INTERNATIONAL MONETARY FUND

THE REVISED EBA-LITE METHODOLOGY

May 2019

IMF staff regularly produces papers proposing new IMF policies, exploring options for reform, or reviewing existing IMF policies and operations. The following document(s) have been released and are included in this package:

Informal Session to Brief:

The report prepared by IMF staff and presented to the Executive Board in an informal session on June 22, 2018. Such informal sessions are used to brief Executive Directors on policy issues. No decisions are taken at these informal sessions. The views expressed in this paper are those of the IMF staff and do not necessarily represent the views of the IMF's Executive Board.

International Monetary Fund
Washington, D.C.

INTERNATIONAL MONETARY FUND

THE REVISED EBA-LITE METHODOLOGY

May 10, 2019

EXECUTIVE SUMMARY

The EBA-Lite methodology was introduced into the Fund's surveillance in 2015. As the EBA covers only 49 countries, the rest of the membership draws on the EBA-Lite for quantitative inputs to their external assessments. After several rounds of use, staff received feedback from country teams, stakeholders, and the Executive Board, including areas for improvement. Reflecting on this feedback, staff conducted the first review of the EBA-Lite in 2018.

The revision of the EBA-Lite methodology was guided by the country composition of the EBA-Lite, which is concentrated in lower-income economies as well as commodity exporters. In addition, the revised EBA-Lite takes account of the 2018 update of the EBA regression models, incorporating these into the current account (CA) and real effective exchange rate (REER) models where data permit. Both the revised EBA-Lite as well as the 2018 update of the EBA regression models continue to be underpinned by the conceptual framework developed in *The External Balance Assessment (EBA) Methodology*.

The review identified three broad areas for improving the EBA-Lite methodology: (1) expanding the fundamentals and policy determinants in the CA and REER regressions to better capture the external balance of EBA-Lite countries; (2) identifying alternatives to regression models for external assessments of large exporters of exhaustible commodities; and (3) a revised approach for the assessment of external sustainability in highly indebted economies. Accordingly, the revised methodology consists of three modules:

(1) *Regression Module*: the key revisions include clarifying the role of remittances and aid in the external balance; incorporating shocks (natural disasters, armed conflicts) to better explain the external balance in EBA-Lite countries; and, expanding the policy determinants by introducing social insurance policies and revising the financial policy variables;

(2) *Module for External Assessments of Exporters of Exhaustible Commodities*: reflecting on the inherent limitations of regression approaches to assess the external balance in large exporters of exhaustible resources, two non-regression approaches are presented as complementary approaches for external assessment in these economies; and

(3) *Module for the Assessment of External Sustainability*: external assessments for countries with high external indebtedness have traditionally drawn on an approach that makes many simplifying assumptions that can affect the assessment of sustainability. A revised approach that addresses these simplifications is proposed, and a probabilistic measure also presented.

The revisions to the EBA-Lite methodology have informed external sector assessments for the EBA-Lite group of countries since the Fall of 2018.

Approved By
Tamim Bayoumi and Martin Kaufman

This paper was prepared by a staff team under the guidance of Mitali Das (SPR) and comprising Mahir Binici, Diego Cerdeiro, Chengyu Huang, Huidan Lin, Rachel Nam, Mohammed Saleh, and Hui Tong (all SPR), and Haobin Wang (WHD). Overall supervision was provided by Tamim Bayoumi and Martin Kaufman (both SPR). Rachelle Blasco provided excellent editorial assistance.

CONTENTS

TABLES

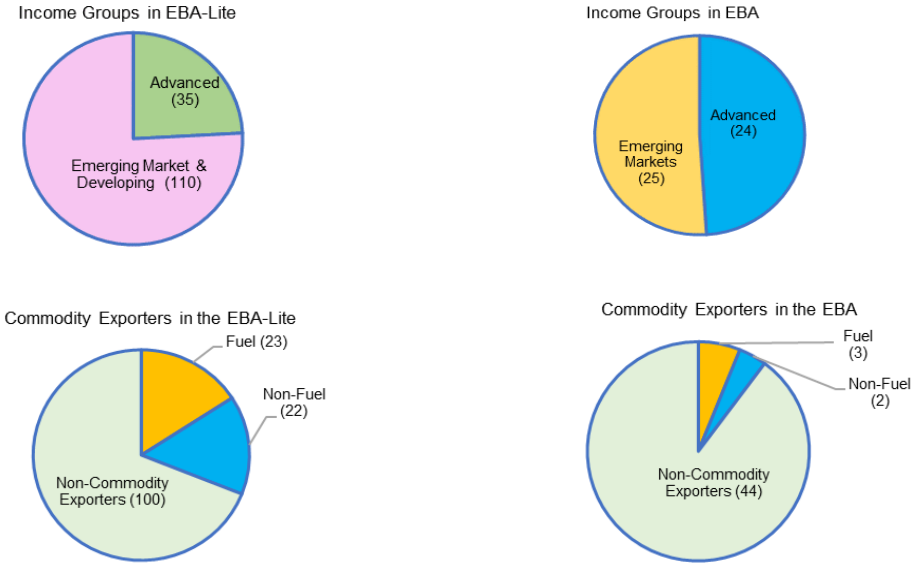
ANNEXES

INTRODUCTION

1. The Fund has taken important steps to enhance external sector assessments since the launch of the External Balance Assessment (EBA) methodology and External Sector Report (ESR) in 2012, which provide a multilaterally-consistent assessment of the 49 largest economies' external sector positions and policies.[1] Following the recommendations of the 2014 Triennial Surveillance Review (TSR), the EBA-Lite was developed in 2015 to extend the EBA methodology to the rest of the membership. After several rounds of use and feedback from stakeholders and the Executive Board, staff conducted the first review of the EBA-Lite methodology in 2018. Revisions to this methodology are summarized in this paper, and they supersede the previous EBA-Lite methodology.[2]

2. The review of the EBA-Lite methodology was largely guided by the country composition of the EBA-Lite sample, which is concentrated in lower-income and developing economies as well as commodity exporters (Figure 1). Due consideration was also given to the significant heterogeneity of the EBA-Lite sample, which raises appreciable empirical challenges (Figure 2). In addition, the revised EBA-Lite takes account of the changes to the regression models in the updated 2018 EBA methodology,[3] incorporating these into the current account (CA) and real effective exchange rate (REER) regression models, except where data limitations preclude.

Figure 1. Country Composition of the EBA-Lite and EBA Samples



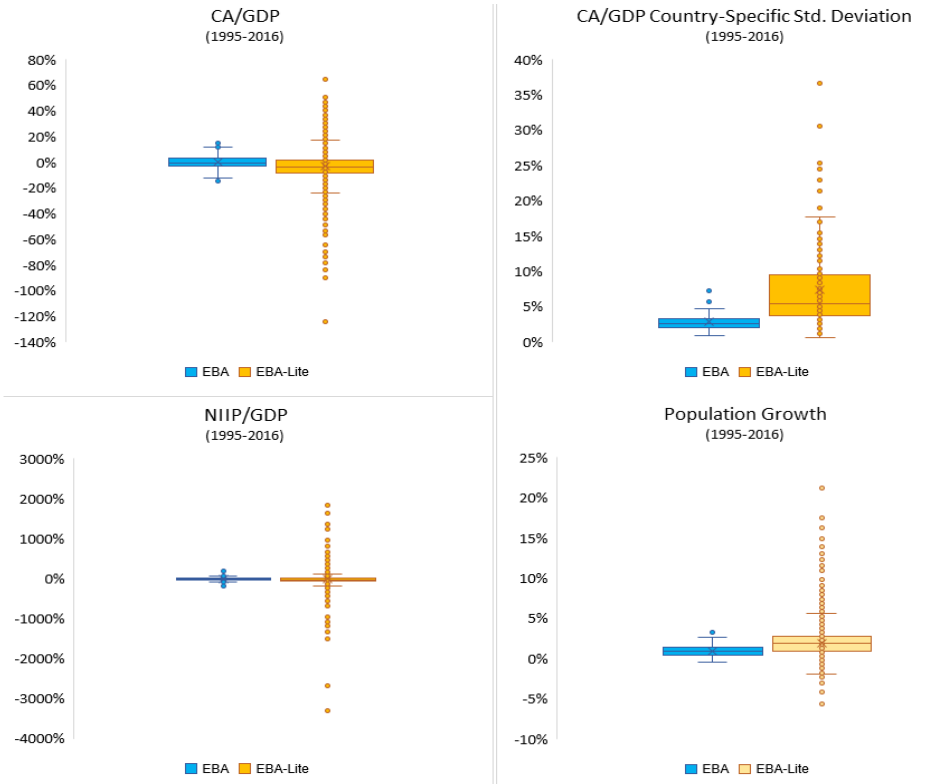
Source: WEO and IMF staff calculations.

[1] The conceptual framework of the EBA methodology that underpins the regression models of the EBA-Lite as well as the 2018 update of the EBA is in Phillips et. al. (2013), "The External Balance Assessment (EBA) Methodology".

[2] See IMF (2016), "Methodological Note on EBA-Lite".

[3] See Cubeddu et. al. (2019).

Figure 2. Empirical Challenges of the EBA-Lite Sample
(select variables)



Reflecting the composition of the EBA-Lite, as well as the incidence of high external indebtedness among them, the revised EBA-Lite methodology consists of three modules. The key revisions in each module are described below, with detailed information in the accompanying notes.

Module I. Revisions to the Regression Models of the EBA-Lite

3. While the revised methodology includes changes to the regression models, the conceptual framework remains that developed in Phillips et. al. (2013). The key innovations of that framework were twofold: (1) expanding the set of policies that influence the CA and REER; and (2) providing a clear distinction between a positive analysis of the CA and the REER, and a normative evaluation of their levels relative to a norm that reflects not only their fundamentals, but also their policies set at a desirable level.

Clarifying the roles of Remittances and Aid in the External Balance

4. The previous EBA-Lite CA model includes remittances and foreign aid as determinants of the CA. The review analyzed the econometric and conceptual issues raised by this approach, considering that both variables are components of the CA balance.

5. From an econometric perspective, a decomposition clarifies that a regression of the CA balance on its sub-components is no longer a saving-investment regression and thus does not identify or estimate a CA gap. On conceptual considerations, we draw on a body of work that finds marginal propensities to save and invest out of current transfers differ systematically from the propensities to save and invest out of other income. This suggests that where current transfers are significant in the saving-investment balance, underlying drivers of the CA may differ as well.

6. Reflecting these insights, in the revised EBA-Lite: (a) aid and remittances are dropped from the CA regression model; and (b) migrant shares are introduced as a covariate. To the extent that propensities to save and invest—and thus the aggregate saving-investment balance—are altered due to differences in source income, migrant shares, which are proportional to current transfers are likely to be an additional driver of the variation in CA balances.

Incorporating Shocks in the EBA-Lite models: Natural Disasters and Militarized Conflicts

7. A review of external assessments indicated ad hoc adjustments to the underlying CA have been made for two types of shocks: natural disasters and, to a lesser extent, militarized conflicts. Both are negative income shocks that can raise the CA balance if national saving rises (or investment falls relative to saving) as a result of the shock, although the CA balance could also decline if the country can smooth consumption by borrowing on international financial markets (Obstfeld and Rogoff 1996). Stylized evidence indicates that these shocks can have sizable impacts on the current account and REER over very short horizons.

8. Natural disasters, and the associated destruction of wealth, can negatively affect consumption while a lower present value of income may deter investment. At the same time, damage to physical capital can lead to increased investment in the aftermath of natural disasters. Both saving and investment may also be affected by financial openness: a high degree of openness allows countries to smooth out the shock to maintain consumption. The impact of natural disasters on the CA is therefore an empirical question. The results show that disasters tend to lower the CA in countries with open financial accounts but raise it in countries with closed financial accounts.

9. Militarized conflicts can similarly disrupt consumption, investment and the cross-border flow of capital. Their impact on the CA is a priori ambiguous as imports may shrink from the decline in domestic demand, while exports may also fall as production facilities are destroyed. Furthermore, lower private capital inflows may be offset by official external financing. Thus, the impact of conflicts on the external accounts is also an empirical question.

10. The revised EBA-Lite includes indicators for both types of shocks in the CA model and permits the impact of natural disaster shocks to vary non-linearly with financial account openness. Including these shocks both lowers the residuals in estimating CA gaps and provides a quantitative measure for an ad hoc adjustment to the underlying CA to capture current shocks.

Policy Norms for EBA-Lite Countries: Social Insurance and Financial Policies

Social Insurance Policies

11. The previous EBA-Lite regression models did not include social insurance policies, a key determinant of precautionary saving. Improvements in data on public health expenditures has now permitted its inclusion in the EBA-Lite CA model, similarly as in the EBA.

12. Social insurance policies are arguably more important in explaining saving in EBA-Lite countries, as public health expenditures are particularly low in these economies and exposure to health risks particularly high. From a positive perspective, this suggests that households in EBA-Lite countries engage in more precautionary saving, given a greater likelihood of catastrophic events. From a normative perspective, however, a greater number of competing demands on public resources suggest a lower capacity for social expenditures. These considerations guide the EBA-Lite indicative policy norms for public health expenditures which are modeled as a function of demographics, income inequality, and income (all as in the EBA) along with fiscal revenues (to reflect lower fiscal capacity in EBA-Lite countries).

Financial Policies

13. Financial variables were included in the previous EBA-Lite regression models, but guidance on financial policy norms was not sufficiently tailored to countries or country groups. Data limitations for EBA-Lite countries preclude the use of BIS-type credit gaps that isolate the credit cycle from its trend. Furthermore, the large financial deepening needs of the EBA-Lite sample suggest taking account of the level of financial development. Reflecting such concerns, the revised EBA-Lite models use two financial policy variables: credit growth to capture cyclical considerations and private credit in percent of GDP to reflect structural impediments, which result in longer-term deviation of saving and investment decisions from their desirable levels.

14. From a normative perspective, the EBA-Lite introduces indicative benchmarks to guide the appropriate level of credit-to-GDP. The suggested norms are assessed with respect to both economic fundamentals—such as the level of income and financial development—as well as cyclical influences. Similarly, we suggest rules-of-thumb to assess a medium-term growth rate of credit, that takes into account the desirable *level* of credit.

Revisions to the EBA-Lite REER Model

15. In parallel with the CA model, analogous changes are made to the EBA-Lite REER regression model. These include: the addition of the public health and credit growth variables, and the indicators for natural disasters and militarized conflicts; the REER model also uses the indicative policy norms for the credit-to-GDP ratio, credit growth, and public health policy.

Module II. Non-Regression-Based Approaches for Exporters of Exhaustible Resources

16. Important considerations for exporters of exhaustible resources are not captured by CA regression approaches. Exhaustible resources can generate potentially large and temporary income streams, and countries may benefit from smoothing domestic absorption. Such saving may

arise from both inter-generational equity concerns, as well as precautionary motives reflecting the high volatility of commodity prices. The approach in the EBA-Lite and EBA is to include a measure of resource temporariness as an explanatory variable in the CA and REER regression models.

17. The review of external assessments in commodity exporters identified three key shortcomings of this approach: (1) the resource temporariness variable does not capture normative considerations such as how fiscal policy should affect the absorption of resource wealth; (2) it does not explicitly link different aspects of countries' balance sheet (e.g. resource and above-ground wealth); and (3) they account only for oil and gas exporters, while there are large exporters of other, non-fuel exhaustible commodities. These considerations are particularly important for the EBA-Lite sample which includes many large exporters of exhaustible commodities.

18. The revised EBA-Lite methodology presents two non-regression approaches for exporters of exhaustible resources. Both approaches have been intermittently considered for external assessments of some large oil exporters. The first approach is based on the allocation of resource wealth for consumption across periods. The second approach explicitly incorporates investment in a dynamic, small open-economy model to account for investment needs, which are generally acute in many commodity exporters. Illustrative evidence is given to show how these models can complement external assessments of large exporters of exhaustible commodities.

Module III. Review of the Assessment of External Sustainability

19. Reflecting the overriding need to lower external liabilities to a level that does not risk growth or financial stability, external assessments in some cases have drawn on the external sustainability (ES) methodology. This approach calculates the REER adjustment required to satisfy the inter-temporal budget constraint as a measure of the adjustment required to restore external sustainability. The incidence of highly-indebted economies is very high in the EBA-Lite sample.

20. The review identified several simplifying assumptions in the ES methodology that can significantly affect the assessment of external sustainability: (1) the ES does not consider that an adjustment of exchange rates results in a revaluation of the NIIP; (2) the ES does not consider rates of return differentials except in a few countries; (3) the ES approach compares debt at a point in the future (rather than its present value) to its level today; and (4) the ES approach takes account of the current account projection in just the last year of the WEO horizon. A revised ES approach that takes account of each of these considerations is proposed.

21. The review also noted that the workhorse approach of the ES model is deterministic, whereas a probabilistic assessment of external sustainability may be more suitable in some cases, as recommended in the IMF's debt sustainability guidance.[4] The revised EBA-Lite introduces a probability approach as a complementary tool that can be used inform the external assessment, particularly when the deterministic approach implies a very large REER adjustment.

[4] See IMF (2002), "Assessing Sustainability".

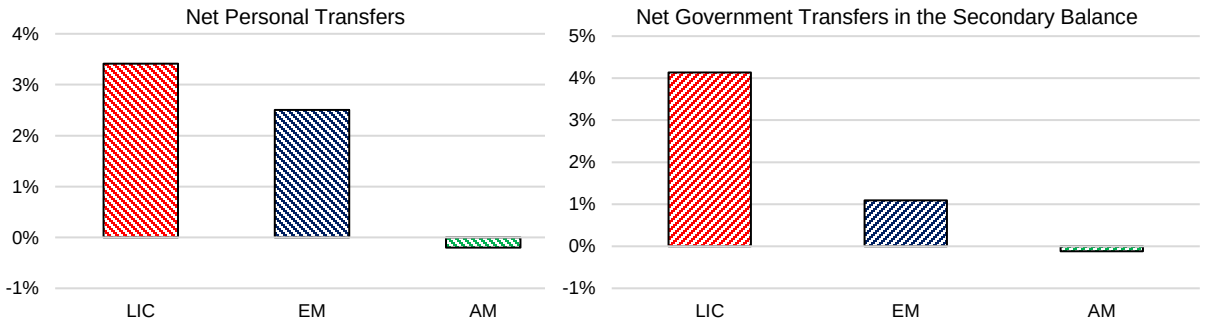
MODULE I. REVISIONS TO THE EBA-LITE REGRESSIONS

A. The Role of Remittances and Aid in the EBA-Lite Regression Models[5]

22. The EBA-Lite regression models previously included workers' remittances and foreign aid as explanatory variables. This note reviews the conceptual and econometric issues raised by this approach, considering that both variables are recorded as *current transfers* of the CA balance.[6]

23. Personal transfers and those involving the general government comprise two significant components of current transfers. Current transfers between resident and nonresident households are categorized as *personal transfers* in the BOP and include workers' remittances. Current transfers involving the general government include various forms of foreign aid (e.g. budgetary grants) which fall under *current international cooperation*. In percent of GDP, current transfers are negligible in advanced economies, but they are significant in low-income and emerging economies (Figure 3). More generally, the secondary income account is a key component of the CA among the latter (Figure 4).

Figure 3. Current Transfers (% of GDP, average 1995–2016)



Source: IFS and IMF staff calculations.

24. The marginal propensities to save and invest out of current transfers may differ systematically from the propensities to save and invest out of other income. With regard to remittances, a large body of work has found that the marginal propensity to consume from remittance receipts is larger than from other income.[7] Among other factors, this reflects that recipient households are typically liquidity-constrained, poor and may *perceive* that the remittance

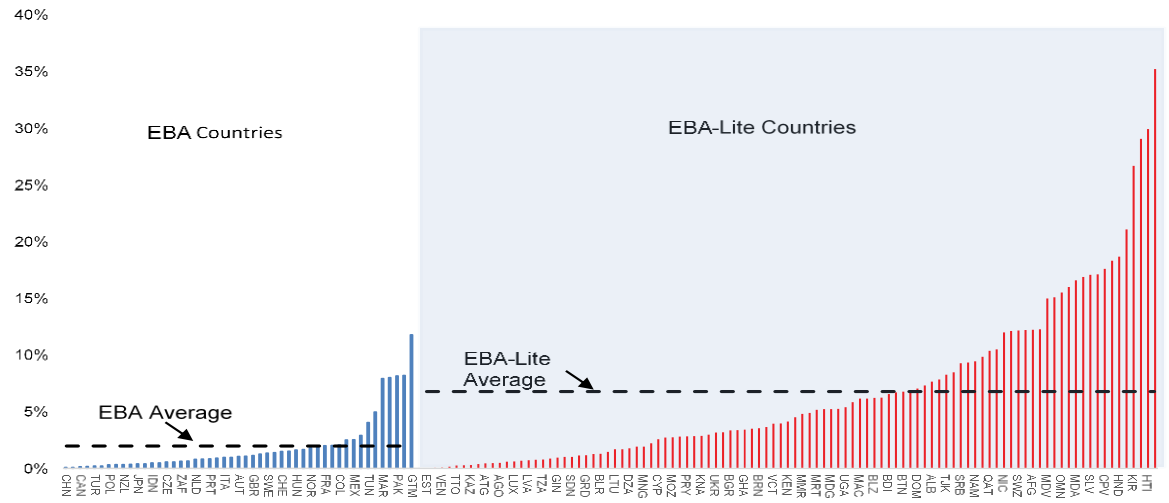
[5] Prepared by Mitali Das (lead), Chengyu Huang and Mohammed Saleh with input from Diego Cerdeiro and Katheryn Russ.

[6] Current transfers, which may be in-kind or in cash, are cross-border transactions between residents and nonresidents recorded in the secondary income account of the balance of payments (BOP).

[7] For the marginal propensities to consume and invest out of aid: see e.g. Boone (1996) and Feyzioglu et. al. (1996); for remittances see Glytsos (1993), Durand et. al. (1996), World Bank (2006), Chami et. al. (2008) and Ratha (2005.

flow is permanent (see Chami et. al. 2008). The evidence also points to a higher marginal propensity to invest out of remittances than out of regular income, as these flows are used to finance physical capital investment, particularly residential construction (Edwards and Ureta 2003). [8] With regard to foreign aid, Obstfeld (1998) theoretically illustrates that an apparently robust implication of representative-agent optimal consumption models is that much of moderate aid inflows "are likely to be consumed, not saved". The evidence is strongly supportive of this conjecture, as marginal propensities to consume out of aid are estimated at close to unity (Levy 1988; Boone 1995, 1996). The evidence on the marginal propensity to invest out of foreign aid is mixed, with some suggesting a low propensity (e.g. Boone 1996) while others suggesting a larger effect (e.g. Feyzioglu et. al 1996).

Figure 4. Absolute Value (CA – Trade Balance – Primary Income Balance), % of GDP (2016)
Sub-sample of EBA and EBA-Lite economies



Source: IFS and IMF staff calculations.

25. The different propensities to save and invest from current transfers suggest that where such transfers are large in national income, saving-investment dynamics are likely to differ as well. The higher propensities to consume and invest out of current transfers suggest that, all else equal, the (aggregate) saving ratio will fall more, the investment ratio will rise more—and thus the CA will decline more—in an economy that receives one unit of transfer income than in an economy which receives one unit of other income. As observed by Obstfeld (1998) in the context of foreign aid, the central elements of this mechanism are closely related to the classical transfer problem.[9]

[8] See Alderman (1996), Adams (1998) and the survey in Chami et. al. (2008).

[9] The relation to the transfer problem is apparent since, if the marginal propensity to consume imports (as a fraction of overall consumption) in the receiving economy is higher than in the sending economy, a CA deterioration will ensue; Das (2018). We thank Katheryn Russ for this observation.

26. The econometric implications of including current transfers in the CA model is that the regression is no longer a saving-investment regression. As aid and remittances are sub-components of the current account, the estimated model does not estimate a current account gap. Decomposing the current account (CA) into Aid and Remittances (A&R) and other components (CA_{Other}), with X denoting remaining covariates, the EBA-Lite CA regression model can be written:

$$CA \equiv [CA_{other} + \text{A\&R}] = \text{X}'\beta + (\text{A\&R})'\alpha + \text{u} \quad (1)$$

which is equivalent to estimating the regression

$$CA_{other} = \text{X}'\beta + (\text{A\&R})'[\alpha - 1] + \text{u}. \quad (2)$$

The regression output of equation (2) can be used to estimate a norm and gap for CA_{Other}, but not for the current account.

27. The above accounting and econometric considerations are not relevant for the EBA-Lite real effective exchange rate (REER) model. As the accounting and econometric issues rest on the fact that current transfers are sub-components of the current account balance, they do not raise corresponding concerns in the EBA-Lite REER model. Indeed, the evidence suggests that both foreign aid inflows (Rajan and Subramanyam 2011) and remittance inflows (Acosta et. al. 2009) result in real exchange rate appreciation, potentially due to Dutch-disease effects that raise the demand for nontradables. This stylized empirical finding (that a net inflow of transfers results in an appreciation of the REER) is conceptually consistent with the idea that a net inflow of current transfers results in a lower saving-investment balance, as described above.

28. Reflecting these considerations, the EBA-Lite drops aid and remittances from the CA but not the REER model and introduces migrant shares as a driver of saving-investment balances. While dropping aid and remittances from the current account model addresses the econometric issues, it raises the question of whether the remaining covariates adequately capture saving-investment dynamics where current transfers are a large fraction of GDP. To the extent that propensities to save and invest are altered due to differences in source income, this requires a variable that distinguishes between the CA dynamics of two economies, in one of which the CA is predominantly composed of the trade balance, while in the other it is predominantly net current transfers.

29. A natural choice for such a variable is the migrant share (defined as the number of outward migrants in ratio to the domestic population), which is likely to be directly proportional to current transfers.[10] The intuition is that in economies where the migrated share of

[10] Migrants are included in the database irrespective of their legal status. The data will typically not include seasonal migrants. Note that the variable refers to *gross* outward migration, i.e. it does not subtract inward migration. Because the variable is measured in ratio to the domestic population, using net migrant shares would spuriously explain large current account balances of certain countries (e.g. large oil exporters) that have relatively large inward migrant stocks in ratio to their domestic population. Insofar as the large current account balances of these countries are likely driven by other considerations, the decision was not to net inward migration. Migration data are from the UN Population Division: http://www.un.org/en/development/desa/population/migration/data/estimates2/estimates17.shtml.

households is higher, receipts of remittances will be larger and, all else equal, the higher average propensity to consume and invest will be reflected in a lower current account balance. The migrant share is analogous to some other demographic variables used in the EBA-Lite models which use compositional differences in populations to identify different propensities to save and dissave.[11] Note that the migrant share is related to remittances, but less so to foreign aid. With regard to foreign aid, the literature has identified key determinants to include relative income, growth, institutions as well as shocks (such as conflicts and natural disasters),[12] which are all present in the revised EBA-Lite current account model.

30. Migrant shares are found to be negatively empirically associated with the current account. The revised EBA-Lite current account model uncovers a negative and statistically significant impact of migrant shares (Table 1). The negative estimate implies that, on average, as outward migration rises, the marginal propensity to invest rises and/or the marginal propensity to save falls in the domestic economy. The magnitude suggests that an 8.6 percentage points (or one standard deviation) increase in outward migration lowers the current account balance by about 1% of GDP.

Table 1. Empirical Estimates of Migrant Shares on the CA Balance

	CA
Migrant Shares	-.001**
	(.00015)
Distinct countries	126
No. observations	2097
Pseudo R-squared	.5681

Source: IMF staff calculations.

31. The overall assessment should take account of country-specific details about the migrant populations. For example, where transfers are perceived as *temporary*, or the remittance flows to relatively high-income households, a higher migrated share may result in relatively higher saving from secondary transfers and the saving-investment balance may increase; see for example, Barai (2012) for the case of Bangladesh.

[11] The migrant share is analogous to some other demographic variables used in the EBA-Lite models which use compositional differences in populations to identify different propensities to save and dissave. For example, the EBA-Lite models posit that in economies where the share of the prime-saving population is greater, all else equal, the propensity to save is higher than in other economies, and the CA corresponding larger.

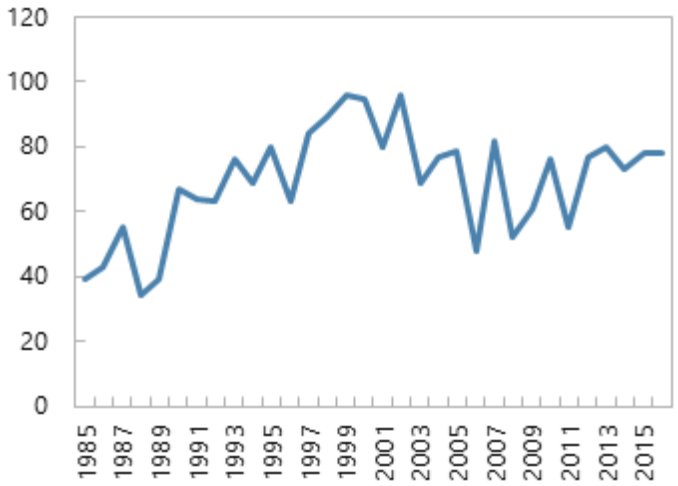
[12] See e.g. Dollar and Levin (2006), Alesina and Weder (2002).

B. Natural Disasters and Saving-Investment Balances[13]

32. Natural disasters can potentially affect saving and investment decisions. The associated destruction of wealth can negatively affect consumption, while a lower present value of income may deter investment. At the same time, damage to physical capital can lead to increased investment in the aftermath of natural disasters. The qualitative as well as the quantitative effect that natural disasters have on current account balances is therefore an empirical question.

33. The relevance of natural disasters for saving-investment balances remains relatively unexplored thus far. While the effect of natural disasters on economic growth has been studied in the literature,[14] their effect on saving-investment balances remains relatively uncharted. Rasmusen (2004) studies the effect of 12 large natural disasters on Caribbean economies and finds strong positive investment responses alongside large deteriorations of the CA. Laframboise and Loko (2012) analyze 7 case studies, and generally find worsening CAs in the wake of natural disasters. Prati et al. (2011) study various determinants of current account balances for a sample of around 50 low-income countries, finding that natural disasters raise the CA in countries with low financial openness, and reduce it in countries with high financial openness. A high degree of financial openness allows countries to smooth the shock and re-build their productive capacity.

Figure 5. Number of Disasters



Source: EM-DAT and IMF staff calculations.
Note: Excluding disasters with no dollar damage reported.

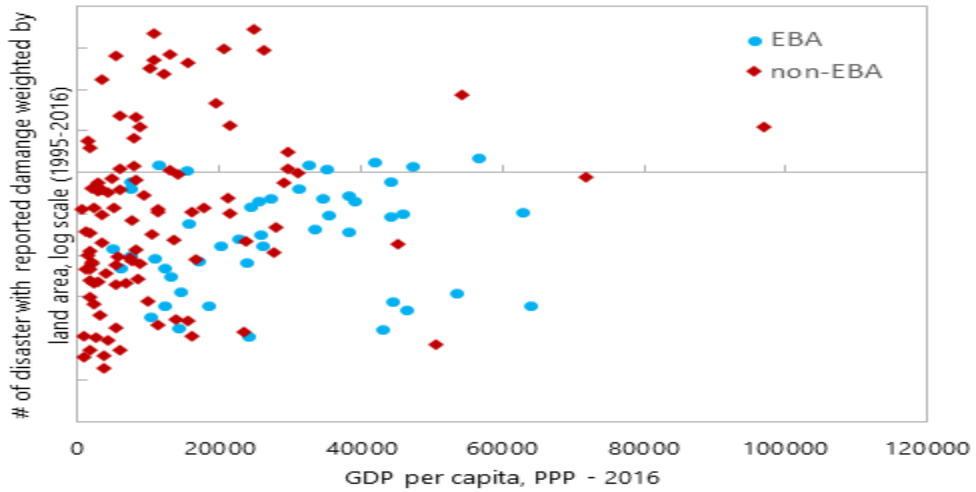
[13] Prepared by Mahir Binici, Diego Cerdeiro (lead), Chengyu Huang, Rachel Nam, Mohammed Saleh, and Hui Tong.

[14] For an overview of the recent literature on natural disasters and growth, see e.g. Felbermayr and Gröschl (2014). For studies focused on weather-related disasters, see IMF (2017).

34. The analysis in this note relies on a database recording the occurrence of, and damage value associated with natural disasters. The Emergency Events Database (EM-DAT), compiled by the Centre for Research on the Epidemiology of Disasters (CRED) at Université Catholique de Louvain, offers up-to-date information on the occurrence of natural disasters. Six broad categories of natural disasters are recorded in the database, including geophysical, meteorological and hydrological events. Not all disasters, however, are economically significant for the economies that suffer them. Crucially, EM-DAT includes, for about half of all recorded events, information on the U.S. dollar damage associated with the disaster (Figure 5). Throughout this note, we will focus on the events with non-missing damage value.

35. Natural disasters are more frequent, and more intense in non-EBA countries. The potential significance of natural disasters for the EBA-Lite regressions lies in their incidence in the EBA-Lite sample. Per square kilometer, natural disasters hit non-EBA countries more frequently (Figure 6). As shown in the existing literature, natural disasters can have effects on, and therefore correlate with other variables included in the EBA-Lite regression (e.g. GDP per capita), especially in less-developed countries (Noy, 2009). As a result, their omission from the EBA-Lite regressions could not only miss a potentially important determinant of saving and investment, but also possibly lead to biased estimates for the coefficients associated with other regressors.

Figure 6. The Frequency of Natural Disasters in EBA and non-EBA Countries



Source: EM-DAT, World Economic Outlook database, World Bank WDI, and Staff calculations.

36. As expected, the effect of disasters on the current account depends on the degree of financial openness. Table 2 reports the estimated coefficients for the disaster-related variables. Given inherent challenges in measuring the damage value related to natural disasters, all specifications rely on dummy variables that equal 1 when reported damage exceeds some threshold. Moreover, and as highlighted already by Prati et al. (2011), the disaster dummy is also interacted with the extent of financial openness, measured by the Chinn-Ito index. Column (1) shows the

results for our preferred specification, which includes a dummy that equals 1 when any economic damage is reported. When a natural disaster hits a country with a completely open financial account, the CA balance is estimated to decline by about 1 percentage points of GDP. At the other end, the marginal effect for a country with a completely closed financial account (Chinn-Ito index equal to 1), the marginal effect is of an increase in the current account balance of about 0.9 percentage points of GDP. As shown in column (2), the qualitative results are robust to choosing a threshold of 0.05 percent of GDP to construct the dummy.[15]

Table 2. Regression Results

	(1)	(2)	(3)
Dummy=1 if $ damage ratio > 0%, relative to world average	-0.013***		-0.00329
	(0.00262)		(0.00272)
Dummy=1 if $ damage ratio > 0%, interacted with Chinn-Ito index, relative to world average	0.029***		0.00325
	(0.00515)		(0.00541)
Dummy=1 if $ damage ratio > 0.05%, relative to world average		-0.00589**	
		(0.00272)	
Dummy=1 if $ damage ratio > 0.05%, interacted with Chinn-Ito index, relative to world average		0.0201***	
		(0.00577)	
5YMA - disaster dummy if > 0%, relative to world average			-0.00543***
			(0.000802)
5YMA - disaster dummy if > 0%, interacted with Chinn-Ito index, relative to world			0.0130***
			(0.00160)
Observations	2,097	2,097	2,095
R-squared	0.568	0.561	0.589

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

37. While identification in the data is challenging, recurring natural disasters may call for precautionary savings. Countries that are hit by natural disasters with some regularity may benefit from saving during non-disaster years. The specification reported in column (3) includes, in addition to the standard disaster dummy of column (1), a set of terms that aim to capture this consideration using the lagged five-year moving average of a disaster with economic damage occurring.[16] The estimated coefficients have the expected sign: except for the most financially-open countries, which have ample ability to tap international markets in the wake of disasters, most countries are expected to save more the more frequently affected they are affected by disasters. The sample, however, does not allow to identify all effects separately, with estimates related to the impact effect of natural disasters losing precision.

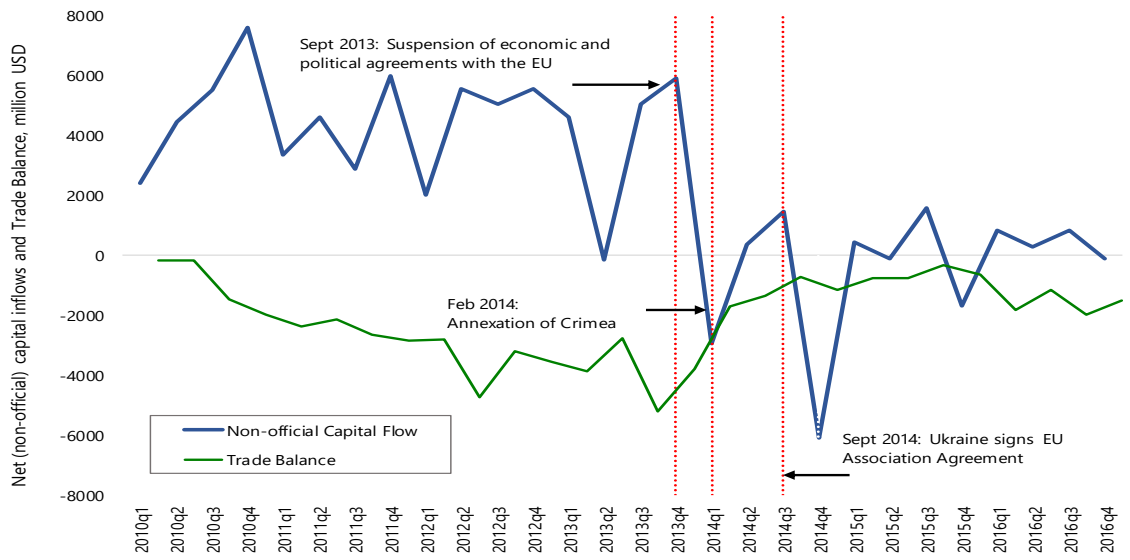
[15] Point estimates are also similar when using a threshold of 0.1 percent of GDP, although—due to the reduction in the subsample of treated observations—coefficients are estimated with less precision.

[16] For example, if a country reports damage from disasters in 1990, 1991 and 1994, but not in 1992 and 1993, then the five-year moving average for 1995 (before taking deviations from world average) would be equal to 0.6.

C. Militarized Conflicts and the Saving-Investment Balance[17]

38. Conflicts between and within countries can significantly disrupt consumption, investment and the cross-border flow of capital. Growth expectations are, in general, revised down with the onset of wars or violent political shocks. Such events discourage investment, trigger capital flight and raise borrowing costs.[18] In many instances, inter-state conflicts are accompanied by sanctions and trade embargoes, which have immediate impacts on the volume of trade. The associated disruptions to economic activity may lead to the dislocation of labor, depressing income and consumption.

Figure 7. Ukraine: Net Non-Official Inflows and Trade Surrounding the Annexation of Crimea



Source: IFS, WEO and Author's calculations.

39. The changes in saving and investment decisions brought on by conflicts can have sizable impacts on current accounts and exchange rates over short horizons (e.g. Figure 7). However, the direction of impact on the trade balance is a priori ambiguous. Imports may shrink from the decline in domestic demand and reduced access to borrowing, but exports could also fall as production facilities are destroyed. Furthermore, lower private capital inflows in times of conflict are oftentimes offset by non-official flows, such as aid and official financing. The existing evidence on the impact of conflicts on external accounts is mixed,[19] indicating this is an empirical question.

[17] Prepared by Mitali Das, Chengyu Huang and Mohammed Saleh, with inputs from Mahir Binici, Diego Cerdeiro, Huidan Lin, Rachel Nam, and Haobin Wang.

[18] Polachek and Sevastiano (2010) analyze the impact of armed conflicts on growth; Blomberg and Hess (2006) its impact on trade costs and Davies (2010) the consequences for capital flight.

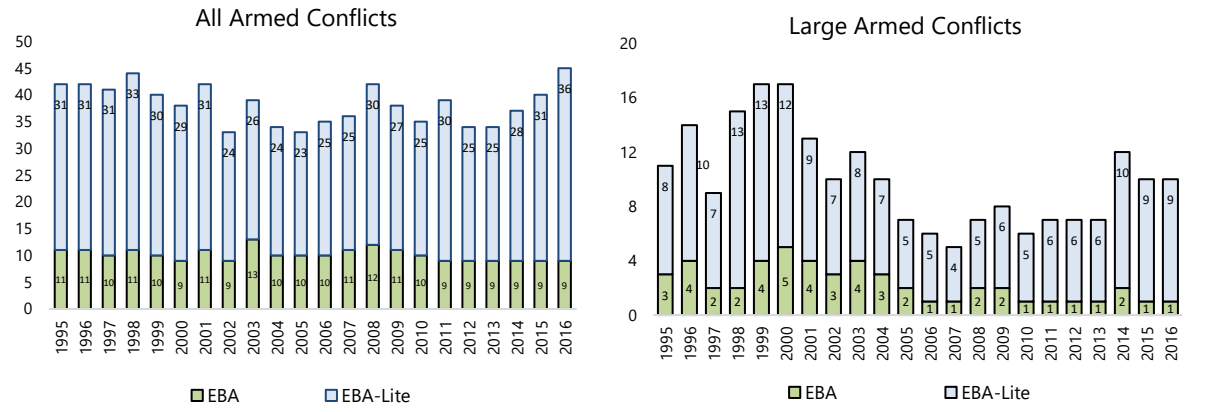
[19] Evidence that wars lower the volume of trade is in Pollins (1989), Glick and Taylor (2007) and Mansfield and

(continued)

40. The revised EBA-Lite considers the impact of armed conflicts on external positions. Drawing from the UCDP/PRIO Dataset (Allanson and others, 2017), the EBA-Lite models include an indicator for armed conflicts.[20] Conflicts are defined to include any of the following: (a) internal armed conflicts (between the government of a state and one or more internal opposition groups); (b) internationalized internal armed conflicts (between the government of a state and an internal opposition group, with intervention from other states on one or both sides); (c) inter-state armed conflicts; and (d) extra-systemic armed conflict (between a state and a non-state group outside its territory).[21] The PRIO records the intensity of armed conflicts with two interval-censored observations: "minor" when annual conflict-related human fatalities are between 25 and 999, and "war" (i.e. large armed conflicts) when fatalities exceed 1,000 on an annual basis.

41. The incidence of conflicts varies across regions and over time and is higher among countries in the EBA-Lite relative to those in the EBA. The potential relevance of conflicts for external accounts differs markedly across regions. Between 1995 and 2016, 39 percent of conflicts worldwide involved countries in the African continent, 29 percent in Asia, and only 4 percent in the Americas. Temporally, while the total number of conflicts has been steady since 1995, large armed conflicts have been noticeably fewer in the 2000s relative to the 1990s, although they have edged higher recently (Figure 8). In both absolute terms as well as in share of their respective samples, the incidence of conflicts during 1995–2016 is higher in the EBA-Lite sample than in the EBA.

Figure 8. Incidence of Conflicts, 1995–2016



Source: UCDP/PRIO Database

Bronson (1997); Christiansen et. al. (2009) find that conflicts raise the current account balance, and Morrow et. al. (1999) and Penubarti and Ward (2000) find no statistically significant impact of conflicts on trade.

[20] The current database is the UCDP/PRIO Armed Conflict Dataset Version 17.22. The UCDP/PRIO data collection is managed by academics and research assistants at Uppsala University in Sweden (https://www.prio.org). It records factual data on ongoing conflicts and does not have perception-based information. This database has been used extensively in the literature. See, e.g., Anderton and Carter (2001), Ciccone (2007) and Christiansen et. al. (2009).

[21] See Gleditsch et al. (2002) and Allanson and others (2017) for an in-depth discussion of these definitions.

42. To empirically account for the impact of conflicts on current accounts and the real exchange rate, the EBA-Lite models includes an indicator for the occurrence of armed conflicts. Using the definition of conflicts above, the indicator assumes the value one in every year where a conflict took place and zero otherwise. Conflicts are unlikely to significantly affect economic activity, and thus external accounts, when they are minor, localized or short-lived. Nevertheless, our indicator covers all conflicts because interval-censoring of the UCDP data precludes identifying conflicts where human losses may be substantial but are nonetheless coded as "minor" because the losses are lower than the UCDP/PRIO thresholds for "wars".[22]

43. The EBA-Lite models uncover empirically significant impacts of conflicts on the current account and exchange rates. Controlling for other CA determinants, the estimates suggest that the marginal impact of an armed conflict is to raise the current account by 1 percent of GDP (Table 3). Note that the indicator measures a shock to the economy which is distinct, though likely correlated with, the quality of institutions proxied by the ICRG index. Some research suggests that the CA impact of wars can persist past the termination of the conflict, (e.g. Fielding 2003). In background work, we tested for persistence by using a lagged conflict indicator. Although the results were of the expected sign, the estimates are jointly noisy and lowered the contribution of the indicator itself. Thus, the revised EBA-Lite models use only the contemporaneous indicator of armed conflicts.

Table 3. Empirical Impacts of Militarized Conflicts on the CA

	(1)	(2)	(3)
Institutions (ICRG Index)	-.038**	-.034*	-.035*
	(.014)	(.014)	(.015)
Indicator =1 in if a conflict begins or continues in any year, 0		.008***	.002
otherwise		(.002)	(.003)
Lagged value of above indicator			.006*
			(.003)
No. observations	2097	2097	2094
No. of distinct countries	126	126	125
Pseudo R-squared	.569	.568	.576

Source: IMF staff calculations.

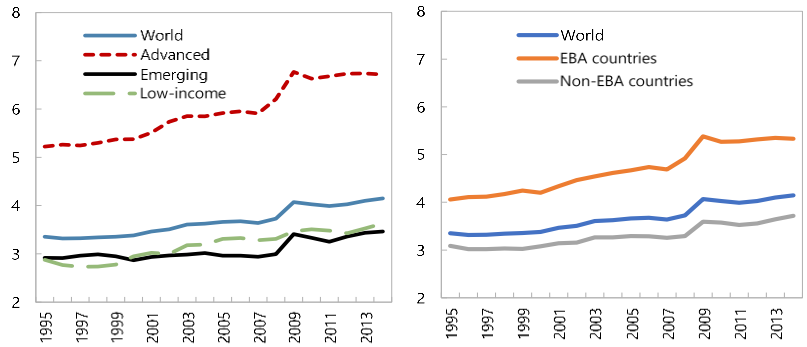
[22] Another limitation is that when a conflict's fatalities exceed 1,000 but the conflict straddles two or more years, it is not identified as a major armed conflict ("war"). An alternative would to specify the presence of a "war" for every year over which it persists, if cumulated fatalities exceed 1,000. The drawback of this approach, however, is that in some conflicts where the intensity is concentrated in specific years, it incorrectly identifies the presence of a "war".

D. Incorporating Public Health Expenditures in the EBA-Lite[23]

44. Owing to data limitations, the previous EBA-Lite models did not include any measure of social insurance policies. The EBA models use the level of public health expenditures in percent of GDP as a proxy for social insurance policies. The hypothesis is that public expenditures on social insurance policies (such as pensions, education or health) may reduce households' precautionary saving and contribute to lowering the aggregate saving rate (Phillips et. al., 2013; Kerdrain et. al., 2010). In the absence of such a variable, the EBA-Lite models do not sufficiently account for policy distortions that contribute to excess imbalances.

45. Social insurance policies are arguably more important in explaining the aggregate saving rate and the external balance in lower-income countries. Public expenditures on health, for example, are very low in low-income and developing economies (which comprise a significant fraction of the EBA-Lite sample), despite their higher exposure to health risks from diseases, low nutritional intake, and high infant mortality (Figure 9 and Table 4). As a result, households in these economies may engage in more precautionary saving given the greater likelihood of catastrophic events. With significant improvements in data availability, the Revised EBA-Lite models include public health expenditures a proxy for social insurance policies.

Figure 9. Public Health Expenditures (% of GDP)



Source: World Bank and IMF staff calculations.

46. Consistent with priors, public health expenditures are negatively associated with the current account balance, and this impact is materially stronger in the EBA-Lite than the EBA sample. A 1 percentage-point increase in public health expenditures in percent of GDP is associated with a decline in the CA of about 0.8 percentage points in the EBA-Lite sample, and about 0.5 percentage points in the EBA sample (Table 5). The higher sensitivity among EBA-Lite countries likely reflects the lower prevalence of social (public) health insurance, which induces a stronger precautionary saving motive.

[23] Prepared by Huidan Lin (lead), Rachel Nam, and Mohammed Saleh. The note also benefited from useful discussion with Baoping Shang. All errors remain our own.

Table 4. Public Health Expenditures and Selected Health Variables (2014)

	World	AE	EM	LIC
Public health expenditure/GDP (percent)	4.1	6.7	3.5	3.6
Infant mortality (per 1,000 people)	32.3	3.9	21.2	58.0
Depth of the food deficit (kilocalories per person per day)	90.5	5.0	66.2	126.3
Incidence of tuberculosis (per 100,000 people)	118.9	13.9	93.9	196.6

Sources: World Bank WDI/World Health Organization Global Health Expenditure Database, UN Inter-Agency Group for Child Mortality Estimation, Food and Agriculture Organization Food Security Statistics, Global Tuberculosis Report provided by WHO/PAHO country offices and technical regional programs based on information reported by the National Tuberculosis Control Programs (NPTs), and IMF staff calculations.

Table 5. EBA-Lite Regressions with Public Health Expenditures

	[1]	[2]
	Updated EBA-Lite CA methodology	
	EBA-Lite sample	restricted to EBA sample
Lagged Public Health Expenditure (% of GDP)	-0.806***	-0.491***
Observations	2097	838
R-squared	0.568	0.662

Source: Staff estimates.

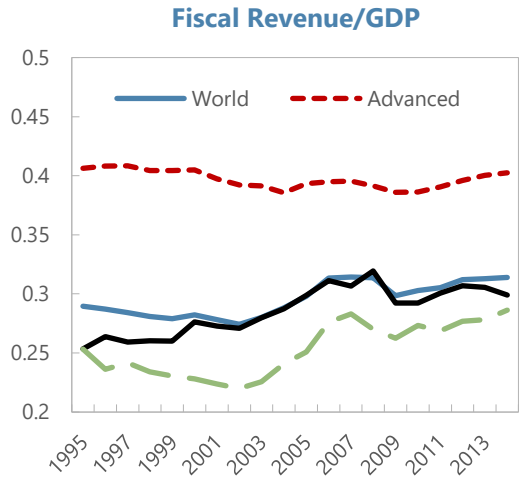
Table 6. Health Expenditures under Selected Financing Sources and Schemes
(% of current health expenditures, 2014)

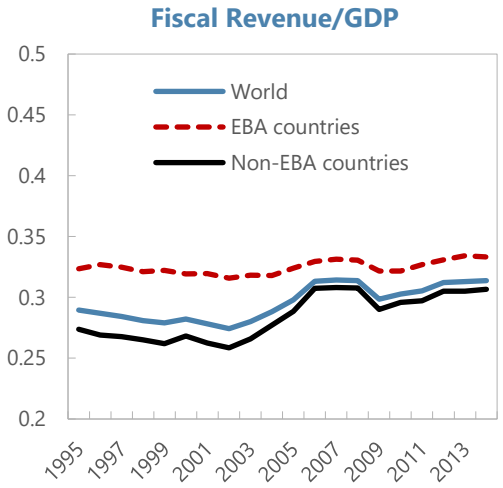
	World	AE	EM	LIC
Domestic private health expenditure	39.2	27.5	41.9	42.0
Social health insurance	24.1	40.8	27.5	7.7
Out-of-pocket	32.2	19.0	32.7	38.0

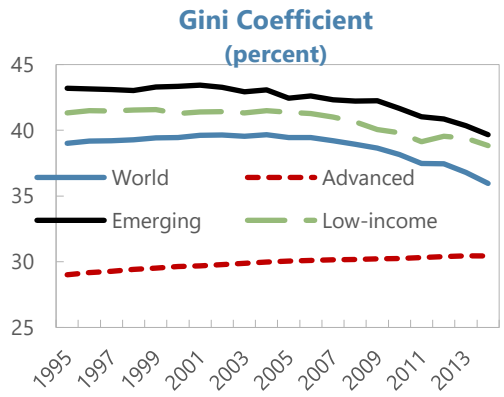
Sources: World Health Organization Global Health Expenditure Database collected from National Health Account or estimated using various accounting techniques depending on the data available for each country and IMF staff calculations.

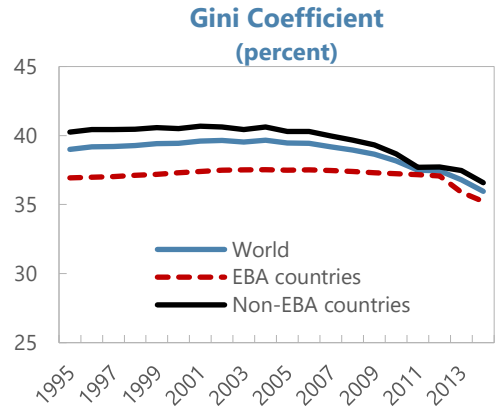
47. As with the other policy variables, an important consideration is in setting the desirable level of public health expenditures. The literature has established that cross-country variations in public health expenditures can be explained not only by factors reflecting the *need* for health spending – such as the demographic structure and epidemiological profile, but also those reflecting *affordability* – such as the income level, the government's fiscal capacity, the cost-benefit of outlays on public health, and other demands on social resources (see, e.g., Savedoff, 2007; Xu et. al., 2011).

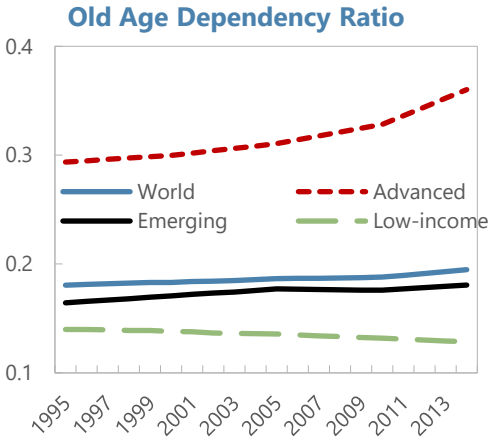
Figure 10. Trends in Key Variables of the Benchmark Regression

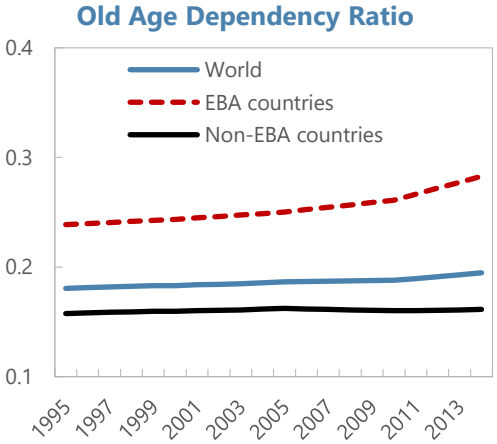












Source: World Economic Outlook, standardized world income inequality database (6.0), United Nations and staff calculations.

48. On the other hand, normative analysis of how much a country *should* spend on health emphasizes the need for health spending, for example, achieving universal health coverage in the Sustainable Development Goals. For many EBA-Lite countries, despite their average lower health quality, public expenditures on health are low, with greater reliance on out-of-pocket spending (Table 6). Low public expenditures may reflect low fiscal capacity and the constraints in mobilizing public resources for health services, all within a context where competing demands on social resources are numerous (e.g., education, transfers, and infrastructure).

49. Reflecting these considerations, the EBA-Lite considers both the need and capacity for public health spending in suggesting a benchmark level. In the EBA model, the benchmark level is suggested based on income, the demographic structure, and income inequality (Phillips et. al., 2013). Recently, Barroy et. al (2016) have shown that, regardless of income level, government revenues are the largest source of expanding the fiscal capacity for health spending. Accordingly, we extend the framework for setting indicative benchmarks by adding fiscal revenue (including grants) as a share of GDP as a measure of the fiscal capacity for health expenditures (see Table 7). All economies, regardless of the income level, face the question of how to sustainably and equitably allocate resources for health. However, among EBA-Lite countries, lower fiscal revenues, along with lower health status, suggests a lower fiscal capacity (Figure 10).

Table 7. Benchmark Regression of Public Health Expenditures

	[1]	[2]	[3]	[4]	[5]
Sample	EBA-Lite	EBA-Lite	AM only	EM only	LIC only
Log (PPP GDP per capita)	0.0037***	0.000904*	0.013***	0.004***	-0.0013
	0.0003	0.0005	0.0013	0.0007	0.0010
Old age dependency ratio	0.1202***	0.090***	0.136***	0.0928***	0.03*
	0.0051	0.0064	0.0070	0.0069	0.0161
Disposable income Gini (1st lag)	-0.0059	0.0162***	-0.117***	0.0514***	0.0674***
	0.0047	0.0042	0.1220	0.0049	0.0116
Fiscal revenue (percent of GDP, 1st lag)		0.083***	0.035***	0.0508***	0.0898***
		0.01	0.005	0.0052	0.0194
Constant	-0.01749	-0.0186***	-0.0985***	-0.0588***	-0.0138**
	0.0027	0.0027	0.0135	0.0060	0.0064
Observations	2540	2499	627	1007	865
R-squared	0.48	0.60	0.58	0.38	0.43

Source: IMF staff estimates.

50. Fiscal revenues are found to be significantly and positively associated with public health expenditures. A 10 percentage-point increase in fiscal revenue to GDP is associated with an increase in public health expenditures to GDP by 0.8 percentage points. Moreover, the magnitude of the coefficient is higher among lower-income economies, consistent with our hypothesis that fiscal revenues present a stronger constraint for public health spending in these economies (Table 7). The fitted values from the regression of public health on old-age dependency, income inequality, income per capita and fiscal revenues will serve as suggested benchmark level of public health expenditure as part of the guidance to country teams. As an alternative, we will also provide the fitted variable from the regression that does not include fiscal revenues.

51. The benchmark level suggests a level of public health expenditure consistent with country characteristics, drawn on cross-country evidence. The indicative benchmarks do not, however, suggest that a desirable level of spending should necessarily be lower because inequality is lower or income per capita is lower. Indeed, the "desirable" level of public health expenditures is not unconstrained: while higher health spending may be desirably higher in an unconstrained setting, this question must be considered in the context of the medium-term macro-fiscal framework, particularly because fiscal revenues themselves reflect policy choices. Therefore, while the benchmark is indicative of a level of public health spending consistent with *given* country characteristics, these characteristics may need to be set at alternative (and more desirable) levels, in considering the desirable level of public health expenditures.

52. The benchmark level can be complemented with country-specific information. The availability of private health insurance, the efficacy of public spending, and the efficiency of the delivery of services are difficult to quantify but could affect the desirable level of public health expenditures. For example, achieving a desirable improvement in public health may require greater expenditures than suggested by the benchmark if health expenditures are inefficiently allocated. Alternatively, if the desirable level of fiscal revenues (consistent with desirable fiscal policy) is higher, one can use the estimated benchmark coefficients to infer how more can be spent on health if fiscal revenues were to increase to the desirable level.

53. In summary, the revised EBA-Lite provides a benchmark level of public health expenditures. The benchmark level considers how much a country on public health relative to countries with similar levels of income per capita, demographics, income inequality, and fiscal capacity. This indicative benchmark can be complemented with country-specific information to assess a norm for public health expenditures.

E. Indicative Guidance for Financial Policies in the EBA-Lite[24]

54. Financial variables were in the previous EBA-Lite models, although concrete normative guidance for setting desirable policy levels was lacking. The literature suggests that both the level of financial development and cyclical financial influences can affect saving, investment and thus the current account. Reflecting this, the revised EBA-Lite models include the level of credit, which is used in a large body of research on CA balance as a proxy for financial development,[25] as well as the growth of credit to account for its cyclical influences.[26] Existing guidance on desirable financial policies is broad yet not sufficiently tailored to countries or country groups. The objective of this note is twofold. First, to lay out the conceptual and empirical underpinnings of the financial variables used in EBA-Lite. Second, to provide country teams with a toolkit that can be used to specify indicative (normative) guidelines for the financial policy variables.

55. The impact of financial factors on the current account may exacerbate cyclical conditions. Procyclicality of the financial system, characterized by excessive credit expansion, can result in demand booms that lower the current account (Adrian and Shin, 2010; Jorda et al. 2011). The policy shortcomings behind such financial excesses may include, for instance, a temporary relaxation in credit standards or weak enforcement of counter-cyclical provisioning (Borio et al. 2001).

56. Current account imbalances may also reflect structural impediments in the domestic financial system. Low levels of financial development may manifest in a shortage of safe financial assets, which can cause countries to export excess savings and result in external imbalances (Caballero, Farhi, and Gourinchas, 2008a 2008b). Low financial development may also reflect the absence of financial instruments to insure effectively against idiosyncratic risks, raising precautionary saving (Mendoza, Quadrini and Ríos-Rull, 2009).[27] Credit market distortions—such as information asymmetries between lenders and borrowers—can lower the return to savings and raise the cost of capital, and hence influence the current account dynamics.[28] In contrast to cyclical deviations, policy

[24] Prepared by Haobin Wang (lead), Diego Cerdeiro and Mahir Binici, with significant inputs from Mitali Das, Chengyu Huang, Martin Kaufman, Rachel Nam and Mohammed Saleh. The note also benefited from useful discussions and comments from Sean Craig, Gaston Gelos, Hui Tong, Huidan Lin, Russell Green, Monique Newiak, Hyun Song Shin, Plamen Iossifov, Ruud Vermeulen, and Yunhui Zhao.

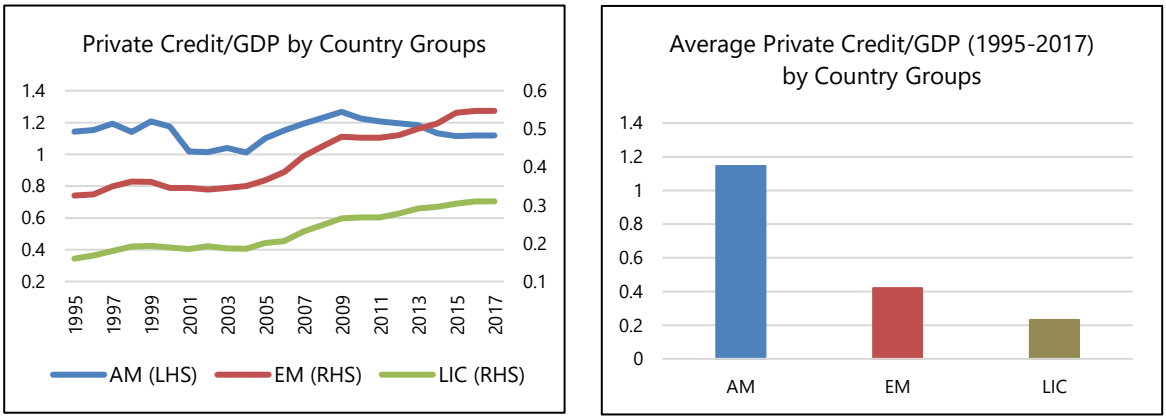
[25] Private credit to GDP is widely used as a benchmark financial variable in the CA literature. See, for example, Chinn and Prasad (2003), Gruber and Kamin (2005), Chinn, Eichengreen, and Ito (2011), among others.

[26] Phillips et al. (2013) emphasize two kinds of financial impacts on CAs: financial excesses and financial depth.
[27] In Mendoza et al. (2009) financial development reflects how well financial contracts, which are used to insure against idiosyncratic risks, are enforced.

[28] Models of credit market imperfections are presented in e.g. King and Levine (1993), Rajan and Zingales (1998), Wurgler (2000), Chinn and Ito (2011), and Geanakoplos and Fostel (2008).

distortions in these instances can be addressed by a range of reforms that enhance financial deepening and overall financial development.[29]

Figure 11. Private Credit in Advanced, Emerging and Low-Income Economies, 1995–2016



Source: WDI and staff calculations.

57. The conceptual considerations, the country composition of the EBA-Lite sample, and data availability guide the choice of the financial variables in the EBA-Lite regression models. More than three-fourths of the EBA-Lite sample are low-income, developing or emerging economies where financial development needs tend to dominate cyclical considerations (Figure 11). At the same time, there are cases in which cyclical considerations are also likely to be important (see e.g. the analysis of Sub-Saharan Africa in Iossifov and Khamis, 2009). To reflect both considerations, the EBA-Lite models include both the private credit-to-GDP ratio, demeaned to account for the significant heterogeneity in starting levels of credit-to-GDP (see Figure 1), and the growth rate of credit, in ratio to GDP, to capture the impact of cyclical changes (e.g. credit booms) on the current account. The BIS credit-gap measure, used in the EBA models, cannot be implemented because of significant data limitations.[30] [31]

58. The EBA-Lite models will include two direct measures of financial policy, as a proxy for both financial excesses and financial depth. Given the conceptual and empirical considerations discussed above, and in line with the existing literature on the determinants of external balances, the

[29] A comprehensive discussion on the many facets of financial development and related policy considerations are presented in Sahay et al. (2015).

[30] The BIS recommends at least 10 years of data, at the quarterly frequency to estimate the credit gap (see Drehmann and Tsatsaronis 2014). This presents severe constraints in the EBA-Lite sample where 31 countries do not have even 10 years of data at annual frequency, and nearly no data at quarterly frequency, and in many cases, the available series are subject to structural breaks. Furthermore, a limitation of the BIS gap, as discussed in Shin (2013), is that it may suggest a large (positive) gap in the event of a recession when output falls but credit remains stable or continues to grow.

[31] Indeed, such gap measures are well-suited to advanced economies where financial cycles are prominent, but may be less suited to economies where prolonged, and possibly accelerating credit/GDP ratios, are desirable symptoms of financial deepening; or where a persistent deceleration of credit is indicative of necessary deleveraging.

EBA-Lite retains the demeaned credit-to-GDP ratio as a benchmark measure that captures both financial deepening and the accumulation of financial excesses. To better capture cyclical developments, the revised EBA-Lite include credit growth as an additional financial policy variable.

Table 8. Determinants of Private Credit/GDP

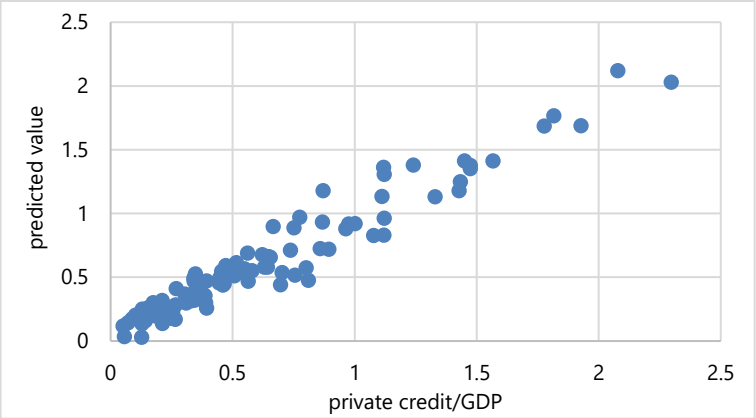
VARIABLES	AM	EM	LIC
Financial development	0.362**	0.40***	0.50***
	(0.16)	(0.06)	(0.07)
GDP per capita	0.459***	0.095***	0.24***
	(0.12)	(0.03)	(0.01)
Public debt	-0.001***	3e-05	9.e-05**
	(0.0005)	(0.000257)	(4e-05)
Financial structure	-0.01	-0.0349***	
	(0.019)	(0.00779)	
Inflation targetter	0.17***	-0.0360**	-0.0493*
	(0.04)	(0.0162)	(0.0295)
Inflation	0.001***	4e-05***	-3e-05***
	(0.000484)	(1e-05)	(8e-06)
Output gap	-0.82**	0.046	-0.31***
	(0.41)	(0.12)	(0.04)
WEO growth forecast	5.27***	0.590*	-0.0263
	(1.62)	(0.32)	(0.0887)
Capital control		-0.10***	-0.07***
		(0.01)	(0.01)
US Federal Funds Rate	-0.03**	-0.04***	-0.003
Euro accession	0.19***		
	(0.05)		
Constant	-4.03***	-0.35	-1.70***
	(1.40)	(0.30)	(0.10)
Observations	637	1,078	1,506
R-squared	0.475	0.391	0.447
Number of countries	35	57	60

Source: staff estimates.

59. An auxiliary regression model is estimated to suggest an indicative estimate of the desirable credit level. Following the notion of a "fundamentals-consistent credit gap" proposed in IMF (2017), benchmark regressions are estimated to suggest an indicative norm for credit to GDP ratios, i.e. levels consistent with a country's economic fundamentals. Building on the existing

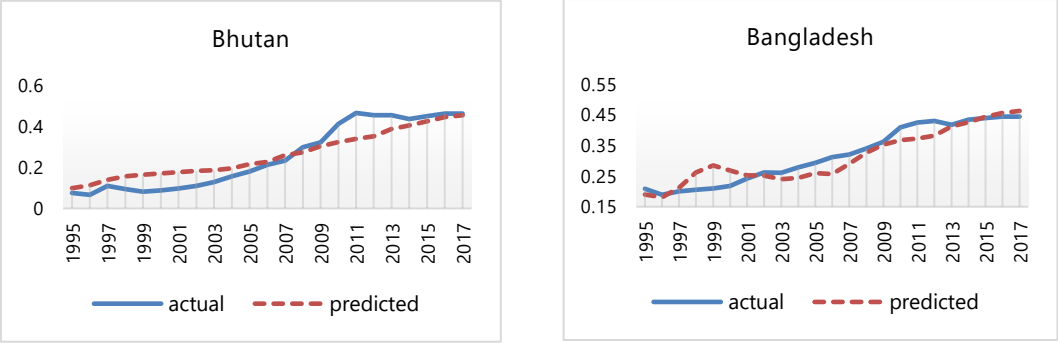
literature, explanatory variables include financial development index, GDP per capita, public debt, inflation, an inflation-targeting indicator, a dummy for Euro accession and a measure of financial structure. Regressions are estimated separately by country groups; see Table 8. Ultimately, however, statistical models are likely to be inadequate in accurately defining financial policy norms, and thus, judgment in applying them is encouraged.[32] Overall, the estimated desirable credit levels are broadly consistent with staff views (see Figures 12, 13, and Table 9 for selected examples).

Figure 12. Actual and Indicative Benchmarks for Credit to GDP Ratios



Source: staff calculations.

Figure 13. Actual Credit-to-GDP (solid line) and Indicative Benchmarks (dashed lines)



Source: WDI and staff calculations.

[32] The indicative guidance for financial policies is similar to the EBA and EBA-Lite indicative guidance for public health, where determinants (e.g. inequality) may not themselves be at their desirable level. Therefore, the country teams must consider the levels of these determinants in assessing the benchmark level of financial policies.

Table 9. Estimated Credit Gaps and Staff Views

Country	Year	Staff Views on Credit and Financial Policies in Article IV Consultation	Indicative Estimated Credit Gaps (P-P*)
Bhutan	2016	"Credit and liquidity conditions should be closely monitored."	+1.7%
Bangladesh	2015	"Macroeconomic performance has been strong over the past two years, underpinned by prudent policies. There is room for a counter-cyclical response to temporary growth shocks."	-0.4%
Cambodia	2016	"Rising financial sector vulnerabilities amid a credit boom pose significant risks to macro-financial stability."	+25%

Source: IMF Staff Reports.

60. A simple rule of thumb can guide the choice of desirable credit growth. A baseline choice is to set the medium-term rate of growth of private credit to be equal to the rate of growth of nominal GDP, so that the credit-to-GDP ratio grows at a constant rate. This is equivalent to a steady-state or balanced growth assumption common in many macroeconomic models. Alternatively, when the current ratio of credit to GDP is above (below) its desirable level, desirable credit growth rates should be non-positive (non-negative). For example, the desirable credit growth rate can be the annual rate which would achieve the desirable credit-to-GDP ratio over a specified medium-term horizon.[33] Where the desirable credit-to-GDP ratio is significantly larger than the current credit-to-GDP ratio, and the implied growth rate of credit thus undesirably high, staff may consider a longer horizon (beyond the five-year WEO horizon) to calculate a path for the growth rate of credit. Country teams may consider other toolkits for the assessment of systemic risk in order to make a more informed judgement.[34]

[33] For example, suppose the desirable credit level (P*) is greater than the actual level (P) and the medium-term GDP growth projection for the country is y%. In order for the level gap to close over *n* years, the desirable constant annual credit growth will be specified to be $\left(\frac{P^*(1+y\%)^n}{P}\right)^{\frac{1}{n}} - 1$.

[34] For instance, Marchettini and Maino (2015) develop a toolkit for the assessment of systemic risks in LICs.

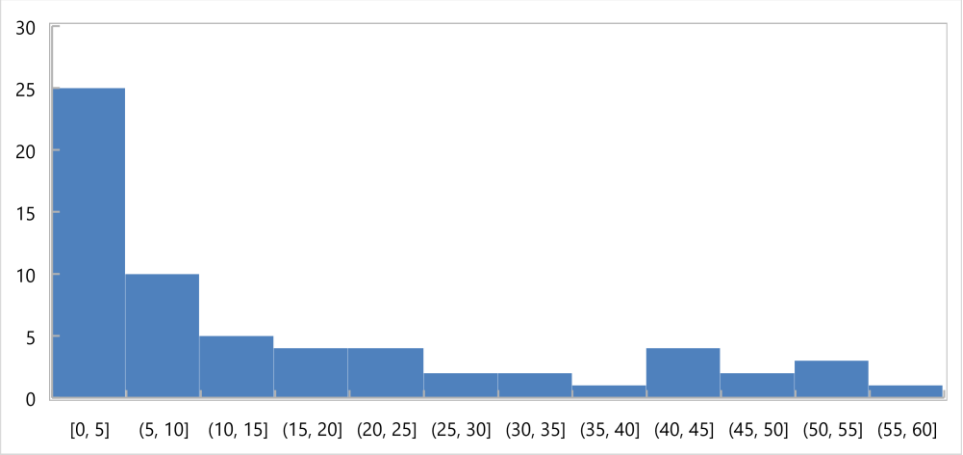
MODULE II. NON-REGRESSION-BASED APPROACHES FOR EXPORTERS OF EXHAUSTIBLE RESOURCES[35]

61. Important considerations for exporters of exhaustible resources are not captured by current account regression approaches. Exhaustible resources can generate potentially very large income streams. Given their exhaustible nature, such income streams are, by definition, temporary, and countries may benefit from smoothing their domestic absorption. Such saving may arise from inter-generational equity concerns—reflecting that the resource revenue is non-renewable—as well as precautionary motives, reflecting the high volatility of commodity prices.

62. While the EBA and EBA-Lite regressions include, for oil and gas exporters, a measure of resource temporariness as an explanatory variable of savings-investment balances, this approach has some shortcomings.[36] First, by treating the variable as a fundamental, it is not able to capture normative considerations, including how fiscal policy should affect the absorption of resource wealth. Second, the regressions do not explicitly link different aspects of countries' balance sheets. For instance, two countries with the same level of oil exports and resource temporariness may require different levels of fiscal saving depending on their levels of above-ground wealth. Finally, the EBA and EBA-Lite specifications focus on oil and gas exporters only, while there are large exporters of other, non-fuel exhaustible commodities.

Figure 14. Net Exports of Exhaustible Commodities

Histogram, % of GDP, 62 countries with positive net exports



Source: UN COMTRADE and IMF staff calculations.

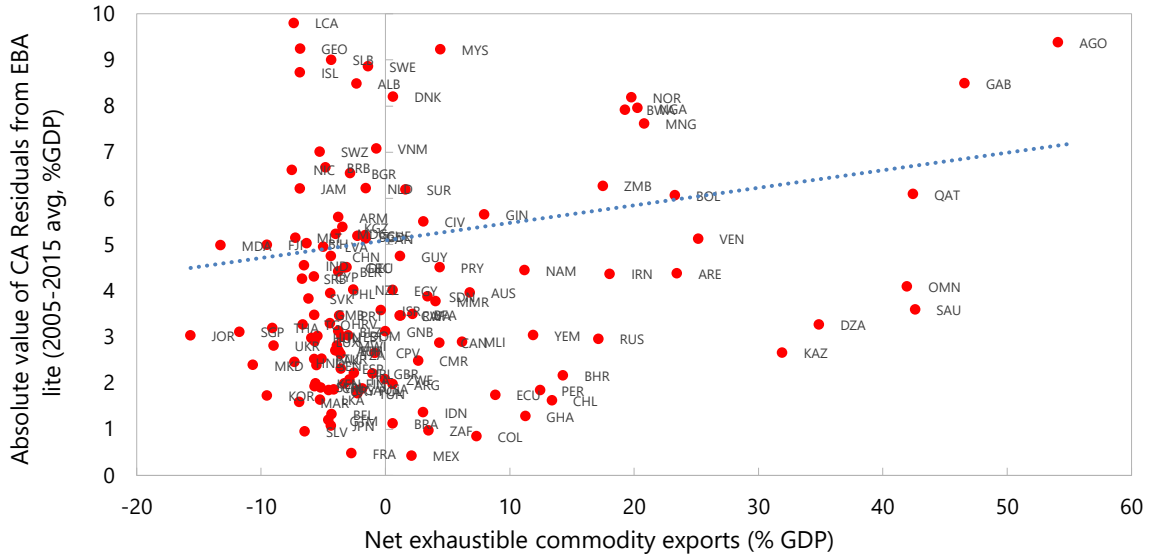
[35] Prepared by Mahir Binici, Diego Cerdeiro (lead), Chengyu Huang, and Hui Tong. The note also benefited from helpful discussions with Grace Li and Felipe Zanna. All errors are ours.

[36] EBA and EBA-Lite regressions include a measure of oil and gas exports' temporariness, measured by the ratio of production to the stock of proven reserves, interacted with the oil and gas trade balance. While this note explores non-regression frameworks, the literature on regression-based approaches offers interesting insights on the specific challenges involved in assessing external balances in resource-rich countries (see e.g. Beidas-Strom and Cashin, 2011; and Hasanov and Senhadji, 2008).

63. Alternative approaches tailored to these countries' specific characteristics can complement the results from standard approaches in EBA-Lite. The incidence of large exporters in EBA-Lite is significant (Figure 14). As a result of the limitations of regression-based approaches discussed above, the fit of the EBA-Lite current account model is relatively poor for these type of countries (Figure 15). Furthermore, given the tight connection between the determination of external and fiscal balances for exporters of exhaustible resources (Figure 16), understanding the role of fiscal policy in driving current account gaps is also important.

Figure 15. EBA-Lite CA Regression Fit

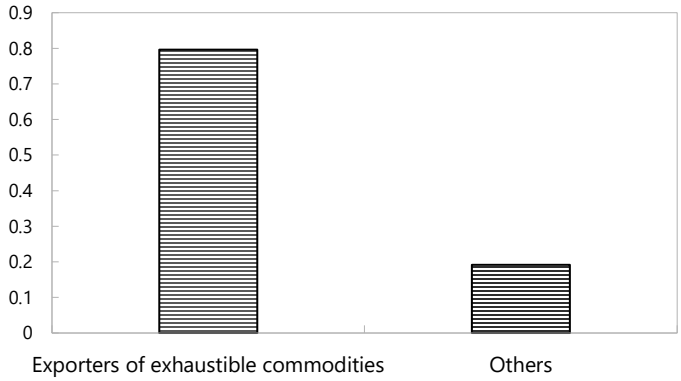
Net Exports of Exhaustible Commodities (horizontal axis) and Absolute value of EBA-Lite CA Residuals (vertical axis)



Source: UN COMTRADE and IMF staff calculations.

Figure 16. Current Accounts and the Fiscal Balance

Correlation (1995–2015)



Source: WEO database and IMF staff calculations.

64. This note discusses in detail two alternative, non-regression approaches for exporters of exhaustible resources. These approaches are here denoted as 'consumption allocation rules' (Bems and de Carvalho Filho, 2009) and 'investment needs model' (Araujo et. al., 2015). Both approaches have been intermittently considered for external assessments of some large oil exporters (Table 10).

Table 10. Application of Alternative Approaches in Staff Reports

	Type of Natural Resources	Consumption allocation rules 1\	Investment inefficiencies 2\	EBA-lite
Low or Lower-Middle Income Countries				
Chad	Oil	2016	2016	
Congo, Rep. of	Oil	2015	2015	
Angola	Oil		2013 3\	Yes
Gabon	Oil	2017	2015 3\	Yes
Equatorial Guinea	Oil	2016	2016	
Upper-Middle Income Countries				
Ecuador	Oil		2015	Yes
Azerbaijan	Oil		2013 3\	Yes
High Income Countries				
Saudi Arabia	Oil	2017		Yes
United Arab Emirates	Oil	2017		Yes

1\ Bems and de Carvalho Filho (2009).

2\ Araujo et al. (2016).

3\ Not latest-available staff report.

65. Consumption allocation rules that distribute resource wealth across periods can be used to derive current account and fiscal policy gaps. The idea is that countries consume an annuity out of their resource wealth, defined as the sum of below-the-ground wealth (the present value of exports of exhaustible commodities) plus above-ground-wealth (net foreign assets); see Bems and de Carvalho Filho (2009). This annuity yields a norm for consumption, from which a saving norm can be readily derived. An extension consists in deriving fiscal savings norms by defining an annuity for fiscal expenditures that draws from the government's resource wealth, defined as the sum of the present value of resource-related revenues plus net government assets).

66. Models that account for investment needs can lead to lower CA norms in resource-rich developing countries. In low-income countries where capital is scarce, it might be desirable to allocate part of the resource wealth to finance investment. The consumption allocation rules described above do not take these needs explicitly into account and may therefore overstate savings-investment norms. Araujo et al. (2016) propose a small open economy model that explicitly incorporates the role of investment. Incorporating investment alongside capital scarcity and credit constraints naturally leads to lower CA norms. CA gaps derived through this approach, however, depend on the calibration of inefficiencies in investment,[37] which can be large in many resource-rich

[37] Araujo et al. (2016) consider two types of investment frictions. *Investment inefficiencies* mean that one dollar invested translates into less than one dollar of productive capital, while *absorptive capacity constraints* imply that adjusting capital stocks is costly. In their calibration, introducing investment frictions can lead to current account

(continued)

developing countries (Pritchett, 2000; IMF 2012). Larger inefficiencies in investment will lead to lower levels of optimal investment, and therefore to higher CA norms.

67. While accounting for precautionary motives can lead to higher current account and fiscal policy norms, the associated magnitudes have been found to be relatively small. In the presence of volatile revenues, precautionary motives—including to avoid boom-bust cycles that harm macroeconomic performance and growth (see e.g. Box 1 in IMF, 2012)—may call for additional savings. Bems and de Carvalho Filho (2011) propose a small open economy model that explicitly accounts for income volatility, with simulations suggesting that precautionary motives play a secondary role relative to consumption smoothing (see Table 4 in Bems and de Carvalho Filho, 2011).[38] This precautionary-savings consideration is therefore not pursued further.

Alternative Approaches at Work: Two Case Studies

68. Two case studies illustrate how norms are derived under the two non-regression approaches. Both case studies compare EBA-Lite results with those that can be obtained by applying the ideas described above. The aim is to use these illustrations to contrast them with EBA-Lite regression-based norms and discuss calibration choices and possible sensitivity analyses. The two cases considered, Ecuador and Nigeria, are heterogeneous both from a regional perspective, as well as in terms of the importance of exhaustible commodities' exports in total exports.[39] [40]

Table 11. EBA-Lite CA Regression Results for Ecuador and Nigeria

	Ecuador	Nigeria
CA-Actual	**-0.2%**	**1.9%**
Cyclical Contributions (from model)	0.2%	-0.1%
Cyclically adjusted CA	-0.4%	2.0%
CA-Norm	-3.6%	1.8%
Cyclically adjusted CA Norm	-3.7%	1.9%
CA-Gap	3.3%	0.1%
o/w Policy gap	-0.6%	-1.4%
Elasticity	-9.8%	-8.7%
REER Gap	-33.8%	-1.7%
CA-Fitted	-4.2%	0.4%
Residual	3.9%	1.6%

Source: Staff calculations.

norms over 5 percentage points higher than in the absence of such frictions (see Figure 5 in Araujo et al.). It is worth noting that, while absorptive capacity considerations would typically lead to gradual investment strategies (see e.g. Berg et al., 2013, and literature cited therein), investment inefficiencies lower optimal investment across all periods.

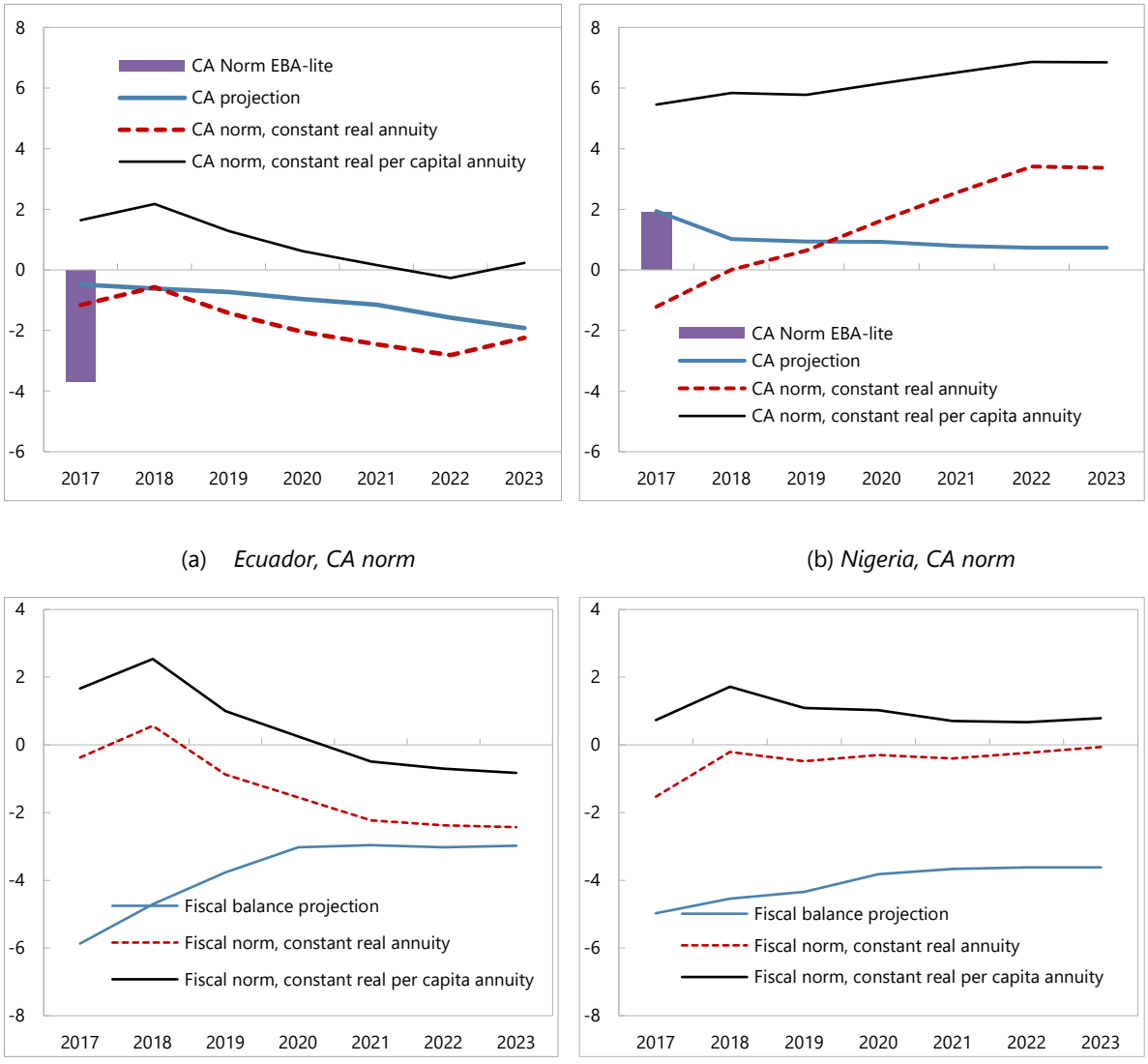
[38] Using asset-pricing techniques, van den Bremer et al. (2016) find a closed-form solution for optimal consumption (eq. (12) in van den Bremer et al.). This result, which relies inter alia on assuming complete markets, underscores how the magnitude of precautionary savings increases linearly with the coefficient of relative prudence.

[39] Average 2005-2015 exhaustible commodities' exports (defined as HS codes 26–28, 71, and 74) represented 57 percent of total exports in Ecuador, and 90 percent in Nigeria.

[40] Results are for illustrative purposes and should not be read as Staff's assessments of the countries' external positions, in particular with respect to any policy norms (such as on the "optimal" fiscal path).

69. The EBA-Lite model provides a regression-based calibration of the current account norm. According to the EBA-Lite CA model, the current account norm for Ecuador is -3.6 percent. The norm has two components: the fitted value from the current account model regression (-4.2 percent), and the policy contributions (0.6%). Among the latter, the fiscal policy gap contributes 1.3 percent to the norm. (Table 11). Similarly, according to the EBA-Lite, the current account norm for Nigeria is 1.8 percent.

Figure 17. Current Account Norms Under Consumption-based Rules



Source: IMF staff calculations.

70. The consumption-based rules approach suggests higher current account and fiscal balance norms relative to the EBA-Lite CA regression model for both country cases. In the case of Ecuador, the EBA-Lite model produces a large current account deficit norm while the consumption-based allocation approach suggests that the norm is a small surplus (Figure 17a). A constant real per capita annuity would ensure that each individual in each generation is allocated the same real resources out of the country's wealth, and should therefore be the preferred normative measure for external-sector assessments.[41] To show how much of the implied norm is due to a growing population, Figure 4b shows the norm under a constant real annuity.[42] This approach also indicates a higher fiscal norm for 2017 compared to the medium-term projection, implying a significant fiscal adjustment over the medium term (Figure 17c). In the case of Nigeria, the EBA-Lite current account model suggests a norm of 1.8 percent. The consumption-based rules also suggest surplus current account norms; however, taking better account of the inter-generational and precautionary needs not fully reflected in the regression approaches, norms are significantly higher (Figures 17b, 17d).

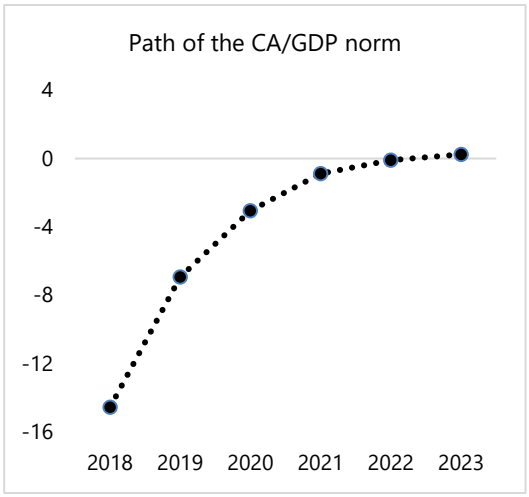
71. The investment-needs approach suggests CA norms that are lower than those implied by consumption-based rules (see Figures 18a, 18b). The small-open economy model is calibrated to the data by taking latest available country data as initial conditions. As a result, to filter out any cyclical components, the focus should be in the norms the model yields in the medium term, similar to the consumption-rules framework. In the case of Ecuador, the medium-term current account norm from the investment model is -0.5 percent, versus 0.2 percent in the consumption rules model. The same pattern carries through for Nigeria: the current account norm from the investment model is about ¼ percent by 2023, while that in the consumption-based rule assuming a constant real per capital annuity model (4.4 percent).

72. The investment-needs model is better suited for countries that have large investment needs and lack market access but have institutional frameworks to effectively implement investments. The investment needs model can also be used beyond EBA-Lite for an integrated assessment. In particular, one of the model's main features is public and private investment efficiency, which could be used to illustrate how external misalignments could change if investment efficiency is improved, thus motivating specific policies beyond those that affect just the external sector.

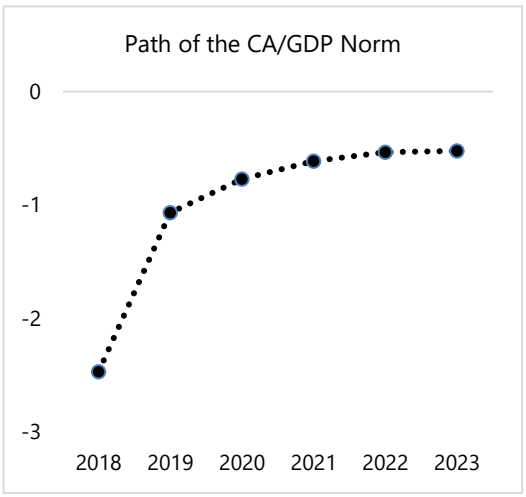
[41] In other words, the baseline case is the one under a constant real per capita annuity allocation rule, as it reflects intergenerational equity.

[42] With a constant real per capita annuity, countries with growing populations save more so that each member of the future (larger) generations receives the same as each member of the current (smaller) generation. In a country with zero population growth, the two norms coincide.

Figure 18. Current Account Norms Under Investment-based Rules



Ecuador, Investment-needs model



b. Nigeria, Investment-needs model

Source: IMF staff calculations.

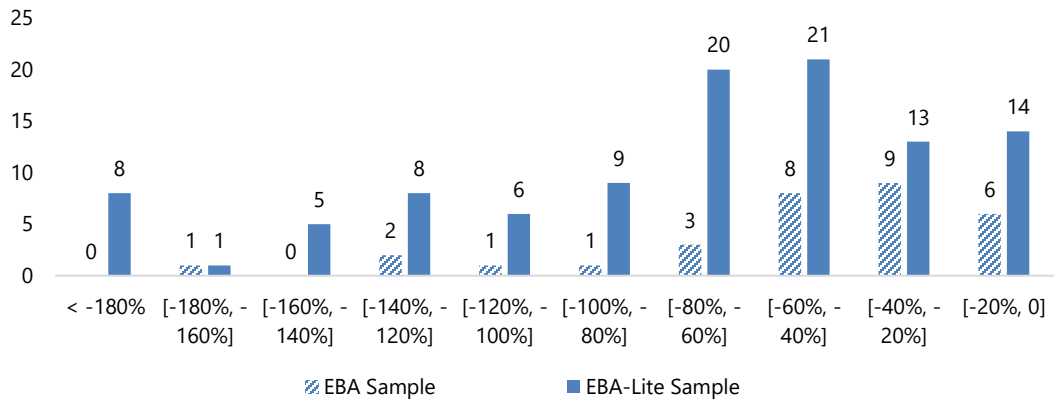
On Fiscal Norms

73. Non-regression-based methods provide two additional approaches to derive fiscal norms. In addition to other standard methods used to derive fiscal norms (e.g., the debt-stabilizing fiscal balance), the approaches presented in this note provide two alternative frameworks. As discussed above, the consumption-rules framework readily yields a fiscal norm that is consistent with intergenerational equity. The investment-needs framework does not explicitly include a government sector, yet could, in some cases, be used to gauge the fiscal norm. If public sector investment represents the lion's share of total investment, then the model could be used to argue that the fiscal gap is smaller than in the consumption-based framework by exactly the same amount as the investment-needs current-account norm is smaller than the consumption-model current-account norm.

MODULE III. REVISED APPROACH FOR EXTERNAL SUSTAINABILITY ASSESSMENT[43]

74. High net external indebtedness exposes debtors to sudden changes in financial market sentiment, which can raise external borrowing costs and trigger the reversal of capital flows. In recent years, such concerns have risen in advanced economies (e.g., Portugal, Spain), emerging markets (e.g. Jordan, Jamaica) and lower-income countries (e.g. Armenia); the incidence of highly negative net international investment positions (NIIP) is nevertheless much higher in the EBA-Lite than the EBA sample (Figure 19). Reflecting the overriding need to lower debt burdens to a level that does not risk growth or financial stability, external assessments in many of these cases have drawn on the *external sustainability* (ES) balance-sheet approach (IMF, 2009).[44]

Figure 19. Frequency Distribution of Negative NIIP
(% of GDP), 2017



Source: IFS and IMF staff calculations.

75. The analytical framework for the assessment of external sustainability is the inter-temporal budget constraint. A workhorse model in international economics (see Obstfeld and Rogoff, 1996), the inter-temporal budget constraint formalizes the concept of debt sustainability: net external liabilities are sustainable if they are less than or equal to the present value of net exports, plus the rate of return differential between external assets and external liabilities times the gross asset position (Box 1). The first term of the present value in equation (1) represents the role of trade in external adjustment, the second term the role of financial factors. When net liabilities do not satisfy equation (1), the real exchange rate depreciation needed to equate them is one measure of

[43] Prepared by Mitali Das with helpful discussions from Olivier Blanchard, Maury Obstfeld, Vitor Gaspar, Tam Bayoumi, Martin Kaufman, Mark Flanagan, Ali Abbas, Mahir Binici, Diego Cerdeiro, Chengyu Huang, Huidan Lin, Rachel Nam, Mohammed Saleh, Hui Tong, and Haobin Wang. The technical framework described in this note is the one derived in Blanchard and Das (2017).

[44] The ES approach originated with the Consultative Group on Exchange Rates (CGER); see IMF 2009.

the external adjustment required to restore external sustainability (see IMF, 2009; Evans, 2012, 2013; and Blanchard and Das, 2017).

Box 1. External Sustainability Framework

Following Blanchard and Das (2017), let external debt accumulation be given by:

$$D_{t+1} = (1 + r_{Lt})D_t + [NX_t + (r_{At} - r_{Lt})A_t] \quad (1)$$

where D_t is net external liabilities at the beginning of t, NX_t is net exports in t, r_{Lt} and r_{At} are real rates of return on liabilities and assets respectively, and A_t denotes gross assets. Note that the net international investment position (NIIP) is conventionally written as external assets minus external liabilities, implying that D is the negation of NIIP. Solving forward recursively, imposing the no-Ponzi game condition and writing in ratios to GDP gives:

$$d_t \leq \sum_{j=0}^{n} \prod_{i=0}^{j} \frac{1+g_{t+i}}{1+r_{Lt+i}} [nx_{t+j} + (r_{At+j} - r_{Lt+j})a_{t+j}] \quad (2)$$

where d_t denotes the ratio of NIIP to GDP, nx_t the ratio of net exports to GDP (inclusive of current and capital transfers), g_t denotes the rate of growth of real GDP and a_t denotes the ratio of external assets to GDP.

Sustainability requires that D be less than or equal to the present value of net exports to GDP plus interest differential times the ratio of gross assets to GDP (a_t). Suppose debt must be stabilized at d^*. Modifying equation (9) of Blanchard and Das (2017) gives:

$$d_t - d^* \left(\prod_{i=0}^{n} \frac{1+g_{t+i}}{1+r_{Lt+i}}\right) \leq \sum_{j=0}^{n} \left(\prod_{i=0}^{n} \frac{1+g_{t+i}}{1+r_{Lt+i}}\right) [nx_{t+j} + (r_{At+j} - r_{Lt+j})a_{t+j}] \quad (3)$$

Let e* be the real effective exchange rate that satisfies equation (3). The exchange rate adjustment required for debt to be sustainable is (e*-e).

76. Owing to the dramatic rise in international asset trade, the role of financial factors in external sustainability has elevated significantly. Gross stocks of foreign assets and liabilities now exceed national GDP in many advanced and emerging economies. With large stocks, even small return differentials can exert an outsized role on debt dynamics (Lane and Milesi-Ferretti, 2005, 2006; Obstfeld, 2012; and Gourinchas and Rey, 2013). In particular, the need to run future trade surpluses can be mitigated by sufficiently high returns on assets relative to returns on liabilities. By the same logic, high returns on liabilities relative to those on assets can make external adjustment more difficult, requiring larger real depreciations to generate larger trade surpluses.

77. The ES approach includes certain simplifying assumptions that can materially affect the assessment of external sustainability. There are four key simplifications.[45] First, the ES approach does not consider that an adjustment of exchange rates affects both net exports as well as the valuation of the current NIIP. Revaluation is tied to the foreign currency denomination of assets and liabilities and can amount to significant fractions of GDP.[46] Second, the ES approach does not

[45] These are identified, and their implications discussed in more detail, in Blanchard and Das (2017).

[46] For example, in countries with more FX-denominated liabilities than FX-denominated assets, disregarding the downward NIIP revaluation from a depreciation could result in incorrectly assessing the NIIP to be sustainable.

generally consider return differentials except for a few countries.[47] Third, the ES approach requires that debt at a point in the future be stabilized at its level today, rather than comparing discounted debt in the future to its level today. Fourth, the ES approach takes account of just the medium-term CA projection, rather than the entire stream of projected CAs as required by equation (2), Box 1. Distinct from these simplifications, is that the ES makes a deterministic assessment; however, as the inter-temporal model draws on uncertain forecasts to judge sustainability, debt cannot be assessed to be sustainable or unsustainable with probability one. Indeed, ex-post reviews show that forecast errors are large and generally adverse (IMF, 2018).

78. The revised EBA-Lite methodology includes a module for both a deterministic and probabilistic assessment of external sustainability. First, we adopt the deterministic approach in Blanchard and Das (2017)—which addresses the four concerns above—by calculating the required REER adjustment as per equation (3). Second, policy circles are increasingly emphasizing probabilistic models of debt sustainability, see e.g. the ECB debt assessment framework (Bouabdallah et. al., 2017; IMF, 2018; Rozenov, 2017; and Barrett, 2018).[48] The revised approach is the one suggested in Blanchard and Das (2017), well-suited to settings where forecasts assume constant exchange rates.[49] In this framework, net external liabilities are deemed sustainable if there is a high enough probability that, at the current exchange rate, they are equal to or less than the present value of net exports plus the rate of return differential times the gross asset position.

79. The probabilistic assessment is a complementary tool that can help inform the assessment, particularly when the deterministic approach suggests a very large required depreciation. The approach is to use the country's historical data to construct the country-specific joint distribution of shocks to growth, the trade balance, returns and the gross positions (e.g. using conditional correlations or a VAR). This approach, in contrast to a deterministic analysis, takes into account that future differences in rates of return may reflect historical differences in portfolio risks. For each draw from this distribution, the exchange rate adjustment required to satisfy the inter-temporal budget constraint is calculated (Box 1, equation 3). Assessing where the current exchange rate stands in the distribution of required REER adjustments yields the probability that a REER depreciation is required to restore sustainability. Reflecting the high variability of real and, particularly, financial shocks, the support of this distribution can be large. Thus, even when debt is deterministically assessed to be unsustainable, the probability that a REER depreciation will be required can be much lower than one.

80. Assessments from the probabilistic framework can be complemented with additional analysis. Using historical data to construct the empirical distribution recognizes the stochastic

[47] These are the United States, Brazil, China, Hong Kong SAR and Switzerland. The last three are large external creditors where persistent trade surpluses suggest that external sustainability is unlikely to be a concern.

[48] The IMF's debt sustainability guidance also emphasizes the need for probabilistic models. E.g. IMF (2002) notes: "…assessments of sustainability are probabilistic, since one can normally envisage some states of the world under which a country's debt would be sustainable and others on which it would not. But the proposed framework does not supply these probabilities explicitly". See also (IMF, 2018).

[49] An application of the probabilistic assessment of external sustainability in 18 African economies is conducted by the African Development Bank (ADB, 2018); see also IMF 2018a and Das and Korniyenko 2019.

nature of the evolution of trade and financial variables, including of gross stocks in ratio to GDP which are assumed to be stationary around a trend. Where unsustainable financial trends have sharply expanded gross assets and liabilities, such trends may not be strictly stationary, potentially subject to sharp reversals (that is, involving nonlinearities), and affect the assessment. Such unsustainable trends have been observed in many advanced economies, but less so in the low-income and developing economies (Obstfeld, 2004). Nevertheless, where such concerns are important, the quantitative metrics would be usefully supplemented with further analysis of *why* gross positions evolved as they did, and the risks entailed.[50]

81. Two practical matters are of particular importance. One, measurement errors in both positions and flows can result in significant mismeasurement of rates of return (see Lane and Milesi-Ferretti, 2009; Gourinchas and Rey, 2013). Where reconciliation data are available, these can be partially addressed as suggested in Lane and Milesi-Ferretti. Second, external adjustment of highly indebted economies should desirably occur over a period longer than the WEO 5-year horizon, requiring longer forecasts for the assessment. We suggest a natural approach to extend WEO forecasts to the long horizon; Box 2.

Box 2. Extending WEO 5-year Forecasts to the Long Horizon

One approach to extending WEO forecasts to the long horizon is to assume that the steady-state is characterized by balanced growth. Suppose the WEO forecast of the growth of potential output in the last year of the WEO horizon is given by q and the length of the long horizon is T. Under this approach, WEO forecasts of the growth rates of exports, imports, nominal output and components of the balance of payments converge linearly to q from the last year of the WEO forecasts through T.

Figure 20 illustrates for the United States. In the March 2018 WEO, q = 1.4%. Suppose T = 15 (10 years past the WEO horizon). Under this approach, net exports in percent of GDP converge to a steady-state ratio of -2.5 percent.

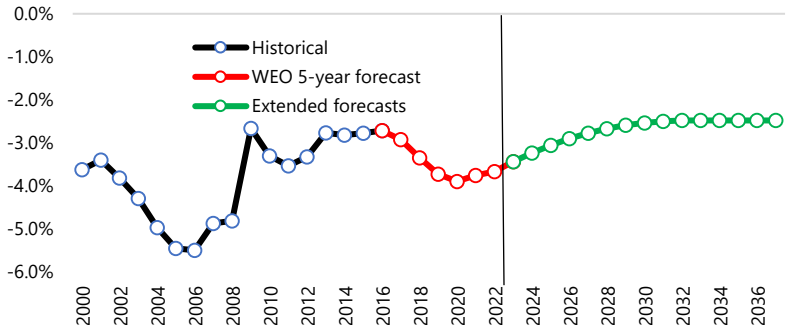
82. The probabilistic approach has larger data requirements. Implementing the probabilistic approach requires a reasonably long historical data series to conduct assessments. For example, the illustration for Chile in Blanchard and Das (2017) required 18 years of BOP and NIIP data at annual frequency. These data requirements do not pose much limitation in implementing the probabilistic approach to EBA-Lite countries. In particular, of the 58 EBA-Lite countries whose 2017 NIIP was weaker than -60% of GDP, 40 have a continuous series of at least 25 years of BOP and NIIP data; 43 have a continuous series of 18 or more years.[51]

[50] We thank Maury Obstfeld for this observation.

[51] Some of the countries without a long enough series are the ex-Soviet and ex-Yugoslav nations whose relatively shorter history precludes having a longer series.

Figure 20. Long Forecasts (2018–33), Extended from the WEO

United States: trade balance (% of GDP)



Source: WEO and staff calculations.

Annex I. Glossary of Variables and Data Sources

Following the arguments laid out in Phillips et. al. (2013), all covariates defined below enter into the regressions either in deviations from the contemporaneous GDP-weighted global average (in the CA model) or in deviations from the contemporaneous trade-weighted average (in the REER model). This approach is taken to ensure multilateral consistency of the estimated CA and REER norms.

A. Glossary

Cyclical Variables

- ***Output gap***. Based on estimates in the WEO, this is the percent different between actual and potential GDP in percent of potential GDP. For countries/ years where output gap estimates are not available, HP filtered estimates (based on WEO actual and projected data) are used.

- ***Commodity terms of trade gap.*** The regressor is constructed in several stages following Phillips et. al. (2013). The commodity index is the ratio of a geometric weighted-average price of 43 commodity export categories to a geometric weighted-average price of 43 commodity imports, each relative to manufactured goods prices in advanced economies, where weights are given by each commodity's share in the countries' export or imports.[1] To produce a gap measure, the time series is extended into the medium term (using the latest IMF commodity prices projections) and then HP filtered separately for each country. Hence, this variable has a zero country-specific mean. In the case of the CA model, the gap is interacted with a measure of the country's trade openness (measured as the average projected trade balance in percent of GDP over the next 5 years).

Policy Variables

- ***Cyclically-adjusted fiscal balance (instrumented).*** For most countries and years, the cyclically adjusted overall general government fiscal balance is based on WEO projections. Where these are unavailable, it is computed as the residual of a country-specific regression of the overall fiscal balance on the output gap. Because of potential endogenous determination of the current account and fiscal balance, the variable is instrumented with lagged global variables (world real GDP growth, world output gap, the world cyclically-adjusted fiscal balance, and global risk

[1] To illustrate, consider a country that exports no commodities. Then the numerator will be the product of each of the 43 commodity relative price indices to the power of zero which will equal one. Conversely, if a country has a balanced trade in one commodity (say a given foodstuff variety), with exports and imports of that commodity being 20 percent of its total average trade (=(exports+imports)/2). Then country's TOT will not be affected for global relative price of that commodity as the index will deliver $(Pfood/Pman)^{0.2}/(Pfood/Pman)^{0.2}=1$, irrespective of the value of Pfood/Pman. Finally, take a country that the same food commodity accounts for 20 percent of its exports and 20 percent of its imports but overall imports are twice as large exports. Then that TOT index will be $(Pfood/Pman)^{0.1}/(Pfood/Pman)^{0.2}= (Pfood/Pman)^{-0.1}$. Taking logs, it can be seen that the country will experience a TOT deterioration of 1 percent when the price of that commodity rises by 10 percent.

aversion which is proxied by lagged U.S. corporate credit spreads), as well as country-specific factors (GDP per capita, the exchange rate regime, and a democracy ranking).[2]

- ***Public health spending/GDP***. Total government expenditures (including through external borrowing and grants) on health schemes, in percent of GDP.

- ***Capital controls index.*** An index measure of capital account openness using the Chinn-Ito index. The index varies between 0 (no controls) and 1 (full controls).

- ***Change in Foreign Exchange Reserves (instrumented).*** Used as a proxy for foreign exchange intervention, this is measured as the change in central bank foreign exchange reserves (including off-balance sheet changes) during the year, in ratio to nominal GDP in U.S. dollars. It enters into the regression model only in interaction with the capital controls index. This variable is instrumented with: the difference between M2/GDP and reserves/GDP, global reserves accumulation and an EMDE indicator (all interacted with the capital controls index); the first stage regression also controls for the predetermined variables in the respective CA or REER regression.

- ***Private credit to GDP.*** Credit provided to the non-financial private sector by domestic non-bank financial and banking institutions, demeaned for each country by its historical (1996-2016) average.

- ***Growth rate of private credit.*** The change in private credit between year t and year t-1, normalized by year t nominal GDP.

Fundamentals

- ***Net foreign assets* (NFA) *to GDP ratio***. This variable enters both in level terms, as well as interacted with an indicator that is equal to one if the NFA position is below negative 60 percent of GDP and zero otherwise. NFA data are an updated and extended version of the Lane and Milesi-Ferretti (2007) EWN dataset which has broader country and time coverage than NIIP data from IFS.

- ***Output per worker, relative to top 3 economies.*** Ratio of GDP (in PPP terms) to working age population relative to average of Germany, Japan, and U.S., demeaned. The variable is also interacted with capital account openness.

- ***Oil and gas trade balance, adjusted for resource "temporariness".*** Exports minus imports of oil and gas in percent of GDP. This variable enters only when the balance of the oil and gas balance is positive. It is defined as the net oil and gas external balance (five-year moving average, in percent of GDP) multiplied by a relative measure of temporariness, which in turn is defined as the ratio of current oil extraction to proven reserves published by the British

[2] Other country-specific controls include the lagged output gap, and the average cross-sectional fiscal balance (the first stage regression also controls for the independent current account regressors).

Petroleum Statistical Review (i.e. the inverse of "years-till-exhaustion") relative to the same ratio for Norway in 2010. Higher values of temporariness indicate that the resource is expected to be exhausted sooner.

- ***5-year growth forecast.*** The IMF's WEO 5-year ahead rate of real GDP growth as a proxy for potential output growth, as cyclical factors are not expected to play a role over the medium-term.
- ***Population growth.*** Annual growth rate of total population.
- ***Old age dependency ratio.*** Ratio of population aged over 65 divided by population between 30 and 64 years old.
- ***Share of prime-aged savers***. Current share of prime savers (ages 45-64) as a proportion of the total working-age population (ages 30-64).
- ***Life expectancy.*** Life expectancy of a current prime-aged saver.
- ***Future Old Age Dependency Ratio.*** Future old age dependency ratio is defined as the average of the old age dependency ratio 15, 20 and 25 years ahead. It enters into the model only in interaction with life expectancy.
- ***Own currency share in global reserves.*** Share of a country's own currency in total stock of world reserves proxies for the "exorbitant privilege." This share in 2017 was highest for the US dollar (67 percent), followed by the euro (20 percent), the yen (4.7 percent), and sterling (4.4 percent). This variable enters alone, as well as interacted with the VIX and the capital account openness index.
- ***VIX.*** The VIX is an index of implied U.S. stock market volatility based on the S&P 500. It enters into the model in interaction with (i) capital account openness; and (ii) capital account openness and own currency share of global reserves.
- ***Institutional quality***. This variable includes 12 sub-indicators from the International Country Risk Guide (ICRG) dataset: government stability; internal conflict; external conflict; military in politics; law and order; ethnic tensions; bureaucracy quality; socioeconomic conditions; investment profile; corruption; religious tensions; and democratic accountability. The indicators are drawn from surveys of risk perceptions related to each of these 12 characteristics. The values are normalized to range between 0 and 1, with higher values signifying less risk.
- ***Migrant Share***. The number of outward migrants in ratio to the domestic population.
- ***Natural Disasters***. Defined as a binary variable that equals 1 when the reported (US dollar) damage in percent of (US dollar) GDP exceeds zero and equals 0 otherwise. This indicator enters directly, as well as in interaction with the capital account openness index.

- ***Armed Conflicts***. Defined as a binary variable that equals 1 in every year in which an armed conflict took place (as recorded in the PRIO database) and equals 0 otherwise.

Additional variables in the EBA-Lite REER Regression

- ***Aid and Remittances***. Current transfers in the secondary income account of the balance of payments, in ratio to GDP.
- ***Real interest rate.*** This variable is the difference between the nominal short-term interest rate and the annual inflation rate. The short-term interest rate is more widely and more consistently available than the policy rate, and the two tend to co-move very strongly given their similar maturities.
- ***Commodity terms of trade***. This regressor, which is used in the REER model, is defined as the ratio of the geometric weighted-average price of key commodity exports to the geometric weighted-average price of key commodity imports. The index is constructed using the prices of six commodity categories (food, fuels, agricultural raw materials, metals, gold, and beverages), measured against the advanced economies' manufacturing goods prices. These relative commodity prices for six categories are weighted by the time average of export and import shares of each commodity category in total trade (exports and imports of goods and services).

B. Data Sources

	Variable	Source
CURRENT ACCOUNT MODEL	**Current Account (% of GDP)**	WEO
	Output gap (% of potential GDP)	WEO, FAD Fiscal Monitor and Estimation
	Commodity terms of trade gap	WEO and World Bank, WITS
	Cyclically adjusted fiscal balance (% of GDP)	WEO
	Public health expenditures (% of GDP)	WDI
	Capital Controls (index)	Chinn-Ito Database
	Change in foreign exchange reserves, interacted with capital controls	WEO
	Private Credit (% of GDP)	WDI
	Growth rate of Private Credit (% of GDP)	WDI and WEO
	Net foreign assets (NFA), (% of GDP)	EWN
	Output per worker, relative to top 3 economies	WEO and UN World Population Prospects
	Oil and gas trade balance, adjusted for resource temporariness	WEO, WITS, and British Petroleum Statistical Review of World Energy
	Expected real GDP growth, 5-years ahead (%)	WEO
	Population growth (%)	UN, World Population Prospects, 2017 Revision
	Old-age dependency ratio	UN, World Population Prospects, 2017 Revision
	Share of prime-aged savers (%)	UN, World Population Prospects, 2017 Revision
	Life expectancy	UN, World Population Prospects, 2017 Revision
	Future old-age dependency	UN, World Population Prospects, 2017 Revision
	Own currency share in global reserves (%)	COFER Database
	VIX	Haver
	Institutional Quality	PRS Group, International Country Risk Guide
	Migrant Share (% of domestic population)	UN, World Population Prospects, 2017 Revision
	Natural Disasters	Emergency Events Database (EM-DAT)
	Armed Conflicts	UCDP/PRIO Armed Conflict Dataset
REER MODEL	**Real effective exchange rate (REER)**	IMF, Information Notice System (INS)
	Real interest rate (%)	IFS, WEO and the Haver Database
	Commodity terms of trade	WEO and World Bank, WITS
	Aid and Remittances (% of GDP)	IFS, WDI

Annex II. Countries in the ESR, EBA, and EBA-Lite

Afghanistan			
Albania			EBA-lite
Algeria			EBA-lite
Angola			EBA-lite
Antigua and Barbuda			
Argentina		EBA	EBA-lite [2/]
Armenia			EBA-lite
Australia	ESR	EBA	EBA-lite
Austria		EBA	EBA-lite
Azerbaijan			EBA-lite [3/]
Bahamas			
Bahrain			EBA-lite
Bangladesh			EBA-lite
Barbados			
Belarus			EBA-lite
Belgium	ESR	EBA	EBA-lite
Belize			
Benin			
Bhutan			
Bolivia			EBA-lite
Bosnia and Herzegovina			
Botswana			EBA-lite
Brazil	ESR	EBA	EBA-lite
Brunei Darussalam			
Bulgaria			EBA-lite
Burkina Faso			EBA-lite [3/]
Burundi			
Cambodia			
Cameroon			EBA-lite [3/]
Canada	ESR	EBA	EBA-lite
Cape Verde			
Central African Rep.			
Chad			
Chile		EBA	EBA-lite
China	ESR	EBA	EBA-lite
Colombia		EBA	EBA-lite
Comoros			
Congo, Dem. Rep.			EBA-lite [3/]
Congo, Republic of			EBA-lite
Costa Rica		EBA	EBA-lite
Côte d'Ivoire			EBA-lite
Croatia			EBA-lite [3/]
Cyprus			EBA-lite [2/]
Czech Republic		EBA	
Denmark		EBA	EBA-lite
Djibouti			
Dominica			
Dominican Republic			EBA-lite
Ecuador			EBA-lite [3/]
Egypt		EBA	EBA-lite
El Salvador			EBA-lite [2/]
Equatorial Guinea			
Eritrea			
Estonia			EBA-lite
Ethiopia			
Euro Area	ESR		
Fiji			
Finland		EBA	EBA-lite
France	ESR	EBA	EBA-lite
Gabon			EBA-lite [3/]
Gambia			EBA-lite [3/]
Georgia			
Germany	ESR	EBA	EBA-lite
Ghana			EBA-lite
Greece		EBA	EBA-lite
Grenada			
Guatemala		EBA	EBA-lite [2/]
Guinea			EBA-lite
Guinea-Bissau			EBA-lite
Guyana			EBA-lite [3/]
Haiti			
Honduras			EBA-lite
Hong Kong	ESR		EBA-lite [2/]
Hungary		EBA	EBA-lite
Iceland			EBA-lite
India	ESR	EBA	EBA-lite
Indonesia	ESR	EBA	EBA-lite
Iran			EBA-lite [2/]
Iraq			
Ireland		EBA	EBA-lite
Israel		EBA	EBA-lite
Italy	ESR	EBA	EBA-lite
Jamaica			EBA-lite [2/]
Japan	ESR	EBA	EBA-lite
Jordan			EBA-lite
Kazakhstan			EBA-lite [3/]
Kenya			EBA-lite
Kiribati			
Korea	ESR	EBA	EBA-lite
Kosovo			
Kuwait			EBA-lite [3/]
Kyrgyz Republic			
Lao			
Latvia			EBA-lite [3/]
Lebanon			EBA-lite [3/]
Lesotho			
Liberia			EBA-lite [2/]
Libya			
Lithuania			EBA-lite
Luxembourg			EBA-lite
Macedonia			
Madagascar			
Malawi			EBA-lite

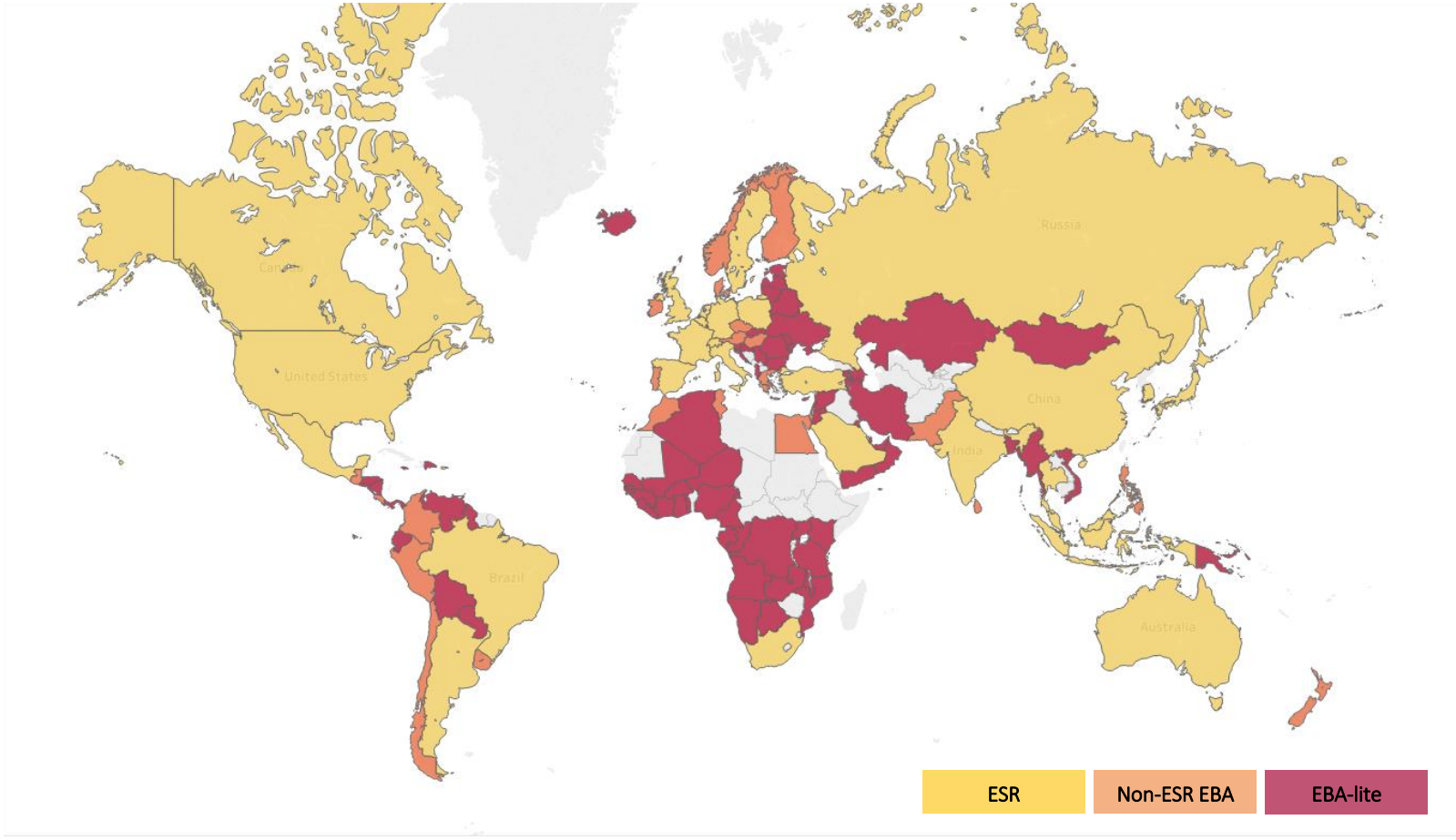
Malaysia	ESR	EBA	EBA-lite
Maldives			
Mali			EBA-lite
Malta			EBA-lite 2/
Marshall Islands			
Mauritania			
Mauritius			
Mexico	ESR	EBA	EBA-lite
Micronesia			
Moldova			EBA-lite
Mongolia			EBA-lite 3/
Montenegro			
Morocco		EBA	EBA-lite
Mozambique			EBA-lite
Myanmar			EBA-lite
Namibia			EBA-lite 3/
Nepal			
Netherlands	ESR	EBA	EBA-lite
New Zealand		EBA	EBA-lite
Nicaragua			EBA-lite 2/
Niger			EBA-lite 3/
Nigeria			EBA-lite
Norway		EBA	EBA-lite
Oman			EBA-lite 3/
Pakistan		EBA	EBA-lite
Palau			
Panama			EBA-lite 2/
Papua New Guinea			EBA-lite
Paraguay			EBA-lite
Peru		EBA	EBA-lite
Philippines		EBA	EBA-lite
Poland	ESR	EBA	EBA-lite 2/
Portugal		EBA	EBA-lite
Qatar			EBA-lite 2/
Romania			EBA-lite 2/
Russian Federation	ESR	EBA	EBA-lite
Rwanda			
Samoa			
San Marino			
São Tomé & Príncipe			
Saudi Arabia	ESR		EBA-lite 3/
Senegal			EBA-lite 3/
Serbia			EBA-lite
Seychelles			
Sierra Leone			EBA-lite 2/
Singapore	ESR		EBA-lite
Slovak Republic			EBA-lite
Slovenia			EBA-lite
Solomon Islands			
Somalia			
South Africa	ESR	EBA	EBA-lite
South Sudan			
Spain	ESR	EBA	EBA-lite
Sri Lanka		EBA	EBA-lite
St. Kitts and Nevis			
St. Lucia			
St. Vincent and Gren			
Sudan			
Suriname			
Swaziland			
Sweden	ESR	EBA	EBA-lite 2/
Switzerland	ESR	EBA	EBA-lite
Syrian Arab Republic			EBA-lite 3/
Tajikistan			
Tanzania			EBA-lite
Thailand	ESR	EBA	EBA-lite
Timor-Leste			
Togo			EBA-lite 3/
Tonga			
Trinidad and Tobago			EBA-lite
Tunisia		EBA	EBA-lite
Turkey	ESR	EBA	EBA-lite
Turkmenistan			
Tuvalu			
Uganda			EBA-lite
Ukraine			EBA-lite
United Arab Emirates			EBA-lite 3/
United Kingdom	ESR	EBA	EBA-lite
United States	ESR	EBA	EBA-lite
Uruguay		EBA	EBA-lite
Uzbekistan			
Vanuatu			
Venezuela			EBA-lite 3/
Vietnam			EBA-lite
Yemen			EBA-lite 3/
Zambia			EBA-lite
Zimbabwe			

1/ Countries are included in the EBA CA model but not in the REER index model.

2/ Countries are included in the EBA-lite CA model but not in the REER index model.

3/ Countries are included in the EBA-lite REER index model but not in the CA model.

Figure 1. Geographical Distribution: ESR, EBA, and EBA-Lite



Annex III. Estimated Coefficients of EBA-Lite CA and REER Regression Models

A. EBA-Lite CA Model

	EBAlite 1.0	Revised EBA-Lite methodology
Cyclically adjusted Fiscal Balance, instrumented	0.527***	0.441***
L. NFA/Y	0.009***	0.023***
L. NFA/Y*(dummy if NFA/Y < -60%)		-0.001
L.Output per worker, relative to top 3 economies	0.103***	0.104***
L.Relative output per worker*K openness	-0.034**	-0.032***
Oil and Natural Gas Trade Balance * resource temporariness	0.031	0.073***
GDP growth, forecast in 5 years	-0.080	-0.81***
Output Gap	-0.134**	-0.182***
Population Growth	-0.496**	-0.813***
Old-age Dependency Ratio	-0.270**	-0.118***
Commodity ToTgap*Trade Openness	0.178***	0.403***
(ΔReserves)/GDP* K controls	0.598***	0.856***
Aid/GDP	-0.257***	
Remittance/GDP	-0.094***	
Institutional/Political Environment (ICRG-5)	-0.048***	
Financial Center Dummy	0.041***	
rel. Dependency Ratio*Aging Speed	0.148***	
rel. Aging Speed * Dependency Ratio	0.161***	
Demeaned Private Credit/GDP	-0.052***	-0.030***
Credit growth		-0.077***
L.demeaned VIX*K openness		-0.002***
L.demeaned VIX*K openness*share in world reserves		0.002**
Life Expectancy at Prime Age		-0.001***
Life Expectancy at Prime Age * Future OADR		0.002***
Prime Savers Share		0.127***
L.Public Health Spending/GDP		-0.81***
Own currency's share in world reserves		-0.072***
Institutional/Political Environment (ICGR-12)		-0.034**
Migrant share		-0.001***
Natural disasters indicator		-0.013***
Natural disasters Indicator * K openness		0.029***
Armed conflicts indicator		0.008***
Constant	-0.035***	0.002
Observations	2,313	2,097
Number of countries	150	126
R-squared	0.45	0.568
Years	1995-2013	1995-2016

B. EBA-Lite REER Model

	EBAlite 1.0	Updated EBA-Lite methodology
Change in reserves/GDP X K Controls (instrumented)	-2.670***	0.24
Real interest rate X K openness	0.377***	0.52***
Aid/GDP	-0.21	-0.19
Remittance/GDP	0.229	-1.23***
L.NFA/GDP	0.0175***	0.057***
L.NFA/Y interacted with >-60% dummy		0.028
Demeaned private credit/GDP	0.125***	0.13***
change of Private Credit in time t from time t-1 divided by GDP		0.27***
L.Output per worker-relative to top 3 economies	0.548***	0.28***
L.Relative output per worker*K openness	-0.122	0.08
Oil and Natural Gas Trade Balance*resource temporariness		0.017
Dependency Ratio		-1.48***
prime saver share (45_64)/(30_64)		0.53
Life Expectancy at age 45		-0.04***
LE at prime age (45) * Future OADR		0.002
Population growth		-1.92***
GDP growth-forecast in 5 years		-0.54*
L.demeaned VIX * K Openness		-0.001
L.demeaned VIX * K Openness*share in world reserves		-0.0003
share of reserve		0.67***
Commodity ToTgap*Trade Openness		-0.042
ICRG 12 Index		0.069
Lagged Public Health Expenditure/GDP		-0.14
Natural disasters indicator		-0.005
Natural disasters Indicator * K openness		0.03
Armed conflicts indicator		-0.009
L.Financial home bias	0.176***	
Log Terms of Trade Goods - WEO	0.0982***	
L.Trade openness (exp + imp)/2GDP	-0.358***	
Output Gap	0.225**	
Constant	4.180***	4.65***
Observations	1893	1512
R-squared	0.479	0.490

References

Adams, R. 1998, "Remittances, Investment, and Rural Asset Accumulation in Pakistan," Economic Development and Cultural Change, 47, 155–73.

African Development Bank (ADB). 2018. "The Status of Debt in Africa: an application of the Blanchard-Das model", working paper.

Alderman, H. 1996. "Saving and Economic Shocks in Rural Pakistan," Journal of Development Economics, 51, 343–65.

Adrian, T., Shin, H. 2010. "Liquidity and leverage," Journal of Financial Intermediation, Elsevier, vol. 19(3), pages 418-437, July.

Alesina, A., B. Weder. 2002, "Do Corrupt Governments Receive Less Foreign Aid?" American Economic Review, Vol. 92, No. 4, pp. 1126-1137.

Araujo, J.D., B.G. Li, M. Poplawski-Ribeiro. and L.-F. Zanna. 2016. "Current account norms in natural resource rich and capital scarce economies," Journal of Development Economics, Vol. 120, pp. 144-156.

Blomberg, B., G. Hess. 2006. How Much Does Violence Tax Trade? Review of Economics and Statistics, 88(4): 599-612.

Barai, M. 2012. "Development Dynamics of Remittances in Bangladesh", Sage Publishing.

Barrett, P. 2018. "Interest-growth differentials and debt limits in advanced economies", IMF Working Paper, forthcoming.

Barroy, H., S. Sparkes. and E. Dale. 2016, "Assessing fiscal space for health expansion in low-and-middle income countries: A review of the evidence", Health financing working paper No. 3.

Beidas-Strom, S. and P. Cashin. 2011. Are Middle Eastern Current Account Imbalances Excessive? IMF Working Paper 11/195.

Bems, R., I. de Carvalho Filho. 2009. "Exchange Rate Assessments: Methodologies for Oil Exporting Countries," IMF Working Paper 09/281.

_____, 2011. "The current account and precautionary savings for exporters of exhaustible resources," Journal of International Economics, Vol. 84, pp. 48-64.

Bénétrix, A., Lane. P., and Shambaugh, J. 2015, "International currency exposures, valuation effects, and the global financial crisis.", Journal of International Economics, 96, 98-109.

Berg, A., R. Portillo, S.-C. S. Yang and L.-F. Zanna. 2013. "Public Investment in Resource-Abundant Developing Countries," IMF Economic Review, Vol. 61, No. 1.

Blanchard, O., Das, M. 2017, "A New Index of External Debt Sustainability", NBER Working Paper No. 24068. https://www.nber.org/papers/w24068

Boone, P. 1995. "The impact of foreign aid on savings and growth," mimeo (London School of Economics).

_____, 1996. "Politics and the Effectiveness of Foreign Aid", European Economic Review, 40, 289-329.

Borio, C. Furfine, C., Lowe, P. 2001. Procyclicality of the financial system and financial stability: issues and policy options. Marrying the macro- and microprudential dimensions of financial stability. BIS Papers 1, 1–57.

Bouabdallah, O., Checherita-Westphal, C., Warmedinger, T. de Stefani, R., Drudi, F., Setzer, R.,Westphal. A. 2017. "Debt sustainability Analysis for Euro Area Sovereigns: A Methodological Framework". ECB Occasional Paper Series, No. 185/April.

Boyd, John, Ross Levine, and Bruce Smith. 1996. "Inflation and Financial Market Performance," Federal Reserve Bank of Minneapolis, Working Paper 573D.

Caballero, R, E. Farhi, and P. Gourinchas, 2008a. "An Equilibrium Model of 'Global Imbalances' and Low Interest Rates," American Economic Review, 98(1) (March): 358-393.

_____, 2008b. "Financial Crash, Commodity Prices, and Global Imbalances," Brookings Papers on Economic Activity 2008(2) (Fall): 1-68.

Chami, R., A. Barajas, T. Cosimano, C. Fullenkamp, M. Gapen and P. Montiel. 2008. "The Macroeconomic Consequences of Remittances", International Monetary Fund, Occasional Paper 259.

Chinn, M., Eichengreen, B. and Ito, H. 2011. A Forensic Analysis of Global Imbalances, NBER Working Papers (17513), National Bureau of Economic Research.

Chinn, M., Prasad, E., 2003. Medium-term determinants of current accounts in industrial and developing countries: an empirical exploration. Journal of International Economics 59 (1), 47e76.

Chinn, M., Ito, H., 2006. What matters for financial development? Capital controls, institutions, and interactions. Journal of Development Economics 82, 163e192.

Christiansen, L, A. Prati, L. Ricci. and T. Tressel. 2010. "External Balance in Low-Income Countries," NBER International Seminar on Macroeconomics, University of Chicago Press, pages 265-322.

Ciccone, Antonio. 2011. "Economic Shocks and Civil Conflict: A Comment." American Economic Journal: Applied Economics, 3 (4): 215-27.

Cottarelli, Carlo, G. Dell'Ariccia, and I. Vladkova-Hollar (2003). "Early Birds, Late Risers, and Sleeping Beauties: Bank Credit Growth to the Private Sector in Central and Eastern Europe and the Balkans." IMF Working Paper 03/213.

Cubeddu, L., S. Krogstrup, G. Adler, P. Rabanal, M.C. Dao, S. Ahmed Hannan, L. Juvenal, C. Osorio Buitron, C. Rebillard, D. Garcia-Macia, C. Jones, J. Rodriguez, K.S. Chang, D. Gautam, Z. Wang, N. Li. 2019. :The External Balance Assessment Methodology: 2018 Update," forthcoming, IMF WP.

Das, Mitali, 2018. "Propensities to Save from Different Incomes", mimeo.

Das, M., C. Li, M. Vargas and H. Wang. 2018, forthcoming "Returns on the External Wealth of Nations: a database".

Davies, V. 2010. "Capital Flight and Violent Conflict: A Review of the Literature", World Bank.

Dollar, D. and V. Levin. 2006. "The Increasing Selectivity of Foreign Aid, 1984-2003," World Development, Vol. 34 (12), pp. 2034-2046.

Drehmann, M., Tsatsaronis, K., 2014. The credit-to-GDP gap and countercyclical capital buffers: questions and answers. BIS Quart. Rev. March.

Durand, J, W. Kandel, E. A. Parrado, and D. Massey. 1996. "International Migration and Development in Mexican Communities," Demography, 33, pp. 249–64.

Evans, M. 2012. "Beyond CGER: Implementation of a new external assessment procedure", IMF working paper.

Felbermayr, G. and J. Gröschl. 2014. "Naturally Negative: The growth effects of natural disasters," Journal of Development Economics, Vol. 111, pp. 92-106.

Feyzioglu, T., S. Swaroop and M. Zhu. 1996. "Foreign Aid's Impact on Public Spending," World Bank Policy Research Working Paper No. 1610.

Fielding, D. 2003. "How Does Civil War Affect the Magnitude of Capital Flight? Evidence from Israel during the Intifada," Discussion Papers in Economics 03/10, Dept of Economics, University of Leicester.

Garcia Martinez, P. and M. Soto. 2017. Enhancing medium-term fiscal policy framework: key imperative for the UAE, United Arab Emirates Selected Issues, 2017, International Monetary Fund.

Geanakoplos, J. A. Fostel. 2008. "Leverage Cycles and the Anxious Economy," American Economic Review, American Economic Association, vol. 98(4), pages 1211-1244, September.

Gleditsch, N., P. Wallensteen, M. Eriksson, M. Sollenberg and H. Strand. 2002. "Armed Conflict 1946–2001: A New Dataset", Journal of Peace Research, 39, 615–637.

Glick, R and A. Taylor. 2007. "Collateral Damage: Trade Disruption and the Economic Impact of War", The Review of Economics and Statistics, MIT Press, vol. 92(1) ol. 92(1), pages 102-127, 05.

Glytsos, N. 1993, "Measuring the Income Effects of Migrant Remittances: A Methodological Approach Applied to Greece," Economic Development and Cultural Change, 42, pp. 131–68.

Gourinchas, P.O and Rey H. 2013. "External adjustment, global imbalances, valuation effects", Handbook of International Economics, Vol. 14.

Gruber, J. and S. B. Kamin, 2005, "Explaining the Global Pattern of Current Account Imbalances," mimeo (Washington, D.C.: Board of Governors of the Federal Reserve System, September).

Guo, K. and V. Stepanyan. 2011. "Determinants of Bank Credit in Emerging Market Economies," Working Paper No. 11/51, International Monetary Fund, March.

Hasanov, F. and A. Senhadji. 2008. "Macroeconomic Balance Approach and Assessment of Exchange Rate Misalignments," in Assessment of Exchange Rates, Middle East and Central Asia Department, International Monetary Fund.

International Monetary Fund (IMF). 2002. "Assessing Sustainability". IMF Policy Paper.

_____, 2006. Methodology for CGER exchange rate assessments. IMF Occasional Paper.

_____, 2012. "Macroeconomic Policy Frameworks for Resource-Rich Developing Countries," Washington, DC, August.

_____, 2017. "The Effects of Weather Shocks on Economic Activity: How Can Low-Income Countries Cope?" Chapter 3 in World Economic Outlook, October.

_____, 2017. "Banking Challenges in the Western Balkans: Prospects and Challenges", Regional Economic Outlook: Europe Hitting Its Stride.

_____, 2018. "Scoping note for the Review of the Debt Sustainability Framework for Market Access Countries". Washington, DC: International Monetary Fund.

Iossifov, P. and M. Y. Khamis 2009. "Credit Growth in Sub-Saharan Africa—Sources, Risks, and Policy Responses" IMF Working Paper 09/180.

Jordà, O., M. Schularick, and A. M. Taylor. 2011. "Financial Crises, Credit Booms, and External Imbalances: 140 Years of Lessons." International Monetary Fund (IMF) Economic Review, 59, 340–78.

Khan, M. A. Senhadji, and B. Smith. 2001. "Inflation and Financial Depth," IMF Working Paper 01/44 (Washington, International Monetary Fund).

Kerdrain, C., I. Koske and I. Wanner. 2010. "The Impact of Structural Policies on Saving, Investment and Current Accounts", OECD Economics Department Working Papers, No. 815, OECD Publishing, Paris.

King, R.G., Levine, R., 1993. Finance and growth: Schumpeter might be right. Quarterly Journal of Economics 108, 717e738.

Laframboise, N. and B. Loko. 2012. "Natural Disasters: Mitigating Impact, Managing Risks," IMF Working Paper 12/245.

Lane, P. and G. M. Milesi-Ferretti. 2005. "A Global Perspective on External Positions," IMF Working Paper 05/161.

_____, 2006. "The External Wealth of Nations Mark II: Revised and Extended Estimates of External Assets and Liabilities, 1970–2004," IMF Working Paper 06/69.

_____, 2009. "Where did all the borrowing go? A forensic analysis of the U.S. external position", Journal of the Japanese and International Economies, 2, 177-199.

Levine, Ross, 2002. "Bank-based or Market-based Financial Systems: Which is Better?" Journal of Financial Intermediation, Vol 11, Issue 4, pp.398-428.

Levine, R. N. Loyaza, and T. Beck. 2000. "Financial Intermediation and Growth: Causality and Causes," Journal of Monetary Economics, Vol 46 pp. 31-77.

Mansfield, E. and R. Bronson. 1997. "Alliances, Preferential Trading Arrangements, and International Trade", American Political Science Review 91(1): 94-107.

Marchettini, D. and R. Maino. 2015. "Systemic Risk Assessment in Low Income Countries: Balancing Financial Stability and Development." IMF Working Paper 15/190.

Mendoza, E. G., V. Quadrini, and J. Ríos-Rull, 2009. "Financial Integration, Financial Deepness and Global Imbalances," Journal of Political Economy 117(3): 317-416.

Moreno-Serra, R. and P. C. Smith. 2015. Broader health coverage is good for the national's health: evidence from country level panel data, Journal of the Royal Statistical Society A (2015) 178, pp. 101-124.

Morrow, J, R. Siverson and T Tabares. 1999. Correction to: 'The Political Determinants of International Trade. American Political Science Review 93(4): 931-933.

Noy, I. 2009. "The macroeconomic consequences of disasters," Journal of Development Economics, Vol. 88, pp. 221-231.

Obstfeld, M. 1998. "Foreign Resource Inflows, Saving and Growth", in Economics of Saving, K. Hebbel-Schmidt and S. Serven (eds.). Cambridge University Press.

Obstfeld, M. 2012. "Does the current account still matter?", American Economic Review, 102, 1-33.

Obstfeld, M. 2012. "External Adjustment", Review of World Economics, 140: 541.

Penubarti, M. and M. Ward. 2000. Commerce and Democracy. Center for Statistics and the Social Sciences Working Paper No. 6, University of Washington.

Phillips, S., L. Catao., L. Ricci., R. Bems., M. Das., J. Di Giovanni., D. Filiz Unsal., M. Castillo., J. Lee., J. Rodriguez., and M. Vargas. 2013. The external balance assessment (EBA) methodology, IMF working paper, WP/13/272. https://www.imf.org/external/pubs/ft/wp/2013/wp13272.pdf

Pollins, B. 1989b. "Does Trade Still Follow the Flag?" American Political Science Review, 83, 465-480.

Prati, A., L.A. Ricci, L. Christiansen, S. Tokarick and T. Tressel. 2011. "External Performance in Low-Income Countries," IMF Occasional Paper 272.

Rajan, R.G., Zingales, L. 1998. Financial Dependence and Growth. American Economic Review 88, 559e586.

Pritchett, L. 2000. "The Tyranny of Concepts: CUDIE (Cumulated, Depreciated, Investment Effort) is not Capital," Journal of Economic Growth, Vol. 5, Issue 4, pp. 361-384.

Rasmussen, T.N. 2004. "Macroeconomic Implications of Natural Disasters in the Caribbean," IMF Working Paper 04/224.

Ratha, D. 2005. "Workers' Remittances: An Important and Stable Source of External Development Finance" Economics Seminar Series, World Bank.

Reserve Bank of India. 2013. "Report of the internal working group on implementation of countercyclical capital buffer", draft, December.

Reserve Bank of South Africa. 2011. Financial Stability Report, September.

Rozenov, R. 2017. "Public Debt Sustainability under Uncertainty: An Invariant Set Approach", IMF WP/17/57. Washington, DC: International Monetary Fund.

Sahay, R, M. Cihák, P. N'Diaye, A. Barajas, R. Bi, D. Ayala, Y. Gao, A. Kyobe, L. Nguyen, C. Saborowski, K. Svirydzenka, and S. Yousefi, 2015. "Rethinking Financial Deepening: Stability and Growth in Emerging Markets." IMF Staff Discussion Note 15/08. Washington, DC: International Monetary Fund (May).

Sahay, R. M. Cihák, and P. N'Diaye. 2015. "How Much Finance is Too Much? Stability, Growth, and Emerging Markets." IMF Blog Post.

Savedoff, William D. 2007. What should a country spend on health care? Health Affairs 26, 962-970.

Schularick, M., A. Taylor. 2012. "Credit booms gone bust: monetary policy, leverage cycles and financial crises, 1870–2008", American Economic Review, vol 102(2), pp 1029–61.

Shin, H. S. 2013, "Procyclicality and the Search for Early Warning Indicators," in S. Claessens, M. A. Kose, L. Laeven, and F. Valencia, eds., Financial Crises, Consequences, and Policy Responses, forthcoming.

Solt, F. 2017. The standardized world income inequality database (SWIID), 6.0.

Svirydzenka, K. 2016. Introducing a new broad-based index of financial development. IMF Working paper 16/5.

van den Bremer, T., F. van der Ploeg., and S. Wills. 2016. "The Elephant in the Ground: Managing Oil and Sovereign Wealth," European Economic Review, Vol. 82, pp. 113-131.

World Bank, 2006, The Development Impact of Workers' Remittances in Latin America, Vol. 2: Detailed Findings, Report No. 37026 (Washington).

_____, 2010 Comments on the consultative document countercyclical capital buffer proposal.

Wurgler, J. 2000. Financial markets and the allocation of capital. Journal of Financial Economics 58.

Xu, K., P. Saksena, and A. Holly, 2011, The determinants of health expenditure: A country-level panel data analysis, Word Health Organization, Working Paper, December 2011.