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The responsiveness of the income balance to the exchange rate

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Abstract

We estimate income balance semi-elasticities with respect to the exchange rate for a wide sample of countries and for different types of income. Semi-elasticities are small for most countries. Therefore, the income balance is generally not a significant channel through which the exchange rate stabilizes the current account and most exchange rate misalignment estimates can focus on trade. However, our method allows for country variation and indicates a significant minority of exceptions.

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1. INTRODUCTION

Large or persistent current account deficits typically precede crises (Catão & Milesi-Ferretti, 2014) and often correct following crises (Lane & Milesi-Ferretti, 2011). Exchange rate (ER) adjustment is often associated with current account rebalancing (Obstfeld & Rogoff, 1995). However, studies are overwhelmingly of the aggregate current account balance (CAB), potentially with an accompanying discussion of trade channels, or focused on trade (Abiad et al., 2014).

External sector assessments map CAB misalignments to ER misalignments using the semi-elasticity of the CAB, η^{CA}, as a share of GDP to the ER; however, η^{CA} traditionally assumes adjustment occurs exclusively through trade (Cubeddu et al., 2019).

The income balance (IB) is at least half of the trade balance (TB) in absolute value terms in half of the world's countries and could thus influence the effectiveness of the ER in correcting the CAB. However, compared to trade, income flows have received little attention. In this paper, we estimate the semi-elasticity of the IB to the ER, η^{IB}. We draw implications for the role of income flows as a stabilization channel and ER misalignment.

Our paper is related to Alberola et al. (2020), who find no significant role for ERs. Although their focus is on investment income flows, we also investigate the role of secondary income. Their regressand is the IB but we estimate elasticities for income receipts and payments separately, which allows us to derive country-specific IB semi-elasticities. The approach is like Colacelli et al. (2021) but more granular. Our sample is substantially larger than in either of these studies and includes low-income countries (LICs). Moreover, we exploit the cross-country variation generated by our approach to assess implications for ER misalignment (Sarno & Taylor, 2003). As a sign of growing recognition of the IB, Allen et al. (2023) propose incorporating it in IMF external sector assessments.

Section 2 introduces the data and empirical approach and Section 3 presents the results. η^{IB} has a symmetric distribution with most values near zero. As discussed in Section 4, this suggests that the IB is generally not a channel through which the ER stabilizes the CAB. However, for many exceptions, the IB is an arithmetically important omission when estimating ER misalignment.

2. DATA AND EMPIRICAL APPROACH

The IB consists of primary income, which mainly consists of investment income paid/received on foreign liabilities/assets, and secondary income, which consists of workers' remittances and other transfers. In absolute value terms, the IB and TB are comparable: $\frac{|IB|}{|TB|} > 1$ in 37 countries and $1 > \frac{|IB|}{|TB|} > 0.5$ in 57 (Table 1). Advanced economies (AEs) are on average net payers of both primary and secondary income while emerging markets (EMs) and LICs are on average net payers of primary income and net recipients of secondary income (Behar & Hassan, 2022).

Table 1: Summary statistics, 2017-2019 average, share of GDP.

Statistic	25th Percentile	Median	75th Percentile
IB	-2.22	0.54	6.42
Primary IB	-4.34	-2.32	0.1
Secondary IB	-0.39	2.37	7.57
TB	-13.94	-3.1	1.98
CAB	-6.4	-2.65	1.17
|IB/TB|	0.26	0.59	0.91
Observations: 169			

Unlike for trade, the theory on nominal income balance responses to depreciations is not well established and there are offsetting channels. Valuation effects following a depreciation imply a rise in local-currency inflows from foreign assets denominated in foreign currency (FC) and a rise in local-currency outflows from foreign liabilities denominated in FC. The net effect depends on the relative sizes of the investment income balance, which is related to net foreign assets (NFA), and on currency composition. In a 50-country sample, the median NFA is –21 percent (Bénétrix et al., 2019), which suggests a net deterioration of the IB after a depreciation. However, because almost all foreign assets are denominated in FC while only one-third of foreign liabilities are denominated in FC for the median country, currency composition implies an IB improvement. A depreciation can increases local-currency profits from exports and thus increase profits repatriated abroad (Behar, 2021). Depreciations increase remittance inflows (Yang, 2008).

We decompose $\eta^{IB} \equiv \frac{\Delta\left(\frac{IB}{GDP}\right)}{\frac{\Delta ER}{ER}}$ as follows:

$$\eta^{IB} = \mu^{Credit}\left(\frac{IC}{GDP}\right) - \mu^{Debit}\left(\frac{ID}{GDP}\right) \quad (1)$$

$\frac{IC}{GDP}$ and $\frac{ID}{GDP}$ are the ratio of income credit and debit to GDP, respectively, and are observable. μ^{Credit} is the exchange rate elasticity of nominal income credits over GDP and estimated by OLS as follows:

$$\ln\left(\frac{IC}{GDP}\right)_{it} = \delta_1^{IC}\ln\left(\frac{IC}{GDP}\right)_{it-1} + \sum_{j=0}^{1}\beta_j^{IC}\ln(\mathrm{ER}_{\mathrm{it-j}}) + \gamma_1^{\mathrm{IC}}\ln\left(\frac{F.Asset}{GDP}\right)_{it-1} + \lambda^{IC}ln\,(RGDP_{it}) + C_i + \Gamma_t + \varepsilon_{it} \quad (2)$$

(2) includes country and year fixed effects, real GDP, and one lag of the dependent variable and the ER, specifically the Real Effective Exchange Rate. It also includes financial assets. The specification for the income debits elasticity, μ^{Debit}, has liabilities instead of assets. Long-run elasticities are:

$$\mu^{Credit} = \frac{\sum_{j=0}^{1} \beta_j^{IC}}{1 - \delta_1^{IC}} \ , \ \mu^{Debit} = \frac{\sum_{j=0}^{1} \beta_j^{DB}}{1 - \delta_1^{DB}} \quad (3)$$

3. EMPIRICAL RESULTS

Consistent with earlier work, we find a significant effect for assets/liabilities on income and the ER is significantly negative for income credits and debits (Table 2).

Table 2: Elasticity panel regressions.

	All Countries		Advanced		Emerging Markets		Low-income		Primary Income		Secondary Income	
	IB Credit	IB Debit	IB Credit	IB Debit	IB Credit	IB Debit	IB Credit	IB Debit	PIB Credit	PIB Debit	SIB Credit	SIB Debit
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Y (t-1)	0.84***	0.77***	0.83***	0.88***	0.78***	0.74***	0.81***	0.74***	0.75***	0.69***	0.79***	0.78***
	(0.05)	(0.04)	(0.04)	(0.04)	(0.04)	(0.05)	(0.05)	(0.06)	(0.05)	(0.05)	(0.02)	(0.02)
log (REER(t))	-0.89***	-0.87***	-0.30	-0.47***	-1.14***	-0.91***	-0.53***	-0.95***	-0.87***	-0.91***	-0.59***	-0.32*
	(0.11)	(0.1)	(0.24)	(0.13)	(0.1)	(0.10)	(0.16)	(0.27)	(0.16)	(0.11)	(0.12)	(0.17)
log (REER(t-1))	0.78***	0.70***	0.31	0.44***	0.86***	0.66***	0.48***	0.78**	0.46***	0.71***	0.42***	0.17
	(0.15)	(0.15)	(0.21)	(0.13)	(0.15)	(0.12)	(0.20)	(0.33)	(0.16)	(0.16)	(0.12)	(0.14)
log (Real GDP(t))	-0.06	0.08	-0.11	-0.08	-0.14	-0.07	-0.13	0.28	-0.24**	0.11	-0.09	0.06
	(0.11)	(0.07)	(0.10)	(0.09)	(0.09)	(0.09)	(0.10)	(0.19)	(0.11)	(0.09)	(0.06)	(0.06)
log (Fin Asset or Liab. (t-1))	0.06**	0.07***	0.05	0.04	0.12***	0.13***		0.02	0.14***	0.11***		
	(0.03)	(0.03)	(0.04)	(0.03)	(0.04)	(0.03)		(0.03)	(0.04)	(0.04)		
Observations	2,568	2,572	700	701	1,027	1,039	1,929	827	2,547	2,577	4,178	4,009
Number of Countries	143	143	32	32	56	56	79	55	142	143	176	176
Adjusted R-sq	0.96	0.93	0.99	0.99	0.96	0.91	0.93	0.89	0.96	0.91	0.95	0.92

*p<0.1; **p<0.05; ***p<0.01. Standard errors in parenthesis. Time and country fixed effects not reported. Insufficient asset data for LICs. Secondary income regressions exclude assets/liabilities.

Table 3 presents μ. Debits and credits increase after depreciation. The magnitudes are large compared to Colacelli et al. (2021) and Allen et al. (2023) and compared to absolute values of trade elasticities (panel D). However, while the negative sign for exports and positive sign for imports guarantees a negative semi-elasticity for the TB, η^{TB} , the negative signs for income debits offset the negative signs for income credits and the net effect, η^{IB}, will be country specific.

Panel B shows that EMs and LICs have higher elasticities than AEs. In panel C, primary income is more responsive in credits than in debits, which is consistent with a higher share of assets denominated in FC than liabilities denominated in FC. Significant estimates for secondary income suggest the ER does not exclusively affect income flows through NFA-related effects. This could be especially relevant for LICs because secondary income is an important component of the IB (Behar & Hassan, 2022).

Table 3: Income credits and debits exchange rate elasticity estimates.

Estimation Sample	μ^{Credit}	μ^{Debit}
A. All Countries	-0.63 (0.74)	-0.74*** (0.28)
B. By Country Income		
Advanced	0.04 (0.45)	-0.29 (0.83)
Emerging	-1.28*** (0.36)	-0.96*** (0.28)
Low-income	-0.28 (0.46)	-0.65** (0.29)
C. By Income Type		
Primary	-1.62*** (0.46)	-0.64*** (0.25)
Secondary	-0.82*** (0.33)	-0.69* (0.36)
D. Trade	μ^{Export}	μ^{Import}
Cubeddu et al (2019)	-0.11	+0.57
IMF EBA-Lite template	-0.44	+0.29
Standard errors in brackets estimated using the delta method. *p<0.1; **p<0.05; ***p<0.01.		

Using Panel B elasticities and country-specific S^{Flow} averaged over 2010-19, we calculate η^{IB} and η^{TB} as per equation (1). We update η^{TB} using μ^{Export} and μ^{Import} in Cubeddu et al (2019).

Figure and Table 4 present the cross-sectional distribution of η^{IB} and η^{TB}. The η^{IB} median is 0.0 but the distribution is broadly symmetric and its 10th and 90th percentiles are -0.095 and 0.062. Consistent with this fact, η^{IB} is statistically significant in only a minority of cases (results available on request). Such variation is primarily generated by our separate estimation of credits and debits combined with country-specific values for each. Countries with the largest positive balances will tend to have negative values for η^{IB} while those with the largest negative balances will tend to have positive values. LICs and a few EMs are in the former group while EMs and a few AEs are in the later (Behar & Hassan, 2022).

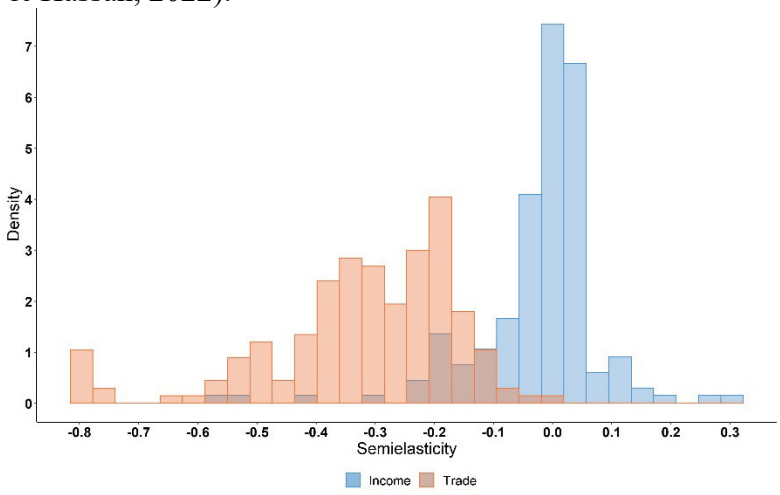

Figure 1: Trade elasticity and income elasticity

Table 4: Summary statistics, 2010 to 2019 average

Variable	Mean	Std. Dev.	Skewness	Excess Kurtosis	p10	p25	Median	p75	p90
η^{IB}	-0.002	0.078	-0.359	3.413	-0.095	-0.025	0.009	0.030	0.062
η^{TB}	-0.321	0.162	-1.223	1.447	-0.532	-0.385	-0.291	-0.205	-0.156
$\eta^{CA} = \eta^{TB} + \eta^{IB}$	-0.323	0.171	-1.006	0.829	-0.539	-0.418	-0.290	-0.196	-0.145
$1/\eta^{TB}$	-3.947	2.039	-1.467	2.733	-6.419	-4.881	-3.439	-2.600	-1.879
$1/\eta^{CA}$	-4.167	2.596	-1.936	4.660	-6.880	-5.092	-3.444	-2.394	-1.854
η^{TB}/η^{CA}	1.038	0.218	1.031	4.359	0.776	0.913	1.043	1.133	1.248

4. IMPLICATIONS

Our finding that η^{IB} is close to zero for most countries suggests that the IB channel is not an important one through which the ER influences the CAB. However, some large negative values suggest an overlooked channel through which an ER depreciation can reduce an excessive current account deficit. Some large positive values imply that the IB channel counters the ER's stabilizing role, especially if a negative IB is contributing to the current account deficit, and potentially increases crisis vulnerability.

Our estimates suggests that ER misalignments are not significantly biased in most countries when omitting the IB. However, countries with large IB deficits are prone to having underestimated exchange rate misalignments while those with large surpluses are likely to have overestimated misalignments. Moreover, the arithmetic of inverse semi-elasticities suggests that the bias can be non-negligible. To show this, following IMF external sector assessments (Phillips et al., 2013), the CAB misalignment as a share of GDP, $\frac{\widehat{CA}}{GDP}$, is converted to an exchange rate misalignment, $\widehat{ER}$ as follows.

$$\widehat{ER} = \frac{1}{\eta^{\mathrm{CA}}} \frac{\widehat{CA}}{GDP} \qquad (4)$$

$\eta^{\mathrm{CA}} \equiv \frac{d^{CA}/_{GDP}}{d^{R}/_{R}} = \eta^{TB} + \eta^{IB}$ so the practice of assuming $\frac{1}{\eta^{\mathrm{CA}}} = \frac{1}{\eta^{TB}}$ is not misleading when $\eta^{IB} = 0$.

Low semi-elasticities generate high inverses with potentially large biases. Table 4 reports $\frac{\eta^{TB}}{\eta^{TB}+\eta^{IB}}$, which is the multiplicative bias in ER gap estimates resulting from imposing $\eta^{IB} = 0$. A mean $\eta^{IB} \approx 0$ implies a mean $\eta^{TB}/\eta^{CA} \approx 1$ and there is no multiplicative bias on average. However, the multiplicative bias grows significantly as one leaves the center of the distribution. The value of 0.776 at p10 indicates a bias of -22 percent and a value of 1.248 at p90 a bias of 25 percent. This suggests important biases for 20 percent of countries. Biases are also non-negligible at the interquartile range. Figure 2 plots the distribution of the bias across countries.

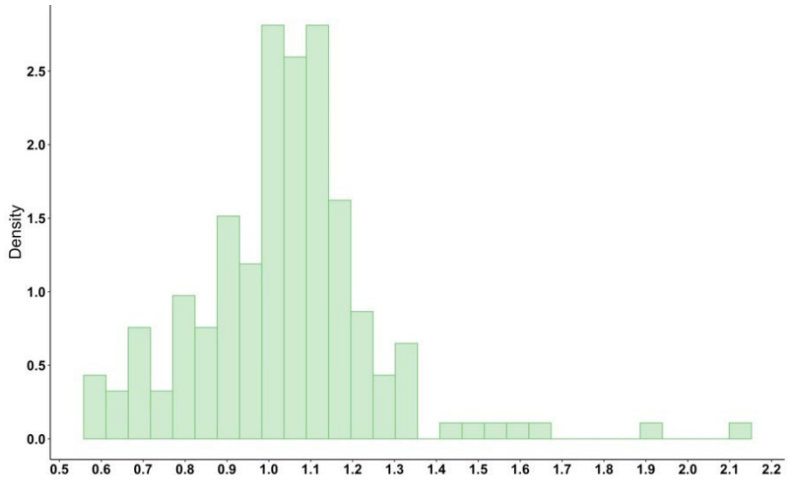

Figure 2: Multiplicative bias in exchange rate gap

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