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26-13 How to Buy a Trade Surplus

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ABSTRACT

This paper shows that fiscal policy and net official financial flows, including foreign exchange intervention, are important drivers of trade (current account) imbalances. Each $1 that a government devotes to a fiscal surplus invested in foreign-currency assets raises a country's current account balance by about $0.80. Other factors also matter, including trend growth rates, per capita income, stocks of foreign assets, and aging populations. The paper extends previous research (Gagnon and Sarsenbayev 2021) by six years and roughly 1,000 observations. The results are broadly similar to those previously obtained.

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INTRODUCTION

Global trade imbalances have been back in the news since the reelection of President Donald Trump. China's current account surplus is on the rise and the US current account deficit has stabilized near a historically large value (Bayoumi and Gagnon 2026).[1] In order to find the right policies to deal with imbalances, it is important to understand to what extent imbalances arise from (1) government policies at home and abroad; (2) other observable differences across countries; and (3) unexplained factors that may or may not reflect harmful distortions.

This paper estimates models that are able to explain nearly half of historical imbalances,[2] with a large share of the imbalances arising from government policies. In particular, we find that governments can buy current account surpluses through a combination of fiscal surpluses and official financial flows such as foreign exchange intervention. A $1 increase in the fiscal balance that is invested abroad raises the current account balance between $0.50 and $1.00. Tariffs, on the other hand, do not have any reliably significant impact on imbalances, despite President Trump's assertion that they do.

These results are obtained in two separate statistical frameworks: country panel regressions of annual current account balances and cross-country regressions of the stock of net foreign assets or cumulated current accounts at a specific point in time.

1 President Trump focuses on the deficit in goods trade, whereas most economists focus on the current account balance. The current account is the broadest measure of trade, recording all income received from foreigners and payments made to foreigners. It is dominated by trade in goods, but also includes trade in services, income earned on overseas capital and labor, and unrequited transfers to foreigners. In principle, the current account equals the difference between a country's saving and investment.

2 This explanatory power is on a par with other leading models, which typically include more independent variables and fewer observations than the models of this paper.

ANNUAL CURRENT ACCOUNT REGRESSIONS

Model Specification

Equations 1 and 2 (below) present the panel specifications of Gagnon and Sarsenbayev (2021), in which Greek letters denote parameters to be estimated, countries are denoted by subscript **i**, and years by subscript **t**.[3]

$$\frac{CAB_{it}}{GDP_{it}} = \alpha_1\left(\frac{FISCAL_{it}}{GDP_{it}}\right) + \alpha_2\left(\frac{FISCAL_{it} \times MOB_{it-1}}{GDP_{it}}\right) + \beta_1\left(\frac{NOF_{it}}{GDP_{it}}\right) + \beta_2\left(\frac{NOF_{it} \times MOB_{it-1}}{GDP_{it}}\right) + \delta_1\left(\frac{NOS_{it-1}}{GDP_{it-1}}\right) + \delta_2\left(\frac{NOS_{it-1} \times MOB_{it-1}}{GDP_{it-1}}\right) + \mu_1 AUX_{it} + \mu_2 (AUX_{it} \times MOB_{it-1}) + \theta_t year_t \quad (1)$$

$$\frac{NPF_{it}}{GDP_{it}} = \alpha_1\left(\frac{FISCAL_{it}}{GDP_{it}}\right) + \alpha_2\left(\frac{FISCAL_{it} \times MOB_{it-1}}{GDP_{it}}\right) + (\beta_1 - 1)\left(\frac{NOF_{it}}{GDP_{it}}\right) + \beta_2\left(\frac{NOF_{it} \times MOB_{it-1}}{GDP_{it}}\right) + \delta_1\left(\frac{NOS_{it-1}}{GDP_{it-1}}\right) + \delta_2\left(\frac{NOS_{it-1} \times MOB_{it-1}}{GDP_{it-1}}\right) + \mu_1 AUX_{it} + \mu_2 (AUX_{it} \times MOB_{it-1}) + \theta_t year_t \quad (2)$$

CAB and NPF are the current account balance and net private financial flows. FISCAL is the cyclically adjusted fiscal balance. NOF is net official flows, defined by the acquisition and disposition of assets and liabilities denominated in foreign currency by public sector institutions in the reporting country.[4] NOS is the net stock of these official financial assets and liabilities. MOB is the Chinn and Ito (2006) index of legal restrictions on capital mobility, normalized

3 A difference from the previous specification is that a variable that allocates global official flows toward economies in proportion to the shares of their currencies in global foreign exchange reserves is no longer statistically significant and has been dropped from equations 1 and 2.

4 The dominant form of official flows is purchases and sales of foreign exchange reserves. However, public sector borrowing in foreign currency counts as a negative official flow. Foreign asset purchases by sovereign wealth funds (SWFs) also count as official financial flows.

to the unit interval [0–1], for which a higher value indicates fewer restrictions on private capital flows.[5] The auxiliary variables (AUX) include lagged MOB, lagged net private financial stocks (NPS) relative to GDP, net energy exports relative to GDP (ENERGY), the lagged real GDP growth rate over the previous five years (GROWTH), lagged purchasing power parity (PPP) adjusted GDP per capita relative to the United States (RELGDP), and the 10-year forward change in the old-age dependency ratio (AGING). Definitions and sources of all variables are listed in the data appendix (page 33).

Finally, the regressions include a full set of time effects or dummy variables for each year. These time effects are a flexible way to model the spillovers of factors influencing each country's CA balance on all other countries under the assumption that such spillovers are in proportion to each country's nominal GDP. Spillovers reflect the necessity that surpluses in some countries require equal-sized deficits in all other countries and vice versa.[6]

Equation 1 presents the current account as a function of NOF and other variables. The coefficient β_1 represents the effect of NOF on the current account, and the coefficient β_2 allows for a differential effect depending on the level of capital mobility. The coefficient δ_1 represents the effect of lagged net official asset stocks on the current account, while the coefficient δ_2 allows for a differential effect with higher capital mobility.

Equation 2 is a restatement of the link between the official flows and the current account in equation 1 that takes advantage of the balance of payments (BOP) identity equating the current account with the financial account: *CAB = NOF + NPF + errors and omissions*.[7] Factors that influence NPF also influence CAB. NOF has

5 MOB is lagged in all regressions, including in interaction terms, even when the interacted variable is not lagged. MOB is based on legal restrictions and thus might be considered a policy variable. But our sense is that differences in MOB across countries and over time reflect slow-moving institutional considerations and not easily adjustable policies to influence output or the trade balance.

6 Errors and omissions in the data imply that this accounting identity does not hold strictly. Time effects implicitly absorb fluctuations in the global current account discrepancy.

7 We ignore the capital account, which is tiny and reflects unusual capital transfers.

a direct effect on CAB (coefficient of 1) in addition to its indirect effect via NPF (presumed to be negative). All other variables affect CAB only to the extent that they also affect NPF.

Any increase in NOF must be associated with some combination of an increase in CAB or a reduction in NPF that jointly equals the change in NOF. When NOF has no effect on CAB (i.e., $\beta_1=0$), it must cause a one-for-one reduction of NPF. Because of errors and omissions in the BOP data, these regressions are not identical. The bias from measurement error in NOF in the estimate of β_1 is downward in equation 1 and upward in equation 2, which helps to put a range on its true value and makes the average of the coefficient estimates from the two equations a convenient statistic to reduce the effects of measurement error. The bias from measurement error in the other explanatory variables is generally downward in both regressions, but there is still added information from each regression that makes it desirable to focus on the average of the coefficients across equations 1 and 2.

Equations 1 and 2 include interactions between most explanatory variables and the MOB term. The interaction terms are included because the effect of many variables could vary with capital mobility. For example, net official flows are expected to have a greater effect on the current account when private financial flows are more restricted (MOB is low). In other words, if NPF cannot respond to NOF, then CAB must move more. On the other hand, demographic or fiscal influences on domestic saving and investment may lead to higher capital flows, and thus larger current account imbalances, when capital markets are less restricted (MOB is high).

A key empirical issue is the potential endogeneity of official flows to shocks to current account balances and net private flows. On the one hand, endogenous movements are likely to arise from attempts to stabilize the exchange rate in the face of trade or financial market shocks. On the other hand, exogenous movements in official flows include increasing holdings of foreign assets for precautionary reasons, saving resource revenues for future generations, borrowing for economic development, and achieving economic growth through higher net exports.

Instrumental variables regressions can address the potential endogeneity of NOF to shocks to current account balances and net private flows. The challenge is to isolate the variation in NOF

that is not driven by shocks that simultaneously drive CAB and/or NPF. Valid instruments must reflect exogenous motives for reserve accumulation. The first instrument used in this paper is official borrowing, which is generally tied to development projects and not responsive to short-term fluctuations in exchange rates.[8] The second is net energy exports for economies with oil-based sovereign wealth funds and 0 for other economies. Third is a dummy variable for banking crises in any of the previous three years, which is meant to capture a desire to rebuild foreign exchange reserves after a crisis.[9] All instrument coefficients have plausible signs and magnitudes. The first-stage R^2s are around 0.4 and the partial R^2s of the instruments are 0.29 for NOF and 0.14 for NOFxMOB, suggesting a reasonable predictive value of the instruments without overfitting.

Regression Results

The regressions cover up to 40 years, 1985 through 2024, for 146 countries. This sample adds roughly 1,000 observations to the regressions in Gagnon and Sarsenbayev (2021), which ended in 2018. As before, many countries have some missing observations, especially near the beginning of the sample and also in 2024. A complete list of countries in our sample and a detailed description of the data, including excluded observations, are provided in the data appendix.

Table 1 (page 8) presents regression results. The coefficients displayed are the averages of the coefficients from equations 1 and 2. The coefficient standard errors are averages of those from the CAB and NPF regressions.[10] The R^2 statistics and the number

8 We tried using data on development assistance commitments (both total and loans) from the Organization for Economic Cooperation and Development as an alternative to this instrument, but it had little explanatory power in the first stage and led to implausibly large coefficients on NOF in the second stage when MOB is low.

9 The instruments also include the interaction of these variables with MOB since both NOF and its interaction with MOB need to be instrumented.

10 Using average standard errors is valid on the assumption of perfect correlation between the two coefficients. To the extent that coefficients are less than perfectly correlated, the true standard error would be smaller. Thus, the significance levels in this paper are conservative.

of observations are taken from the CAB regression (equation 1) because we are interested in explaining current accounts and we wish to be comparable to other studies.[11] The coefficient standard errors are robust to heteroskedastic and first-order autocorrelated residuals. Significance levels are denoted by one asterisk (5 percent) and two asterisks (1 percent).

Column 1 is our baseline model after dropping interactions of variables with MOB that were not statistically significant (FISCAL, NPS, MOB, ENERGY, and AGING). Most of the remaining interactions in column 1 are statistically significant (NOS, GROWTH, and RELGDP). We chose to keep the NOF interaction in part because it is significant in some of the alternate specifications of table 1 and in part because the International Monetary Fund's (IMF) current account model has a NOF interaction with MOB (discussed below). The coefficients imply that a $1 increase in FISCAL raises the current account $0.30 and a $1 increase in NOF raises the current account $0.31 when MOB=0, $0.42 when MOB=0.5, and $0.53 when MOB=1.[12] The higher estimated effect of NOF under high mobility versus low mobility is the most striking difference from the previous results, in which the NOF coefficient was 0.66 when MOB=0 and 0.33 when MOB=1 (Gagnon and Sarsenbayev 2021, table 2). An increase in the effect of NOF as MOB rises goes against the logic of capital mobility, which should enable greater private sector arbitrage of the effects of official sector financial flows and thus a smaller net effect on the CAB. The remaining columns of table 1 show that a higher coefficient on NOF when MOB=1 than when MOB=0 is not a robust result (nor is the difference significant in column 1). What is robust is a significant positive effect of NOF under both low and high values of MOB.

11 The sample with NPF is about 7 percent smaller and generally has a lower R^2, possibly reflecting greater measurement difficulties and errors in the financial account relative to the current account. As shown in table 2, the coefficients in the baseline regression of equation 1 are very similar to the baseline averages shown in table 1.

12 Recall that MOB is normalized to take values between 0 and 1. The effect when MOB=1 is the sum of the coefficient on NOF and the coefficient on NOFxMOB.

Table 1

Current account models

Variables	Baseline	Alternate instrument	OLS	Country effects	Advanced economies[a]	Developing economies	2005–2024
	1	*2*	*3*	*4*	*5*	*6*	*7*
Policy							
FISCAL	0.31** 0.05	0.22** 0.05	0.38** 0.04	0.28** 0.05	0.31** 0.09	0.30** 0.06	0.31** 0.07
NOF (MOB=0)	0.31** 0.10	0.69** 0.14	0.39** 0.06	0.20* 0.09		0.22* 0.10	0.65** 0.14
NOF (MOB=1)	0.53** 0.13	0.67** 0.12	0.22** 0.05	0.44** 0.12	0.89** 0.30	0.60** 0.14	0.56** 0.15
NOS (MOB=0)	0.03** 0.01	0.03** 0.01	0.03** 0.01	0.02 0.01		0.04** 0.01	0.00 0.02
NOS (MOB=1)	-0.00 0.01	-0.01 0.01	0.01* 0.00	-0.00 0.01	-0.01 0.02	-0.01 0.01	-0.01 0.01
Auxiliary							
NPS	0.02** 0.00	0.02** 0.00	0.02** 0.00	0.00 0.00	0.03** 0.00	0.02** 0.01	0.02** 0.00
MOB	-1.49 0.85	-1.68 0.89	-2.17** 0.81	1.40 1.06	-1.94* 0.89	-1.92 1.17	-0.50 1.06
ENERGY	0.13** 0.02	0.12** 0.02	0.12** 0.02	0.34** 0.04	-0.19** 0.05	0.17** 0.02	0.15** 0.02
GROWTH (MOB=0)	0.04 0.08	-0.01 0.08	0.02 0.08	0.01 0.08		-0.07 0.08	0.03 0.10
GROWTH (MOB=1)	-0.34** 0.10	-0.36** 0.10	-0.25** 0.09	-0.56** 0.09	-0.55** 0.16	-0.24 0.13	-0.32** 0.11
RELGDP (MOB=0)	-2.74* 1.26	-3.41** 1.28	-2.71* 1.27	9.25** 2.10		-6.75** 1.87	-1.49 2.32
RELGDP (MOB=1)	5.02** 0.55	5.13** 0.52	5.55** 0.51	8.80** 2.04	4.59** 0.89	3.05 1.61	5.00** 0.70
AGING	0.15** 0.04	0.10* 0.04	0.16** 0.04	-0.02 0.05	0.10 0.06	0.10 0.07	0.13** 0.05
R-squared	0.44	0.40	0.47	0.67	0.51	0.36	0.46
Observations	4,224	4,224	4,224	4,224	1,282	2,942	2,704

* p<0.05, ** p<0.01; OLS = ordinary least squares

a. No MOB interaction used. Coefficients are placed in the MOB=1 row because MOB is high in the advanced economies.

Note: Numbers reported in blue are standard errors. Coefficients and standard errors are averages of respective coefficients and standard errors from CAB and NPF regressions. Reported R-squared and number of observations are from CAB regressions.

The remaining coefficients in column 1 are mostly similar to those in the previous paper with only a couple points worth mentioning. First, the decline in the coefficient on NOS as MOB rises from 0 to 1 is more pronounced in the new results; this decline is in the expected direction and it stands in contrast to the perverse pattern for the NOF coefficient. Second, the negative effect of GROWTH under high mobility is about half as strong as in the previous paper.

The effects of the independent variables are all in the expected directions. Higher stocks of net official and private assets tend to boost the current account, presumably through income flows from the underlying assets. Net energy exports boost the CAB to a modest extent.[13] Fast-growing economies tend to have lower CABs, presumably because they have higher investment rates. Higher PPP GDP per capita seems to reduce the CAB when MOB is low but it increases it when MOB is high. The latter effect is the expected one and it is the operative effect for most observations, as the effect of RELGDP is positive for values of MOB above 0.35 and most observations in the regression sample have MOB>0.35 (the median is 0.54). Finally, economies facing a growing share of the elderly in the population tend to have higher current account balances, presumably reflecting higher saving.

Column 2 presents results using an alternative set of instruments for NOF. In this regression, the instruments are a complete set of country dummy variables. (These are not interacted with MOB.) These instruments capture differences in the propensity to conduct official flows across countries that are not correlated with year-to-year swings in capital flows and exchange rate pressures. The main differences from column 1 are a modest decline in the FISCAL coefficient and a large increase in the NOF coefficients, especially when MOB=0. The NOFxMOB coefficient equals 0 and is not significant, so there is no longer any difference between the effect of NOF when MOB=0 and MOB=1. However, the overall fit of the regression is somewhat lower than in column 1.

13 This effect likely has an important transitory component, as an increase in oil prices immediately raises CAB for exporters and lowers it for importers, with subsequent adjustments occurring over time.

Column 3 presents results without instruments for NOF (ordinary least squares or OLS). Now the coefficient on FISCAL rises a bit from column 1 as does that on NOF when MOB=0 but the coefficient on NOF when MOB=1 falls substantially. The difference in the NOF effects under low and high MOB is significant and in the expected direction, as higher MOB reduces the effect. Comparing the results without instruments to those with instruments (column 1) suggests that endogenous responses of NOF are driven mainly by trade shocks when MOB is low and financial shocks when MOB is high because the direction of simultaneity bias is upward for trade shocks and downward for financial shocks (Gagnon 2013). Other coefficients are little changed.

Column 4 adds a full set of country dummies to the baseline regression. The FISCAL coefficient is little changed from column 1. The NOF coefficients are both a bit smaller, but not significantly so, and the MOB interaction remains positive though not significant.[14] The NOS and NPS coefficients are smaller, probably reflecting the fact that these variables move slowly over time and thus much of their effects are absorbed by the country dummies. The MOB interaction for NOS is no longer significant. Other coefficients sometimes change noticeably, and the reasons for most of these changes are unclear. The biggest changes tend to be for variables that have greater variation across countries than over time and are thus closer substitutes for country fixed effects. In particular, the RELGDP effect is much larger than in column 1 and its MOB interaction is not significant.

Column 5 presents the regression limited to advanced economies; MOB interactions are dropped because these economies generally have very high values of MOB. The FISCAL coefficient is similar but the NOF coefficient is much larger than in the baseline, at 0.89. The NOS coefficient, on the other hand, is considerably lower (indeed negative but not significantly so). The ENERGY coefficient is now negative and significant. The GROWTH effect is larger and the AGING effect is smaller.

14 Technically, we are not testing for differences in coefficients across models, which would require joint estimation of both models. Rather, we refer to the statistical significance of the difference between a given coefficient estimate and a specific value that happens to be equal to the estimated value in a different model.

Column 6 presents results for developing economies. The FISCAL coefficient is similar to that in column 1. Both NOF effects and most other coefficients are reasonably similar to those in column 1. Notable exceptions include the coefficient on RELGDP, which is more negative when MOB=0, and AGING, which is a bit larger.

Column 7 presents results limited to the second half of the sample. The FISCAL coefficient is unchanged from column 1. The NOF coefficient when MOB=0, however, is much larger and slightly exceeds the value when MOB=1. (The interaction term is no longer significant.) The NOF coefficients are close to the values shown in column 2. As somewhat of an offset, the coefficients on NOS are considerably lower than those in column 1, perhaps reflecting lower average interest rates in the second half of the sample, and the MOB interaction is no longer significant. Other coefficients have relatively minor changes.[15]

Overall results from table 1 include the following:[16] The FISCAL effect is quite tightly estimated around 0.3. The NOF effect is significantly positive for both low and high values of MOB, but its value is less tightly pinned down, ranging from 0.2 to 0.9 for both MOB=0 and MOB=1. Compared to results in the previous paper, the NOF coefficients here are somewhat lower for MOB=0 and notably higher for MOB=1. High values of both NOF coefficients are especially apparent in the second half of the sample. NOS has a small positive effect on the current account, especially when MOB=0, and this effect arises mainly from the first half of the sample when interest rates were consistently above zero.

15 In a regression on the first half of the sample, most coefficients are similar to those in column 1, but the NOF coefficients are not significant, the NOS coefficients are larger and more significant, and the FISCAL coefficient is smaller. Using the alternate instruments in the first half yields NOF coefficients of 0.23 (not significant) when MOB=0 and 0.64 (highly significant) when MOB=1.

16 Other regressions not shown in table 1 have only minor effects on the estimated coefficients in column 1. These include allowing for an autocorrelated residual, weighting observations by nominal GDP (either including or excluding the United States), and using Stata's robust regression command. In all cases, the FISCAL and NOF coefficients remain in the range displayed across the columns of table 1.

Nonpolicy effects can be summarized as follows: NPS, ENERGY, and AGING have small but fairly robust positive effects on the current account. GROWTH reduces the CAB and RELGDP increases it, but these effects occur mainly when MOB is high. MOB itself has little direct impact on the CAB.

Tariffs and Trade Balances

President Trump raised US tariffs substantially in 2025 with the stated goal of reducing the US trade deficit. Because tariffs are applied on merchandise trade, which is the largest component of the current account, an obvious question is whether tariffs have any systematic effect on the current account balance.

Economists have long argued that tariffs have little or no effect on the balance of trade. Tariffs make imports more expensive and thus reduce imports. However, they also reduce the demand for foreign exchange to buy imports, thereby reducing the value of foreign currencies. Cheaper foreign currencies offset part of the effect of tariffs on the price of imports and they also make exports more expensive to foreigners. The end result is that imports and exports decline equally, with no impact on the balance.

Many studies confirm that tariffs have little or no effect on current account balances (for example, Furceri et al. 2018; Boz et al. 2019). Empirical models of current account balances at the IMF and elsewhere do not include tariff variables (Allen et al. 2023; Chinn and Ito 2025).

There are a number of issues that confront any attempt to include tariffs in regressions like those of table 1. First, the most widely available data on tariffs are constructed either by averaging published tariff rates across product categories or by dividing total tariff revenue by the total value of imports. The first measure over-weights tariffs on goods that have a minuscule role in international trade. The second measure under-weights high tariffs that shut down most or all imports in those categories. Second, tariffs may be endogenous to trade balances, requiring instrumental variables or other procedures to tease out cause and effect. Third, tariffs that are expected to be temporary can have important temporary effects on the trade balance, requiring some assessment of the extent to which changes in tariffs are expected to persist.

We inserted measures of tariff rates into the baseline regression of table 1.[17] A 10 percentage point increase in the simple average tariff rate raises the current account balance 0.7 percent of GDP, and this effect is statistically significant. However, the effective tariff rate (total tariff revenue divided by total import value) has an insignificant coefficient near zero.

In light of the above methodological issues, as well as the fact that the estimated effect of tariffs is relatively small, not robust to different measures of tariffs, and reduces our sample by about one-quarter, we chose not to include tariffs in the regressions of table 1.

Model Fit in Selected Economies

The solid lines in figure 1 (page 14) display the CAB for selected economies. The dashed lines are the fitted values of the baseline model shown in column 1 of table 1.[18] The colored bars display the estimated contributions of FISCAL (blue), NOF and NOS (green), and all auxiliary variables (orange).[19,20] In order to capture spillovers from the effects of variables in other countries that are absorbed in the estimated year effects, each variable is expressed as the difference between its value in a given country and its global GDP-weighted average.

17 The tariff rates were lagged by one year to minimize endogeneity bias. The tariff data are simple mean and weighted mean applied tariff rates for all products from the World Bank's World Development Indicators database. Missing values are filled using Applied Harmonized System simple average and weighted average tariffs from the World Integrated Trade Solution system.

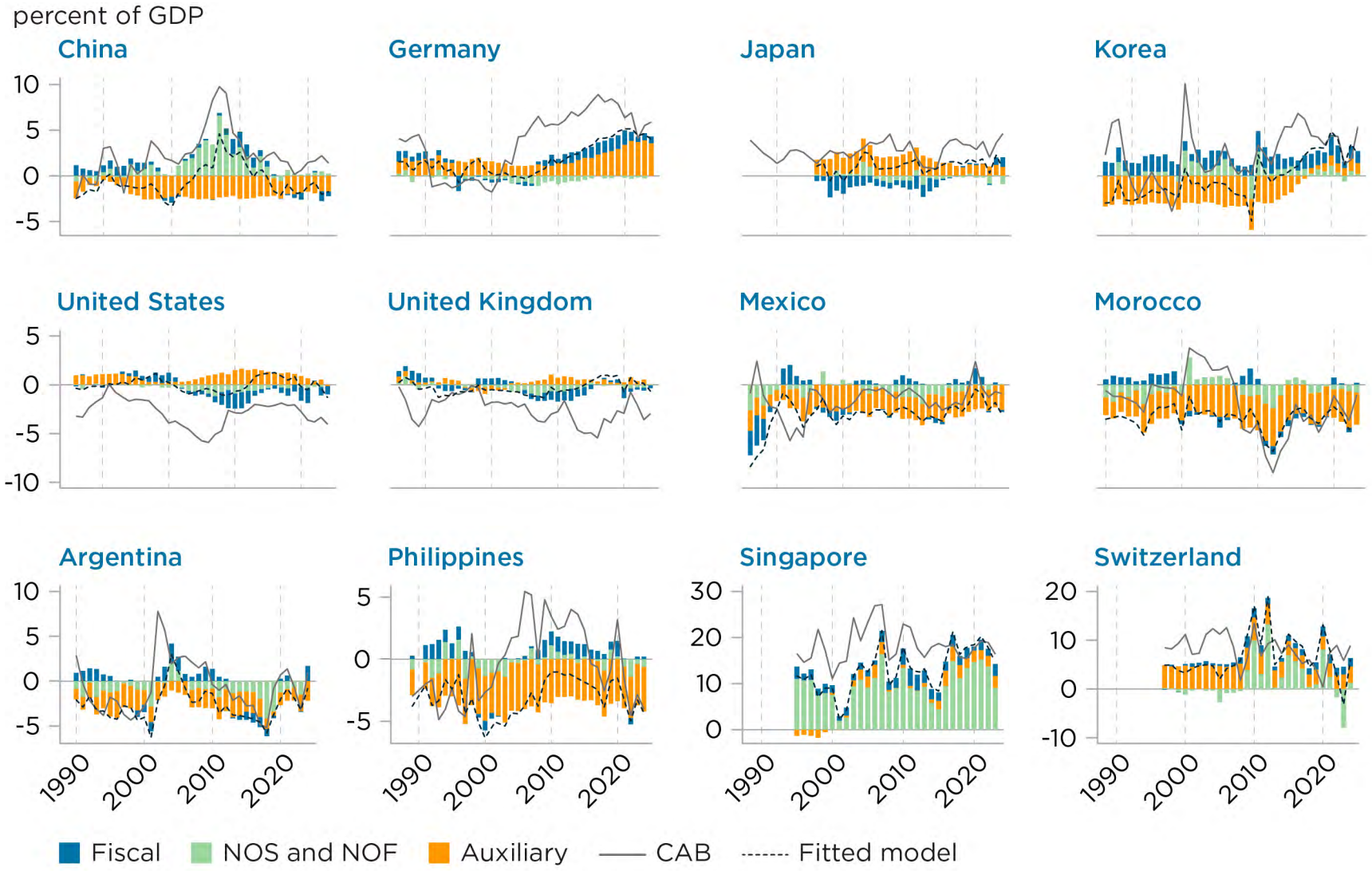
18 The fitted values include spillovers from the aggregate effects of variables in all economies working through the year effects. By construction, spillovers flow to all economies in proportion to nominal GDP.

19 The bars are based on the actual values of FISCAL and NOF, as opposed to the cyclically adjusted fiscal balance and instrumented NOF used in the regression.

20 The regression coefficients reflect partial effects of each variable independently. The figures do not allow for potential interactions between the independent variables in any counterfactual exercise.

Figure 1

Fitted models of current account balances for selected economies



Source: Authors' calculations based on column 1 of table 1.

The first row displays four major surplus economies. NOF and NOS were important contributors to surpluses in China and Korea at various points in time, but much less so for Germany and Japan.[21] FISCAL makes modest positive contributions in Germany and Korea and negative contributions in Japan. The auxiliary variables contribute to surpluses in Germany and Japan, whereas they push toward deficits in China, reflecting China's rapid growth and low RELGDP. In Korea, auxiliary variables contributed toward deficits before 2010 but more recently have pushed toward surpluses, reflecting Korea's slowing growth and rising RELGDP. The actual CAB tends to be close to or above the fitted value in these economies.

The second row displays four deficit economies. For the United States and the United Kingdom, FISCAL, NOF, and NOS contributed to deficits at times after 2000, whereas auxiliary variables pushed toward surpluses. The NOF and NOS effects in these economies mainly reflect spillovers from NOF and NOS in other economies, as the United States and the United Kingdom have very low values of NOF and NOS. The fitted values are correlated with CAB but almost always lie above CAB, in contrast to the situation in the surplus economies. Clearly the model is missing some important factors that explain persistent imbalances across these economies.[22]

For Mexico and Morocco, the fitted and actual values of CAB are often close, although Mexico's CAB has exceeded the fitted value persistently since 1999. Morocco had a significant and unexplained surge in its CAB in the early 2000s, but the fitted values are very close to actual values from 2008 through 2023. In both Mexico

21 The NOF effect when MOB=0 in the baseline model is near the bottom of its range across models. A version of figure 1 based on column 7 of table 1 shows a noticeably higher contribution of NOF and NOS in China with only small changes to the other panels of figure 1.

22 Adding a dummy variable for five English-speaking advanced economies (United States, United Kingdom, Canada, Australia, and New Zealand) to the baseline model yields a highly significant coefficient of –3.6 with little impact on any other coefficient. This may reflect unique financial market characteristics of these economies, and we plan to explore this issue in future research.

and Morocco, the most persistent drivers of CAB deficits are the auxiliary variables.

The third row displays four economies with large or highly variable CABs. The model explains Argentina's CAB very well, with both policy and auxiliary variables contributing importantly. The model explains the Philippines CAB quite well near the beginning and end of the sample, but from 2000 through 2015 the CAB was far above its fitted value. In both Argentina and Philippines, the auxiliary variables push toward deficits. For Singapore and Switzerland, both policy and auxiliary variables contribute to large sustained surpluses, most notably NOF and NOS in the case of Singapore. In both economies, the CAB tends to lie above its fitted value in the first part of the sample before converging toward the fitted value in the last 10 to 15 years.

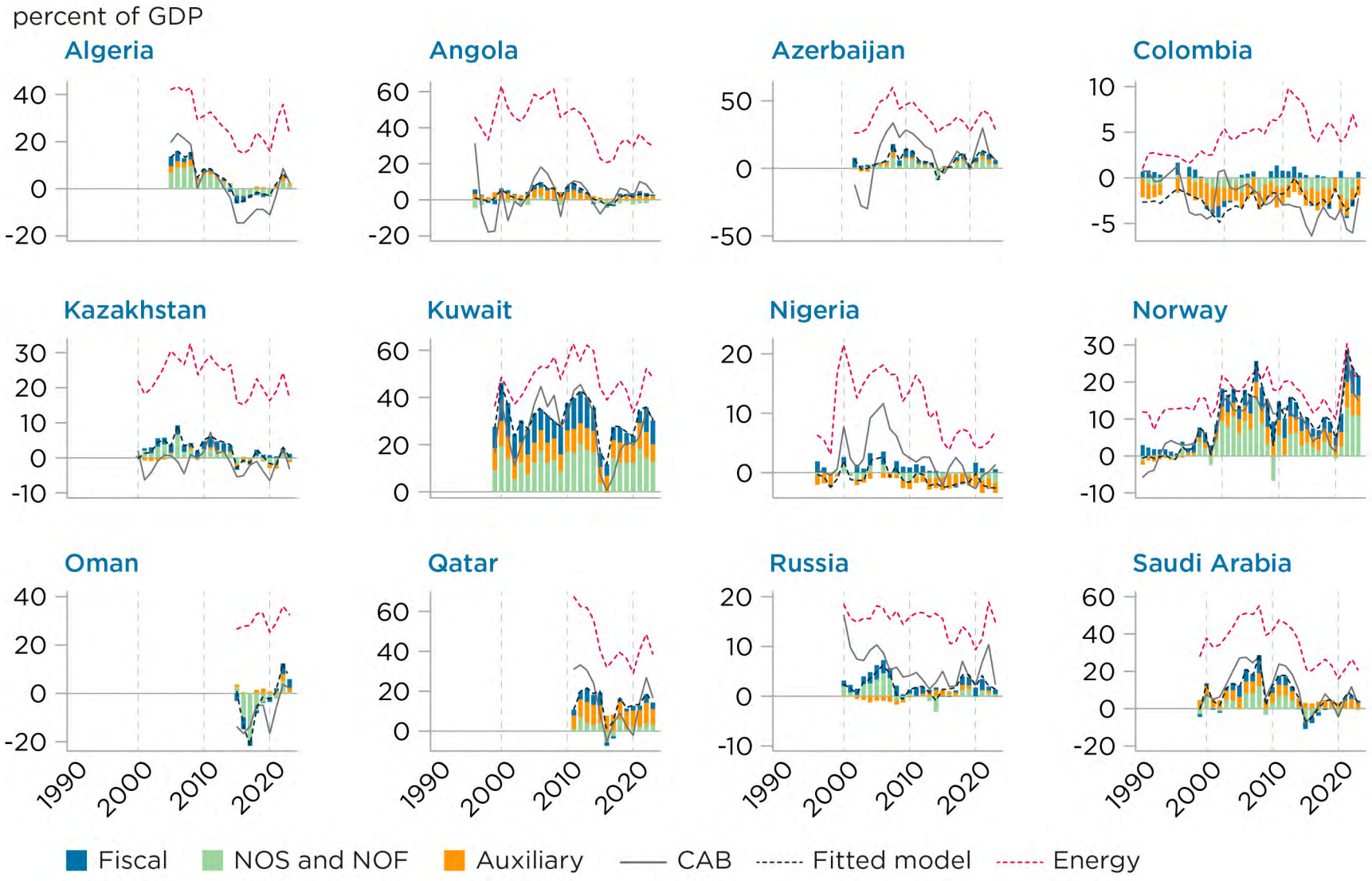
An important implication of this paper is that large net energy exports do not guarantee a current account surplus. Major energy exporters whose governments save their energy revenues through fiscal surpluses and net official flows and stocks tend to have commensurate CAB surpluses. Energy exporters whose governments do not save energy revenues tend to have small surpluses or even CAB deficits.

Figure 2 (page 17) displays the same data as figure 1 for 12 net energy exporters. In addition, the figure includes a red dashed line denoting ENERGY, net energy exports as a percent of GDP. Countries whose governments save a large fraction of energy exports include Kuwait, Norway, Qatar, and Saudi Arabia. In these countries, CAB is typically positive and equal to a substantial fraction of the value of ENERGY. For Norway, there is a sharp turning point after the establishment of its sovereign wealth fund in 1996. Prior to 1996, Norway's CAB was far below ENERGY. Afterwards, it jumped to a substantial fraction of ENERGY and this is largely explained by the rise in FISCAL, NOF, and NOS.[23] In Kuwait, there is a temporary decline in the CAB, as the government drastically reduced saving in 2015–16, even though ENERGY remained fairly high.

23 The rise is temporarily reversed by a massive foreign exchange intervention in 1998 to counter weakness in the Norwegian krone during the global financial turbulence that year.

Figure 2

Fitted models of current account balances for selected energy exporters



Source: Authors' calculations based on column 1 of table 1.

Countries whose governments do not save significant amounts of energy revenues, such as Angola, Colombia, Kazakhstan, and Oman, tend to have small or negative values of CAB. Nigeria is a bit puzzling, as it had a surge in CAB in the mid-2000s despite modest government saving. More recently, CAB in Nigeria has been close to the model prediction.

Comparison to the IMF's Current Account Model

Since 2013, the IMF has published a series of External Balance Assessment (EBA) models based on a panel regression framework similar to that of table 1 (Phillips et al. 2013). These models inform the IMF's critical work in monitoring and assessing global current account imbalances and the policies and economic forces that drive them. The most recent version of EBA (Allen et al. 2023, table 4) shares strikingly similar coefficients to the baseline model of table 1 for key variables that both models have in common: FISCAL, NOS, NPS, and GROWTH. However, a key difference is that EBA has a coefficient on its version of NOF that is higher when MOB=0 (0.6 versus 0.3 in table 1) and much lower when MOB=1 (0.0 versus 0.5). This subsection shows that these differences arise because the EBA definition of NOF and the countries in its sample exclude important observations in which large official flows in countries with high capital mobility are associated with large values of CAB.

Table 2 (pages 19–20) presents a sequence of regressions that move from the results of this paper toward the latest version of EBA. This sequence allows us to understand the reasons for differences in statistical results. Column 1 presents the baseline panel regression of this paper based solely on the CAB (equation 1). The coefficients are close to the baseline results in column 1 of table 1, reflecting the fact that the coefficients of a regression based on NPF (equation 2) are not very different and the baseline is the average of the two sets of coefficients. Column 2 limits the regression to the EBA countries and years, reducing the sample size by more than half. The main effects are moderate reductions in the NOF coefficients and increases in the NOS and NPS coefficients. The GROWTH effect is larger when MOB=1 and the AGING effect is smaller.

Table 2

Comparison to IMF's External Balance Assessment (EBA) model

Variables	Baseline	Baseline EBA sample	Alternate instruments	Reserves only	Reserves ex interaction	Reserves ex interaction OLS	EBA	Baseline ex interaction full sample
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*
Policy								
FISCAL	0.32** 0.05	0.28** 0.04	0.27** 0.04	0.29** 0.04	0.26** 0.04	0.32** 0.03	0.31** 0.07	0.25** 0.05
NOF (MOB=0)	0.36** 0.10	0.27** 0.10	0.44** 0.17					0.63** 0.14
NOF (MOB=1)	0.50** 0.14	0.30* 0.12	0.32** 0.11					0.58** 0.09
RESF (MOB=0)				0.81** 0.25	1.80** 0.28	0.60** 0.08	0.63** 0.23	
RESF (MOB=1)				0.35** 0.13	0.09 0.13	0.01 0.05	0 n.a.	
NOS (MOB=0)	0.03** 0.01	0.07** 0.01	0.06** 0.01	0.06** 0.01	0.03** 0.01	0.03** 0.01	0.04** 0.01	0.01 0.01
NOS (MOB=1)	0.00 0.01	0.01 0.01	0.01 0.01	0.02* 0.01				

table continues

Variables	Baseline	Baseline EBA sample	Alternate instruments	Reserves only	Reserves ex interaction	Reserves ex interaction OLS	EBA	Baseline ex interaction full sample
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*
Auxiliary								
NPS	0.02**	0.04**	0.04**	0.04**	0.04**	0.04**	0.04**	0.02**
	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
MOB	-2.13*	-2.17*	-2.13*	-1.58	0.98	-0.65*		-0.76
	0.84	0.99	0.99	1.02	0.53	0.33		0.42
ENERGY (MOB=0)	0.12**	0.12**	0.12**	0.15**	0.11**	0.11**		0.11**
	0.02	0.03	0.02	0.03	0.03	0.02		0.02
GROWTH (MOB=0)	-0.07	0.01	-0.02	-0.03	-0.23**	-0.18**		-0.15**
	0.08	0.09	0.09	0.09	0.06	0.05		0.05
GROWTH (MOB=1)	-0.29**	-0.46**	-0.45**	-0.46**			-0.30**	
	0.09	0.09	0.09	0.09			0.10	
RELGDP (MOB=0)	-1.76	-4.04**	-3.92**	-3.52**	2.59**	2.19**		4.60**
	1.26	1.05	1.03	1.04	0.59	0.57		0.44
RELGDP (MOB=1)	5.74**	3.18**	3.20**	3.61**				
	0.54	0.65	0.66	0.69				
AGING	0.16**	0.08*	0.07*	0.06	0.05	0.10**		0.11*
	0.04	0.03	0.03	0.03	0.04	0.03		0.04
R-squared	0.44	0.45	0.45	0.43	0.31	0.43	0.53	0.41
Observations	4,224	1,563	1,563	1,572	1,572	1,572	1,480	4,224

* p<0.05, ** p<0.01

Note: Numbers reported in blue are standard errors. Regressions are for equation 1 only. The EBA model coefficients (column 7) are from Allen et al. (2023). The EBA model covers 52 advanced and emerging-market economies from 1986 to 2019.

Source: Authors' calculations.

The standard instruments for NOF are not appropriate for the EBA regression because they focus on non-reserve flows, whereas EBA excludes non-reserve components of net official flows. Column 3 presents our baseline model in the EBA sample using the alternative instruments from table 1 (country dummies). This leads to a moderate rise in the NOF coefficients, especially when MOB=0, and little change in any other coefficient compared to column 2. Column 4 replaces NOF with net flows of foreign exchange reserves (RESF); this is a subset of NOF and is the variable used in EBA. This leads to a nearly identical coefficient when MOB=1 and a much larger coefficient when MOB=0 compared to column 3.[24] Other coefficients are largely unaffected.

Column 5 drops all MOB interactions except for RESF, as EBA does not include such interactions. This leads to a further rise in the RESF coefficient when MOB=0 and a fall to near 0 when MOB=1. The MOB coefficient rises. Other coefficients are little changed, with the newly unified coefficients taking on intermediate values between their low and high MOB values in column 4.

Column 6 presents the same model as column 5 without using instruments for RESF (OLS). EBA uses three instruments for RESF and we are missing some of the data needed to construct these instruments.[25] The OLS results provide a check on how sensitive the coefficients in column 5 may be to using alternative instruments. The main effect of the shift from instrumental variables to OLS is to reduce the RESF coefficient when MOB=0. The coefficient on MOB also becomes negative as it was in columns 1–4.

24 This regression shows that our broad conclusion that the effect of NOF is positive and significant is not sensitive to our construction of the non-reserve components of NOF. When the sample of the regression in column 4 is expanded to include all available countries and years, the NOF coefficients are 0.28 and 0.82 and the latter is highly significant.

25 The instruments are (1) global reserve flows; (2) the broad money supply (M2) relative to emerging market average as a share of GDP; and (3) a dummy variable for developing economies. M2 is missing for about one-quarter of the EBA sample in our data. In any case, we believe M2 is not a valid instrument because it is highly correlated with saving, which is an important driver of the CAB.

Column 7 presents the published EBA coefficients for variables that are shared between the two models.[26] The ENERGY and MOB variables are defined differently in EBA and their coefficients are not shown. EBA has more and different demographic variables, as well as other variables not shown here: an output gap, a credit gap, a measure of institutional quality, health spending, the commodity terms of trade, and a change in the real exchange rate. Nevertheless, the similarities between the shared coefficients in columns 6 and 7 are striking. The coefficients on FISCAL, RESF, NOS, and NPS are nearly identical.[27] The coefficients on GROWTH are not significantly different.

Of greatest interest are the coefficients on RESF. When MOB=0, these coefficients are essentially identical (0.6) across columns 6 and 7. The coefficients are also essentially identical (0.0) when MOB=1. Thus, the implied effect of RESF on CAB declines linearly from 0.6 when MOB=0 to 0.0 when MOB=1 in columns 6 and 7. However, the EBA RESF coefficient is not freely estimated when MOB>0; instead, it is constrained to be 0 when MOB=1. Such a constraint is not rejected in columns 5 and 6, where the effect is freely estimated to be around 0 when MOB=1. However, it is rejected in column 4.

The only difference between the regressions of columns 4 and 5 is the exclusion of MOB interactions in column 5. The economic case for including these interactions is equally strong for nearly all variables in the regression because restrictions on capital mobility are expected to shrink imbalances toward zero for any imbalance driven by private sector behavior. Given that several of these interactions are statistically significant, the IMF's decision to exclude them is hard to justify.

However, even if one accepts these exclusions of MOB interaction terms, there is no reason to expect that the effects of RESF (or NOF) must be 0 when MOB=1. MOB=1 when capital flow restrictions are at their minimum, but that does not imply that assets in different currencies are perfect substitutes or that financial

26 EBA uses a five-year projection for GROWTH, which is similar to, and highly correlated with, our five-year lagged GROWTH.

27 EBA constrains the coefficients on NOS and NPS to be identical by including only their sum, net foreign assets, in the regression.

markets in these economies are perfectly efficient. The main reason that this restriction is not rejected in the EBA data sample is that the EBA sample excludes important information on official financial flows in economies with high values of MOB. In particular, the focus on RESF ignores the effects of non-reserve official flows, such as Norway's large sovereign wealth fund. Figure 2 shows that Norway's large CAB is well explained by our model, including most importantly NOF and NOS driven by the sovereign wealth fund, despite having MOB=1 for most of the sample.

Replacing RESF with NOF in the regression of column 5 (not shown) yields coefficients of 1.00 when MOB=0 and 0.22 when MOB=1, both statistically significant. But this regression omits most economies with sovereign wealth funds or official development loans in foreign currencies. Column 8 displays the regression of column 5, replacing RESF with NOF, in the full sample of this paper. Now the NOF coefficients are 0.63 (MOB=0) and 0.58 (MOB=1) and each is highly significant, with no significant difference between them.

Altogether then, by excluding the effects of sovereign wealth funds and official external borrowing from the regressions, EBA eliminates much of the evidence that supports a robust role for net official flows in determining current account balances, including in economies with high levels of capital mobility. This exclusion occurs in two ways: first, EBA limits the analysis to reserve flows instead of all official flows (RESF vs. NOF), and second, EBA excludes many economies with official external debt or sovereign wealth funds from its sample, such as Saudi Arabia and Singapore.

LONG-TERM DRIVERS OF IMBALANCES

Cross-country Regressions in 2023

This section presents cross-country regressions of stocks of net foreign assets (or cumulated current account balances) on stocks of government debt, net official assets, and long-term averages of other driving variables. This simple approach focuses on long-term effects, whereas the annual panel approach of the previous section may underestimate long-term effects to the extent that these are hidden by lags in adjustment and short-term volatility in the independent variables.

Table 3 (page 25) presents regressions based on analogs to the variables in table 1. NFA is net foreign assets. CUMCA is the cumulated value of the current account balance (in US dollars) from 1981 through the date of the regression plus the dollar value of net foreign assets in 1980 all divided by GDP in dollars. GGDEBT is gross government debt.[28] NOS is the stock of net official foreign assets, as in table 1. SPILL is the world stock of net official assets times each country's share in official reserve holdings as of 2016.[29] NFA, CUMCA, GGDEBT, NOS, and SPILL are all expressed as a percent of each economy's GDP. MOB is the Chinn-Ito measure of capital mobility normalized to range from 0 to 1 and averaged over the 10 years prior to the date of the regression. ENERGY is the sum of net energy exports in the 10 years prior to and including the date of the regression divided by GDP in the date of the regression. GROWTH is the average growth rate of real GDP in the 10 years prior to the date of the regression. RELGDP is the average value of PPP GDP per capita relative to the United States over the 10 years prior to the date of the regression. AGING is the old age dependency ratio projected for 10 years after the date of the regression minus the value from 10 years before the date of the regression. The data appendix contains descriptions and source information for all variables used in the paper.

28 Net debt is not available for 65 of these economies. Using it does not change our core coefficients much. Neither net debt nor gross debt includes non-debt assets held by governments, which are important for some countries.

29 SPILL controls for the effect of official asset holdings in each economy on net foreign assets of other economies given that one country's assets are another country's liabilities. SPILL is constructed under the assumption that this effect is proportional to the shares of economies in issuing currencies held as foreign exchange reserves. The United States has by far the largest share, around 60 percent. A number of other advanced economies plus China have positive shares. SPILL in other economies is zero. If the effect of NOS on other countries' NFA or cumulated CAB is instead allocated equally across economies as a percent of their GDPs, it is well controlled by the constant term. In the latter case, the United States will still absorb the largest offset simply because it has the largest GDP.

Table 3

Net foreign asset (NFA) and cumulated current account (CUMCA) model

	NFA full model	NFA ex interactions	CUMCA ex interactions	CUMCA only energy exporters	CUMCA core model	NFA core model	NFA instrumental variables
	1	*2*	*3*	*4*	*5*	*6*	*7*
Policy							
GGDEBT	-0.51 0.44	-0.57* 0.23	-0.77* 0.35	-0.70 0.65	-0.67 0.38	-0.43 0.23	-0.67** 0.25
GGDEBTxMOB	-0.06 0.62						
NOS	1.66** 0.37	1.37** 0.14	0.84** 0.19	1.09** 0.24	1.10** 0.19	1.24** 0.13	0.99** 0.24
NOSxMOB	-0.40 0.54						
SPILL	-1.04 0.99	-0.05 1.04	2.09 1.39				
Auxiliary							
MOB	-112.19 93.61	-39.88* 18.76	-15.64 27.21				
MOBxMOB	95.43 82.34						
ENERGY	-0.01 0.11	-0.14 0.10	0.45** 0.15	0.21 0.18			
ENERGYxMOB	-0.29 0.23						
GROWTH	2.91 4.81	-3.50 3.73	1.55 6.27				
GROWTHxMOB	-11.65 7.99						
RELGDP	226.90 121.19	48.66 26.40	34.41 34.55	-81.93 40.68	76.54** 18.21	54.00** 19.10	72.65* 29.94
RELGDPxMOB	-181.34 125.22						
AGING	-371.99 199.43	207.11 163.04	195.41 131.72				
AGINGxMOB	737.23* 365.57						
Constant	-0.83 34.98	7.14 23.57	-21.78 32.19	60.80 43.89	-25.47 22.30	-21.86 13.57	-11.31 14.56
R-squared	0.78	0.74	0.65	0.77	0.58	0.70	0.70
Observations	137	137	137	24	142	142	137

* p<0.05, ** p<0.01

Note: Numbers reported in blue are standard errors.

Source: Authors' calculations.

All regressions in table 3 are based on 2023 stock data.[30] Column 1 presents a regression of NFA on all independent variables plus interactions of the independent variables with capital mobility (MOB) except for SPILL, which is nonzero mainly for economies with the highest degree of mobility. Only the AGING interaction term is statistically significant. Column 2 presents the same regression after dropping all interaction terms. Only three coefficients are significant at the 5 percent level: GGDEBT, NOS, and MOB. The coefficients imply that each dollar increase in GGDEBT reduces NFA by $0.57 and each dollar increase in NOS raises NFA by $1.37.

One concern with including NOS in a regression of NFA is that measurement error and valuation adjustments in official and private assets will pass through to NFA directly, since NFA is the sum of NOS and NPS. Moreover, valuation adjustments in NOS are likely positively correlated with valuation changes in NPS, which are not in the regression. These considerations tend to bias the coefficient on NOS upward relative to its effect on the current account over time. Column 3 addresses this concern by replacing NFA with CUMCA, the cumulated current account balance. In principle, NFA equals CUMCA plus any changes in the market values (valuation adjustments) of underlying assets. Because CUMCA is based on trade and income flows, it is not affected by measurement errors and valuation adjustments in NOS, and thus the NOS coefficient should not be biased upward in column 3. Three coefficients in column 3 are significant. The GGDEBT effect is a bit larger than in column 2, at –0.77. The NOS effect is smaller, at 0.84. And ENERGY is now significant at 0.45 but MOB is no longer significant.

The fact that the ENERGY coefficient is positive and significant in the CUMCA regression, but negative and not significant in the NFA regression, raises the possibility of measurement error again. This time, errors in ENERGY pass through to CUMCA because ENERGY is a large component of the current account in many economies. To explore this issue further, column 4 drops

30 2024 data are missing for roughly half of these economies, but the core results in 2024 are essentially identical for NOS, while the GGDEBT effect is somewhat smaller and the RELGDP effect is somewhat larger.

the insignificant variables of column 3 (except RELGDP, which is significant in later regressions) and limits the sample to the 24 economies that had positive net energy exports in every one of the 10 years prior to and including 2023. About half of these economies have policies that systematically save a large share of energy revenues in official foreign assets and half do not have such policies.[31] Those with explicit saving policies tend to have large current account surpluses and those without such policies tend to have current accounts in balance or even in deficit (as shown in figure 2). The estimated direct effect of ENERGY (as opposed to indirect through NOS) is smaller in column 4 than in column 3 and no longer statistically significant.[32] As in column 2, the coefficient on ENERGY in the same regression with NFA as the dependent variable (not shown) is negative and insignificant. Thus, we conclude that ENERGY is at most a minor contributor to trend current account balances except when the government chooses to save its energy revenues in official foreign assets.

Column 5 presents our core regression, after dropping ENERGY and sequentially dropping other variables that are not significant. We leave GGDEBT in because it is nearly significant in this regression and it is significant in some of the other regressions of this table. Each dollar of government debt reduces CUMCA by $0.67. Each dollar of net official assets raises CUMCA by $1.10. Raising PPP per capita GDP by 10 percent (0.10) of the US level raises CUMCA by nearly 8 percent of GDP; in other words, richer economies tend to run trade surpluses. The equation R^2 shows that this simple specification with three variables explains nearly 60 percent of the variation in CUMCA across 142 economies.[33]

31 More than half (15) have sovereign wealth funds, but a few of these have not saved significant amounts of oil revenues.

32 The same regression in 2018 yields an even smaller coefficient (0.11) on ENERGY that is also not significant, whereas the coefficient on NOS is essentially unchanged and highly significant.

33 Tariff data are available for 100 of these economies. Neither simple average tariffs nor effective tariffs are significant when added to the core regression for 2023. (Tariffs are calculated as averages over the 10 years prior to the regression date, similar to RELGDP.) Simple average tariffs (but not effective tariffs) have a significantly positive coefficient in 2018.

Column 6 presents the core regression using NFA as the dependent variable. The coefficients on GGDEBT and RELGDP decline a bit while that on NOS rises, but not as much as in columns 1 or 2. This likely reflects the measurement error and valuation adjustment issues described earlier, and column 5 remains our preferred specification.

Column 7 runs the same regression as column 6 using ENERGY as an instrument for NOS to mitigate the measurement error and valuation adjustment issues. The results here are more plausible. In fact, they are similar to the core results in column 5, with an even more plausible coefficient on NOS. ENERGY seems to be a valid instrument for NOS when the dependent variable, NFA, is not affected by measurement error in ENERGY, unlike CUMCA.

Robustness to Countries and Years

Table 4 (page 29) presents results on the robustness of our core model to changes in the sample. Column 1 repeats the core regression (column 5 of table 3). Column 2 limits the sample to 36 advanced economies. The coefficient on NOS declines moderately but remains highly significant. The coefficient on GGDEBT shrinks considerably and that on RELGDP nearly doubles, though neither change is statistically significant. Column 3 focuses on 106 developing economies. The coefficients all move in the opposite direction compared to those for the advanced economies. The NOS coefficient rises slightly from its column 1 value. The coefficient on GGDEBT becomes more negative and that on RELGDP less positive, but neither change from the column 1 value is significant. Overall, the NOS effect is large in both advanced and developing economies, whereas the GGDEBT effect is mainly seen in developing economies and the RELGDP effect is much stronger for advanced economies.

As is shown in figure 3 on page 30, for a few economies NOS exceeds 200 percent of GDP in 2023. To explore whether our results are reliant on a small set of outliers, column 4 limits the regression to economies in which the absolute value of NOS is less than 50 percent of GDP. This restriction has only modest effects on the NOS and RELGDP coefficients. It does reduce the GGDEBT coefficient noticeably, but not significantly.

Table 4

Cumulated current account (CUMCA) model in different samples

	CUMCA core	Advanced economies	Developing economies	|NOS|<50	2018	2010
	1	*2*	*3*	*4*	*5*	*6*
Policy						
GGDEBT	-0.67 0.38	-0.21 0.44	-0.83 0.48	-0.37 0.24	-0.33 0.39	-0.50* 0.24
NOS	1.10** 0.19	0.75** 0.20	1.20** 0.23	1.28** 0.44	1.22** 0.26	0.89** 0.15
Auxiliary						
RELGDP	76.54** 18.21	128.01** 32.82	48.45 58.92	80.45** 17.65	67.88** 19.20	54.05** 14.56
Constant	-25.47 22.30	-90.07* 41.09	-8.72 32.64	-43.01** 14.30	-46.76** 17.74	-37.69** 9.97
R-squared	0.58	0.54	0.58	0.29	0.58	0.52
Observations	142	36	106	128	143	141

* p<0.05, ** p<0.01

Note: Numbers reported in blue are standard errors.

Source: Authors' calculations.

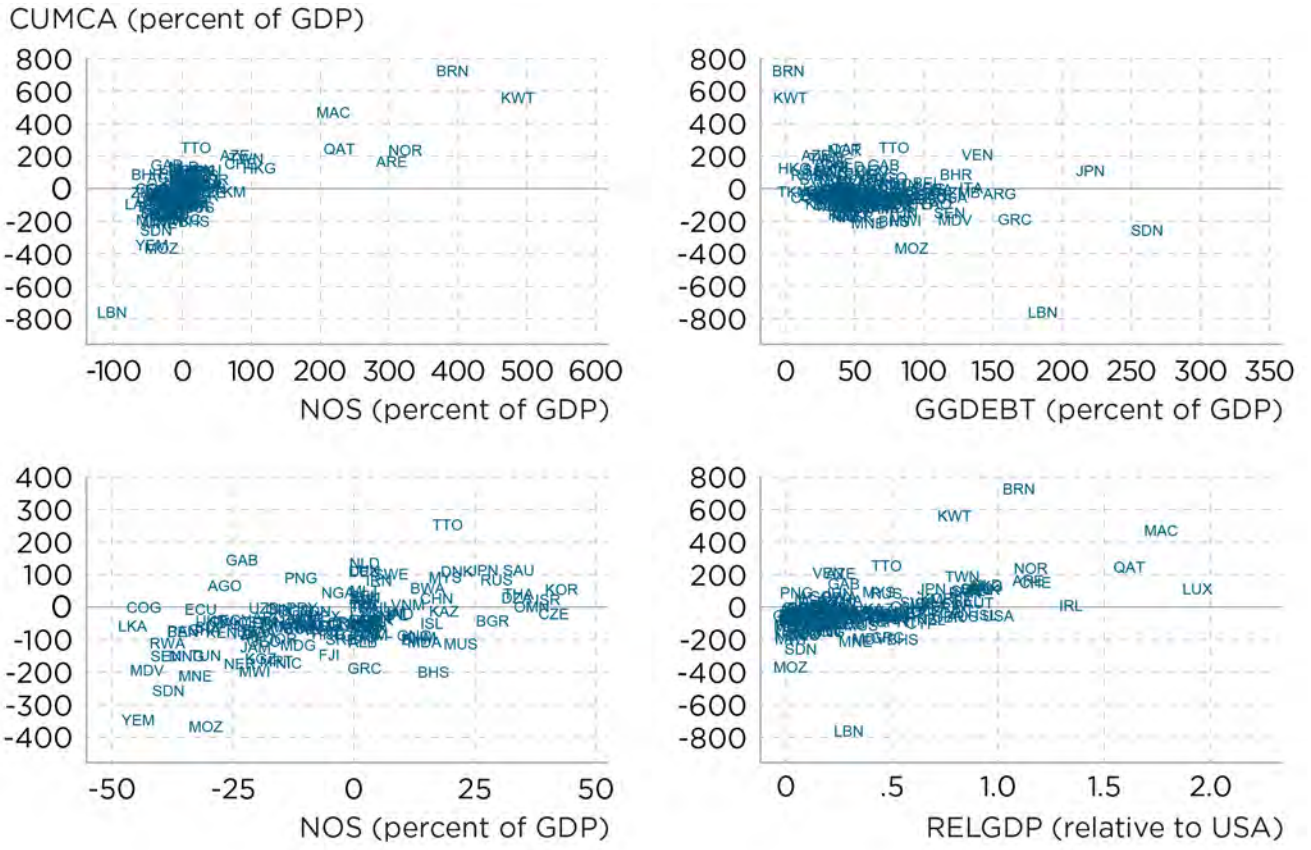
Column 5 runs the core regression with 2018 data and the main change is a reduction in the GGDEBT coefficient. Column 6 runs the core regression with 2010 data. All coefficients shrink moderately from their column 1 values, but none of the changes is statistically significant.

Altogether, evidence from the cross-country stock regressions strongly supports the conclusion that government borrowing and net official asset purchases have important effects on the current account. However, the coefficient near 1 for NOS is at the upper limit of what is theoretically possible. In this regard, the results from the annual regressions of table 1, in which the sums of the FISCAL and NOF coefficients lie between 0.5 and 1.0, are more plausible.[34]

34 Roughly speaking, the regressions in tables 3 and 4 are stock analogs of the flow regressions in tables 1 and 2. However, the stock analog of FISCAL flows is the government's net financial asset position, which is not available for most countries. GGDEBT excludes all assets and net debt excludes equity holdings.

Figure 3

Cumulated current accounts and core explanatory variables in 2023



Source: Authors' illustration using data described in data appendix.

Figure 3 presents scatterplots of the core model data. The positive correlations of CUMCA with NOS and RELGDP are readily apparent, as is the negative correlation of CUMCA and GGDEBT. The correlation between CUMCA and NOS is not driven solely by large outliers in NOS, as is demonstrated in the lower left panel, which is restricted to observations with –50<NOS<50.

CONCLUSION

The evidence strongly suggests that governments can buy current account surpluses. Raising the fiscal balance by $1 tends to raise the current account by $0.30. Issuing $1 of domestic currency debt to buy foreign-currency assets (foreign exchange intervention) raises the current account anywhere from $0.20 to $1.00, with a value

around $0.50 to $0.60 most plausible.[35] The most powerful policy, as exemplified by Norway and Singapore, is to run a fiscal surplus and invest the proceeds in foreign-currency assets. In that case, $1 buys a current account surplus of around $0.80 or so.

The results are supported by annual panel regressions of current accounts and cross-country stock regressions of cumulated current accounts or stocks of net foreign assets. The estimated effects in the panel regressions may be biased down slightly by incomplete modeling of lagged effects. The estimated effects in the stock regressions appear to be biased upwards in ways that we are only partly able to correct. Nevertheless, the overall conclusion from both sets of regressions is very powerful and robust to changes in sample and methodology.

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35 In this regard, the baseline model NOF coefficient of 0.30 when MOB=0 seems too low. It is near the bottom of the range of values shown in this paper, and theory suggests that the NOF coefficient when MOB=0 should be at least as large as that when MOB=1. Thus, we find the most plausible range for the NOF effect to be 0.50 to 0.60 for both high and low values of capital mobility.

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DATA APPENDIX

The principal sources of data used for the analysis in this paper are the IMF Balance of Payments (BOP), International Investment Position (IIP), International Reserves and Foreign Currency Liquidity (IRFCL), and World Economic Outlook (WEO) databases. Other data used are the World Bank's World Development Indicators (WDI) database and the External Wealth of Nations (EWN) database curated by Gian-Maria Milesi-Ferretti at the Brookings Institution. A few series are taken from other sources as described below. All data are annual. All stocks and flows are expressed in percent of nominal GDP. BOP, IIP, and WEO data, as well as the Chinn-Ito capital mobility data, are from April 2026. The EWN data and data related to sovereign wealth funds were accessed in January 2026. IRFCL, WDI, and other data were downloaded in August-September 2025.

Regressions and figures exclude countries with 2024 GDP less than $5 billion. Also excluded are countries heavily affected by war or sanctions: Afghanistan, Iraq, Libya, Syria and South Sudan. Haiti, Kosovo, Sierra Leone, and Somalia are excluded because of limited availability of energy data. Barbados and Mauritius (before 2011) are excluded due to implausibly large swings in net foreign assets. The following observations are excluded owing to sharp spikes in net financial flows or net official flows, often arising from debt forgiveness:[36] Botswana (2000–2004), Republic of Congo (1994), Ecuador (1995), Guinea (2011–2012), Honduras (2006–2008), Croatia (2023), Iceland (2008–2010), Kenya (1995–1999), Kyrgyz Republic (2022–2024), Laos (2010), Madagascar (1997), Mozambique (2001), Mauritania (2019), Niger (2006), Nicaragua (1996), Rwanda (2006), Sudan (1991), and Uruguay (2002–2003).

*Net official asset stocks (**NOS**)* are the sum of foreign exchange reserves and nonreserve official foreign assets minus official foreign liabilities.

The primary source for *foreign exchange reserves (**RESS**)* is the IIP database. It is calculated as Total Reserve Assets minus

36 Including the following observations has little effect on the coefficients of the baseline model.

Monetary Gold and Special Drawing Rights Liabilities. Missing observations are filled in with data from the "FX Reserves minus gold" series in the EWN database. The net long position in financial derivatives (forwards, futures, or options contracts) is added where available in the IRFCL database. Reserve assets for Iran from 2012–2021 are from the Central Bank of Iran. Foreign exchange reserve data for Norway for 1993 is from EWN. Foreign exchange reserve data for Taiwan are from the Central Bank of the Republic of China. For euro area countries, reserves are held both at the national central banks and at the European Central Bank. IMF data for the euro area include all of these reserves; reserves for each member country as a share of GDP are set equal to the euro area total as a share of euro area GDP.

*Nonreserve official foreign assets (**NROAS**)* are assumed to be zero for countries without a sovereign wealth fund (SWF). IIP data are used for the following countries with SWFs: Russia, Korea, Kazakhstan, Bahrain, Chile, Colombia, Angola, Guyana, Nigeria, Israel, Panama and Mauritius. These countries' nonreserve official foreign assets are set equal to the sum of the central bank's or general government's holdings of "Equity and Investment Fund Shares" as well as "Debt Securities" within the "Portfolio Investment" asset category and "Currency & Deposits," "Loans," as well as "Insurance & Pension" within the "Other Investment" asset category in the IIP database.

For countries with SWFs that are not included in the official IIP asset data, data come from other sources that provide information on assets held by SWFs. The Sovereign Wealth Fund Institute (SWFI) and the Center for the Governance of Change at IE University's SWF annual reports (IE-SWF) are used for the following countries: Azerbaijan, Brunei Darussalam, Ghana, Kuwait, Malaysia, Oman, Qatar, Trinidad and Tobago, and the United Arab Emirates.

Official foreign assets for Algeria are set to 0 before the founding of its SWF in 2000. In 2000–16, they are set equal to the value of the Revenue Regulation Fund from the Ministry of Finance and in 2017, 2018, and 2022 from archived data of SWFI, which was accessed using the Wayback Machine. Official foreign assets for Macao are set to zero before the start of its fiscal reserve in 2012. Fiscal reserve data for 2012–18 are from IMF Article IV reports and fiscal reserve data for 2019–24 are from the Monetary Authority

of Macao. For Norway, data on the SWF are from Norges Bank. China's official foreign assets are from SWFI and China Investment Corporation annual reports.

Saudi Arabia moved SWF assets into reserves in 2005, so NROAS is set to zero after that, and for earlier years, data from Gagnon and Sarsenbayev (2021) are used. For the UAE, Oman, and Brunei, data from Gagnon and Sarsenbayev (2021) are extended using IE-SWF annual reports.

Missing values for nonreserve official foreign assets are constructed for some years for Algeria, Angola, Kuwait, Singapore, and Qatar using the perpetual inventory (PI) method equation: NROAS = (1+VALRATE) * NROAS(–1) + NROAF. NROAF is nonreserve official asset flows, defined below. VALRATE is the change in the market value of the previous year's stock of official assets expressed as a rate of return. The PI method can run both backward and forward from any year in which we have stock data. It requires flow data and an estimate of VALRATE, which is based on the average VALRATES of Chile, Korea, Norway, and Russia, all of which have both stock and flow data. For Singapore, data from Gagnon and Sarsenbayev (2021) are extended using the PI method with NROAF. However, in the case of Singapore the PI method creates implausible values toward the end of the sample, which led us to drop Singapore from the 2023 stock regressions (tables 3 and 4) but Singapore is included in the annual flow regressions because NOF is obtained from official data and the coefficient on NOS is small, with any errors in NOS limited to the last few years of the sample.

The main source for official foreign liabilities is public and publicly guaranteed external debt stocks from the WDI dataset. For advanced economies, official foreign liabilities are assumed to be in local currency and are set to zero (they are missing in the WDI dataset). For developing economies that are missing in the WDI dataset, we use the IMF IIP data. For developing economies with missing data in both WDI and IIP, we set official liabilities to 0, as these tend to be wealthier countries such as major oil producers. Analogous to NROAS, official liabilities are defined as the sum of the following liabilities: Official foreign liabilities for Oman and Malaysia come from the central bank. Nicaragua is set to missing

for 1990 due to an extreme jump in the data in that year. Uruguay official foreign liabilities are interpolated for the years 1988–89.

*Spillovers from NOS to other countries (**SPILL**)* are the world stock of NOS times each country's share in the issuance of official foreign exchange reserves (IMF COFER data) as of 2016.

*Net financial assets (**NFA**)* are the differences between a country's external financial assets and its liabilities from EWN.

*Net private financial stocks (**NPS**)* are the difference between a country's NFA and NOS.

*Net official flows (**NOF**)* are the sum of foreign exchange reserve flows and nonreserve official asset flows minus official liability flows. Financial flows include purchases and sales of assets, extension and repayment of loans, and reinvested income earned on assets. This definition ensures that the current account equals the financial account in principle. Flows do not include changes in the market valuation of existing assets.

*Foreign exchange reserve flows (**RESF**)* are primarily from the BOP dataset: Reserve Assets, US dollars. Flows of monetary gold and Special Drawing Rights liabilities are subtracted from this series. Where data are available in the IRFCL dataset, changes in financial derivatives (forwards futures or options contracts) are added to reserve flows. For Taiwan, forward positions data are obtained from the central bank. Missing values are filled using perpetual inventory method. $RESF_t = RESS_t - RESS_{t-1} (1 + VALRATE_t)$, where VALRATE is based on the average of all countries with complete data. For euro area countries, reserve flows are replaced with euro area aggregates analogous to the treatment of reserve stocks above.

*Nonreserve official asset flows (**NROAF**)* are taken from asset-side "portfolio flows" and "other flows" for the central bank and general government for countries with SWFs, analogously to the nonreserve official stocks described above. For countries without SWFs, NROAF is set to zero. Singapore's nonreserve official asset flows are the sum of the "Other Investment" and "Portfolio Investment" series in the BOP dataset, which is taken from national sources via Macrobond, and set as missing prior to 1995, when the portfolio flows begin. Nonreserve official asset flows for Saudi Arabia, Macao, China, the United Arab Emirates, Brunei, Oman,

Malaysia, Trinidad and Tobago, Israel, Mauritius, Bahrain, and Panama are extrapolated using the PI method based on nonreserve official asset stocks (NROAS). For Algeria, the PI method is used to fill missing NROAF for the years 2000–04 where NROAS is publicly available.[37]

Official liability flows are based on liability-side "portfolio flows" (Debt securities and Equity and investment fund shares) and "other flows" (Currency & Deposits, Loan and Insurance & Pension) for the central bank and general government, removing debt forgiveness flows, as measured by BOP "Capital Account, Capital Transfers, General Government, Debt Forgiveness, Credit, US Dollars." For several countries, where BOP data are not available, change in public and publicly guaranteed external debt stocks from the WDI dataset is used after subtracting debt forgiveness flows. Consistent with the treatment of official liability stocks, for advanced economies (as defined by the IMF), official foreign liability flows are assumed to be in local currency and are thus set to zero.

*Current account balances (**CAB**)* are taken from BOP. Missing values are filled in with data from WEO.

*Net private financial flows (**NPF**)* are defined as the difference between the financial account balance and NOF. The financial account balance is taken from the BOP dataset and debt forgiveness flows are subtracted where available. Data on the financial account balance for Taiwan are obtained from Macrobond. Data on the financial account balance for UAE is obtained from Central Bank of UAE.

*Gross domestic product (**GDP**)* (in US dollars, nominal local currency, and real local currency) come from WEO.

*Output gap (**GAP**)* is 100 times the deviation of the logarithm of real GDP from the 11-year centered moving average of log real GDP, where the forward years near the end of the sample are based on WEO projections.

*Fiscal balances (**FISCAL_UNADJ/GDP**)* are defined as general government net lending in percent of GDP from WEO. Missing values

37 As mentioned above, the PI method was used to fill in missing values for NROAS in Algeria in 2019–24 based on published values of NROAF.

are filled in with data from WDI (except for India, where the WDI data looked incompatible with the WEO data). Data for Cameroon, Central African Republic, Mali, and Niger in 2006 are replaced by interpolation to remove spikes from debt forgiveness. 2006 values for Burkina Faso and Zambia are replaced with WDI data. Nicaragua's 1990 value and Equatorial Guinea's pre-1996 values are set to missing.

The *cyclically adjusted fiscal balance* as a share of GDP (***FISCAL/GDP***) is constructed as the residual from a regression of FISCAL_UNADJ/GDP on GAP and the change in GAP, shown in table A.1 on page 39.

Net energy exports (***ENERGY***) are from WDI energy exports and imports as a share of merchandise trade times the value of merchandise trade expressed as a percent of nominal GDP. Some apparent errors in certain years for the Bahamas and Zimbabwe are set as missing. Missing values are interpolated in volume terms separately over the periods 1985–99, 1999–2010, and 2010–24 (and the interpolations were not done for countries missing data at the endpoints of these periods) and then converted to values using Brent oil prices and the historical ratio of the country's energy prices to Brent prices. Cyprus, Venezuela, Angola, Uzbekistan, Laos, Myanmar, and Tajikistan are excluded from these interpolations, as well as countries that have less than five observations for net energy exports.

Remaining missing observations are replaced with an alternative series calculated based on net energy imports as a share of energy use and energy use per capita from WDI as well as population, oil price, and GDP series from WEO. The alternative series is used as the primary source for Democratic Republic of Congo, Equatorial Guinea, Serbia, and Turkmenistan. It is also used to fill missing values before the main series starts for Angola, Belgium, Ethiopia, Iran, Luxembourg, Myanmar, Namibia, Nigeria, Tajikistan, Tanzania, Uganda, Uzbekistan, Yemen, and Zambia, for Bahrain before 2001 and after 2020, for Chad from 2002 onward, for UAE before 2003.

Energy consumption data for Taiwan are taken from the Republic of China (Taiwan) Ministry of Economic Affairs, with physical volumes multiplied by prices for various energy items reported in WEO.

*Capital mobility (**MOB**)* is the Chinn-Ito measure based on legal restrictions to private capital flows and is normalized to lie between 0 and 1, with higher values denoting greater openness. Some of the countries with missing data are set equal to the values for their neighboring countries: Brunei is set equal to Malaysia; Macao to Hong Kong; Luxembourg to Belgium; Montenegro and Serbia to Croatia; and Taiwan to Korea.

*Relative PPP GDP per capita (**RELGDP**)* is constructed from WEO data. It is a country's purchasing power parity (PPP) adjusted GDP per capita divided by the US per capita GDP.

*Old age dependency ratio (**AGE**)* is the ratio of the population aged 65 and older to the population between 15 and 64. Data are from the United Nations World Population Prospects 2024 database and include projections to 2035.

*Projected aging (**AGING**)* is the change in AGE over the subsequent 10 years. In the stock regressions (tables 3 and 4), it is the value of AGE 10 years after the date of the regression minus the value of AGE 10 years before the date of the regression.

Table A.1

Regression to create adjusted fiscal balance

Variables	Fiscal regression
GAP	0.203** 0.017
Change in GAP	0.125** 0.019
Constant	-2.204** 0.080
Observations	5,008
R-squared	0.061

** p<0.01

Note: Numbers reported in blue are standard errors.

Source: Authors' calculations.

Table A.2

Countries included in the regression sample

1	Albania	30	Croatia[a]
2	Algeria	31	Cyprus[a]
3	Angola	32	Czech Republic[a,b]
4	Argentina[b]	33	Democratic Republic of the Congo
5	Armenia	34	Denmark[a,b]
6	Australia[a,b]	35	Dominican Republic
7	Austria[a,b]	36	Ecuador
8	Azerbaijan	37	Egypt[b]
9	Bahrain	38	El Salvador
10	Bangladesh[b]	39	Estonia[a]
11	Belarus	40	Ethiopia
12	Belgium[a,b]	41	Fiji
13	Benin	42	Finland[a,b]
14	Bolivia	43	France[a,b]
15	Bosnia and Herzegovina	44	Gabon
16	Botswana	45	Georgia
17	Brazil[b]	46	Germany[a,b]
18	Brunei Darussalam	47	Ghana
19	Bulgaria	48	Greece[a,b]
20	Burkina Faso	49	Guatemala[b]
21	Cambodia	50	Guinea
22	Cameroon	51	Guyana
23	Canada[a,b]	52	Honduras
24	Chad	53	Hong Kong SAR[a]
25	Chile[b]	54	Hungary[b]
26	China[b]	55	Iceland[a]
27	Colombia[b]	56	India[b]
28	Costa Rica[b]	57	Indonesia[b]
29	Côte d'Ivoire	58	Ireland[a,b]

table continues

59	Iran	90	Myanmar
60	Israel[a,b]	91	Namibia
61	Italy[a,b]	92	Nepal
62	Jamaica	93	Netherlands[a,b]
63	Japan[a,b]	94	New Zealand[a,b]
64	Jordan	95	Nicaragua
65	Kazakhstan	96	Niger
66	Kenya	97	Nigeria
67	Korea[a,b]	98	North Macedonia
68	Kuwait	99	Norway[a,b]
69	Kyrgyz Republic	100	Oman
70	Laos	101	Pakistan[b]
71	Latvia[a]	102	Panama
72	Lebanon	103	Papua New Guinea
73	Lithuania[a]	104	Paraguay
74	Luxembourg[a]	105	Peru[b]
75	Macao SAR[a]	106	Philippines[b]
76	Madagascar	107	Poland[b]
77	Malawi	108	Portugal[a,b]
78	Malaysia[b]	109	Qatar
79	Maldives	110	Republic of Congo
80	Mali	111	Romania[b]
81	Malta[a]	112	Russia[b]
82	Mauritania	113	Rwanda
83	Mauritius	114	Saudi Arabia
84	Mexico[b]	115	Senegal
85	Moldova	116	Serbia
86	Mongolia	117	Singapore[a]
87	Montenegro	118	Slovak Republic[a]
88	Morocco[b]	119	Slovenia[a]
89	Mozambique	120	South Africa[b]

table continues

121	Spain[a,b]	134	Türkiye[b]
122	Sri Lanka[b]	135	Turkmenistan
123	Sudan	136	Uganda
124	Sweden[a,b]	137	Ukraine
125	Switzerland[a,b]	138	United Arab Emirates
126	Taiwan[a]	139	United Kingdom[a,b]
127	Tajikistan	140	United States[a,b]
128	Tanzania	141	Uruguay[b]
129	Thailand[b]	142	Uzbekistan
130	The Bahamas	143	Vietnam[b]
131	Togo	144	Yemen
132	Trinidad & Tobago	145	Zambia
133	Tunisia[b]	146	Zimbabwe

a. Denotes advanced economy based on IMF 2025 classification.
b. Denotes economy included in the IMF EBA model.

GLOSSARY

AGE	The old age dependency ratio, defined as the ratio of the population aged 65 and older to the population between 15 and 64
AGING	10-year forward change in AGE
AUX	Auxiliary variables
BOP	Balance of payments
CAB	Current account balance
COFER	Currency Composition of Official Foreign Exchange Reserves
EBA	External Balance Assessment
ENERGY	Net energy exports
FIS_UNADJ	Fiscal balance
FISCAL	Cyclically adjusted fiscal balance
GAP	Output gap
GGDEBT	Gross general government debt
GROWTH	GDP growth rate
MOB	Measure of international capital mobility
NFA	Net foreign assets
NOF	Net official financial flows
NOS	Net stock of official financial assets and liabilities
NPF	Net private financial flows
NPS	Net private financial stocks
NROAF	Nonreserve official asset flows
NROAS	Net stock of nonreserve official assets
OLS	Ordinary least squares
RELGDP	Purchasing power parity–adjusted GDP per capita relative to the United States
RESF	Foreign exchange reserve flows

table continues

RESS	Foreign exchange reserves
SPILL	Allocation of world NOS to reserve-issuing countries
SWF	Sovereign wealth fund
VALRATE	Change in the market value of last year's stock of foreign exchange reserves or nonreserve official assets

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