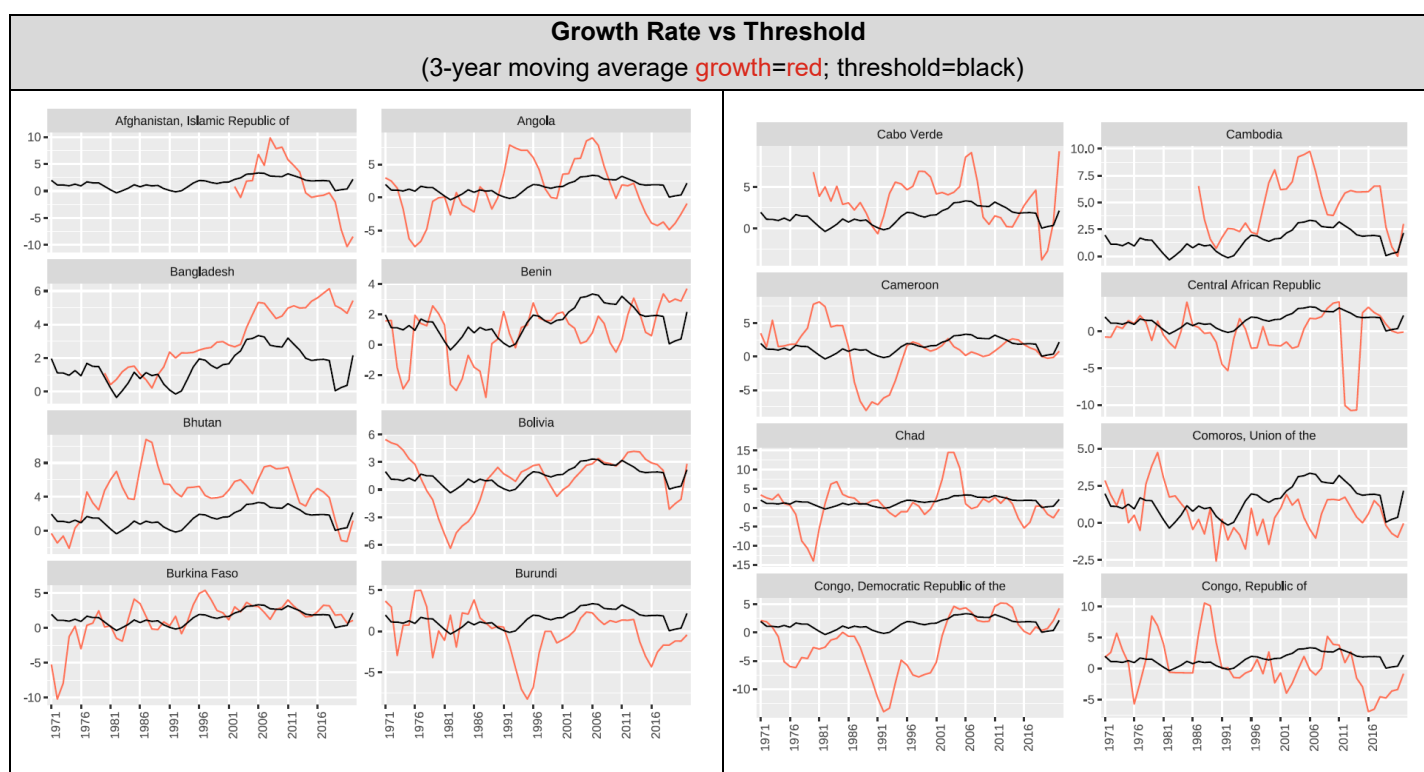
- Weak structural fundamentals (sources of fragility) are the most significant contributors to the probability of systemic breakdowns as they amplify economic and policy stressors.
- The main principle for policy design in fragile states should therefore be to focus on eliminating the sources of fragility, especially when these pose an existential threat (e.g. excessive concentration of activities, fiscal and external vulnerabilities that can plunge countries into severe crises, threats from natural disasters). In

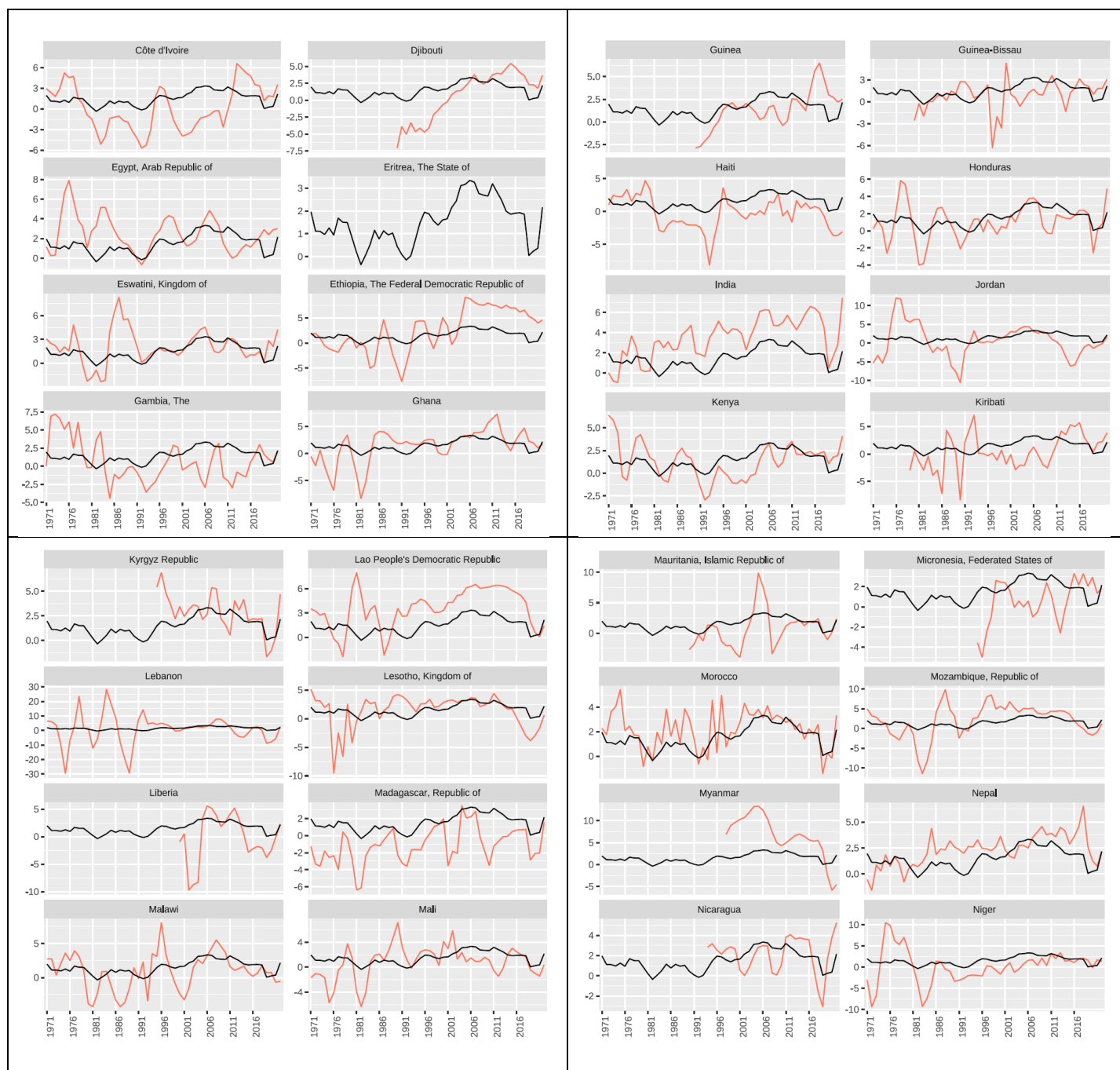
the words of Taleb (2012): “If something is fragile, its risk of breaking makes anything you do to improve it or make it efficient inconsequential unless you first reduce that risk of breaking – i.e. survival and risk control takes strong precedence over efficiency, success or growth”. Focus on eliminating the sources of fragility—the “via negativa” approach advocated in Taleb (2012)—would also help avoid costly mistakes associated with interventions through new initiatives or “via positiva”. Finally, this approach is well consistent with Rodrik’s (2006, 2010) growth diagnostic, where the most significant constraints on economic growth are identified and addressed in a dynamic evolutionary setting.

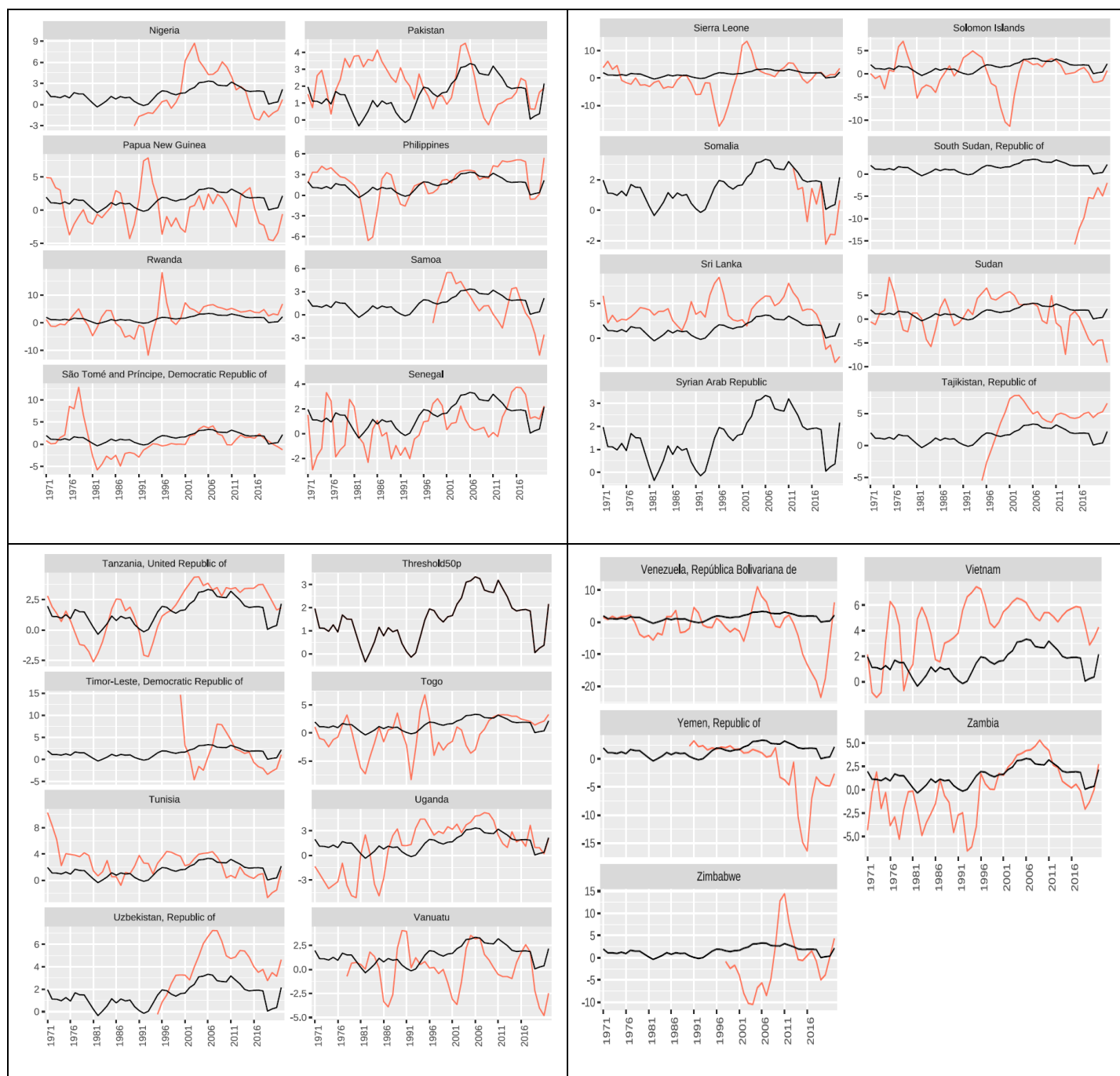
- While we drew lessons about the main drivers behind political and economic fragility, these drivers are in fact time- and country-specific—as we have illustrated in the case of the recent coups d’état in Niger and Gabon—and could be used as such by policymakers for guidance on specific interventions to mitigate fragility.
- The focus of the paper has been on state fragility, but it is worth remembering that policies could also help address fragility at the personal level: the focus on eliminating existential threats should also extend to protecting the very weak, who themselves face such threats (Taleb, 2012), through strengthened social safety nets and reducing spending benefitting those better off.
- In chronically fragile environments, where multiple structural weaknesses overlap, political systems are more susceptible to destabilizing economic and policy stressors due to the compounding effects of their weaker fundamentals (sources of fragility).
- Helpfully, the compounding effects work the opposite way as well: the sources of fragility could also amplify positive shocks, in the sense that improvements in the economic, political or policy environments can have stronger benefits in counties with weak fundamentals. In other words, strengthening structural fundamentals and improving policy outcomes can have higher returns in chronically fragile environments in terms of staving off political breakdowns than they do in structurally more robust environments.
- Therefore, continued engagement by multilateral institutions and donors in fragile situations is likely to have particularly high dividends—especially in the context of structural programs—for at least three reasons: (i) their financial support can help stabilize the macroeconomic environment and mitigate risks of fragile political responses; (ii) they would help address the sources of fragility through structural reforms; and (iii) stronger policies targeted in programs would bring additional benefits in terms of reducing stressors.

Annex I. Identifying Chronic Fragility: Actual vs Benchmark Growth for LICs and LMICs

The table below shows the actual growth rate of the low-income and lower middle-income countries (measured as a three-year moving average; red lines) relative to the benchmark threshold (median) growth of these countries (black lines). Countries whose growth rates were below the threshold on average since the 1970s, 1980s, and 1990s (all three periods) are considered fragile, unless they showed growth above threshold for each of the past ten years. Note that for South Sudan and countries of the former Soviet Union, the first four years after the breakaway are not shown, as they are not counted in the exercise.







Annex II. Economic Fragility to Stress

Table II.1. Recessions with fragile economic responses¹

Country	Recession begins	Recession ends	Length of recession	Cumulative decline in GDP	Average decline in GDP	Max annual decline	Chronic fragility
Antigua and Barbuda	2009	2012	4	-16.9	-4.2	-7.3	
Argentina	2000	2003	4	-10.4	-2.6	-5.4	
Aruba, Kingdom of Neth.	2020	2021	2	-10.1	-5.1	-8.7	
Bahamas, The	2020	2021	2	-9.2	-4.6	-6.7	
Barbados	2019	2021	3	-10.2	-3.4	-5.2	
Burkina Faso	1972	1974	3	-18.5	-6.2	-8.6	
Cabo Verde	1975	1977	3	-15.1	-5.0	-6.6	
Cameroon	1988	1995	8	-25.5	-3.2	-5.3	1
Chile	1974	1976	3	-10.6	-3.5	-5.8	
Congo, Democratic Republic	1990	2002	13	-69.0	-5.3	-10.8	1
Equatorial Guinea	2015	2024	10	-39.9	-4.0	-7.9	
Eritrea, The State of	2017	2017	1	-7.7	-7.7	-7.7	
Estonia, Republic of	2009	2011	3	-11.4	-3.8	-5.8	
Fiji, Republic of	2020	2022	3	-12.8	-4.3	-7.5	
Gabon	1978	1981	4	-30.2	-7.5	-16.3	
Gabon	1987	1988	2	-8.6	-4.3	-4.7	
Greece	2009	2015	7	-28.6	-4.1	-8.0	
Guyana	1978	1985	8	-27.0	-3.4	-6.6	
Jordan	1989	1991	3	-10.8	-3.6	-6.0	1
Kiribati	1991	1991	1	-6.4	-6.4	-6.4	1
Kuwait	1982	1983	2	-11.6	-5.8	-9.5	
Latvia, Republic of	2009	2011	3	-16.3	-5.4	-7.7	
Lebanon	2019	2022	4	-30.7	-7.7	-11.1	
Lesotho, Kingdom of	1977	1979	3	-11.7	-3.9	-7.6	
Libya	1981	1988	8	-46.4	-5.8	-8.5	
Libya	1994	1999	6	-18.8	-3.1	-5.9	
Macao, SAR	2015	2017	3	-16.5	-5.5	-8.1	
Macao, SAR	2020	2022	3	-44.8	-14.9	-16.8	
Madagascar, Republic of	1982	1983	2	-7.2	-3.6	-3.6	1
Maldives	2020	2020	1	-5.6	-5.6	-5.6	
Mali	1982	1984	3	-10.5	-3.5	-4.3	1
Mongolia	1991	1994	4	-20.1	-5.0	-7.2	
Nauru, Republic of	2007	2007	1	-4.7	-4.7	-4.7	
Niger	1972	1974	3	-11.9	-4.0	-7.3	1
Niger	1983	1986	4	-12.0	-3.0	-6.2	1
Palau, Republic of	2018	2023	6	-19.8	-3.3	-6.2	
Panama	2020	2020	1	-3.6	-3.6	-3.6	
Poland, Republic of	1981	1983	3	-14.1	-4.7	-6.9	
Qatar	1982	1983	2	-10.2	-5.1	-5.8	
Samoa	1981	1983	3	-9.2	-3.1	-5.4	1
Samoa	2021	2023	3	-8.1	-2.7	-5.2	1
San Marino, Republic of	2009	2014	6	-30.5	-5.1	-8.2	
Saudi Arabia	1982	1987	6	-34.8	-5.8	-10.4	
Solomon Islands	1999	2003	5	-21.9	-4.4	-8.3	1
South Sudan, Republic of	2024	2024	1	-10.1	-10.1	-10.1	1
St. Lucia	2020	2021	2	-11.9	-5.9	-7.4	
Suriname	1991	1994	4	-13.9	-3.5	-4.3	
Suriname	2020	2022	3	-14.4	-4.8	-5.7	
Trinidad and Tobago	1983	1990	8	-27.9	-3.5	-6.7	
Togo	1993	1994	2	-8.6	-4.3	-6.7	
United Arab Emirates	1982	1988	7	-22.4	-3.2	-5.8	
Uruguay	1982	1985	4	-12.9	-3.2	-5.6	
Venezuela, República Bolivariana	2015	2022	8	-115.1	-14.4	-25.8	1
Zimbabwe	1999	2009	11	-60.4	-5.5	-10.1	1

1/ The steepest recessions are those during which the average or maximum declines were steeper than one standard deviation away from the mean of all recessionary episodes (excluding those due to conflict or country breakoffs). Recessions are identified as years of negative growth, with the latter measured on a 3-year moving average basis.

Annex III. Methodology for Fragility Identification by Major Institutions

Institution / Name of the FCS list	Main Criteria for Classification										
Fund For Peace / Fragile States Index (FSI)	<p>The FFP produces an annual ranking of 178 countries using a Scoring System based on content analysis from online and print sources, quantitative data from multilateral organizations, and qualitative review by experts. The FSI is based on 12 indicators grouped in four main categories: cohesion (security apparatus, fractionalized elites, and Group Grievance) social indicators (Demographic pressures and Refugees and IDPs), economic Indicators (Uneven Development, Economic Decline and Poverty, and Human Flight and Brain Drain), political (State Legitimacy, Public Services, and Human Rights and Rule of law), and cross-cutting indicators (External Intervention). Each of the 12 indicators is scored from 0 (most stable) to 10 (most fragile). The FSI classifies countries in four categories based on their total score:</p> <table border="1"> <thead> <tr> <th>Score Range</th><th>Category</th></tr> </thead> <tbody> <tr> <td>0.0 – 29.9</td><td>Sustainable</td></tr> <tr> <td>30.0 – 59.9</td><td>Stable</td></tr> <tr> <td>60.0 – 89.9</td><td>Warning</td></tr> <tr> <td>90.0 – 120.0</td><td>Alert</td></tr> </tbody> </table>	Score Range	Category	0.0 – 29.9	Sustainable	30.0 – 59.9	Stable	60.0 – 89.9	Warning	90.0 – 120.0	Alert
Score Range	Category										
0.0 – 29.9	Sustainable										
30.0 – 59.9	Stable										
60.0 – 89.9	Warning										
90.0 – 120.0	Alert										
World Bank / IMF List of Fragile and Conflict Affected States	<p>The World Bank's list is updated annually and captures the typology and severity of challenges faced by the heterogenous group of FCS. The methodology classifies fragility and conflict situations using the following two criteria:</p> <ol style="list-style-type: none"> Countries with high levels of institutional and social fragility, identified based on the following indicators that measure the quality of policy and institutions, and manifestations of fragility: (a) the CPIA score for IDA countries (for which CPIA scores are disclosed) that is below 3.0; or (b) the presence of a UN peacekeeping operation; or (c) flight across borders of 2,000 or more per 100,000 population from the origin country or territory, who are internationally regarded as refugees in need of international protection Countries affected by violent conflict, identified based on a threshold number of conflict-related deaths relative to the population. Countries in ongoing conflict, as measured by (a) an absolute number of conflict deaths above 250 according to ACLED and 150 according to UCDP; and (b) above 2 per 100,000 population according to ACLED and above 1 according to UCDP; or 2) Countries with a rapid deterioration of the security situation, as measured by (a) an absolute number of conflict deaths above 250 according to ACLED and 150 according to UCDP; (b) between 1 and 2 (ACLED) and 0.5 and 1 (UCDP) per 100,000 population; and (c) more than a doubling of the number of casualties in the last year) 										
OECD / States of Fragility	<p>The OECD defines a multidimensional fragility framework as the combination of risk exposure and limited coping capacity of states, systems, or communities to manage, absorb, or mitigate those risks. Fragility is measured annually in 177 contexts across six dimensions: Economic, Environmental, Human, Political, Security, and Societal. 56 indicators from independent third-party data sources are used to approximate each dimension, with 8–10 indicators by dimension. The calculation of the states of fragility index is based on a principal component analysis that reduces the indicators in each dimension into principal components. The fragility score is then obtained by using the first two components from each dimension. Finally using natural breaks in the data, classification of countries is based on the following score thresholds: High fragility: score below –1.18, and Extreme fragility: score below –2.7.</p>										

Annex IV. Drivers of Economic and Political Fragility: Machine Learning Methodology

This annex summarizes the machine learning methodology used in the economic fragility section to identify the drivers of steep economic recessions and in the political fragility section to study the drivers of coups d'état and their interactions, as well as to estimate coup probabilities based on these drivers. The summary is based on [Cebotari, et al \(2024\)](#).

Data and Sample

The machine learning exercise uses variables that capture a country's demographic, development, inclusion, governance, macro stability, and sociopolitical stability characteristics (including first difference transformations to capture within country dynamics) (Table 1):

- For the *political fragility* exercise, we use a total set of 55 predictors, as described in [Cebotari, et al \(2024\)](#). The training sample for the exercise consists of 192 countries during the period 1970–2019, whereas the period 2020–2022—which has seen a resurgence in coups—is kept for out-of-sample testing. The prediction framework uses year $t-1$ data to predict coup in year t .
- For the *economic fragility* exercise, the predictor set is only slightly modified to include additional variables to capture economic drivers such as tourism expenditures as a share of GDP. The prediction framework uses year t data to predict the occurrence of a steep economic recession within the following two years (i.e., year $t+1$ and $t+2$) or the following three years (i.e., year $t+1$, $t+2$, and $t+3$).

Category	Variables
Development and Demographics	Income per capita Share of Elder Population Literacy Rate ...
Inclusion and Governance	Degree of Democratization Gini Inequality Voice and Accountability ...
Macro Stability	Real GDP Growth Inflation CA Balance ...
Sociopolitical Stability	Political Stability and Absence of Terrorism Weighted Conflict Index ...
Policy	Fiscal Balance Public Debt Military Spending ...

Table IV.2. Predictors for Economic Recessions

Natural Resources Rents	GDP per capita	M2 Growth
Natural Resources Rents (change)	Export Partners' Growth	Inflation
Tourism Expenditure	Oil Price	Inflation (change)
CA Balance	Oil Price (change)	Natural Disaster-Affected Population
CA Balance (change)	Fed Funds Rate	Natural Disaster-Affected Population (change)
External Debt	Fed Funds Rate (change)	Battle-Related Deaths
External Debt (change)	ToT %Change	Battle-Related Deaths (change)
NEER %Change	World Uncertainty	Weighted Conflict Index
REER %Change	World Uncertainty (change)	Weighted Conflict Index (change)
Reserves Coverage	External Crisis	Governance
Reserves Coverage (change)	Fiscal Crisis	Governance (change)
Fiscal Balance	Financial Crisis	Political Stability
Fiscal Balance (change)	Private Credit	Political Stability (change)
Public Debt	Private Credit (change)	
Public Debt (change)		

Machine Learning Algorithms: Tree-Based Models

We employ two tree-based supervised machine learning models for the prediction of coups, i.e., the labelled prediction target—Random Forest and XGBoost—and conduct a horse race between them to select the winning model based on AUC scores. As tree-based ensemble methods, these models overcome overfitting that is common in binary classification trees by combining many single trees and introducing sampling and randomness for each tree or at each node.

The binary classification tree method (Breiman et al., 1984) uses a decision tree to flag an observation by going from the original complex sample to smaller and purer subsamples. Each decision tree consists of a root node, branches departing from parent nodes and entering child nodes, and multiple terminal nodes which are also called leaves. In the structure of classification tree, leaves represent the flagged classes (determined by the class with the most votes within one leaf) and branches represent the conjunctions of indicators that lead to the classes. Observations in the root node are sent to left or right child nodes according to some splitting rules that identify indicators and corresponding thresholds. Once the whole sample is split into two subsamples, such process is repeated on each child node recursively until each leaf consists of observations in one class, or some stopping criteria are met (e.g., the maximum depth or the minimum leaf size of a tree is reached). In other words, a decision tree is made up of many splits, which consists of a parent node, two child nodes, and branches departing from the parent node and entering child nodes. The indicator and threshold used to split the sample at each node are chosen based on some measures of impurity, such as the Gini impurity index. Because of the recursive algorithm, the binary classification tree structure partitions the classification (or prediction) space into multiple smaller spaces, which allows for a complex relationship between the classification (or prediction) outcome and predictors, such as non-linearities, non-monotonicities, and interactions among indicators.

Binary classification trees are prone to overfitting when a tree grows fully to fit all observations in the training sample, which results in a deep tree with small leaves containing only few observations with strict rules. Such a deep tree will fail to make accurate predictions for new observations because it includes too much noise from the training sample that is irrelevant to new predictions. To reduce overfitting of one single binary classification tree, ensemble models consisting of many binary classification trees were proposed.

Random Forest: Among ensemble models based on binary classification trees, the simplest is Random Forests introduced by Breiman (2001), which applies the general techniques of bootstrap aggregating (bagging). The Random Forest consists of multiple binary classification trees, each of which is grown on a random sample selected with replacement from the training sample, which decreases the variance of the model without substantially increasing the bias. Additionally, it performs random feature sampling such that only a random subset of predictors selected from the entire set are considered at each split, effectively preventing strong correlations among trees. In the end, class predictions for new observations are made by taking the majority vote of classes determined by individual trees, and scores of new observations are calculated by taking the average of scores generated by individual trees. Bootstrap aggregating and feature sampling together help Random Forests prevent overfitting and thus achieve better prediction performance.

XGBoost: In addition to Random Forests, we also consider XGBoost (Chen & Guestrin, 2016), another ensemble learning algorithm with the binary classification tree as the building block. XGBoost employs gradient boosting, in which individual binary trees are trained sequentially. To be specific, each new binary tree is trained to learn the residuals of previous trees, which are the differences between the predicted and actual values of the target variable. Moreover, XGBoost adds a penalty term to the loss function used in training the model, which helps prevent overfitting by discouraging the model from becoming too complex. The complexity is measured by sum of the depth of all trees and the number of trees in the XGBoost model. The depth of a

tree in an XGBoost model refers to the number of splits in the tree. A tree with more splits has a greater depth and can capture more complex interactions in the data but may also be more prone to overfitting. Also, the more trees you have in the XGBoost model, the more likely you will capture some “idiosyncratic” pattern only for this sample and suffer over-fitting problem when make prediction on another sample. Thus, the algorithm builds new trees to minimize the errors in the training set while controlling the complexity of the trees to ensure it has good generalization ability.

Shapley Values

To unpack the black box of machine learning models and understand the contributions of predictors, we report the results in terms of Shapley values ([Strumbelj and Kononenko, 2010](#); [Lundberg and Lee, 2017](#))—built on the concept of Shapley values from cooperative game theory ([Shapley, 1953](#); [Young, 1985](#))—which essentially measure the additive contribution of each predictor to the likelihood of a coup relative to the sample-average predicted probability of a coup (for a detailed description of the Shapley values algorithm see below).

Annex V. Countries in Conflict under Different Thresholds

In the table below we illustrate how the identification of political fragility (as countries experiencing internal conflict) varies based on the conflict threshold chosen. The highlights indicate the year where deaths from conflict exceed specific thresholds, for each country that experienced conflict.

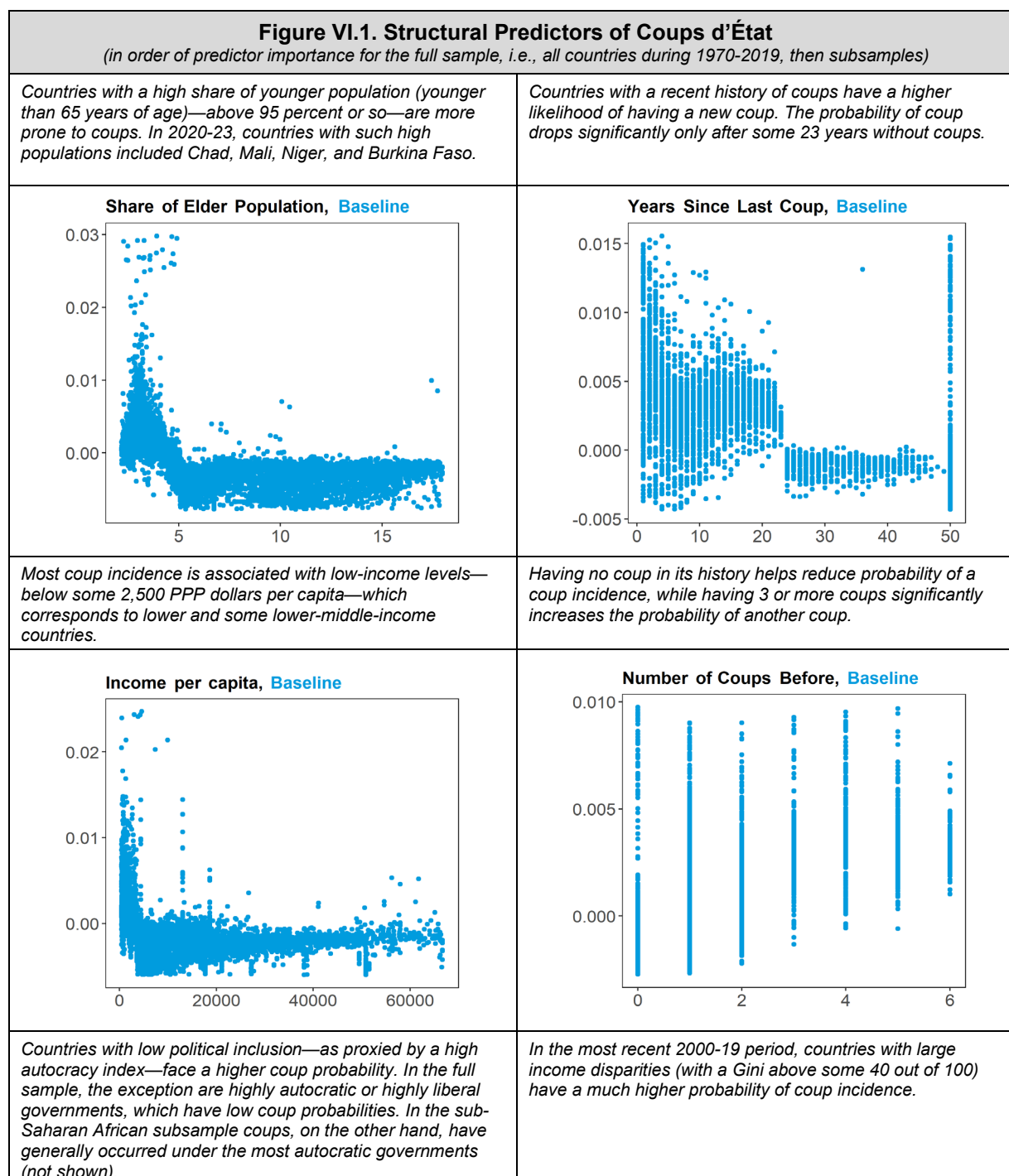
Table III.1. Countries in Conflict under Different Conflict Thresholds, 2020-23

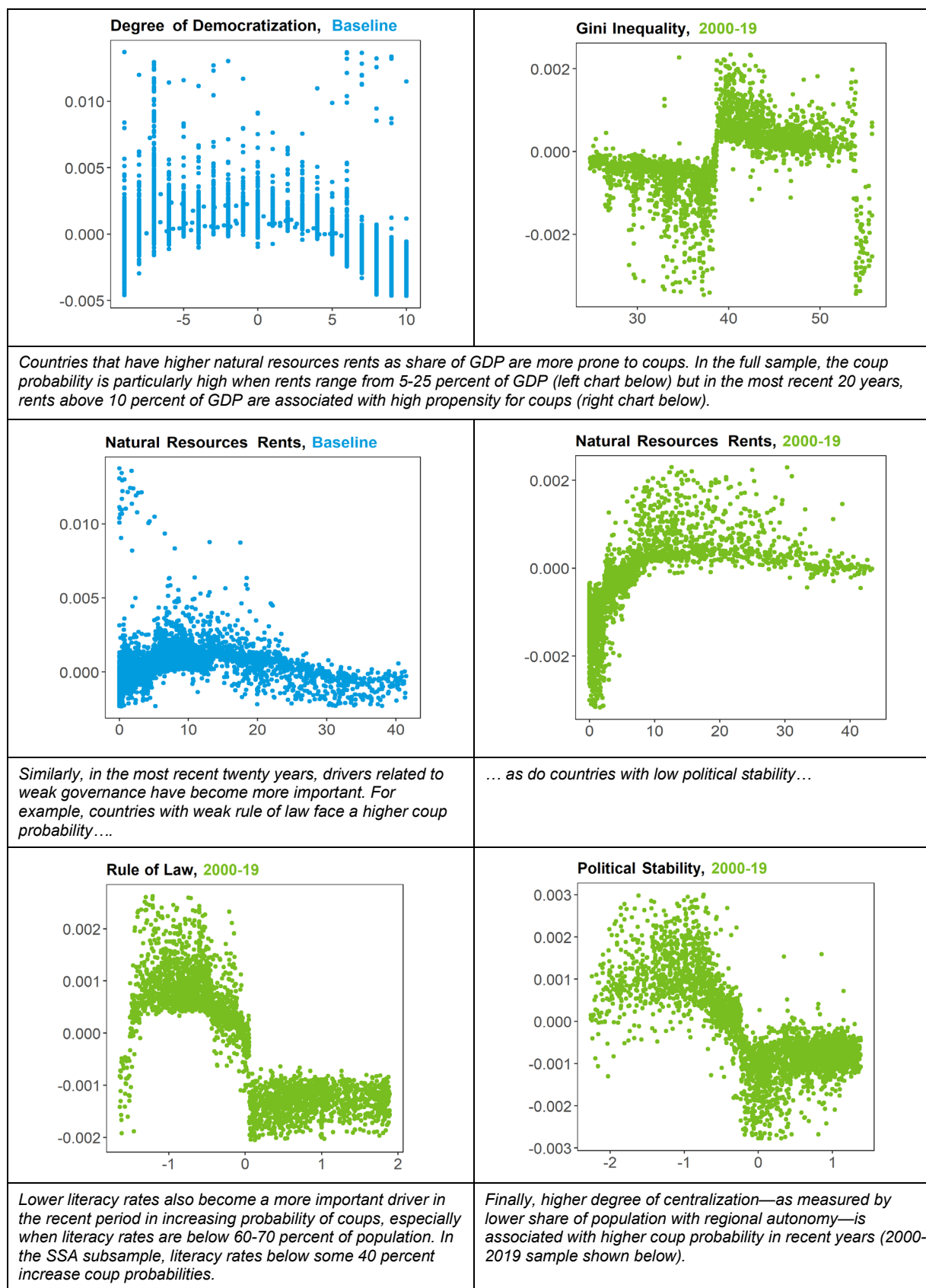
	10 killed per million (>.001% of population) (54% of country-years of conflict excluded)				50 killed per million (>0.005% of population) (75% of country-years of conflict excluded)				100 killed per million (>0.01% of population) (83% of country-years of conflict excluded)			
	2020	2021	2022	2023	2020	2021	2022	2023	2020	2021	2022	2023
Afghanistan												
Azerbaijan												
Burkina Faso												
Burundi												
Cameroon												
Central African Republic												
Chad												
DR Congo												
Ethiopia												
Iraq												
Israel												
Libya												
Malaysia												
Mali												
Mozambique												
Myanmar (Burma)												
Niger												
Rwanda												
Somalia												
South Sudan												
Sudan												
Syria												
Yemen (North Yemen)												

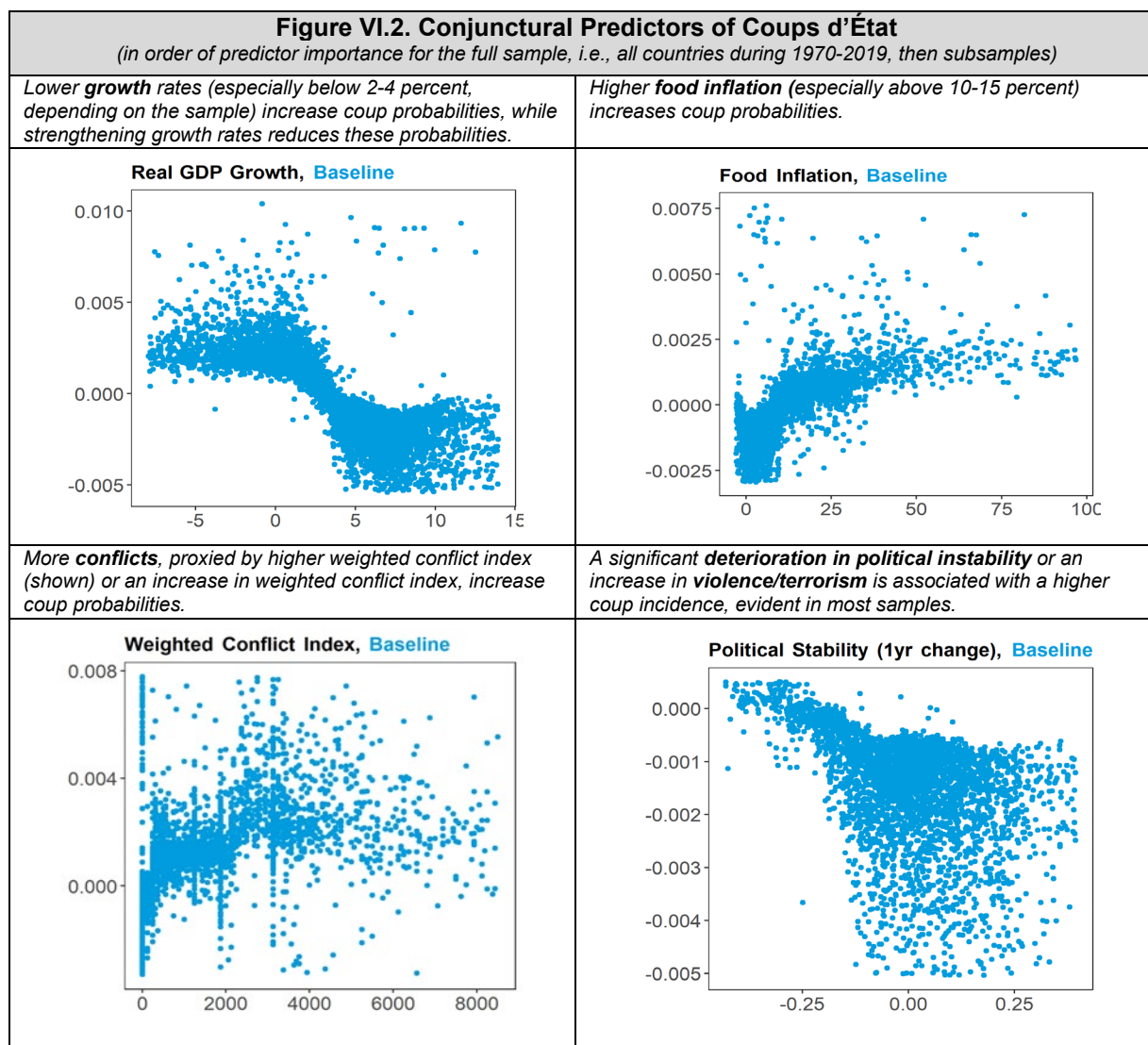
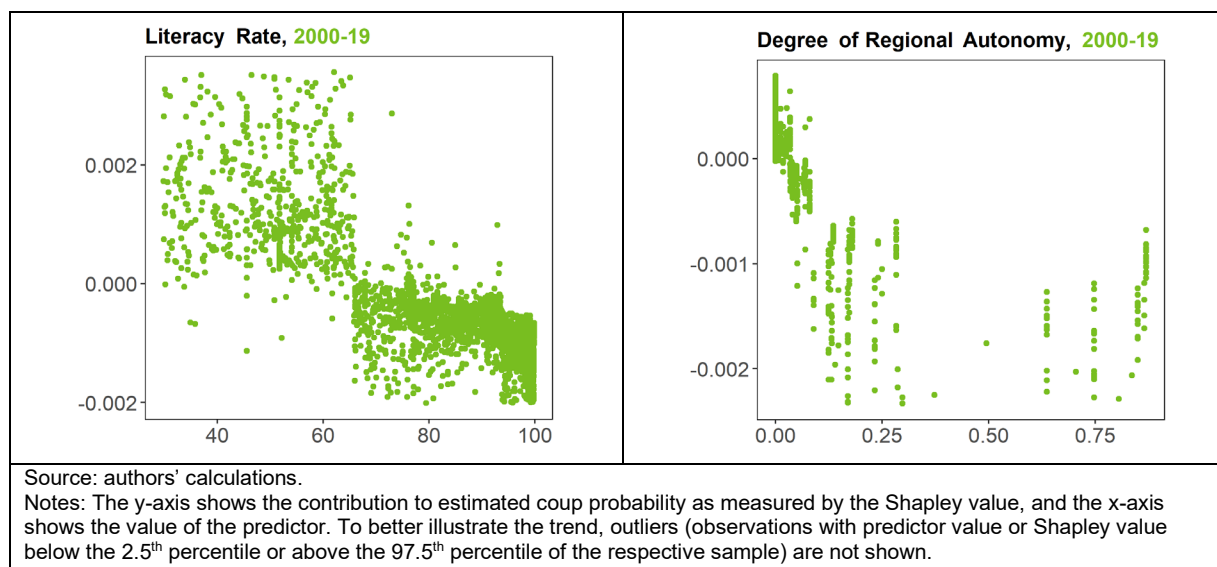
Source: WB, Novta, WEO, UPPSALA, and authors' calculation.

Annex VI. Drivers of Coups and Their Interactions

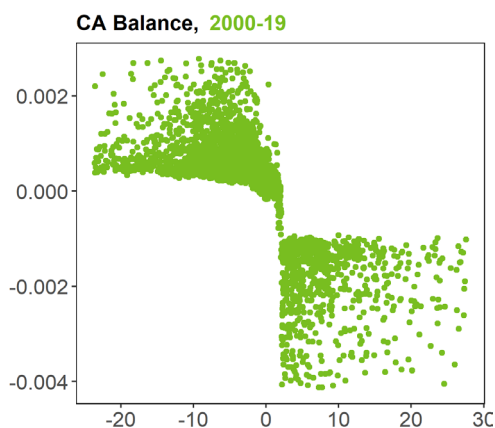
The annex reports on the contribution of structural and conjunctural drivers to estimated coup probabilities based on the machine learning exercise, with the last two figures showing the nonlinear interaction of these drivers (the full set of results are in Cebotari et al, 2024).



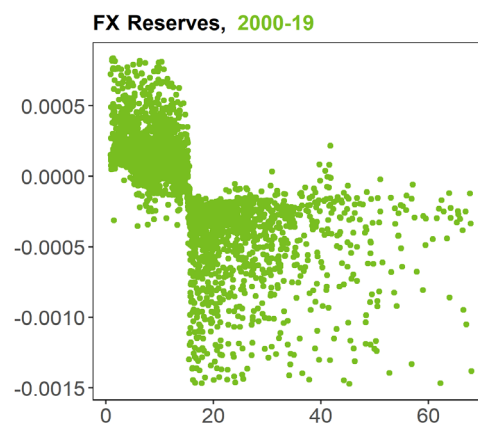




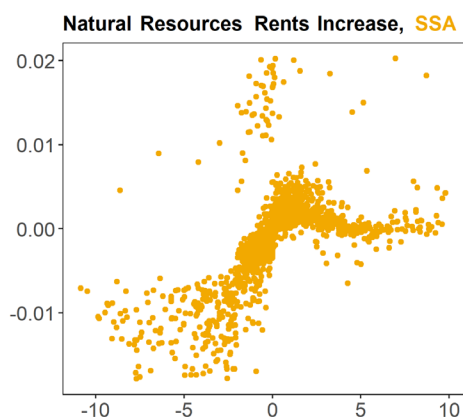
In most subsamples—e.g., the 2000-19 period, and countries of ME&CA regions—a **weak external position** is a significant driver of coup probability. For example, a **higher current account deficit**...



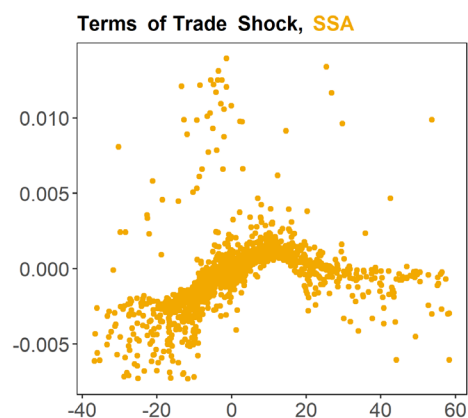
...as well as **lower FX reserves** increase coup probabilities (2000-19 period shown).



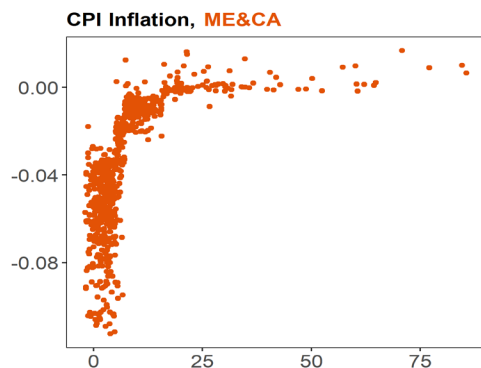
However, in the SSA sample the opposite is true—higher current account balances (usually higher than about -6 percent of GDP) increase coup probabilities. This is because many SSA countries rely on oil wealth, hence an increase in **rents from natural resources**...



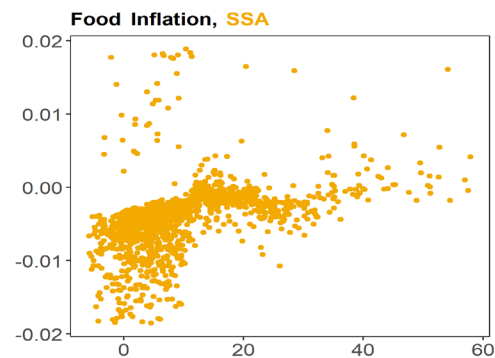
...associated with positive **terms of trade shocks** increases coup probabilities, likely due to higher incentives to seize power (SSA sample shown) ...



Higher **inflation** is associated with higher likelihood of coups in most samples (except outliers that are beyond normal inflation range) including ME&CA samples (shown).



Food inflation above some 10 percent is another coup driver, most significant in the SSA sample (shown).

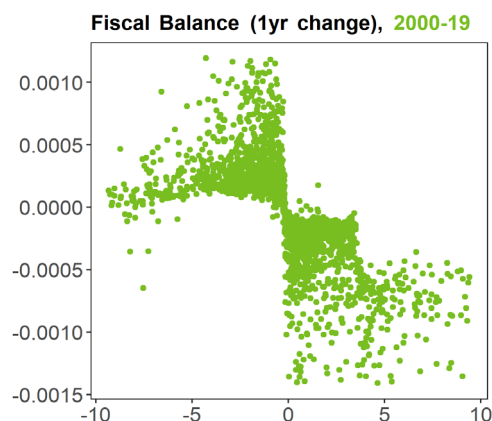


Source: authors' calculations.

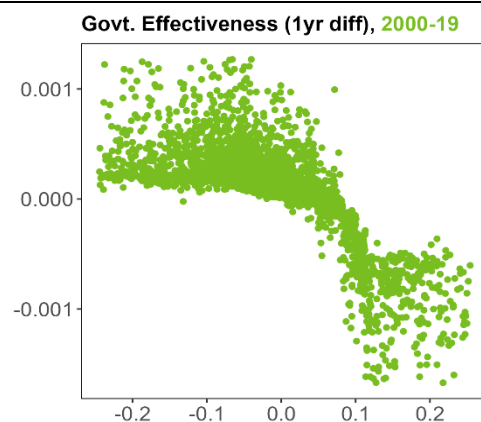
Notes: The y-axis shows the contribution to estimated coup probability, and the x-axis shows the value of the predictor. To better illustrate the trend, outliers (observations with predictor value or Shapley value below the 2.5th percentile or above the 97.5th percentile of the respective sample) are not shown.

Figure VI.3. Policy Predictors of Coups d'État*(in order of predictor importance for the full sample, i.e., all countries during 1970-2019, then subsamples)*

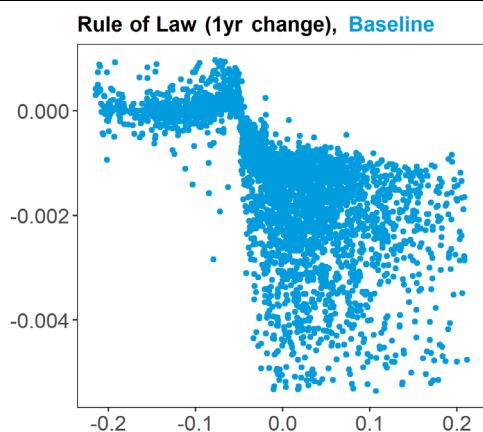
*Improvements/deteriorations in the **fiscal balance** reduces (increases) coup probabilities, possibly due to a signaling effect of policy competence (2000-19 sample shown).*



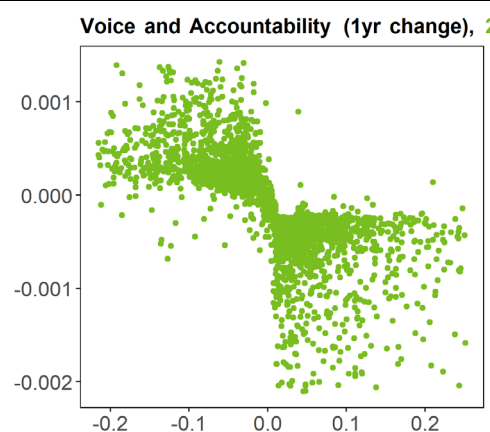
*Improvements in **governance** contribute to lowering coup probabilities. These include improvements in the **government effectiveness** (2000-19 sample shown),*



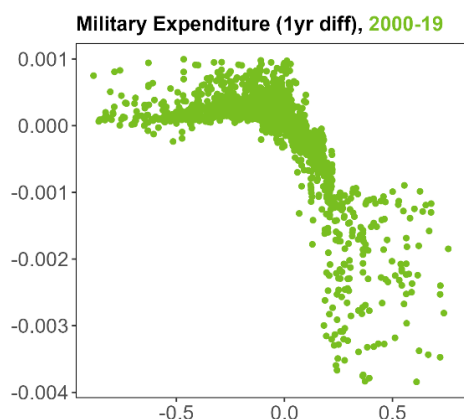
*... in the **rule of law** (full sample shown),*



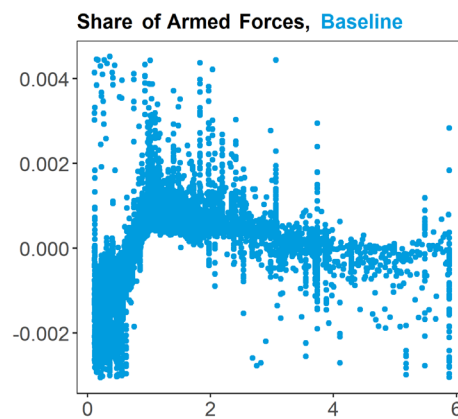
*...and in **voice and accountability** (2000-19 sample shown).*



*An **increase in military spending** (as share of GDP) is associated with lower coup probability, especially in the recent 2000-19 period (shown below) and in SSA. The **level of military spending** is also significant in these two subsamples but has a u-shaped effect: only very low (less than 1 percent of GDP) or very high (above 2-5 percent of GDP) levels of spending reduces coup probabilities (not shown).*



*A higher **share of armed forces** increases probability of coups in the full sample (shown) and in recent years when they exceed about 1 percent of the labor force.*



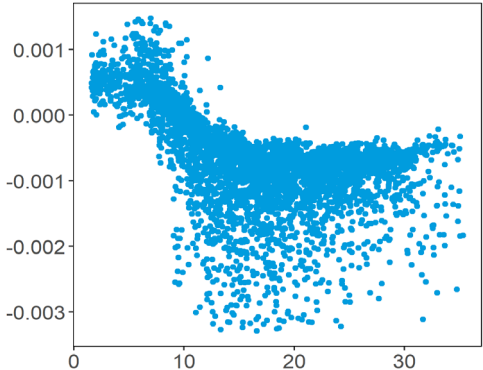
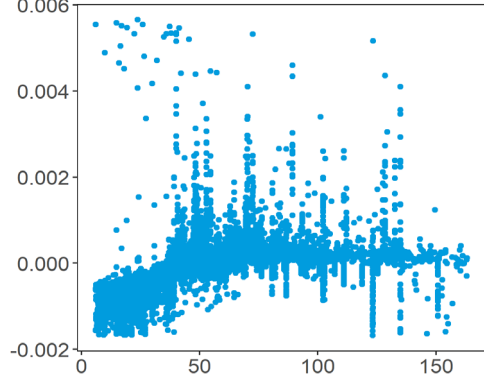
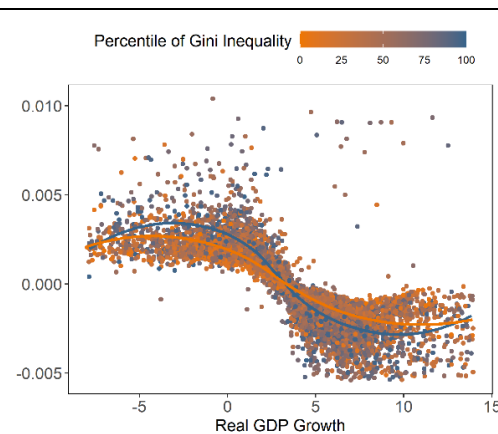
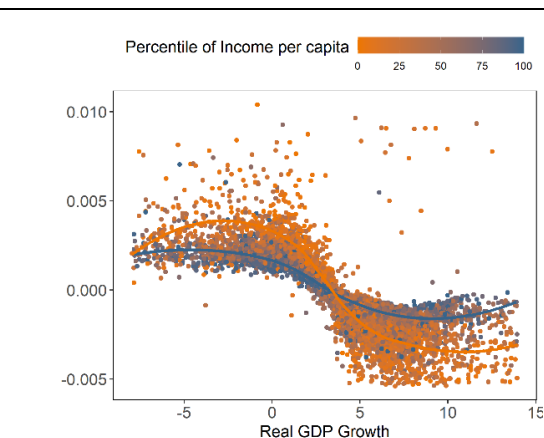
<p>Government revenues as a share of GDP is not a significant contributor to coup probabilities (ranked 21st in terms of average contribution to coup probability), but it may be worth highlighting that when revenues fall below 10 percent of GDP for the full sample and below 18 percent for the last twenty years, coup probability increases, likely due to weaker state capacity.</p>	
<p>While not significant, when public debt is below about 50 percent of GDP, the higher it is, the higher coup probability.</p>	
<p>Government Tax Revenue, Baseline</p> 	<p>Public Debt, Baseline</p> 
<p>Source: authors' calculations.</p> <p>Notes: The y-axis shows the contribution to estimated coup probability, and the x-axis shows the value of the predictor. To better illustrate the trend, outliers (observations with predictor value or Shapley value below the 2.5th percentile or above the 97.5th percentile of the respective sample) are not shown.</p>	

Figure VI.4. Interaction Effects Between Stressors and Sources of Fragility

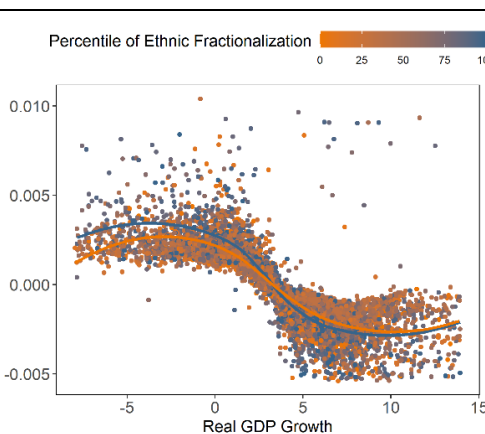
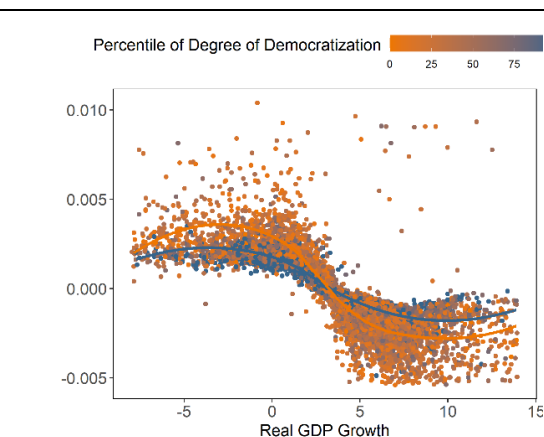
In low-income countries, weak growth has a larger impact on increasing the probability of coups, while strong growth is more effective in reducing the coup probability.

Other weak structural fundamentals have a similar amplifying effect on political or economic shocks, such as income inequality, ...



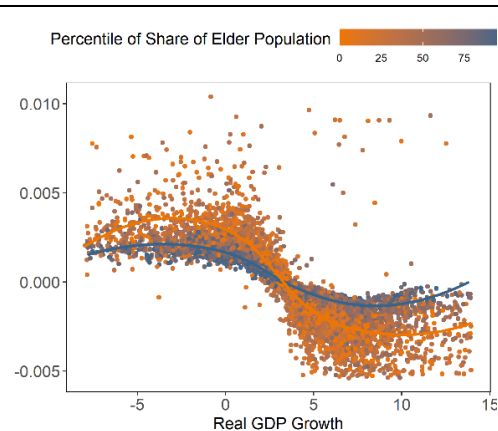
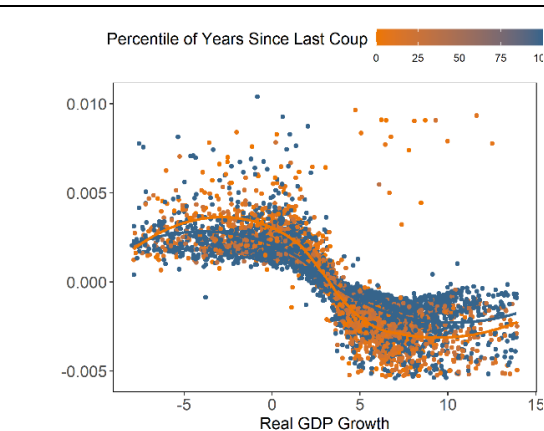
... weaker inclusion, especially on the political front (measured by the degree of democratization) ...

... and ethnical front, ...



..., and weaker political stability, proxied by a recent incidence of coups.

Weak growth would also make coup more likely in countries with a younger population.



Countries with a lower income per capita or a lower degree of democratization would see a larger impact of high food inflation on their coup probabilities, especially in SSA countries (SSA sample shown left)

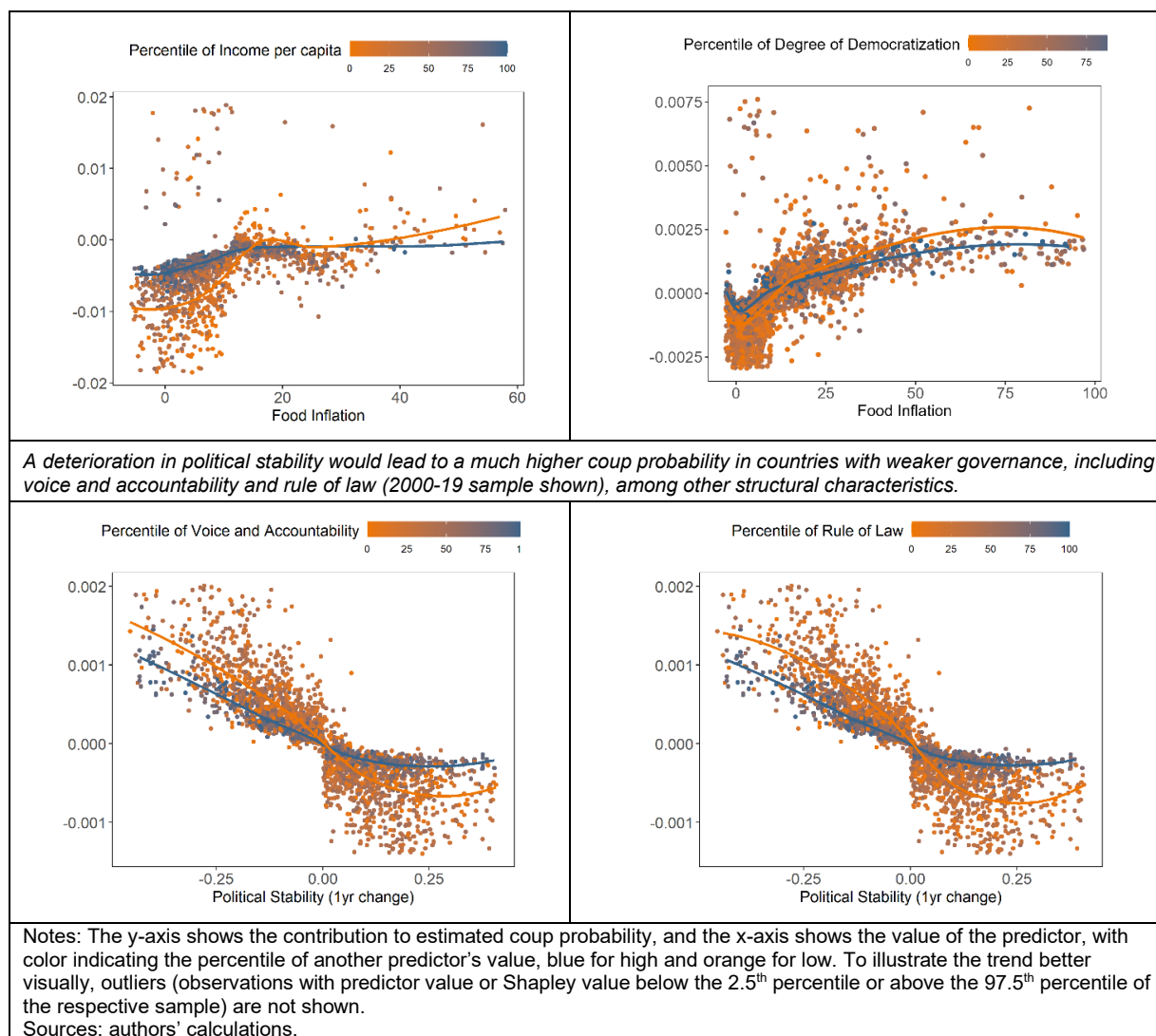
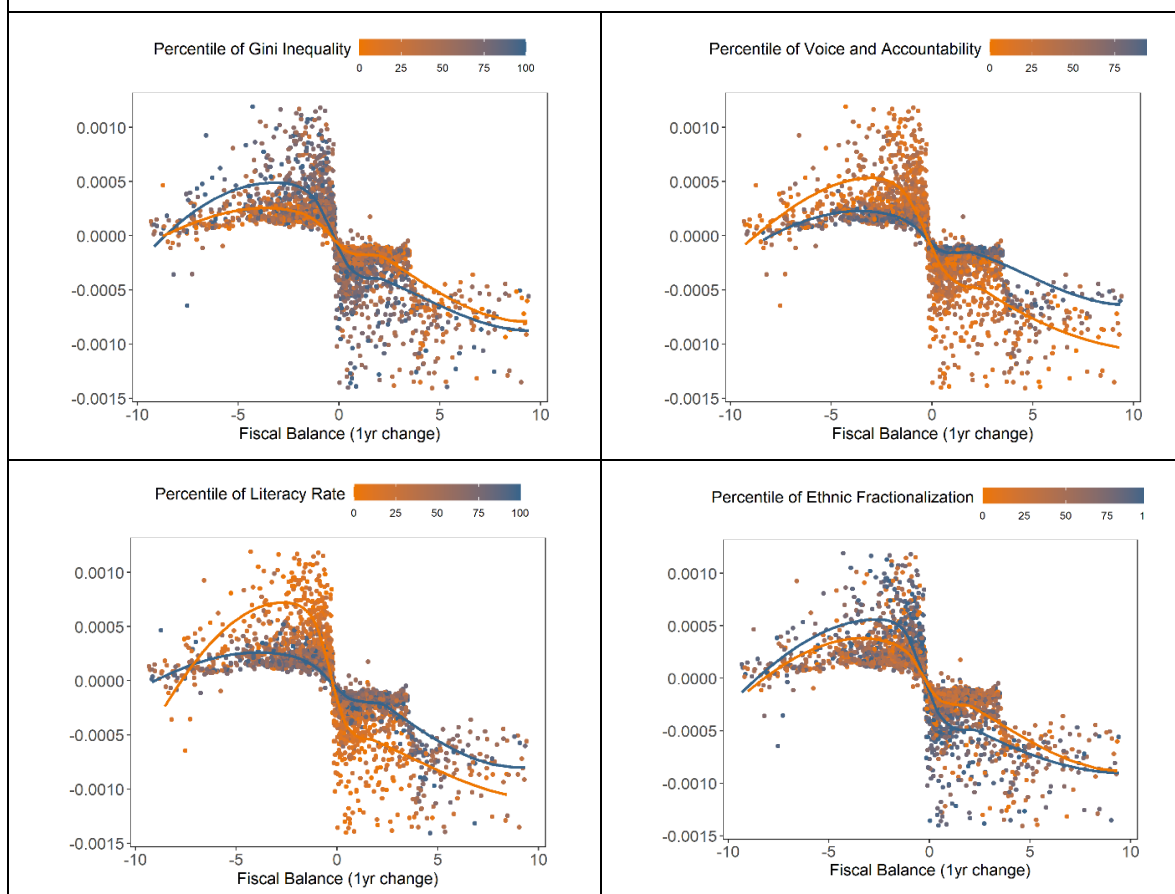
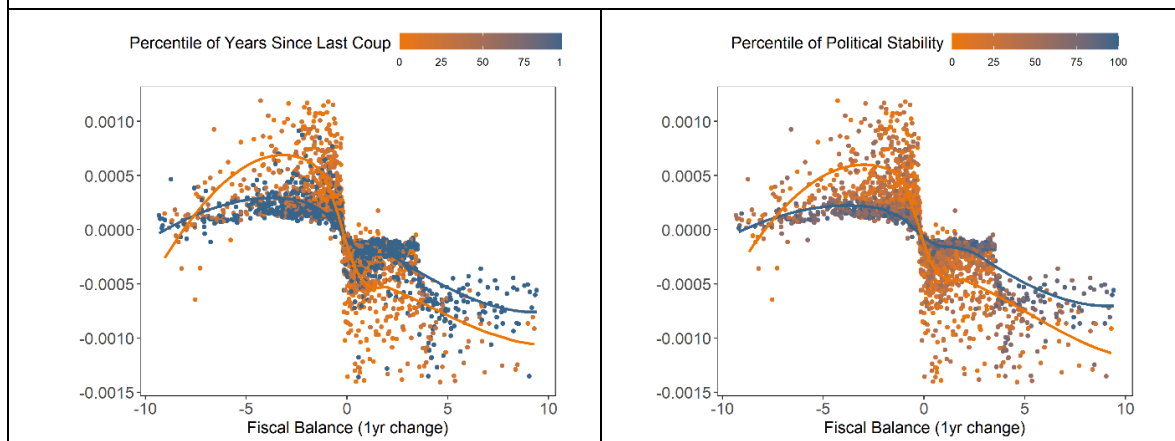


Figure VI.5. Interaction Effects between Policies and Sources of Political Fragility

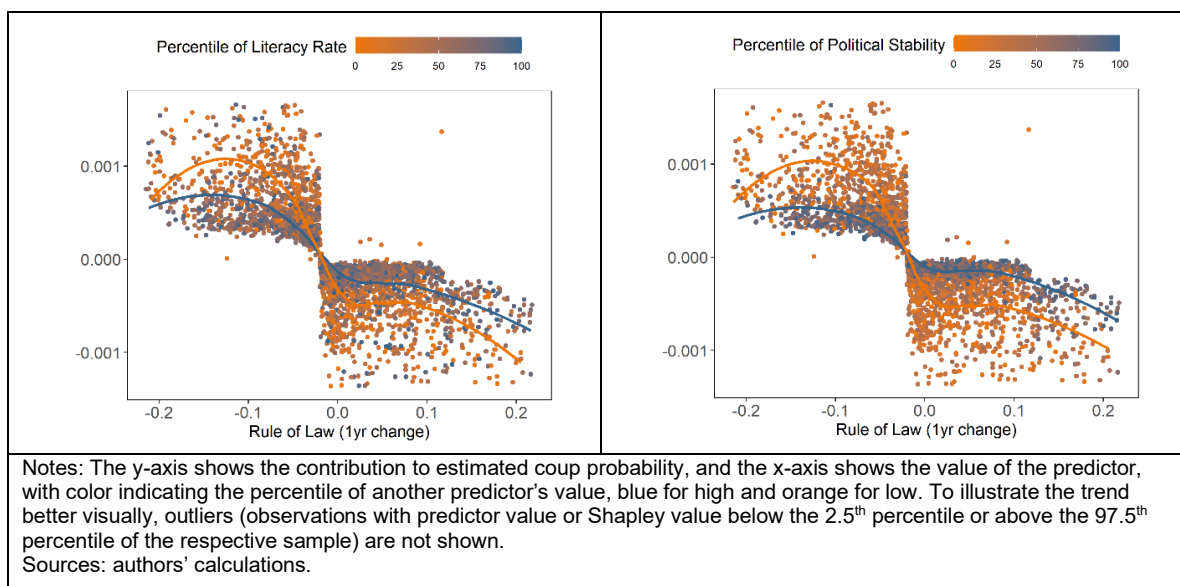
A deterioration in fiscal balance in countries with weaker fundamentals (higher inequality, weak governance, low literacy, higher ethnic fractionalization) is associated with larger increase in coup probabilities, while an improvement in fiscal balance in these countries would deliver stronger effects in terms of reducing coup probabilities (2000-19 sample shown).



A deterioration in fiscal balance in countries with weak political stability—proxied either by recent coups or low political stability index—is associated with larger increase in coup probabilities, while an improvement in fiscal balance in these countries would deliver stronger effects in terms of reducing coup probabilities (2000-19 sample shown).



Similar results for a change in rule of law (2000-19 sample shown).



References

- Bar-Yam, Y., and Epstein, I. R. 2004. "Response of complex networks to stimuli," *Proceedings of the National Academy of Sciences of the United States of America*, 101(13), 4341–4345.
<https://doi.org/10.1073/pnas.0400673101>
- Besley, T. J. and Persson, T. 2014. "The Causes and Consequences of Development Clusters: State Capacity, Peace, and Income," *Annual Review of Economics*, Vol. 6, pp. 927-949, 2014, Available at SSRN: <https://ssrn.com/abstract=2477767> or <http://dx.doi.org/10.1146/annurev-economics-080213-041128>.
- Besley, T. and Persson, T. 2010. "State Capacity, Conflict, and Development," *Econometrica* 78(1), 1-34.
- Besley, T. and Persson, T. 2011. "Pillars of Prosperity: The Political Economics of Development Clusters," Princeton University Press
- Bosetti, L., A. Ivanovic, and M. Munshey. 2016. "Fragility, Risk, and Resilience: A Review of Existing Frameworks," United Nations – Center for Policy Research, United Nations University.
- Breiman, L. 2001. "Random forests," *Machine Learning*, 45(1): 5-32.
- Breiman, L., Friedman, J., Stone, C.J., and Olshen, R.A. 1984. "Classification and regression trees," CRC Press.
- Collier, P. 2007. "Africa's Economic Growth: Opportunities and Constraints," *African Development Review, African Development Bank*, vol. 19(1), pages 6-25.
- Cebotari, A., E. Chueca-Montuenga, Y. Diallo, Y. Ma, R. Turk, R. W. Xin, and H. Zavarce. 2024. "Political Fragility: Coups d'État and their Drivers," *IMF Working Paper* 2024/034.
- Cerra, V. and Saxena, S. 2008. "Growth Dynamics: The Myth of Economic Recovery," *American Economic Review, American Economic Association*, vol. 98(1), 439-457, March.
- Chami, R., M. Coppo, R. Espinoza, and P. Montiel. 2021. "Macroeconomic Policy Issues in Fragile States," In *Macroeconomic Policy in Fragile States*, Oxford University Press, edited by R. Chami, R. Espinoza, and P. Montiel.
- Chen, T., & Guestrin, C. 2016. "Xgboost: A scalable tree boosting system," In *Proceedings of the 22nd acm sigkdd international conference on knowledge discovery and data mining*. 785–794.
- Easterly, W. R., and Wetzel, D. L. 1989. "Policy Determinants of Growth: Survey of theory and evidence," *Policy, Planning and Research Working Papers Series No. 343*, Washington D. C., World Bank, 1-41.
- Fischer, S. 1992. "Macroeconomic Stability and Growth," *Cuadernos de Economía* 29 (87): 171-186.
- Forni, M., Gambett, L., Maffei-Faccioli, N. and Sala, L. 2024. "[Nonlinear Transmission of Financial Shocks: Some New Evidence](#)," *Journal of Money, Credit and Banking*, Blackwell Publishing, vol. 56(1), 5-33, February.
- Gründler, K. and Potrafke, N. 2019. "Corruption and economic growth: New empirical evidence," *European Journal of Political Economy*, Volume 60, 1-12.
- Henisz, W.J. 2003. "The Institutional Environment for Economic Growth," *Economics and Politics*, Wiley Blackwell, 12(1), 1-31.
- International Monetary Fund. 2021. "How to Assess Country Risk: The Vulnerability Exercise Approach Using Machine Learning," *IMF Technical Notes and Manuals* 2021/003, International Monetary Fund.

- Laeven, L. and Valencia, F. 2020. "[Systemic Banking Crises Database II](#)," *IMF Economic Review*, Palgrave Macmillan; International Monetary Fund, vol. 68(2), 307-361, June.
- Leeson, P. T. 2020. "Logic is a harsh mistress: welfare economics for economists," *Journal of Institutional Economics*, Cambridge University Press, vol. 16(2), 145-150, April.
- Lloyd, P. and Lee, C. 2018. "A Review of the Recent Literature on the Institutional Economics Analysis of the Long Run Performance of Nations," *Journal of Economic Surveys*, Wiley Blackwell, vol. 32(1), pages 1-22, February.
- Lucas, R.E. Jr. 1988. "On the Mechanics of Economic Development," *Journal of Monetary Economics* 22: 3-42
- Mueller, H., and Rauh, C. 2022. "The Hard Problem of Prediction for Conflict Prevention", *Journal of the European Economic Association*, Volume 20, Issue 6, December 2022, Pages 2440–2467, <https://doi.org/10.1093/jeaa/jvac025>
- Novta, N. and Pugacheva, E. 2021. "The macroeconomic costs of conflict," *Journal of Macroeconomics*, Elsevier, vol. 68(C).
- Leepipatpiboon, P.; C. Castrovillari, and T. Mineyama. 2023. "Macroeconomic Shocks and Conflict", Working Paper 23/68, International Monetary Fund.
- Lundberg, S. M., & Lee, S. I. 2017. "A unified approach to interpreting model predictions." *Advances in neural information processing systems*, 30.
- Pritchett, L., and Lewis, A. 2022. "Economic growth is enough, and only economic growth is enough." [Basics-legatum-paper_short.pdf](#)
- Pritchett, L. 1997. "Divergence, Big Time." *Journal of Economic Perspectives*, 11 (3): 3-17.
- Pritchett, L. 2000. "Understanding Patterns of Economic Growth: Searching for Hills among Plateaus, Mountains, and Plains", *The World Bank Economic Review*, 14(2), 221–250. <http://www.jstor.org/stable/3990235>
- Ray, D. and Esteban, J. 2017. "Conflict and Development," *Annual Review of Economics*, 9, Free Review Article.
- Rittel, H. W., & Webber, M. 1973. "Dilemmas in a General Theory of Planning." *Policy sciences*, 4(2), 155-169. https://urbanpolicy.net/wp-content/uploads/2012/11/Rittel+Webber_1973_PolicySciences4-2.pdf
- Rodrik, D. 2006. "Goodbye Washington Consensus, Hello Washington Confusion? A Review of the World Bank's Economic Growth in the 1990s: Learning from a Decade of Reform." *Journal of Economic Literature*, 44 (4) 973-987.
- Rodrik, D. 2010. "Diagnostics before Prescription", *Journal of Economic Perspectives*—Volume 24, Number 3, Summer, 33–44.
- Rohner, D. and Thoenig, M. 2021. "The Elusive Peace Dividend of Development Policy: From War Traps to Macro Complementarities," *Annual Review of Economics*, 13 (1), 111–131.
- Romer, P.M. 1990. "Endogenous technological change," *Journal of Political Economy* 98 (5): S71-S102
- Shapley, L. S. 1953. "A Value for n-Person Games," *Annals of Math Studies*, (28).
- Solow, R.M. 1956. "A Contribution to the Theory of Economic Growth," *Oxford Review of Economic Policy* 23 (1): 3-14.
- Strumbelj, E., & Kononenko, I. 2010. "An efficient explanation of individual classifications using game theory," *The Journal of Machine Learning Research*, 11, 1-18.

- Taleb, N. N. 2011. "A Map and Simple Heuristic to Detect Fragility, Antifragility, and Model Error", *NYU-Poly working paper*, SSRN.
- Taleb, N. N. 2012. *Antifragile: Things That Gain from Disorder*, Harlow, England: Penguin Books.
- Taleb, N. N. 2013. "Philosophy: 'Antifragility' as a mathematical idea." *Nature*, Feb 28; 494(7438): 430. doi: 10.1038/494430e. PMID: 23446406.
- Taleb, N. N., Canetti, E., Kinda, T., Loukoianova, E., and Schmieder, C. 2012. "A New Heuristic Measure of Fragility and Tail Risks: Application to Stress Testing," *IMF Working Paper*, WP/12/216.
- Young, H.P. 1985. "Monotonic solutions of cooperative games." *International Journal of Game Theory*, 14:65–72



PUBLICATIONS

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