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Ebony Center Policy Brief: EPB 2023-2 21 August 2023

Assessing State Fragility: The Case of South Sudan[1]

EXECUTIVE SUMMARY

1. **South Sudan is judged, by a variety of international rating schemes, as among the most fragile states in the world;**
2. **This means that South Sudan is one of the least coherent (most dysfunctional) states;**
3. **Artificial Intelligence (AI) and Machine Learning (ML) were deployed by the International Monetary Fund (IMF) to assess the incoherence of South Sudan across six dimensions—economic, environmental, human, political, security, and social;**
4. **All six dimensions are seriously defective, and there has been no measurable improvement since independence in 2011;**
5. **South Sudan cannot survive without the financial and technical help of many international organizations—the World Bank, the IMF, the United Nations Development Programme, the World Food Programme, and the African Development Bank;**
6. **The most serious risk is that these organizations, seeing little progress on all six dimensions of state coherence, will simply walk away and allow South Sudan to slip even further into chaos and despair.**

I. What is a Fragile State?

A ***fragile state*** can be thought of as having the following properties: (1) lack of a shared national identity; (2) absence of a sense of government legitimacy; (3) lack of the capacity to govern; (4) little confidence in its own future; (5) an under-developed private sector; and (6) significant exposure to political and economic shocks.[2] Such places are "fragile" because they lack all—or most—of the necessary attributes that characterize well-functioning and resilient states. It is useful to think of such places as ***notional states***. They are aspirational.

[1] Prepared by Dan Bromley, on behalf of VEST, Ebony Center.
[2] In: Tohid Atashbar. 2023. How Nations Become Fragile: An AI-Augmented Bird's-Eye View (with a Case Study of South Sudan), International Monetary Fund, Working Paper WP/23/167, page 6.

With respect to South Sudan, there are frequent reminders of over 62 "tribes." Does this ethnic abundance suggest a nation with a shared identity? What does it mean to be "South Sudanese"? Of equal importance, can it be said that the government is widely regarded as legitimate, that it has the capacity to govern, that it is confident in its future, that there is a viable and well-functioning private sector, and that there is clear evidence of necessary resilience in the face of governing and economic shocks?

We do not offer answers to these important questions, but such considerations provide a lens through which the international donor community tends to view countries that come to them seeking financial and technical assistance. It should be obvious that how those six questions get answered will have enormous influence on the willingness of international organizations to engage with specific countries. After all, their funding does not mysteriously appear as manna from heaven. These organizations get their money from the tax contributions of wealthy countries. Taxpayers in such places have an interest in making sure that their gifts of charity are distributed to worthy recipients. Waste is not an option. Fragile states are, by definition, risky. This financial uncertainty applies, with equal force, to foreign direct investments and to investments by the private sector within fragile states. Fragility leads to yet greater vulnerability.

The IMF recently carried out an important piece of exploratory work. Specifically, IMF staff asked the important question: does the recent interest in Artificial Intelligence (AI) and Machine Learning (ML) hold significance for assessing the suitability of individual countries for the receipt of scarce international donor assistance? Specifically, will money and technical assistance do good work—or will it be wasted?

This is a welcome initiative from an organization that is highly respected, but known for its almost-exclusive focus on the financial aspects of individual countries. In this report, the analytical and diagnostic capacities of the IMF staff are applied across a much broader set of concerns—governance, resilience, human rights, state legitimacy, and overall country coherence. With this more comprehensive assessment of the functional attributes of states, it is obvious that we have finally come to the domain of "big data" in international development work. And to make sense of such data-rich environments, analysts require special help. That is what AI and ML offer.

II. What Are AI and ML?

Drawing on the IMF report:

> *Artificial intelligence (AI) aims to replicate human cognition in computer systems for real-world operation, while machine learning (ML) provides specific algorithms enabling computers to uncover insights, make decisions, and refine performance. Though distinct, AI and ML work symbiotically - ML delivers the technical mechanisms powering AI's goal of human-mimetic capabilities. Together, AI and its underlying ML components create versatile, adaptable systems that can analyze complex datasets, identify intricate patterns, and apply learnings to new situations. With fragility assessment, AI/ML provides key tools to model multifaceted relationships within data and generate nuanced, contextual insights* [p. 14].

In practical terms, AI/ML offer short-cuts that allow humans to make sense of abundant data about specific questions. For our purposes here, the use of these analytical tools has enabled the IMF to aggregate and distil a large number of indicators that reveal insight into the coherence of individual countries. ***Coherence*** is the exact opposite of ***fragility***. As seen above, the idea of a fragile state is that it is weak across a number of indices, and is therefore generally unable to carry out the essential tasks of statecraft. By way of contrast, a ***coherent*** state is one that is able to accomplish these necessary functions.[3] For obvious reasons, the international donor community is interested in assisting coherent states.

The obvious question arises—why are these innovative methods (AI and ML) better than traditional ways of aggregating data and producing meaningful results? This suspicion of AI in particular, is understandable. But AI also has the potential to generate clarity and coherent syntheses of large data sets, thus freeing humans to become more accomplished diagnosticians. As we will see in the following section, there are already a number of different scaling algorithms for assessing the alleged fragility of individual countries.

The task of AI is to replicate human cognition in difficult and complex activities that transcend the ability of humans. In the absence of such data-distillation protocols, researchers are restricted to a few well-known data sources that may or may not be reliable. Even before AI came on the scene, the indispensable World Development Indicators of the World Bank was forced to rely on models constructed by the International Labour Office (ILO) in Geneva for a variety of employment statistics. That is because a large number of developing countries remain unable (or unwilling) to collect reliable data on employment conditions. In addition, it is impossible, in the World Development Indicators, to find data for many developing countries on such things as electricity production, electricity outages (reliability), fertilizer usage, and other essential indicators of a country's functioning. Surely, data exist on these missing indicators. If AI can help researchers and policy makers in this essential task, everyone will benefit.

The task of ML (machine learning) is to augment the search and synthesis role of AI by providing constructed algorithms that drive AI systems in the quest for new insights and data refinements. According to the IMF report:

> *Together, AI and its underlying ML components create versatile, adaptable systems that can analyze complex datasets, identify intricate patterns, and apply learnings to new situations. With fragility assessment, AI/ML provides key tools to model multifaceted relationships within data and generate nuanced, contextual insights* [p. 14].

III. Indices of Fragility

The IMF report relies on AI/ML methods to synthesize several existing indices of state fragility. The first of these is the ***Fragile States Index*** (FSI) published by the Fund for Peace. This approach to fragility is based on a "conflict assessment framework" that seeks to assess a state's susceptibility to collapse. That is, the FSI serves as an early-warning system to imminent crisis

[3] Daniel W. Bromley and Glen D. Anderson. 2012. Vulnerable People, Vulnerable States: Redefining the Development Challenge. London: Routledge.

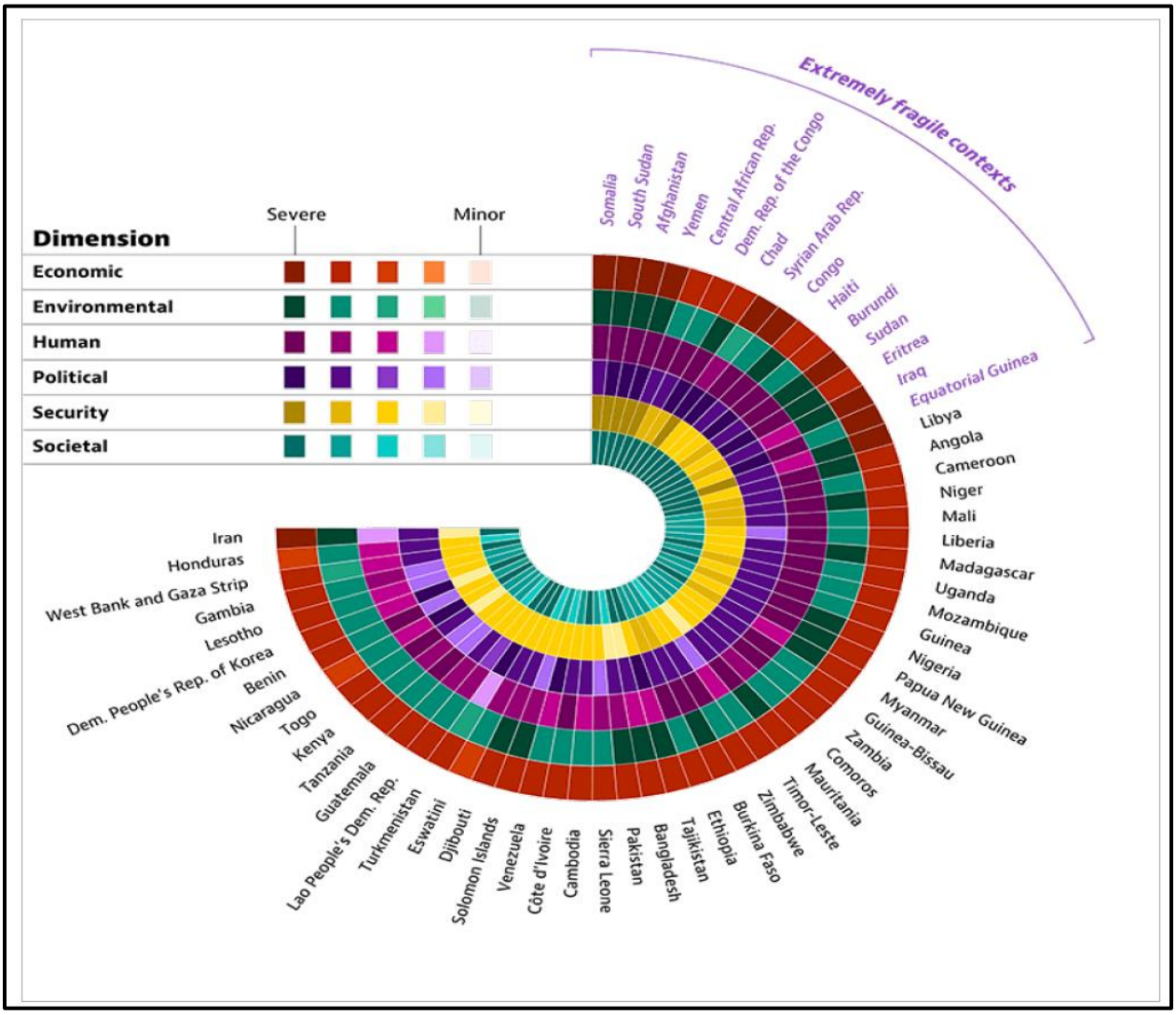
and collapse. The FSI seems less concerned with poor state performance than with how close to a tipping point individual states appear to be. Table 1 shows the specific categories of the FSI.

Table 1. The FSI of the Fund for Peace.

Group	Cohesion	Economic	Political	Social
Components	C1: Security Apparatus	E1: Economic Decline	P1: State Legitimacy	S1: Demographic Pressures
	C2: Factionalized Elites	E2: Uneven Economic Development	P2: Public Services	S2: Refugees and IDPs
	C3: Group Grievance	E3: Human Flight and Brain Drain	P3: Human Rights, Rule of Law	X1: External Intervention

Using AI/ML allows the analyst to synthesize a number of indicators from 178 countries. Sources for the FSI come from the World Bank, various UN agencies, and a variety of NGOs. The FSI is updated annually.

A second set of fragility indices comes from the Organization for Economic Cooperation and Development's (OECDs) ***States of Fragility*** index. In contrast to the above ***Fragile States Index***, the ***States of Fragility*** index does not generate a single score for each country. Rather, here there is a set of indicators that measure the fragility of individual countries on different dimensions. The OECD index then scores individual countries on a combination of risk exposure and inadequate state capacity to manage, absorb, or mitigate those assorted risks. The OECD approach is based on a diagnostic procedure that quantifies fragility on a scale of intensity that is then expressed differentially across six dimensions—economic, environmental, political, security, human, and societal. Then, each component entails eight to twelve indicators. The result is 44 indicators across all six dimensions that quantify fragility-related risks and coping ability. The end point is a conjunction of fragility, risk, and resilience. A graphical representation of this aggregating process is shown in Figure 1.



Source: Atashbar, 2023.

Figure 1. OECD Dimensions of Fragility

A third attempt to identify fragility is found in the ***Country Policy and Institutional Assessment*** (CPIA) of the World Bank and the IMF. This is a rating scheme that is not directly focused on the idea of fragility, yet can be considered as guide to coherence of individual nation-states. The scores across 16 indicators range between 1 (low) and 6 (high). The scores are assigned by local experts, employees of the World Bank and the IMF, and of other organizations familiar with individual countries. Notice that the CPIA is exceedingly subjective. There is also a tendency is such scoring methods for reversion to the mean. A score of 3 is so very attractive compared with the harsh 1, and the improbable 6. The CPIA therefore entails a significant loss of information.

Table 2. The Country Policy and Institutional Assessment (CPIA)

Clusters	Economic Management	Structural Policies	Policies for Social Inclusion/Equity	Public Sector Management and Institutions
List of criteria	1. Monetary and Exchange Rate Policies 2. Fiscal Policy 3. Debt Policy and Management	1. Trade 2. Financial Sector 3. Business Regulatory Environment	1. Gender Equality 2. Equity of Public Resource Use 3. Building Human Resources 4. Social Protection and Labor 5. Policies and Institutions for Environmental Sustainability	1. Property Rights and Rule-based Governance 2. Quality of Budgetary and Financial Management 3. Efficiency of Revenue Mobilization 4. Quality of Public Administration 5. Transparency, Accountability, and Corruption in the Public Sector

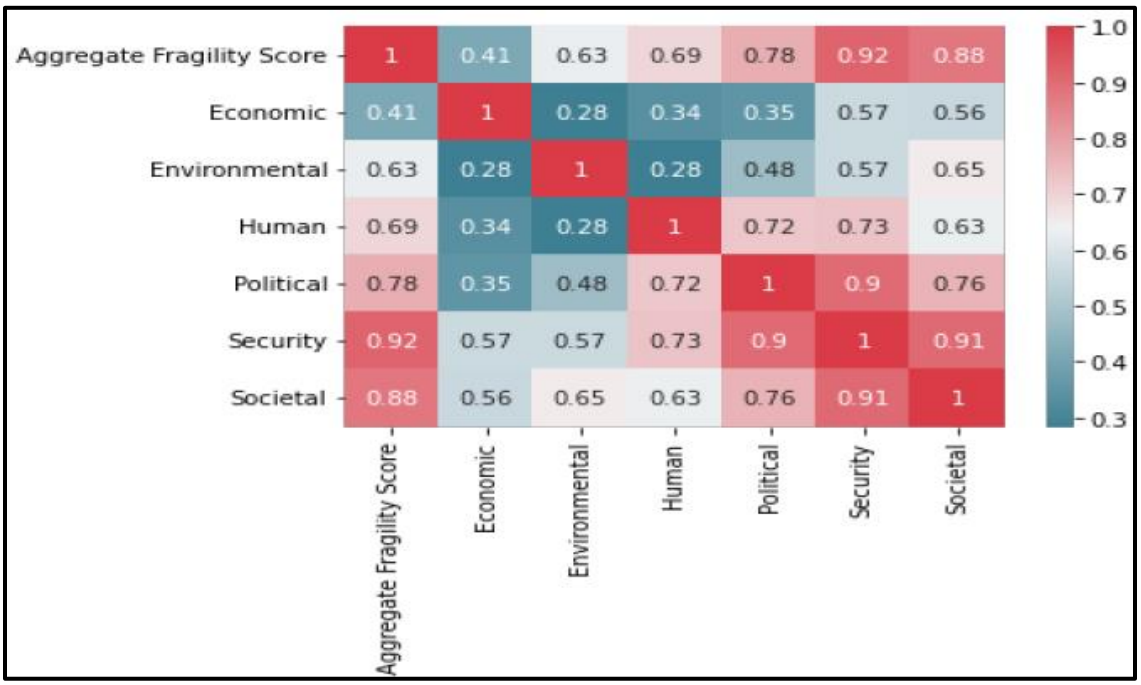
Source: Atashbar, 2023.

IV. South Sudan: A Fragile State

The IMF report then offers an assessment of the fragility of South Sudan using the data synthesis and analytical aspects of AI/ML. The report acknowledges that in 2011, Sudan was classified as a **Fragile and Conflict-Affected State** by the IMF. Therefore, when South Sudan became independent in 2011, it was "born fragile." As is well known, the IMF report continues to note that: "South Sudan's economic and social indicators, which were already among the lowest in the world at the time of independence, have worsened considerably during the last decade [p. 26]. In previewing its assessment, the IMF writes that:

> *South Sudan is currently facing a "fragility trap" with interlocking sources of state fragility. An overly centralized state with limited legitimacy and checks on the executive branch, rent extraction by the political elite and vested interests, conflict over resources, and a large security sector/incomplete demobilization from the civil war are some prominent factors. Other factors include the legacy of a fraught independence from Sudan, weak public financial management, an economy over-reliant on oil, a large displaced population, and increasing exposure to climate shocks* [p. 26].

The IMF here repeats a number of concerns expressed by a series of Ebony Center Policy Briefs (and Policy Notes) over the past several years. The above description is elaborated by use of a "heatmap" (Figure 2). Here we see a standard correlation matrix linking all six dimensions of fragility with a compilation algorithm called an ***Aggregate Fragility Score*** (AFS). More troubling than the extent of problems on display in Figure 2, is evidence from an associated graph (not shown here) indicating that—apart from women's political empowerment—the risk and coping/resilience-related components remain at high levels, with no improvements on any dimension. Over a decade of political independence from Sudan has brought about very little that can be thought of as contributing to a coherent state in South Sudan.



Source: Atashbar, 2023.

Figure 2. Heatmap of Correlation of Dimensional Fragilities: South Sudan (2021)

V. Conclusions

The IMF assessment of South Sudan, drawing on the innovative procedures of Artificial Intelligence and Machine Learning, provides a detailed and comprehensive picture of why South Sudan continues to occupy the lowest possible scores and rankings across a wide range of international rating schemes. There can be no national joy in this harsh judgment. It may be supposed that such rankings mean nothing when measured up against the real challenges facing the country. But that is backwards. The "real challenges" are the result—the quite expected playing out—of the very incoherencies identified by the AI/ML procedures explained in the IMF report. We see that the AI/ML process is both a description of the recent past, and a plausible prediction of the most likely future for South Sudan.

To put the problem in the starkest possible terms, why should the international development community try to help South Sudan when the government—and the people of South Sudan—seem to care so little about addressing those very problems.